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How to cite this thesis

A HUMAN-CENTERED DESIGN APPROACH TO FASHION DESIGN EDUCATION

by

RESHMA NESHANE HARVEY

A thesis

sumitted in fulfilment of the requirements for the degree

DOCTOR OF PHILOSOPHY

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at the

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SUPERVISOR: Prof P J Ankiewicz
CO-SUPERVISOR: Dr C F van As

OCTOBER 2018
DEDICATION

In memory of:
My dearest parents Mr and Mrs Paladh
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EXECUTIVE SUMMARY

Historically, design has taken place within a technology-driven design paradigm, in which the designer, based on inward-looking practice, knowledge and values, shapes material products for mass-market consumption. However, national and international design discourse is shifting towards a human-centered design paradigm that foregrounds the needs of users and positions the user as an active, collaborative participant in the design process.

Aligning with this shift, there is a need for general design education to transform from an inward-looking, lone-genius ethos to one that considers inclusive, collaborative design with users. However, when it comes to fashion design education, pedagogy continues to align predominantly with a technology-driven design paradigm that fosters an inward-looking, lone-genius ethos where students design for themselves or for imagined users.

This study challenges such conventional pedagogy in fashion design education, by proposing a human-centered design approach in which students are educated to become agents of change in transforming the existing design situation to a preferred one upon entering the professional world. However, fashion design education, particularly from a human-centered design approach, is an underdeveloped researched area, and it lacks academic rigor and scientific investigation. Nonetheless, such research is important given the national and international shifts in design praxis and education. The extent to which such an approach might add value to pedagogical activity within fashion design education in the South African higher education context has not been scientifically explored as yet.

As such, this study aimed to explore and establish underlying design principles for a human-centered design approach and its effects to fashion design education at an urban South African higher education institution. In this study, effects refer not to cause and effect relations, but to participant views and experiences regarding the design principles of human-centered design. This aim was guided by the overarching research question: what are the pedagogical strategies and underlying design principles of a human-centered design approach and its effects to fashion design education at a higher education level? This study employed design-based research, which was selected due to the need to establish theoretical design principles with which to design and implement human-centered teaching and learning interventions within fashion
design education. Embedded in design-based research, the study employed an interpretive paradigm and a qualitative research approach that utilised multiple methods of data collection from multiple sub-sets including a theoretical, professional and educational scope.

Through a series of teaching and learning interventions, this study contributes to scholarship on fashion design education. It proposes nine human-centered design, 16 fashion design praxis, and 16 design education pedagogy design principles that, in combination, constitute the elements of a philosophy underlying fashion design education in higher education from a human-centered design perspective. The contribution of this study is ground-breaking, research-led teaching as there does not appear to be similar doctoral study undertaken in fashion design education in higher education either in South Africa or internationally. Moreover, research-led teaching embedded in a human-centered design approach to fashion design education in a higher education context has never been scientifically explored through iteration cycles. From a pragmatic perspective, the study contributes a refined teaching and learning intervention for adaption and evaluation in future research which, it is hoped, may improve fashion design educational practice.
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<td>Activity tasks</td>
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<tr>
<td>BA</td>
<td>Bachelor of Arts</td>
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<td>CAQDAS</td>
<td>Computer-Aided Qualitative Data Analysis software</td>
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<td>DBR</td>
<td>Design-based research</td>
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<td>DEP</td>
<td>Design education pedagogy</td>
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<td>FD</td>
<td>Fashion design (only used in the educational context)</td>
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<td>HCD</td>
<td>Human-centered design</td>
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<tr>
<td>HE</td>
<td>Higher education</td>
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<td>HEI</td>
<td>Higher education institution</td>
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<td>Icograda</td>
<td>International Council of Graphic Design Associations</td>
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<tr>
<td>ISO</td>
<td>International Organization of Standards</td>
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<tr>
<td>MEHD</td>
<td>Multiple external hard drive</td>
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<tr>
<td>PB</td>
<td>Project-based</td>
</tr>
<tr>
<td>PPC</td>
<td>Password protect code</td>
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<td>SA</td>
<td>South African</td>
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<td>Studio-based</td>
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<td>TDD</td>
<td>Technology-driven design</td>
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CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1. INTRODUCTION

Leading design theorist, Herbert Simon (1982:129) put forward the statement that design is a planned “course of action aimed at changing existing situations into preferred ones”. Of the same view, Fuad-Luke (2009:5) posits that design is a deliberate act of “moving from an existing situation to a preferred”. However, these statements raise several questions with respect to what design is, what is the existing design situation, what are the preferred conditions, and what course of action is needed to change the position? These same questions extend to design education because this is the platform where students learn to become professional designers.

This chapter seeks to respond to the aforementioned questions by first deliberating on the broader scope of design and then narrowing this down to the specific discipline of fashion design. In the same light, discussions also commence with design education and then filter down to fashion design (FD) education, specifically. The discipline of fashion design, and the education thereof, is the focus of this study because this aligns with my professional interest, as I am a FD educator at a South African (SA) higher education institution (HEI).

This chapter begins with discussion of the theoretical debates on design as both noun and verb and the multi-dimensional meaning of design. In the same light, the discussion seeks to contextualise fashion as both noun and verb and argues for the need to include design process, practice and product into the discourse of fashion studies. Subsequently, I scope out the theoretical framework that acts as a point of departure for this inquiry and then offer my position regarding a working paradigm and definition for fashion design. I then deliberate on the existing design situation and the paradigm shifts occurring within the general design landscape, drawing linkages with the challenges facing professional fashion design.

---

1 When contextualising fashion design in an educational framework, the abbreviation FD is used to represent fashion design. However, the abbreviation is not used when discussions are focused on professional fashion design praxis.
Thereafter, the discussion moves to consideration of existing conditions regarding design education and the need to change the educational context. This filters down to consideration of FD education, specifically, and research on teaching and learning strategies. Within these pedagogical strategies, and the shifts in design and design education, the research problem within a SA HE framework is outlined, leading to the formulation of the overarching aim of the present inquiry. In alignment with this aim, I then construct research questions and objectives in order to steer the inquiry. Thereafter, I scope out my assumptions and personal rationale for undertaking this inquiry and map out the conceptual framework for the study. This lends way to a synopsis of the research design and methods deployed in the study. The chapter concludes with an outline of the study and reflections on how the goals of this chapter were addressed.

1.2 DEFINING DESIGN

In this section, I conceptualise design in order to develop an understanding of its constructs and formulate a working premise for design. This section begins by debating the word design as both noun and verb and then extends this discussion in order to investigate how the notion of design is viewed. Based on these discussions, the section ends with presentation of my working premise for design.

1.2.1 Design as noun and verb

Design is a multi-dimensional, mystifying and complex phenomenon with no explicit definition. As a result, designers and design researchers have interpreted the meaning of design from different positions. Krippendorf (2006:xv) advocates that the word design “means to mark out, set apart, give significance by assigning it to a use, a user or an owner”. Despite this, philosopher Vilém Flusser (2012:17) claims that design is a noun and verb and that, etymologically, it means to “de-sign”. Giacomin (2014:607) concurs, also noting that design is a noun and a verb.

As a noun, Flusser (2012:17) argues that design implies an “intention, plan, intent, aim, scheme, plot, motif [and] basic structure”. Additionally, scholars generally agree that design as a noun involves plans and intentions or purpose (Giacomin, 2014; Houkes, Vermaas, Dorst & De Vries, 2002); however, Houkes et al. (2002:304) also include practical reasoning in this
regard. Nonetheless, these scholars concur that intentions are associated with design, when considered as a noun (Flusser, 2012; Giacomin, 2014). Despite this, Muratovski\(^2\) (2016:xxi) challenges this by asserting that when the word entered the English language in the 1930s, it emerged as a verb that referred to a process involving intentions and actions.

As can be seen, the word itself introduces opposing perspectives. However, whether it is considered as a noun or verb is not the only contestation in the literature as contrasting views are also evident with regard to what constitutes design as a verb. Flusser (2012:17) maintains that, as a verb, design means to draft and sketch, but Giacomin (2014:607) rejects this by remarking that sketching and drawing are actually nouns and not verb forms. In my view, sketching and drawing are activity orientated and as such, parallel with Friedman’s (2003:508; 511) claim that design refers to a process involving both thought and action. It is this combination of design, thought and action that leads to the generation of tangible material products. This is perhaps the reason why Giacomin (2014:607) asserts that design, in its verb form, suggests descriptions that represent an artefact, its intended function, or purpose. However, Giacomin (2014:607) views purpose as having both noun and verb meanings. The theoretical discussion presented here suggests that design can be viewed as both a noun and verb, and that these multi-dimensional perspectives shed light on how different scholars view the scope of design.

1.2.2 Scoping design

Design is commonly associated with problem-solving. Simon (1982:129) views design as a method of problem-solving with the aim of changing from an existing to a preferred situation. Dorst (2006:14-15) corroborates this view that design is a form of problem-solving but also views design as a mix of creative and analytic reasoning. Similarly, scholars also concur that design is a co-evolution between problem and solution (Cross, 2008; Lawson, 2010). In this study, I align myself with these scholars, view design as the co-evolution of problem and solution and take as given that design begins with a problem.

\(^2\) Muratovski has multidisciplinary training and experience in design fields such as Graphic Design, Visual Communication, Industrial design, Architecture, Interior, and Furniture Design. Additionally, the scholar has vast academic experience in design education.
Adding to the debate on design as problem-solving, scholars generally agree that design is a human activity and a way of thinking and acting that manifests in the materialisation of tangible products (Lawson & Dorst, 2009; Nelson & Stolterman, 2012). Fuad-Luke (2009:1; 5) links this way of thinking and acting to design activism by claiming that when these constructs connect, the mind-set they ultimately evoke channels the manner in which one thinks about design and the actions one takes. Hence, the manner in which one thinks about design cannot be disconnected from human activity. Blessing and Chakrabarti (2009:1) confirm that although many definitions of design exist, it is fundamentally about activities aimed at bringing forth a product derived from a specific need. This means that design involves “people, a developing product, a process involving multiple activities and procedures” (Blessing & Chakrabarti, 2009:2). Corroborating this, Muratovski (2016:xxi) also considers design as a process involving a strategic set of goals, choices and planning actions carried out by human beings in order to attain objectives.

In light of the aforementioned theoretical considerations, there is a definite multi-dimensionality in the literature with respect to the meaning and definition of design. On the one hand, design has both noun and verb meanings but with no clear definition. Then again, design is envisioned as the co-evolution of problem and solution, a process involving multiple activities and a product that involves people. However, the design mind-set regarding how one thinks about design cannot disengage itself from problem and solution, the process and human activities of designing nor from the product that emerges from such thought and action. Taking into consideration the multiple perspectives regarding the exact meaning of design, in the following sub-section, I offer my position on these debates and formulate a working definition of design.

1.2.3 Working premise of design

Considering various theoretical perspectives, my working premise is that design refers to the co-evolution of a problem and solution. Design is a deliberate way of thinking and acting that is directed by specific inner-self intentions (volition) that then manifests in the manner in which human beings execute actions and activities in a design process. From these activities, a sketch, plan or specifications emerge that translate into a tangible product that addresses a specific purpose and need. I include thinking and acting in my working definition of design in order to draw attention to the potential to transform existing design approaches by considering
alternative mind-sets and ways of practicing so that the existing situation can shift to a preferred one. With this in mind, I shift the discussion specifically to fashion design.

1.3 CONTEXTUALISING FASHION AND FASHION DESIGN

As in the case of design, the etymology of fashion is also both a noun and verb. In this section, I discuss fashion in both its noun and verb forms in order to take a position and formulate a working premise on fashion design. In light of this, the section begins with discussion of fashion as a noun before considering its verb meaning.

1.3.1 Fashion as noun

As a noun, fashion studies have been researched, explored and theorised by historians, sociologists, anthropologists and social psychologists (Barnard, 2007; Kaiser, 2012; Kawamura, 2005; Smal & Lavelle, 2011; Svendsen, 2012). Writers on fashion appear to have borrowed their theories from the fields of humanities and social sciences (Barnard, 2007; Paulins & Hillery, 2009). As a result, philosophical discussions have been framed in terms of diverse approaches to fashion such as trickle-down theories, adornment, style, taste and dress, society, class divisions, culture, body and identity (Barnard, 2007; Frisby & Featherstone, 2000; Svendsen, 2012; Wolfendale & Kennett, 2011).

Fashion, as a noun, includes some literature on the philosophy of fashion (Wolfendale & Kennett, 2011; Svendsen, 2012). However, La Caze (2011:200) points out that fashion literature, as debated by philosophers, has been criticised for various reasons such as the tensions between fashion and creativity, change, the body, and the artificiality and superficiality associated with fashion. Svendsen (2012:17) states that philosophers have ignored fashion as a legitimate area of study because it is considered trivial with little value for academic investigation. Hopkins (2012:10) admits that due to its nature, fashion does appear trivial. This is perhaps because design, including fashion, as a professional grouping is seen as a craft (Friedman, 2003; Tovey, 2015) usually associated with the making of products. Although there is a body of literature discussing the philosophy of fashion (Kawamura, 2005; La Caze, 2011; Svendsen, 2012; Wolfendale & Kennett, 2011), there is a distinct difference between fashion and fashion design.
In an earlier publication, Kawamura (2005:1; 26; 45) confirms that fashion is a system that brings about the concept and practice of fashion. Subsequently, Loschek (2009:21-28) corroborates the view that fashion is a social system; while Aage and Belussi (2008:476) put forward the argument that fashion is a cultural item that has symbolic value. Welters and Lillethun (2011:xix) define fashion as shifting dress styles and appearance espoused by a group of people. Several scholars concur that fashion only becomes fashion when it is accepted by a large majority of consumers (Aage & Belussi, 2008; Kawamura, 2005; Loschek, 2009; Welters & Lillethun, 2011). These arguments suggest that there is a definite multi-dimensionality in the literature with respect to the specific intent and focus of fashion.

Although a body of literature discussing the philosophy of fashion and research in fashion studies exists, as early as 2003, Breward (2003:15) argued that a disadvantage of fashion studies is the predisposition towards engaging with fashion as a noun and as unit of analysis by studying them in terms of culture or broader historical and social processes. This implies that fashion can take on a verb meaning within design.

1.3.2 Fashion design as verb

Breward (2003:15) argues for the reinsertion of the nature and process of design into the discourse of fashion studies, thus providing opportunities to merge fashion with design. Smal and Lavelle (Lavelle, 2013; Smal & Lavelle, 2011) corroborate the need for academic discourse and research into fashion design as practice, product and process. The implication of this is that fashion design should take on the same understanding and scope of design as explained in subsections 1.2.1 and 1.2.2 respectively.

Ellinwood (2011:1) approaches fashion, as a verb, from a design angle and argues that fashion design is a material-visual solution incorporating materials and functions to generate a product through different stages of activity in a design process. Later, Roubelat, Brassett, McAllum, Hoffmann and Kera (2015:27) advocate that fashion design is the “process through which fashions are designed”. These theoretical views imply that fashion design is a process and product hence sharing commonalities with scholars who argue that design is about products or objects as well as processes or activities (Blessing & Chakrabarti, 2009; Lawson & Dorst, 2009; Nelson & Stolterman, 2012; Muratovski, 2016).
However, fashion design as a practice, process and product remains an underdeveloped research area. Lavelle (2013:1-3) claims that very little theory exists with respect to fashion design as practice but there is an interest in incorporating the process of design and the importance of design theory within fashion discourse. A growing number of publications about fashion design process is evident (Aspelund, 2010; Au, Taylor & Newton, 2003; 2004; Ellinwood, 2011; Laamanen & Seitamaa-Hakkarainen, 2014; Lamb & Kallal, 1992; Lee & Jorousek, 2015; Min, DeLong & LaBat, 2015). While the common element within these studies of fashion design process is that they characterise this process as involving analysis-synthesis-evaluation, they differ regarding the triggers, stimulus, and initial stages of the design process.

On the one hand, designers’ subjective personal feelings, imagination, and intuition are seen to act as the trigger or stimulus that drives design and, as such, inspiration is the first stage in the design process (Aspelund, 2010; Laamanen & Seitamaa-Hakkarainen, 2014; Lee & Jorousek, 2015). In this scenario, fashion design is viewed from the perspective of the designer’s expert mind-set. On the other hand, in some design processes, design problems serve as the trigger, with problem identification positioned as the first stage (Ellinwood, 2011; Min et al., 2015). When fashion design process begins with a problem, it aligns with the philosophy of design in engineering and architecture, where design is seen as the co-evolution of problem and solution (Cross, 2008; Cross, 2011; Lawson, 2010). Chapter 4 outlines some of the design process models applied in fashion design.

Research on the design process is traditionally based in the architecture and engineering design fields. This is why Lee and Jorousek (2015:151) argue that when it comes to fashion design such research is limited, which ultimately impedes the discipline because of the conventional focus on, for example, the cultural effects of design, historical garment influences, fashion trends, and the social meanings of clothing, rather than on the design process. Based on this, although publications on fashion design process are evident, these are often presented predominantly in terms of designers’ subjective personal feelings, imagination, and intuition that trigger and drive design. As such, they might lack sufficient research and deeper theoretical discourse in terms of grounding the study of design processes within well-formulated theoretical frameworks.
1.4 THEORETICAL FRAMEWORK

As has been discussed, fashion design is a process that lacks well-founded theoretical frameworks. Griffiths (2000:72) postulates that, although bodies of work on fashion design exist, “they carry little or no academic gravitas” because they lack a general theoretical foundation for discussion. Various scholars confirm that there is limited theory utilising fashion design as practice and argue the need for a “solid design theory in fashion design” that includes design processes to broaden the scope of the discipline (Au et al., 2003:5; Lavelle, 2013). Without a well-founded theory of fashion design with which to ground it, this study initially draws on philosophy of design as an overarching theoretical framework.

As such, the theoretical framework initially draws on design researcher, Terence Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design as a point of departure. Love examines the multi-dimensional perspectives on design theory and develops a taxonomy for design. Love (2000:293-305) critically analyses the problems associated with the disarray, coalescence and multiplicity in design theory and suggests a meta-theoretical taxonomy. This is the theoretical rationale for selecting this particular taxonomy.

Love (2000:305-306) organises this meta-theoretical taxonomy into four core levels of abstraction, namely 1) direct perceptions of reality, 2) objects, 3) design process and 4) philosophical matters. He explains that the object level is further sub-divided according to description and behaviour of the elements. Likewise, design process is sub-divided into four tiers of description, namely 1) mechanisms of choice, 2) design methods, 3) design process structure, and 4) theories about the internal processes of designers and collaboration. Finally, philosophical matters relate to 1) general design theories, 2) epistemology, and 3) ontology. Chapter 3 deliberates on each of these core and sub-levels in detail.

Drawing from this taxonomy, design process entails sub-division of design methods and design process structure; however, positioning this within the context of this study is necessary. As such, in the section that follows, I position design processes with a particular design method paradigm and take a particular stance with respect to fashion design.

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3 I acknowledge Love (2000) and use the word object as reflected in his meta-theoretical taxonomy. Similarly, I use the word product and object interchangeably to reflect scholarship.
1.5 WORKING PARADIGM AND DEFINITION FOR FASHION DESIGN

1.5.1 Working design method paradigm

The study of design process is an area of inquiry known as design methodology or design studies and draws from the field of engineering. Cross (1984:vii), in a seminal work on design methods, confirms that design process involves studying the principles, practices and procedures of design in relation to how designing is and could be carried out. Beyond that, Cross (1984:vii) links the design process with the manner in which designers work and think, and the development and application of suitable structures, new design methods and procedures within design processes. Dorst (1997), in a doctoral study, affirms that the study of design process or design methodology may be viewed from the lens of a positivist rational problem-solving paradigm, which is planned and structured, or from the less-structured constructivist reflective practice paradigm. From the stance of positivist rational problem-solving, Dorst (1997) asserts that the goal is objective interpretation with prescriptive design methods while the subjective, less-structured approach is core to constructivist reflective practice. Dorst further argues for a dual-mode model of design methodology combining both the positivist and constructivist paradigms in the different design process phases. Later, Lawson and Dorst (2009:56) confirmed the appropriateness of a dual-mode model design methodology by arguing that designers must make both subjective and objective evaluations when making judgements. It is clear from these arguments that a dual-mode model is an appropriate paradigm as the lens to guide this study but a working definition of fashion design is also necessary.

1.5.2 Working definition of fashion design

Drawing from the discussion presented in section 1.3, this study considers fashion as a verb focussing on design as practice and process. In this study, I see fashion design as a process that aligns with the dual-mode model of design methodology as proposed by Dorst (1997) because, on the one hand, it is about solving a problem in a positivist way but, on the other, the design process is less-structured and falls within a constructivist reflective practice paradigm. In addition, I specifically adopt the word praxis for this study by aligning myself with Crouch and Pearce (2012:40; 44) who argue that practice is about the acquired application of skill but praxis, in contrast, is about an understanding of theory, agency, thinking and doing action that, when combined, culminate in a tangible outcome. As such, when the word ‘fashion design
praxis is used in this study, it is seen holistically to comprise of constructs pertaining to the way one thinks about and approaches fashion design, the underlying volition, the conceptual knowledge and the actions undertaken in the design process that culminate in a product. When using the word ‘practice’ in this study, I refer to the know-how application of fashion design praxis. Employing the term ‘fashion design praxis’ aligns with my working definition of design as a deliberate way of thinking and acting that manifests itself in the manner in which human beings engage with design process activities where a sketch, plan or specifications emerge that translate into a tangible product in order to address a specific purpose and need. In this way, referring to praxis rather than practice also offers the potential to incorporate new theories and new ways of engaging with design activities in order to transform a current situation into a preferred one. Such existing and preferred forms of praxis are evident in the paradigm shifts occurring in the design landscape.

1.6 DESIGN PARADIGM SHIFTS

In this section, I briefly discuss perspectives concerning the paradigm shifts and changing landscape of general design in order to explore how and why such movements and alternative ways of thinking and approaching design are necessary. I commence the discussion by explicating the shift from technology-driven design (TDD) to human-centered design (HCD).

Giacomin (2014:607-608) argues that general design today is characterised by and practiced under three distinct paradigms, or values, namely TDD, HCD and environmentally-sustainable design. Historically, as a result of the first industrial revolution, design was generally practiced within a TDD paradigm, also known as the market-driven school of thought, whereby the designer, based on their expert knowledge and values, shaped material products in large quantities for mass production and consumption by consumers (Krippendorff, 2006; Sanders & Stappers, 2012; 2014). In opposition to the TDD paradigm, a HCD approach addresses the needs of the user and the user becomes an active, collaborative participant in the design process hence suggesting a move away from the designer, including fashion designers, as the mythos or sole genius in the design process (Fletcher, 2008; Fletcher & Grose, 2012; Krippendorf, 2006; Nelson & Stolterman, 2012). From these discussions, it is evident that, within a TDD

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4 I note that single quotation marks are used in this study to place emphasis on a construct.
5 Also known as user-centered design as discussed in sub-section 3.5.1
paradigm, people are viewed as consumers, whereas, in HCD, people are referred to as users. For this reason, in this study, I use ‘consumers or customers’ when discussing TDD, but I refer to people as ‘users’ when discussing the HCD perspective. Discussion framing such distinctions in the mind-set and approach to design praxis within TDD and HCD further unfolds in Chapter 3.

Although the TDD movement may have dominated the design scene, scholars argue that it is shifting and, for this reason, design in general should move away from a TDD paradigm to one of HCD and sustainable praxis (Fry, 2009; Krippendorff, 2006; Sanders & Stappers, 2012; 2014). Theoretical perspectives suggest that this approach is becoming prominent in design discourse and research (Fletcher, 2008; Fletcher & Grose, 2012; Krippendorf, 2006; Nelson & Stolterman, 2012).

At the 2014 South African-based Design Indaba Conference, a Danish design team argued for the notion of ‘design for the other 90%’ where design solutions, ranging from fashion to product design, address the needs of users (Design Indaba, 2014). The notion of ‘the other 90%’ implies that at least 90% of the world’s population may not be served by professional design practitioners. Moreover, the Cumulus Johannesburg Conference, jointly hosted by Greenside Design School and the Faculty of Art, Design and Architecture at the University of Johannesburg in September 2014, was also themed ‘Design with the other 90%: Changing the world by design’ and was underpinned by a HCD approach (Cumulus Johannesburg, 2014). Design with the other 90% suggests that users are active, engaged participants in design processes.

Although the design situation is shifting, with HCD gaining increased momentum in design discourse and research, Endsley and Jones (2012:6-7) and Norman (2013:18) confirm that praxis remains grounded in a TDD paradigm but these scholars also stress the need for HCD approaches to counteract the situation. When it comes to professional fashion design, praxis remains grounded in the TDD paradigm.
1.7 FRAMING PROFESSIONAL FASHION DESIGN PRAXIS

1.7.1 Positioned within a technology-driven design (TDD) paradigm

Although international and national shifts towards HCD might be occurring, this might not be so prominent in the case of professional fashion design praxis. Sanders and Stappers (2014:30) point out that fashion design still functions within the traditional mind-set of designing for people. Several scholars of fashion design concur that the TDD paradigm continues to dominate fashion design praxis and that this creates a culture of overabundance and conspicuous consumption, materialism, marketing and commercialisation. As such, fashion has become known as fast fashion (Fletcher, 2015; Joy, Sherry Jr, Venkatesh, Wang & Chan, 2012; Pookulangara & Shephard, 2013; Welters, 2015). I concur with the argument that fashion design continues to be dominated by the TDD paradigm, and that these dominant approaches and ways of thinking have culminated in fast fashion. Scholars generally note that fast fashion is driven by factors such as 1) frequency and ever-changing fashion trends, 2) cheap design with low-cost materials and labour, 3) speed in the supply chain and quick turn-around time in production and distribution, 4) short product life spans, and 5) high levels of impulse buying (Fletcher, 2008; Fletcher, 2010; Keiser & Garner, 2012; Welters, 2015). However, there is an increasingly evident rejection of fast fashion and increasing calls for change in fashion design praxis.

1.7.2 Motivation to change fashion design praxis

Several scholars reject fast fashion and traditional TDD praxis and argue, instead, for user-centered design⁶ (UCD), co-design⁷ and environmentally sustainable approaches (Clark, 2008; Fletcher, 2008; Fletcher & Grose, 2012; Fletcher & Tham, 2015; Hethorn, 2015; Peterson, 2015; Walker & Giard, 2013). Fletcher (2008:192-193) argues that even though fashion designers may play a fundamental role in design processes, design no longer remains the work of the specialist fashion designer and the user is no longer a passive audience but has a voice and acts as a co-creator and partner which aligns with HCD.

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⁶ UCD is also known as HCD as seen in sub-section 3.5.1.
⁷ As outlined in sub-section 3.5.3, co-design, also referred to as participatory design, is an approach to HCD (Sanders & Stappers, 2008; Steen, 2011).
Despite this, Bye (2010:27-45) argues that user participation in design processes remains almost non-existent. Bye (2010:27-45) maintains that fashion designers research fashion trends, search for inspiration and develop design line concepts to ultimately produce clothing products\(^8\). Moreover, Harvey (2013:113-144) finds that young, incubator-resident fashion designers, located within the Johannesburg Fashion District in SA, are not economically viable because they design clothing products for personal gratification and give little or no consideration to user needs. This suggests that local users may not have been active, collaborative participants within the design process of fashion designers, as dominant global discourses of HCD suggest.

That users may not have an active voice or choice in design processes poses a problem in the real-world of fashion design because conventional, mainstream, industry-based fashion design praxis focuses on retail consumers and contemporary social ideals of beauty and attractiveness but tends to ignore the voice of users (Carrol, 2015:151-152). It could be argued that fashion designers do actually design for consumers, but Fletcher and Grose (2012:132-133; 144) make clear that design with users involves active, engaged and collaborative participation in design activities on the part of designers and users whereas design for consumers only involves addressing specific user needs. Hence, there is a duality between ‘design for’ and ‘design with’ and ‘users’ versus ‘consumers’ (further discussed in sub-section 3.4).

The arguments put forward indicate that a HCD approach seems underutilised in professional fashion design praxis but that this situation ought to change in order to make the discipline more relevant and align to current discourses. One way of counteracting this situation is through education because this is the platform where students learn to become future professional fashion designers. If opportunities are created for FD students to be educated and trained within a HCD approach then, when they become professional designers, they may well align themselves with changing praxis. After all, it is at the level of education that students acquire the values and ideologies that inform their future practice as designers. As such, FD education is the underlying focus of this inquiry. Of course, educational values and ideologies are transforming across design education, in general.

\(^8\) Clothing products may or may not necessarily be wearable. For example, an avant-garde clothing product may not necessarily be a wearable product.
1.8 SHIFTS IN DESIGN EDUCATION

Design education, in general, has witnessed a number of movements including its formalisation as an academic discipline because of the first industrial revolution (Lyon, 2011:8). This section briefly explains three fundamental shifts that have occurred in general design education, but these are unpacked in detail in Chapter 4. In the sub-section that follows, I briefly discuss the first and second movements in general design education.

1.8.1 Contextualising the first and second movements of design education

Scholars generally agree that design education originally emerged as a semi-formal tradition directed towards craft training and the making of products (Lawson & Dorst, 2009; Lyon, 2011). The first movement in design education was known as the atelier system (currently known as the design studio), which emerged at the French-based, Ecole des Beaux Arts School and grounded itself in professional design practice where students were taught about the design process through supervised practice and learning-by-doing (Oxman, 2001:271-72).

The second shift occurred in the 20th century and emerged in the pedagogy of the Bauhaus9 and the Russian State Higher Art and Technical Studios respectively (Oxman, 2001:272). The Bauhaus model was instrumental in revolutionising the scope of design education across the globe with its grounding in a modernist philosophical paradigm merging art, craft, design and industry with the goal and mission to “integrate artistic and practical pedagogy, aesthetics and applied skills” (Lawson & Dorst, 2009; Wax, 2010:31). Although the modernist Bauhaus model was exceedingly influential, its relevance and appropriateness to current and preferred design praxis has been questioned as argued in the following sub-section.

1.8.2 Motivation to transform design education

Lawson and Dorst (2009:222) argue that the Bauhaus grounding principles in stylistic modernism remain dominant in general design education. Arguments put forward by Lawson and Dorst (2009:223-4) and the International Council of Graphic Design Associations10

9 The Staatliches Bauhaus School of Art, Design and Architecture, commonly known as the Bauhaus School, was established in 1919 in Weimar and ran until 1933 (Lawson & Dorst, 2009; Lyon, 2011).

10 Icograda is a partner of the International Design Alliance.
(Icograda) (Icograda, 2011:8-9) suggest that design education should be transformed so as to consider, amongst others, issues of social sustainability and inclusive design through empowerment of and collaboration with users. This constitutes a third movement in design education.

Despite these debates, scholars argue that design education continues to maintain conventional frameworks due to their emphasis on encouraging students to engage in self-expression, develop personal style, and rely on intuition, creativity and imagination in order to produce design ideas that may not necessarily materialise in reality (Lyon, 2011; Muratovski, 2016). These values are what Muratovski (2016:xxx) refers to as an “inward-looking practice” because they ultimately manifest in personal self-expression and design for oneself rather than for people but Muratovski also argues for an “externally-driven process” which places people and their needs at the core of design.

I align myself with Muratovski and use the term ‘inward-looking practice’ to refer to the values associated with self-expression, development of personal style, and reliance on intuition, creativity, and imagination. I am inclined to agree that design education, in general, tends to preserve the outdated mainstream educational models of the first and second movements. This favours an inward-looking educational ideology of modernism that encourages and supports the development of lone-genius designers, which further aligns with the TDD paradigm. As such, general design education should shift its scope and align itself with transformative design paradigms. However, Muratovski (2016:xxx-xxxi) cautions that such change in design education is largely dependent on the educational provider’s school of thought and pedagogy, but that inward-looking practice no longer suffices for future designers to become agents of change. Despite this, when it comes to FD education, the section that follows shows that the education of students remains grounded in inward-looking practice and outdated educational models.
1.9 FRAMING FASHION DESIGN (FD) EDUCATION

1.9.1 Characterising design education

FD education\(^{11}\) is aimed towards the professional fashion industry with teaching and learning related to the design process embedded in professional practice. FD forms part of the design arena and is commonly positioned within the broad area of design education. As such, the current scope of FD education in the HE sector is typically characterised by the dimensions of design education.

Like design education, FD education has its traditional roots in craft skills that harness aspects such as drawing, modelling, simulation, perception, imagination, manipulation and visualisation (Tovey, 2015:41). From this craft orientation, many leading American FD schools aligned themselves with the Bauhaus vision and offered structured programmes involving professional practicum, vocation and trade predilections (Skjold, 2008; Wolff & Rhee, 2009; Wax, 2010; Faerm, 2012). FD education may well continue to position itself and its scope in the outdated philosophies of the Bauhaus, modernist educational model in which making products, stylising and harnessing creative and aesthetic skills remain core. If so, FD education will continue to ground itself in procedural knowledge rather than conceptual knowledge. However, a lack of conceptual knowledge is not unique to FD education but to design education in general, given that greater emphasis is given to skills development rather than theory (Tovey, 2015:3).

1.9.2 Knowledge in fashion design (FD) education

Scholars generally agree that conceptual knowledge is about understanding the principles, concepts and definitions about a domain (McCormick, 2006; Rittle-Johnson, 2006; Star & Stylianides, 2013). Gilbert Ryle (1949:28-29), a pioneering philosopher on knowing-that and knowing-how, put forward the claim that a person has to first know the rules, concepts and criteria (knowing-that) before applying it to knowing-how to perform a task. As such, conceptual knowledge is knowing-that but knowing-how is what scholars call procedural

\(^{11}\) Drawing from literature, FD education also goes by the name of apparel or clothing and textile education (Rhee, 2008; Karopva, Jacobs, Lee & Andrew, 2011) possibly due to the programme categorisation and name descriptors of respective regions and institutions.
knowledge, which is associated with skills acquisition or the “know how to do it knowledge” (De Vries, 2005; McCormick, 2006:34). Chapter 4 advances discussion on these two knowledge types.

Nevertheless, both the conceptual and procedural knowledge domains ultimately link FD education curriculum content with subject\textsuperscript{12} specialisations. FD subjects typically entail, for example, textile\textsuperscript{13} science, fashion business, “pattern making, garment construction, designing fashion collections and understanding various markets” (Faerm, 2012:212; Rhee, 2008). Traditional manual and computer-aided pattern\textsuperscript{14} making, grading, fit and proportions, textile properties and industrial manufacturing processes all form part of what Ashdown (2013:114) refers to as technical design. Rhee (2008:194), in contrast, associates clothing construction with technological manufacturing processes.

While I acknowledge that technical design and clothing construction might be valuable, in my view, the terminology may depend on the educational provider and name preference. Within the context of this study, I refer to pattern making, grading, fit, proportions, and industrial manufacturing processes as the technical aspects of design and position them under the umbrella of technology-related activities. Technology and design activities require conceptual and procedural knowledge that emerges from two different but interrelated processes. This is because, as Cross (2008; 2011) and Aspelund (2010) claim, technological processes are concerned with the technical operations and industrial aspects of manufacturing.

Within the context of this study, the prototype stage combines design and technological processes because a prototype is both a design activity and a technology-related action. A prototype is made by converting a design sketch or plan of an abstract solution first into a full, human-size flat pattern or through draping fabrics on a mannequin and then translating them into a sewn sample. These two processes require the application of pattern-making and manufacturing principles and know-how that are different to drawing, sketching or painting typically required within design activities. However, design activities and solutions cannot be finalised until a prototype is made, hence, in my view, the prototype is both a design and

\textsuperscript{12} In a SA HE context, a subject is commonly known as a module.

\textsuperscript{13} In this study, I use the word textile when referring to scientific construction and properties or in the discipline of textile design. Other than in this context, I use the word fabric.

\textsuperscript{14} Pattern development, sometimes referred to as pattern technology, pattern making or pattern engineering, is a method that translates shapes, lines and design detail represented in design sketches into full body proportioned shapes.
technology-related activity. Nevertheless, taking into consideration the vocational scope of FD education, knowledge applied in both design and technological processes is predominately grounded in procedural knowledge or the know-how of, for example, drawing, sketching, painting and making.

Like its international counterparts, in the SA HE framework, FD education is largely vocational (Smal & Lavelle, 2011; De Wet, 2017). Due to its conventional nature and vocational scope, the HE curriculum for FD education in SA focuses principally on job-related practical skills training and, as such, is directed towards procedural knowledge (Smal & Lavelle, 2013:197). Similar to its international counterparts, local FD education has its roots in craft education and remains grounded in the first and second design education movements.

Nonetheless, fashion curricula both internationally and locally do include limited conceptual or knowing-that knowledge. From an international perspective, Rhee (2008:194; 198) remarks that conceptual knowledge is about the scientific formulation of textiles while Griffiths (2000:69) points out that FD education underpins theory in historical and linear chronologies of dress styles or what he refers to as “hemline theories”. More recently, FD education reserves its conceptual knowledge for consideration of the history of dress styles as well as trend forecasting (Shin & Cassidy, 2015:173-176).

From a local perspective, the HE curriculum for FD education offers limited conceptual knowledge in the form of industry-related theory and Western historical chronologies of dress styles (Smal & Lavelle, 2011:197). Although not documented, in my experience as a fashion educator, I am inclined to say that FD students also acquire conceptual knowledge about design elements and principles. This corresponds with Muratovski’s (2016:xxx) claim that design education curricula generally include concepts associated with design-related principles such as line, direction, proportion, texture, movement, colour, space, balance and harmony. Such conceptual knowledge is then applied to and combined with procedural knowledge to culminate in fashion design praxis-related activities.

1.10 PEDAGOGICAL STRATEGIES IN FASHION DESIGN (FD) EDUCATION

In FD education, teaching and learning related to the design process is embedded in the traditions of studio-based (SB) pedagogy. The educational studio is a replica of the professional
design milieu and the content of design processes is imparted through practice (Oxman, 2001:271). Saghafi, Franz and Crowther (2010:2) postulate that the SB style is associated with a project-based (PB) approach that fosters learning. Advancing on this idea, Brandt, Cennamo, Douglas, Vernon, McGrath and Reimer (2013:332) maintain that this pedagogy includes activities and interactions while design knowledge and the construction thereof guide studio activities. Chapter 4 unpacks SB pedagogy in detail.

To carry out design activity, procedural knowledge is required but the conceptual knowledge underpinning design projects generally encompasses fashion trends or themes, season and target market categories. Shin and Cassidy (2015:174) confirm that it is commonly accepted in FD education that students research fashion trends in terms of, for example, social, cultural, economic, political and lifestyle factors as well as consumer attitudes and fashion forecasting, and categorise these into themes of colour, fabric and design style. As such, student design project briefs include, for example, a theme or fashion trend, a season such as spring/summer and a target market category such as ready-to-wear or eveningwear. The project brief paves the way for research strategies that involve visual representations through collated secondary images in the form of mood boards to drive creativity in and for the design process but this tactic is commonly accepted in FD education as a way to merge problem and solution space and communicate design ideas (Aspelund, 2010; Cassidy, 2008). The mood board is a fundamental part of the students’ design process as it visually represents and communicates design concepts and thinking that relate to, for example, specific fashion trends, colour palettes, fabrication, and target market categories (Cassidy, 2008:43).

FD students may develop several different types of visual mood boards with each highlighting slight differences and purposes but all predominately directed by secondary visual research as opposed to primary empirical research. The argument made by scholars who write on FD education, is that any form of visual board should evoke and represent aspects of, for example, inspiration, imagination, feelings, meaning creation, the look and feel of the design project, forecasting, intuition, emotions and aesthetic experiences (Aspelund, 2010; Cassidy, 2008; De Wet, 2017). These mood boards then trigger the conceptualisation of a series of design sketches related to clothing products. However, ultimately, such a pedagogy fosters an inward-looking practice that manifests in personal self-expression. International studies (Cassidy, 2008; Lapolla, 2014) and local scholarship (De Wet 2016; 2017) on FD education show the reliance
on secondary visual research and the promotion of an inward-looking practice. In Chapter 4, I deliberate on these studies in detail.

Based on the above discussion, FD education appears to foster a culture of secondary visual research, inspirational ideas and research relating to fashion trends and themes. However, actual user engagement seems to be largely non-existent throughout the design process. Then again, I argue that FD education fosters an inward-looking practice that encourages students to learn to become the lone-genius star designers who predominately design for themselves or through their expert lens for the imagined consumer. My argument coincides with earlier scholarship where Newstetter and McCracken (2001:67) claim that design students in general tend to ignore the constraints of the user and design for themselves without consideration of user needs. More recently, this argument was reiterated by Hall and Logo (2015:1) who maintain that FD students continue to design for themselves because they do not have sufficient opportunity to design for or with real users.

Renowned international trend forecaster and Dean of the Hybrid Design Studies Department at the Parsons School of Design, Li Edelkoort (2016:n.p), in an Anti-Fashion manifesto\(^\text{15}\), argued that FD education across the globe fails to take cognisance of the fact that the world is changing: for example, collaboration is becoming increasingly important yet FD schools continue to educate students to become “individual star designers for the catwalk”. As a result, the fashion industry continues to work in a 20th century mode where designers are the lone-genius designers, hence the view that fashion design and education are outdated and lack transformation (Edelkoort, 2016:n.p). Yet FD education predominately aligns itself with an archaic TDD paradigm and the traditional philosophies and pedagogies of the long surpassed Ecole des Beaux Arts and Bauhaus educational models in which students are educated through an inward-looking approach to become the lone-genius designer. As such, FD education may not have fully embraced the shifts in design praxis and education.

Despite this, international discourse on FD education shows that it is possible to transform from a conventional educational model to more preferred models through sustainability-related curricula (Fletcher & Williams, 2013; Kennedy & Terpstra, 2013; Obregón, 2013; Szenasy, 2009). From a local context, Smal and Harvey (2017:277-280) illustrate the transformation of

\(^{15}\) Presented at VOICES, Business of Fashion annual gathering.
FD education at a fourth-year level from an inward-looking practice to an externally-driven praxis grounded in a design-with-intent research foci underpinned by sustainability and HCD.

1.11 FRAMING THE RESEARCH PROBLEM WITHIN A SOUTH AFRICAN HIGHER EDUCATION FRAMEWORK

The preceding discussion suggests that transformation in FD education is possible but requires a shift in mind-set and pedagogical methodologies in order to ensure that FD students learn to become design activists and agents of change, and in order to design with the needs of people and planet in mind as opposed to for their own individual gratification. This argument is corroborated by Obregón (2013:30) who claims “fashion designers educated through sustainability curriculum will see themselves as agents of change that can be part of a solution”.

In light of this, in the present study, I opt to challenge conventional ideologies and pedagogies in FD education through a HCD approach. I acknowledge that HCD can be used as a research strategy in its own right but, for this study, I elect for an approach aligning myself with scholars who claim that it is a philosophy and a mind-set or a worldview that changes the way that design and development processes are seen and approached (Norman, 2013; Sanders & Stappers, 2012). For designers to change their existing mind-set and philosophies to a preferred HCD situation, a planned course of action may be required at an educational level hence the grounding of this study in a HCD approach to FD education within a SA HE context.

I argue that a HCD approach might add value to pedagogical activities and design knowledge in student design process activities and tasks within FD education. However, in scholarship and related research, there appears limited scientific evidence of a HCD process in pedagogical activities to FD education at a SA HE level. In light of this, FD education with a HCD approach appears to be an underdeveloped researched area in the SA HE context in that it lacks rigorous academic investigation as well as practical guidelines for teaching and learning with which to change pedagogical practice. However, a HCD approach is necessarily very relevant at this stage given the national and international move towards HCD and, even more so given the call for inclusive and collaborative design in education.

The challenge is that FD education, within the framework of SA HE, continues to align itself with the TDD paradigm, conventional educational models associated with the first and second
design education movements; as such, it remains grounded in traditional ideologies and pedagogies and continues to foster an inward-looking culture. Without rigorous scientific inquiry, pedagogical practice lacks clarity regarding how to educate FD students in SA in a way that allows for and incorporates the user as an inclusive collaborator in design process activities. The extent to which such an approach might add value and contribute to sound and relevant pedagogical practice to FD education in SA has not been scientifically explored as yet.

1.12 AIM OF THE INQUIRY

Against the backdrop of the research problem, the purpose of this study is to explore and establish the underlying design principles of a HCD approach and its effects to FD education within SA HE. In this study, effects refer not to cause and effect relations, but to participant views and experiences regarding the design principles of HCD.

To achieve the main purpose of this study, the subsequent section highlights the overarching research question and sub-questions with linkages made to the objectives of this inquiry.

1.13 RESEARCH QUESTION AND OBJECTIVES

Based on the aim, to guide this study, the following overarching research question is articulated:

What are the pedagogical strategies and underlying design principles of a HCD approach and its effects to FD education at a HE level?

Against the backdrop of this overarching research question, the following sub-questions have been formulated:

- What are the underlying design principles (tenets) of HCD and the philosophy of fashion design praxis that can be used, as part of a formal teaching and learning intervention in educating FD students?
• How do the design principles of HCD align with the design process in professional fashion design praxis?
• What are the effects of the teaching and learning intervention in enhancing a HCD approach to FD education?

Linking the research question and sub-questions, Table 1.1 highlights the objectives formulated with respect to the research phases in order to achieve the main aim of this study. Similarly, in Table 1.1, I highlight the scope of each phase.

Table 1.1: Research phases and objectives

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<thead>
<tr>
<th>SCOPE</th>
<th>PHASE</th>
<th>OBJECTIVE</th>
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<tbody>
<tr>
<td>Theoretical perspectives</td>
<td>1A</td>
<td>To answer part of the first research sub-question, this phase defines the underlying philosophy of fashion design praxis</td>
</tr>
<tr>
<td></td>
<td>1B</td>
<td>To answer part of the first research sub-question, this phase defines the underlying design principles (tenets) of HCD</td>
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<tr>
<td></td>
<td>1C</td>
<td>This phase defines the design principles of fashion design praxis</td>
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<td></td>
<td>1D</td>
<td>This phase defines the design principles of design education pedagogy (DEP)</td>
</tr>
<tr>
<td>Professional fashion design praxis</td>
<td>1E</td>
<td>To answer the second-research sub-question, this phase explores and describes the role and the design process of a HCD approach in professional fashion design praxis and its alignment to the design principles of HCD established in Phase 1B</td>
</tr>
<tr>
<td>Pilot study intervention</td>
<td>2</td>
<td>The guiding design principles established in Phase 1 are applied in order to design and implement the first HCD teaching and learning intervention for FD education</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>From the pilot intervention, this phase ascertains or determines the effects of the HCD approach and its underlying guiding design principles to FD education in order to refine the design principles</td>
</tr>
<tr>
<td>Main study intervention</td>
<td>4</td>
<td>Based on the results of the pilot study, this phase involves the design and implementation of the second HCD teaching and learning intervention for FD education</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>To answer the third research sub-question, this phase ascertains or determines the effects of the HCD approach and its underlying design principles to FD education</td>
</tr>
</tbody>
</table>

Table 1.1 outlines that Phase 1 is divided into five sub-phases. In addition, Table 1.1 shows that the objectives align with the aim of this study, which grounds itself in FD education at a SA HE level.
1.14 RESEARCHER ASSUMPTIONS AND PERSONAL RATIONALE

I am a Senior lecturer in the Department of Fashion Design at an urban SA HEI with 22 years of teaching experience in FD education, 19 of which are at this particular HEI. I currently teach the modules Fashion Design and Technology 1, Production Environment Studies 3 and Research Methodology 3 at undergraduate level. At a postgraduate level, I supervise students in the Baccalaureus Technologiae: Fashion, MA\textsuperscript{16}: Design and BA\textsuperscript{17} Honours: Design programmes. As a result, I am familiar with the current nature and scope of FD education at HEIs in SA. Additionally, my teaching experience gave insight into the design processes and nature of design-related projects offered to FD students.

Over the years, I found myself disillusioned with FD education simply because students are educated in a manner that draws on secondary visual research and aligns them with seasonal fashion trends and inward-looking design practice. I began to question why FD education continues to teach with an inward-looking practice rather than externally-driven processes where people and planet are at the core of design. After all, are lone-genius designers still applicable in a world faced with social, environmental and economic challenges? Furthermore, I questioned if FD education was encouraging students to plagiarise and re-interpret existing designs despite the fact that creativity and innovation often emerged in discussions.

To me, FD education was no longer adding value and simply contributed to aesthetics, being up-to-date with the latest fashion trends and the over-consumption of non-essential products without consideration of socio-environmental challenges. This informed my intention to educate FD students in a manner in which they learn to become agents of change and transform existing situations into preferred ones. It is my ideological view that FD students cannot transform their thinking about fashion design praxis and how they practice it unless they have knowledge about and are exposed to alternative approaches and educated in a manner that helps them to learn to design with empathy for users in an inclusive and collaborative way.

In addition to the above, my personal rationale for this study is thus four-fold. Firstly, as an educator, I desire to add empirically-based scientific value to the current scope and intent of

\textsuperscript{16} In the SA HE context, the MA is a master's degree.
\textsuperscript{17} In the SA HE context, the BA is a bachelor's degree.
FD education at HE level in SA. Secondly, HCD aligns to one of the faculty’s research niche areas. Thirdly, empirically-based scientific teaching and learning in FD education aligns to the HEIs drive for research-led teaching and learning and the faculty’s research area of Scholarship of Teaching in Art and Design. Fourthly, the effects of a HCD approach might add value to the current scope of FD education as offered at SA HEIs.

1.15 CONCEPTS AND ASSUMPTIONS RELEVANT TO THIS STUDY

The research process put forward by Trafford and Leshem (2008:170), which they refer to as a magic circle (illustrated in Figure 1.1), guides this study.

![Figure 1.1: The magic circle adapted from Trafford and Leshem (2008:170)](image)

The magic circle in Figure 1.1 comprises outer and inner circles that represent the different but interconnected components and activities in the research process. The outer circle of the model depicts conventional research actions with two possible commencement points. According to Trafford and Leshem (2008:171), an idea for a research topic may lend way to relevant readings pertaining to the topic in which a gap in knowledge exists, or the research topic could stem from an area of interest. In this study, the gap in knowledge emerged predominantly from my area of interest but also from scholarship. Such a gap in knowledge then lends way to a research issue with these two factors setting the boundaries for investigation (Trafford & Leshem, 2008:171). Moving clockwise on the circle, the research issue then articulates with a research statement. In this study, I refer to this statement as an aim, as presented in section 1.12. Proceeding horizontally, in a linear manner, the research questions are then formulated from...
the research statement. Theoretical perspectives through the development of a conceptual framework then begin to address the research questions.

A conceptual framework is a theoretical overview and a strategic map that guides and informs decisions concerning the execution of the research design, processes and methods (Leshem & Trafford, 2007; Trafford & Leshem, 2008). Trafford and Leshem (2008:101) advise that the conceptual framework visualise the theories from which concepts are drawn for the investigated topic. Although Ravitch and Riggan (2017:5) agree that a conceptual framework guides the research design, process and methods of data collection, these scholars claim that the framework is actually an argument made up of a series of logical proposals to ground the purpose of the study. In this study, I am inclined to accept the view that a conceptual framework is an argument as opposed to a visualisation of theories, but I agree that such a framework guides and informs the research design, process, and methods.

Trafford and Leshem (2008:171) argue that fieldwork and research design influence each other because an iterative relationship exists between the two. The data collected from the fieldwork gives rise to a horizontal progression of factual, interpretative, and conceptual conclusions thus contributing to knowledge and ultimately closing the gap (Trafford & Leshem, 2008:171). However, these factual, interpretative, and conceptual conclusions along with the contribution to knowledge should relate to the research issue hence ultimately closing the outer circle of the model (Trafford & Leshem, 2008:171). Although I acknowledge Trafford and Lesham’s argument for factual conclusions in the magic circle, I am inclined to believe that this is dependent on the research paradigm through which an investigation is viewed. My view here is founded in Silverman’s (2014:173) claim that positivists are concerned with factual information.

Turning the discussion back to the magic circle, the inner circle presented in Figure 1.1 positions four diagonal double arrow-headed lines that connect and influence factors on the outer circle. Borrowing from Trafford and Leshem (2008:171-172), Table 1.2 summaries the double arrow-headed line connections and influences on the outer circle.

As I note in section 1.5, in this study, fashion design is conceptualised as a verb focussing on design processes positioned in the field of inquiry known as design methods and viewed from the lens of a dual-mode model design paradigm. In the same light, fashion design praxis is a
deliberate way of thinking and acting that manifests itself in the manner in which human beings engage with design process activities. As mentioned in section 1.11, I opt for HCD as an approach, an ideology, mind-set, or worldview that changes the way design processes are seen and engaged with in order to educate FD students. From this position, Figure 1.2 visualises the conceptual framework that guides this inquiry.

Table 1.2: Inner and outer circle connections and influences

<table>
<thead>
<tr>
<th>CONNECTIONS</th>
<th>INFLUENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research issue link to research design</td>
<td>This connection should show the research boundaries and focus of the research issues. Additionally, they should link and influence the research design and the fieldwork in order to address the research issue.</td>
</tr>
<tr>
<td>Research statement link to factual conclusions</td>
<td>This connection should show the direct influence and relationship between the research statement and factual conclusions.</td>
</tr>
<tr>
<td>Research questions link to interpretative conclusions</td>
<td>The research question should be answered by analysing, interpreting, and discussing the evidence.</td>
</tr>
<tr>
<td>Conceptual framework link to conceptual conclusions</td>
<td>This influences and demonstrates the relevant scholarly and theoretical levels of the research.</td>
</tr>
</tbody>
</table>

Figure 1.2: Conceptual framework
1.16 RESEARCH DESIGN

Aligning with the conceptual framework illustrated in Figure 1.2, this section provides an overview of the research design about which Chapter 2 provides detailed discussion.

1.16.1 Design-based research (DBR)

Due to the need to establish theoretical design principles to guide the design and implementation of HCD teaching and learning interventions in FD education, this study adopts design-based research\(^\text{18}\) (DBR). Scholarship foregrounds the context-specific nature of DBR (Barab & Squire, 2004; The Design-Based Research Collective, 2003; Wang & Hannafin, 2005). In view of this, although I acknowledge that this study may be applicable to disciplines such as architecture and industrial design, the context-specific nature of DBR necessitates a focus on FD education and the nature of fashion-related products, as the outcome of the design process, rather than other products.

Regardless of discipline, Joseph (2004:235) argues that DBR serves the goal of research, design and pedagogical practice to enhance learning in real-world contexts. Plomp (2010:9-10; 12-13) postulates that DBR is a systematic study that aims at the design, development and evaluation of an educational intervention intended to improve educational practice. Plomp (2010:15) claims that the first phase in DBR involves preliminary research focusing on theoretical perspectives and the formation of conceptual or theoretical frameworks but Plomp also recommends involvement with practitioners and process as an input method.

Embedded in DBR, an interpretive paradigm drawing on social constructivist methods guides this study. Scholars maintain that constructivism and interpretivism are frequently seen as interchangeable terms and are often combined together (Creswell, 2014; Merriam, 2009:8-9). Merriam (2009:8-9) remarks that within an interpretive paradigm, researchers seek to socially construct knowledge from numerous realities and interpretations because no single reality is seen to exist. In section 2.3, I justify the appropriateness of this paradigm for this research.

\(^{18}\) DBR also goes by the names design research, development research and design experiments (refer to section 2.2.2) but in this study, I opt for the name DBR.
Grounded in DBR and an interpretive paradigm drawing on social constructivist methods, this study pursues a qualitative research approach since it aims to explore the multiple realities of a specific situation and capture “what people say and do as a product of how they interpret the complexity of their world, to understand events from the viewpoints of the participants” (Burns, 2000:11). In section 2.4, I justify the choice of a qualitative research approach within DBR.

1.16.2 Unit of analysis, sampling and research methods

The primary unit of analysis and phenomenon in this study is the FD educational intervention involving a group of FD students and educators (known in this study as facilitators) within the context of an urban SA HEI. However, study of a HCD approach in professional fashion design praxis is needed as input to address the primary unit of analysis. Hence, the secondary unit of analysis is the role and the design process of a HCD approach in fashion design praxis with professional fashion designers.

A purposive sampling method guides the selection of participants in both units of analysis. Purposive sampling refers to participants who are selected based on their knowledge in respect of the inquiry and because they fit the criteria to participate in the research inquiry (Babbie, 2008:204; Henning, Van Rensburg & Smit, 2004). For Phase 1E (as illustrated in Table 1.3), purposive sampling compromises of two Johannesburg-based professional fashion designers and one user (non-designer) selected because they fit specific criteria (refer to section 2.7.3 for discussion). Although the user was not initially part of this study, the opportunity arose to gather data from this participant. Purposive sampling for Phases 2, 3, 4 and 5 entails first-year FD students, two FD facilitators and the researcher, all at an urban SA HEI (as seen in Table 1.3 and discussed further in sub-section 2.7.3).

Due to the different research phases, this study deploys several data collection methods. Phases 1A, 1B, 1C and 1D employ a desktop research method. Desktop research is a method used to collect secondary data accessible via a researcher’s computer desktop (Bradley, 2007:81). Phase 1A reviews Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design as a point of departure. Furthermore, desktop research also examines Carl Mitcham’s (1994) technology-related framework. Investigating both of these serves the purpose of developing a personal philosophy of fashion design praxis. Phase 1B entails review of scholarship pertaining to discourses on HCD with the purpose of defining a set of tentative
underlying design principles. Phases 1C and 1D review scholarship with the purpose of defining a set of tentative design principles of fashion design praxis and DEP respectively.

Table 1.3: Data collection and analysis matrix

<table>
<thead>
<tr>
<th>RESEARCH PHASE</th>
<th>DATA COLLECTION METHODS</th>
<th>PARTICIPANTS</th>
<th>ANALYSIS METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Desktop</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>1B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1D</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1E             | • Face-to-face individual, semi-structured interviews  
                • Dyadic face-to-face semi-structured, interview  
                • Artefacts (photographs)  
                | Professional fashion designers and user  
                | Constant comparative method  |
| 2 and 3  
(First intervention known as the pilot study) | • Self-administered semi-structured questionnaires  
                • Participant observation.  
                • Artefacts (photographs)  
                | First-year FD students, FD facilitators and researcher  
                | Constant comparative method  |
| 4 and 5  
(Second intervention known as the main study) | • Self-administered semi-structured questionnaires  
                • Face-to-face individual semi-structured interviews  
                • Participant observation  
                • Artefacts (photographs)  
                |                                      |

Phase 1E comprises face-to-face, individual semi-structured interviews with two professional fashion designers and one dyadic interview with one of these designers and a user. Semi-structured, open-ended interviews create an opportunity to socially interact in the interview process and capture the different realities of the participant (Henning et al., 2004; Stake, 1995). The individual interviews aim at exploring, gaining an in-depth understanding of and describing the design process and design methods (positivist, constructivist and dual-mode model), the role of users, and the extent of user participation in a HCD process. The dyadic interview aims at further eliciting data from the designer and obtaining the views of the user with respect to understanding his/her role and involvement in design process activities. As a secondary method of data collection, artefacts comprising of self-created photographs serves an empirical purpose of capturing the reality of what these fashion designers actually did when
engaging with design process activities. Data obtained from Phase 1 operates as input into the design, implementation and evaluation of a pilot FD educational intervention (Phases 2 and 3) with first-year FD students, underpinned by a HCD process.

The teaching and learning intervention unfolds in two iteration cycles known as the pilot study (Phase 2 and 3 - first cycle) and main study (Phases 4 and 5 - second cycle). The pilot study utilises participant observation and self-administered, semi-structured, open-ended questionnaires as primary methods and artefacts as a secondary instrument of data collection. Thomas (2011:165) states that questionnaires serve the purpose of exploring participants’ viewpoints. Student questionnaires aim at exploring and ascertaining the main effects of the HCD approach and its underlying tentative design principles on FD education as implemented in the pilot study. Facilitator questionnaires aim to determine the holistic effects (impact or outcomes) of the implementation of the HCD approach within FD education.

Turning to observation, Creswell (2014:190) asserts that researchers use this method in a qualitative way to observe activities on a research site. This study pursues participant observation, with observer as primary role and participant as secondary role. This serves the purpose of exploring and documenting the design process activity tasks executed by FD students and the manner in which these actions unfolded whilst simultaneously incorporating the design principles of HCD. To capture the social reality of design process activities and for the purpose of comprehensive evidence, I use artefacts, as a secondary method, through self-created photographs. The main study also employs participant observation and artefacts in the same way.

Similarly, the main study employs self-administered, semi-structured, open-ended questionnaires with the same group of FD students serving the same purpose. Also due to refinement in data collection methods from the pilot study, the main study employs individual face-to-face, semi-structured interviews with the same two facilitators. These interviews serve the same purpose as the student questionnaires but from the facilitators’ perspectives hence offering multiple perspectives of the same phenomena.

In light of the multiple data collection methods utilised, this study utilises several methods to capture empirical data (refer to section 2.8.5) prior to analysis. To analyse raw data, the study applies a constant comparative method of analysis. Merriam (2009:177) claims that the
constant comparative method of analysis compares units of data by searching for patterns, which are then moved into categories. To execute a constant comparative method of analysis, I predominately use Atlas.ti to code raw data and arrange them into categories and themes.

1.16.3 Trustworthiness measures

Aligning with the above research design and methodology, trustworthiness is an important consideration in any qualitative study. Several scholars recommend that to ensure trustworthiness of a study, methodological triangulation, member-checking, peer investigators, providing a rich, thick description of the findings, clarifying any bias, maintaining a quality assurance or audit trail system, and reporting on negative responses are appropriate methods (Mouton, 2001; Merriam, 2009; Golafshani, 2003; Creswell, 2014). This study uses several methods to ensure trustworthiness. These methods are merely listed below but section 2.10 provides details of the application thereof.

- Methodological triangulation
- Member-checking
- Use of peer investigators
- Rich thick description to convey findings
- Reporting of negative responses
- Maintaining an audit trail
- Cross checking student data
- Clarifying any bias

1.17 CHAPTER OUTLINE

In Table 1.4, I outline the chapters that make up this thesis, along with the purpose of each. For logical coherence, the chapters are structured such that they correspond with the research phases.
Table 1.4: Chapter outline

<table>
<thead>
<tr>
<th>PHASE</th>
<th>CHAPTER</th>
<th>OUTLINE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>The first chapter provides an introduction and background with the purpose of outlining the research gap, problem, aim, research questions and objectives</td>
</tr>
<tr>
<td>1A and 1B</td>
<td>2</td>
<td>This chapter explores the research design and the manner in which DBR goals align with the research phases</td>
</tr>
<tr>
<td>1C and 1D</td>
<td>3</td>
<td>Firstly, the chapter investigates theoretical frameworks with the purpose of establishing a personal philosophy for fashion design praxis. Secondly, it reviews scholarship on HCD with the purpose of theoretically defining a set of tentative design principles of HCD</td>
</tr>
<tr>
<td>1E</td>
<td>4</td>
<td>Firstly, scholarship is reviewed with the purpose of exploring the dimensions of the philosophy of fashion design praxis in order to define a tentative set of design principles with respect to fashion design praxis. Secondly, scholarship is reviewed regarding design education in order to define a set of tentative design principles for DEP</td>
</tr>
<tr>
<td>2 and 3 (Pilot study – first intervention)</td>
<td>5</td>
<td>Chapter five deliberates on and describes the empirical findings regarding the role and design process of a HCD approach in professional fashion design praxis and its alignment to the design principles of HCD established in Phase 1B</td>
</tr>
<tr>
<td>4 and 5 (Main study – second intervention)</td>
<td>6</td>
<td>This chapter narrates the design and implementation of the pilot study and summarises the empirical findings obtained therefrom. The chapter also reports, retrospectively, on how the design principles were refined and pedagogical strategies improved</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>Firstly, this chapter contextualises the design and implementation of the main study. Secondly, it narrates the empirical findings obtained. Thirdly, it scopes out the final design principles of HCD, fashion design praxis and DEP for FD education</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>This chapter provides conclusion and recommendations</td>
</tr>
</tbody>
</table>

Having outlined the chapters that follow, the subsequent section concludes this chapter with reflection with respect to the purpose of the chapter.

1.18 CONCLUSION

The theoretical perspectives presented in section 1.2 suggest that design is both a noun and verb but that multi-dimensional meanings of design exist. I formulated a working definition of design in order to position this study within these debates. Likewise, the discussion on fashion presented in section 1.3 also suggests noun and verb meanings of ‘fashion’, but the literature
indicates that fashion as process, practice and product is an underdeveloped research area. In section 1.4, the argument is made that fashion design lacks a well-founded theory, which paved the way to scope out the theoretical framework deployed as a point of departure for this inquiry. Subsequently, section 1.5 offered a working paradigm of design methods and fashion design.

Section 1.6 spotlights changes in the general design landscape, particularly a move away from the lone-genius mind-set commonly associated with a TDD paradigm to one where HCD and environmental sustainability are at the forefront. However, the challenges of fashion design praxis emerged in section 1.7 as it remains grounded in a TDD paradigm despite the changing design landscape.

Likewise, section 1.8 shows that there are calls within general design education to shift from conventional models of fostering inward-looking practice to developing an externally-driven process in which people are at the core. The discussion then turned to framing FD education in section 1.9, and section 1.10 highlights the fact that FD education remains trapped in conventional ideologies and pedagogical strategies that continue to foster inward-looking practice and educate students to become the star lone-genius designer, thus aligning itself with a TDD paradigm. This paved the way for identifying the research problem in section 1.11 where I argued for a HCD approach to FD education within a SA HE framework in order to align with the calls to shift the scope of FD education from an existing situation to a preferred one. Based on the research problem, section 1.12 framed the aim of this study leading to the formulation of the overarching research question, sub-questions and objectives for this inquiry in section 1.13. In section 1.14, I declared my position as a FD educator and clarified my biases paving the way for my personal rationale for this study. To achieve the aim of this study, in section 1.15, I scoped out core constructs and assumptions relevant to this study and put forward a conceptual framework to guide the inquiry. A synopsis of the planned course of action is mapped out in section 1.16, grounding this study in DBR and describing the methods used to identify participants and collect and analyse data. Chapter 1 concludes with presentation of a chapter outline for this thesis. In Chapter 2, I expand on section 1.16 to deliberate on the research design and methods framed within DBR.
CHAPTER 2

RESEARCH DESIGN

2.1 INTRODUCTION

In Chapter 1, the background to this study was outlined, framing the research problem within a SA HE fashion design (FD) educational framework. In addition, Chapter 1 scoped the overarching aim, research question and objectives of this study. In Chapter 2, I discuss the research design employed within this study, addressing the what, why and how of this research. Babbie and Mouton (2001:4-6) advocate that scientific knowledge is acquired through rigorous, methodical and systematic investigation. A systematic and methodical research design was necessary in order to address the overarching aim, research question and objectives of this scientific inquiry.

The current chapter commences with discussion of design-based research (DBR) and the manner in which its goals align with the respective research phases of the study. Embedded in DBR, discussion then filters down to the research paradigm before moving to the research approach that guided the study, in which I seek to justify the selected approach. Discussion then shifts to contextualisation of the primary and secondary units of analysis and the reasons as to why the latter was necessary for the study. Thereafter, the setting in which the inquiry was conducted is described.

In the latter part of the chapter, discussion pertains to the research methodology, with specific deliberation given to the methods used, the reasons for their selection, and how they were applied in the study. This includes discussion of the sampling methods used to select participants, why they were chosen and who participated in this study. It also includes the data collection methods used to elicit both theoretical and empirical information, particularly as these correspond with DBR and the respective research phases. In addition, the methods used to record, transfer and preserve the safety and security of data are described. Furthermore, the methods used to analyse the empirical data are described before consideration is given to the question of trustworthiness as well as the ethical implications of the study. This discussion culminates in identification of the lens or metaphysical position adopted within the study. The
chapter concludes with reflection on the manner in which the purpose of the chapter has been achieved.

2.2 DESIGN-BASED RESEARCH (DBR)

2.2.1 Rationale for design-based research (DBR)

This study was conducted through a DBR lens through the establishment of theoretical design principles and HCD teaching and learning interventions for FD education. The Design-Based Research Collective (2003:5; 8) claim that researchers engage with DBR in order to create productive learning theories that are not commonly used nor understood. They further state that DBR has the potential to create new teaching and learning environments and investigations, formulate teaching and learning theories that are relevant to context, advance design knowledge and heighten capacity for education innovation. Later, scholars identified the context-dependency of DBR (Barab & Squire, 2004; Wang & Hannafin, 2005). As noted in sub-section 1.16.1, although I acknowledge that this study may be applicable to disciplines such as architecture and industrial design, the context-specific nature of DBR necessitates a focus on FD education. In light of these assertions, considering the research problem, overarching aim, research question and objectives of this study, DBR was selected because a HCD approach within the context of SA FD education is relatively new. However, it has the potential to create new pedagogical strategies and learning situations, contribute to theoretical discourse in educational contexts, and strengthen the capacity of alternative FD educational models.

Considering the underlying rationale for DBR, I begin by framing DBR and describing its aims and characteristics. The discussion then shifts to theoretical recommendations for framing DBR and culminates in identification of a road map for DBR that aligns with the objectives and respective phases in this inquiry.

2.2.2 Framing design-based research (DBR)

During the first decade of this century, DBR emerged as a new research methodology to guide educational research (Amiel & Reeves, 2008; Anderson & Shattuck, 2012; The Design-Based Research Collective, 2003). DBR is the popular term but scholars agree that DBR also goes by the names of design research, development research and design experiments (Amiel & Reeves,
Although DBR is grounded in educational research, it should not be confused with action research.

Anderson and Shattuck (2012:17) differentiate between DBR and action research because the former evolves from and leads to design principles whereby the latter does not. This claim aligns with the view of various scholars who draw attention to the fact that design principles direct design interventions but are subsequently refined such that new principles emerge (Collins, Joseph & Bielaczye, 2004; Plomp, 2010; Reeves, 2006). As such, DBR is different from action research. In the sub-section that follows, I describe the aim and characteristics of DBR.

2.2.3 Aim and characteristics of design-based research (DBR)

In DBR, practitioners and researchers collaborate in order to design interventions that meet the goals of a local context by linking methods to processes of enactment in order to achieve specific outcomes and generate knowledge (The Design-Based Research Collective, 2003:5; 7). Joseph (2004:235) argues that DBR serves the goal of research, design, and pedagogical practice to enhance learning in real-world contexts. DBR is defined as:

... a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories (Wang & Hannafin, 2005:6-7).

Likewise, scholars remark that DBR is systematic and aimed at connecting educational research and real-world problems through the iterative design and development of interventions hence commencing with a few validating principles that act as guidelines but, through refinement, new design principles may be generated that can direct future, similar research (Amiel & Reeves, 2008; Plomp, 2010). Plomp (2010:13; 18) further declares that educational interventions are evaluated through reflection and analysis aimed at improving educational practice. However, The Design-Based Research Collective (2003:5) advocate that DBR goes beyond the design and testing of interventions in that it should also personify scholarly claims about teaching and learning and manifest relations between theory, a designed product and practice. Effective DBR should include the principles of:
... addressing complex problems in real contexts in collaboration with practitioners; integrating known and hypothetical design principles with technological advances to render plausible solutions to these complex problems; and conducting rigorous and reflective inquiry to test and refine innovative learning environments as well as to define new design principles (Reeves, 2006:58).

These principles are further evident in scholarship (Anderson & Shattuck, 2012; Barab & Squire, 2004; The Design-Based Research Collective, 2003), as outlined in Table 2.1.

Table 2.1: Characteristics of DBR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Design learning environment guided by theories (design principles)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Research and development unfold through multiple cycles of design, testing and refinement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Research on designs should give way to general design principles</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Situated in messy, authentic educational environments</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reliant on methods to document and connect processes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Document achievements and fiascos through evidence-based methods</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Use of mixed methods</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Collaborative partnership between researchers, practitioners and participants</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Practical impact on practice</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Process oriented and linked to outcomes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Involves multiple variables through student collaboration available resources, learning of content and transfer</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the aforementioned discussion, it is clear that DBR first seeks to develop design principles that are then applied in order to systematically research, design and implement iterative cycles of analysis in an attempt to refine and define new design principles. The goals of DBR ought to be engineered in a systematic way in order to correspond with the research scope and respective phases of the inquiry.
2.2.4 Aligning design-based research (DBR) goals to research phases

To align the aim and characteristics of DBR, the following sequential steps have been put forward:

Design experiments\(^{19}\) were developed to carry out formative research to test and refine educational designs based on theoretical principles derived from prior research. This approach of progress refinement in design involves putting a first version of the design into the world to see how it works. Then, the design is constantly revised based on experience, until all the bugs are worked out (Collins et al., 2004:18).

Subsequently, Amiel and Reeves (2008:34) propose a framework rooted in the notions of analysis, development, iteration and reflection in order to guide the enactment of DBR (as visualised in Figure 2.1). I found this framework useful for developing a conceptual framework that aligned DBR with the objectives and respective phases of the current inquiry, as also shown in Figure 2.1.

As can be seen in Figure 2.1, the present DBR begins with analysis of the shifts in general design praxis (briefly outlined in section 1.6) and design education (briefly outlined in section 1.8). In addition, I engaged in literature review of current pedagogical strategies used in FD education (as noted section 1.10) which culminated in the formulation of a research problem. In addition, being a FD educator placed me in a position in which I was able to collaborate with colleagues and engage them in discussion pertaining to the need for change in FD education. This first step set the course of theoretical and empirical action to guide subsequent research phases. The research phases depicted in Figure 2.1 pertain to professional fashion design praxis (Phase 1E) as input into Phases 2 and 3 (pilot study) which dealt with the educational context. When combined, all these research objectives and phases require embeddedness in a research paradigm as is described in the section that follows.

\(^{19}\) Collins et al. (2004:18) refer to DBR by the name of design experiments.
REFINEMENT OF PROBLEM, SOLUTION, METHODS, AND DESIGN PRINCIPLES (Amiel & Reeves, 2008)

PHASE 1A: Define a personal philosophy of fashion design praxis
PHASE 1B: Define the underlying design principles (tenets) of HCD
PHASE 1C: Define the design principles of fashion design praxis
PHASE 1D: Define the design principles of design education pedagogy (DEP)
PHASE 1E: Explore and describe the role and the design process of a HCD approach in professional fashion design praxis

PHASE 2 – PILOT STUDY
The guiding design principles established in Phase 1 are applied to design and implement the first HCD teaching and learning intervention for FD education in collaboration with FD educators as research participants

PHASE 3 – END OF PILOT CYCLE
Ascertain or determine the effects of the HCD approach and its underlying guiding design principles to FD education in order to refine the design principles

PHASE 4 – MAIN STUDY
From the pilot study, this phase designs and implements the second HCD teaching and learning intervention for FD education in collaboration with FD educators as research participants

PHASE 5 – END OF MAIN CYCLE
Ascertainment or determines the effects of the HCD approach and its underlying design principles to FD education

Analysis of practical problems by researchers and practitioners in collaboration
Development of solutions informed by existing design principles
Iterative cycles of testing and refinement of solutions in practice
Reflections to produce design principles and enhance solution implementation

Figure 2.1: DBR alignment to inquiry. Mapped from Amiel and Reeves (2008:34)
2.3 RESEARCH PARADIGM

By its very nature, all research is interpretative and directed by researchers’ basic ontological, methodological and epistemological beliefs, which constitute the lens through which they see the world and how they come to investigate and understand the world (Denzin & Lincoln, 2011a:13; 2011b:91). Denzin and Lincoln (2011a:13) remark that positivist/post-positivist, constructivist/interpretive, critical and feminist/post-structural are four major schools of thought that dominate research.

DBR, specifically, was engineered through the lens of an interpretive paradigm via social constructivism. This paradigm was selected because any form of design (including fashion design), by its very nature, constitutes social action and because a HCD approach involves people and their needs. To study a HCD approach, this inquiry grounds itself in a field of inquiry known as design methods. Dorst (1997:171) recommends that design praxis and design education, in general, should include elements of positivist, rational problem-solving along with a constructivist, reflective practice paradigm in order to achieve better efficiency and effectiveness. From a research position, I selected an interpretive paradigm because I aimed to understand the social reality of participants with respect to how fashion design processes unfold in professional praxis, and to propose HCD as an alternative model for FD education taking into consideration my ontological belief that multiple perceptions of realities exist. Multiple realities allow for social, co-creation of knowledge, understanding and meaning that represent participants’ diverse versions of reality.

Merriam (2009:8-9) maintains that constructivism and interpretivism are frequently interchangeable terms, while Creswell (2014:8) claims that social constructivism is habitually combined with interpretivism. Scholars concur that an interpretive/constructivist paradigm seeks to construct understanding about the social world (Babbie & Mouton, 2001; Denzin & Lincoln, 2011a). For this reason, the ontological belief underpinning the constructivist/interpretive paradigm is one that comprises multiple perceptions and interpretations of reality about which researchers seek to socially co-construct knowledge and understanding with participants in their natural settings (Denzin & Lincoln, 2011b; Merriam, 2009). In addition, Creswell (2014:8) postulates that social constructivists pursue understanding of the world and its multiple views in an attempt to search for meaning to represent what King and Horrocks (2011:21) refer to as “reality out there”. These theoretical
views and the selection of an interpretive paradigm via social constructivism corresponds with the qualitative research approach selected for this study.

2.4 QUALITATIVE RESEARCH APPROACH

2.4.1 Defining qualitative research

Embedded in DBR, this study adopts a qualitative research approach since it is aimed at exploring the multiple realities of a specific situation. Qualitative research is concerned with describing and understanding human behaviour and is a social research approach aimed at studying human action from an “insiders’ perspective” (Babbie & Mouton, 2001:53). A comprehensive definition of qualitative research is as follows:

Qualitative research is a situated activity that locates the observer in the world. Qualitative research consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural setting, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them (Denzin & Lincoln, 2011a:3).

Certain characteristics support these definitions of qualitative research. These characteristics are described in the sub-section below.

2.4.2 Characteristics of qualitative research

To describe the characteristics of qualitative research, I borrow from the work of Creswell (2014), Flick (2014), Stake (2010) and Yin (2011), as illustrated in Table 2.2. In light of these characteristics, a qualitative research approach allows for multiple perceptions of reality to be captured in participants’ natural settings and for interpreting the meanings that people ascribe to the design process and its alignment with HCD in professional fashion design praxis and the implications for education. Qualitative research supported rich and thick description of this phenomenon.
Table 2.2: Characteristics of qualitative research

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Studies meaning in participants’ real-world, natural settings</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Represents and captures the views and perspectives of people</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Contributes insights into existing or emerging concepts</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Uses multiple forms of data as evidence</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Triangulation of data</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Appropriate methods and theories</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reflexivity of the researcher and the research</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Interpretative in nature</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Experiential, empirical and field-oriented</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The researcher is the main instrument</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Acknowledges multiple meanings of reality</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Aims at knowledge production for improved practice</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Works towards generalisation or particularisation</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Uses words and open-ended questions</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Works inductively and deductively</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

However, as can be seen in Table 2.2, Creswell (2014:186) argues that qualitative researchers work both inductively and deductively because they build patterns, categories and themes, while also looking back and deciding if more data is needed. Similarly, Babbie (2008:24-25) posits that researchers work both inductively and deductively with the former involving moving from particular to general through the discovery of patterns but the latter requiring testing of whether such patterns really occur. Merriam (2009:15-16) agrees that qualitative researchers work inductively to gather data and build concepts, theories and hypothesis so as to move from the particular to the general but rejects deductive logic by saying that such a form of reasoning is actually a positivist way of testing hypotheses.

In light of these views, in this study I predominately use inductive reasoning to find patterns, categories and themes and, as such, move from the particular to the general. However, with regard to professional fashion design praxis, an unforeseen opportunity arose in which additional data was needed to establish whether users played a role in the design process. As such, deductive reasoning also came into play. As illustrated in Figure 2.1, professional fashion design praxis (Phase 1E) served as input into FD education. These constitute the secondary and primary units of analysis, respectively.
2.5 UNITS OF ANALYSIS

Babbie and Mouton (2001:84) argue that a unit of analysis is the ‘what’ in respect of the object, phenomena or event being investigated. In this study, the primary unit of analysis or phenomenon was the FD education interventions implemented within the context of a SA HEI, but study of HCD approaches within the practice of fashion design was needed as input to address the principal unit of analysis.

As such, the FD educational intervention represented the core area of research, and was of interest because a HCD approach to FD education in SA is relatively new thus corresponding with Merriam’s (2009:44) identification of the heuristic aim of discovering novel meanings and experiences. In addition to this primary unit of analysis, the secondary phenomenon involves describing the role and design process of HCD approaches within professional fashion design praxis, thus aligning Merriam’s (2009:43) requirement of literal, rich, thick description of situations. Having explained the primary and secondary units of analysis, this discussion now shifts to contextualising the inquiry in terms of the environment in which the study was conducted.

2.6 CONTEXTUALISING THE INQUIRY

As was shown in Table 2.2, all the cited scholars concur that qualitative research should be conducted in participants’ natural, real-world settings (Creswell, 2014; Flick, 2014; Stake, 2010; Yin, 2011). I align myself with this recommendation and conducted this inquiry in participant’s natural setting. In the sub-sections that follow, I report on the natural setting in question and frame it in accordance with DBR (refer to Figure 2.1). This discussion begins with contextualisation of Phase 1 of the inquiry.

2.6.1 Contextualising Phase 1 of the inquiry

Phases 1A, 1B, 1C and 1D of this inquiry were conducted in my (the researcher’s) natural setting, namely that of my personal living space. This personal space was equipped with relevant research tools such as a computer, access to online literature and internet connectivity thus providing an environment conducive to research production.
Phase 1E was carried out in the participants’ natural environment, namely that of their fashion design studios and retail spaces within the Johannesburg area. In one situation, the design studio and retail space were in two detached locations but due to multiple interactions, the study was conducted in both settings at the convenience of the participant. In the second situation, the design studio adjoined the retail space where design and business activities unfolded hence culminating in an interactive co-located environment. The following section describes the setting for the remaining phases of the inquiry.

2.6.2 Contextualising the fashion design (FD) educational setting of the inquiry

The teaching and learning interventions implemented in Phases 2, 3, 4 and 5 were carried out in a FD department at an urban SA HEI. The FD department in question previously offered a vocation-based programme of study, but recently introduced a new Bachelor of Arts (BA) degree programme in FD that replaced the former programme. This FD department was selected as the preferred HEI at which to conduct this study because the BA FD programme has a specific teaching and learning focus that aligns with the paradigm shifts occurring in the general design landscape. The second reason for selecting this particular programme was that the previous vocational programme was being phased out and it made little sense to implement teaching and learning interventions within a programme that would soon no longer exist.

To conduct Phases 2, 3, 4 and 5 and administer data collection instruments, this inquiry was carried out in two locations, namely the design and technology studios and academic office spaces located within the FD department. The design and technology studios are a socially-constructed teaching and learning environment in which students learn how to design, learn about design and learn to become professional fashion designers (as discussed further in sub-sections 6.4.2.5 and 7.2.2.7 respectively). Hence, they constitute a naturalistic, real-world context for FD education as recommended in DBR research (Anderson & Shattuck, 2012; Barab & Squire, 2004; The Design-Based Research Collective, 2003). The academic office environment provided a safe and non-intrusive hub in which to collaborate and consult with FD educators (known as facilitators in this study) on the design and implementation of two teaching and learning interventions (known as the pilot and main studies, respectively) and

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20 To protect the identity of the department, the year in which the new programme was introduced will not be mentioned.
collect data from them. To gather data from participants, this inquiry made use of a particular sampling procedure, as is discussed in the following section.

2.7 SAMPLING METHOD AND PARTICIPANTS IN THE INQUIRY

2.7.1 Framing sampling methods

Sampling is first aimed at establishing a sample of data sources from a larger population group that are eligible for inclusion in a study and, second, entails selecting an actual sample (Given, 2008:797). Scholars concur that sampling is a method used to appropriately select cases or population groups, but that a challenge lies in the fundamentals of sample selection, rational choice and number of participants, hence in qualitative research, the attributes of the sample can be pre-determined (Flick, 2014; Yin, 2011). Several sampling methods (convenience, snowball, systematic, stratified, random, probability, multistage cluster and purposive) exist to guide and streamline sampling decisions (Babbie & Mouton, 2001; Given, 2008; Silverman, 2014; Yin, 2011). Flick (2014:177) contends that sampling decisions should lead to the generation of information rich data. I considered these views when selecting an appropriate sampling method in order to generate information rich data.

2.7.2 Purposive sampling method

This study deploys a purposive sampling method in order to generate information rich data. Purposive sampling is a form of judgement sampling in that researchers choose participants based on their own knowledge and the aim of the study (Babbie & Mouton, 2001:66). It can be argued that researchers understand the scope of their own study and that they therefore have the potential to exercise judgement regarding the participants that hold information rich data. Purposive sampling is employed in order to decisively select participants that hold the most relevant data applicable for a study (Yin, 2011:88). Within purposive sampling, participants are chosen based on their knowledge and because they have certain features that align with a set of criteria for participation in the inquiry (Babbie, 2008; Henning et al., 2004; Silverman, 2014). In this study, participants were purposefully selected because they conformed to specific, pre-determined criteria and held knowledge deemed necessary for this study. The subsequent sub-section outlines who these participants were and what the criteria were used to select them.
2.7.3 Framing the participants and selection criteria

In this study, five different sub-set participant groups were purposively sampled across the various research phases and units of analysis. Phases 1A, 1B, 1C and 1D did not involve any participants due to the nature of the data collection method used in those phases, as is discussed in sub-section 2.8.2.1. For Phase 1E, the participants included two Johannesburg-based professional fashion designers whom I refer to as Designers X and Y. These participants were selected because they acted as gatekeepers of professional knowledge with respect to fashion design praxis and their participation was necessary as input in designing the first teaching and learning intervention. In addition, these participants were selected because they met the following pre-determined criteria.

1. They needed to be expert fashion designers with five or more years of professional practice. I categorised expert by following Lawson and Dorst’s (2009:83) framework of design expertise where designers are seen to be experts when they have five to ten years of experience in the profession.

2. The designers need to have experience and expertise in showcasing fashion design collections\(^{21}\) at SA fashion events such as the SA Fashion week.

3. They needed to adopt a HCD approach in their fashion design practice.

The first two criteria were easily identifiable due to the fashion designers professional experience and expertise in the fashion industry. However, the third criterion posed a challenge with respect to predetermining whether or not potential participants actually adopted a HCD approach in their fashion design practice without first collecting the empirical data. Table 2.3 provide profiles of Designer X and Y.

\(^{21}\) A collection, or sometimes known as a range, is a series of designs made into tangible clothing products that share a common theme and design element such as colours, silhouettes, fabrics and design details. However, clothing products may or may not necessarily be wearable. For example, an avant-garde clothing product may not necessarily be wearable.
Table 2.3: Designer profiles

<table>
<thead>
<tr>
<th>PARTICIPANT</th>
<th>PROFILE</th>
</tr>
</thead>
</table>
| Designer X  | • Has qualifications in fashion design as well as a BA: Commerce  
|             | • An alumni from the FD department where this study was conducted  
|             | • Approximately six years professional expertise (at the time of data collection)  
|             | • Showcased collections at SA fashion-related events  
|             | • Showcased collections at SA Fashion Week  
|             | • Showcased collections on international platforms  
|             | • Won a SA designer award  
|             | • Designs ready-to-wear clothing products for women  
|             | • Has clothing retail stores in Johannesburg and Cape Town |
| Designer Y  | • Has qualifications in fashion design  
|             | • Approximately 10 years’ professional expertise (at the time of data collection)  
|             | • Showcased collections at SA fashion-related events  
|             | • Showcased collections at SA Fashion Week  
|             | • Designs ready-to-wear clothing products for women  
|             | • Has a clothing retail store in Johannesburg |

As data collection with Designer X proceeded, it became evident that this particular fashion designer was utilising a HCD approach by including users in the design process and designing with them. Although inclusion of users, as non-designers, in the design process was not the intention of this study, the opportunity arose to include a user (known as User X in this study) as a participant. To include User X as a participant, Designer X acted as gatekeeper by permitting and facilitating such inclusion. This is in line with King and Horrocks’ (2011:31) claim that potential participants can be approached via gatekeepers who grant consent and enable access.

User X was an actual user of wearable clothing products designed by Designer X. In addition, User X, who was not a professional designer and had no formal knowledge of fashion design, actively participated in the design activities executed by Designer X. User X was selected because this participant possessed information relevant to this study from the perspective of an authentic user/non-designer, which supported the qualitative research need for multiple perspectives.

With regard to Phases 2, 3, 4 and 5, three participant sub-sets were involved: FD students (simply known as students in this inquiry), FD facilitators (educators) and myself as researcher.
Pre-determined sampling criteria were established prior to participant selection. These criteria are shown in Table 2.4.

**Table 2.4: Sampling criteria for fashion design students and facilitators**

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FD STUDENTS</strong></td>
<td></td>
</tr>
<tr>
<td>Part of the student population at the FD department</td>
<td>Setting for the inquiry</td>
</tr>
</tbody>
</table>
| First-year students registered for the newly introduced BA FD programme | • Both interventions were designed for implementation in this programme  
  • The programme has a specific teaching and learning focus |
| Registered for the module, Fashion Design and Technology 1A (FDT1A), in the first-semester | Pilot study was designed for implementation in this module forming part of the first-semester curriculum offering |
| Registered for module Fashion Design and Technology 1B (FDT1B), in the second-semester | Main study was designed for implementation in this module forming part of the second-semester curriculum offering |
| **FD FACILITATORS** | |
| Academic cohort at the FD department | Setting for the inquiry |
| Teach the modules FDT1A and FDT1B | Participants needed to collaborate in the design of interventions and facilitate implementation of the designed interventions with FD students |

The student population sample comprised of the first cohort of students registered for the BA FD programme at the urban SA HEI. In particular, student participants were registered for the modules FDT1A (first-semester) and FDT1B (second-semester), which formed part of the BA FD programme mix, where the pilot study was designed and implemented in the former module and the main study in the latter.

Of the 25 students registered for FDT1A, 24 participated in the pilot study while one was continuously absent. For the main study, 23 students continued to be registered for FDT1B and thus continued to participate in the study. These students ranged between the ages of 17 to 28 years with the majority aged either 19 or 20 years. One student, who was 28 years old, had some experience in the fashion industry. In addition, two student-participants were under the age of 18 and therefore considered as minors. However, their participation was obtained with consent from their respective parents (as further outlined in Table 2.7).
Regarding the FD facilitators, two educators participated in this study from the same urban SA HEI. However, these facilitators did not assume the role of participants only but they were collaborative and consultative partners in the DBR process. These facilitators contributed to the design, and were ultimately responsible for facilitating the implementation of procedural knowledge of both pilot and main interventions. As such, collaboration with these two facilitators aligned with the characteristics of DBR as was shown in Table 2.1.

The two facilitators were selected because they formed part of the academic cohort and were responsible for teaching and learning in the selected modules FDT1A and FDT1B. One facilitator had more than five years’ experience lecturing in FD education, while the second one was a practicing professional fashion designer who recently entered the academic arena. As such, the second facilitator had less than two years’ experience as a FD educator. For ethical reasons, facilitator profiles are not presented in the same way as that of the designers (shown in Table 2.3) as doing so might reveal their identity to their colleagues and expose them to possible risk.

Both facilitators have professional relations, as colleagues, without any personal affiliations. In the same light, there were no personal relations between Designer X and Designer Y themselves, nor between any of the facilitators and designers. Moreover, maintaining the designers’ confidentiality ensured that the facilitators were unaware of the participating designers. Likewise, I have professional relations with both facilitators and both designers without any personal relationships.

In addition, as the researcher, I assumed a dual role of observer and participant. As observer, I assumed the role of data collection instrument during implementation of both the pilot and main studies. As participant, I assumed the role of designing the interventions in collaboration with both facilitators but also facilitated the conceptual (theory) knowledge required to support implementation in both interventions (this is explained further in Chapters 6 and 7 respectively). I purposefully opted not to facilitate the procedural knowledge aspects of interventions in order to maintain objectivity and not introduce biases that could jeopardise the study. Hence, my primary role was that of observer and data collection instrument.
2.8 DATA COLLECTION METHODS

2.8.1 Overview

As was seen in Table 2.2, scholars advocate for multiple data collection methods within qualitative research in order to achieve richness (Creswell, 2014; Flick, 2014; Yin, 2011). This study employed multiple data collection methods in order to address the overarching research aim, question and objectives of the inquiry. Moreover, multiple data collection methods allowed for interpretation of meaning from different perspectives hence further enriching the use of qualitative research within DBR. In the following sub-sections, I deliberate on the data collection methods deployed by stating which methods were used, why they were selected and how they were applied in the context of this study.

2.8.2 Data collection methods for Phase 1

As noted in section 1.13 and illustrated in Table 1.1, Phase 1 was further sub-divided into five sub-phases. As such, discussion in this sub-section is structured in the same way.

2.8.2.1 Desktop research method

Phases 1A, 1B, 1C and 1D employed desktop research as a method of data collection. This was aimed at reviewing scholarship in order to guide the design of the FD education interventions. Blaxter, Hughes and Tight (2006:65) postulate that desktop research is dissimilar to fieldwork research in that the former is done at the researcher’s desk whereas the latter is a process that necessitates that the researcher goes out into the field. Blaxter et al. (2006:65) confirm that literature and internet searches are forms of desktop research. The implication here is that desktop research is neither empirical nor original but that it draws on secondary research. Given (2008:803) confirms that secondary information has been compiled by someone else hence it pre-exists for researchers to use.

22 Blaxter et al. (2006:65) refer to it as desk research but for the purpose of consistency, I call it desktop research.
For Phase 1A, I developed a personal philosophy of fashion design praxis (see Chapter 3) by reviewing Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design as a point of departure. In addition, desktop research also entailed investigation of Carl Mitcham’s (1994) philosophical framework for the four modes of manifestation of technology. Developing a personal philosophy of fashion design praxis was first necessary as it acted as a framework for Phase 1C.

Phase 1B, meanwhile, entailed desktop research aimed at reviewing HCD scholarship with the purpose of defining the underlying design principles of HCD. Through extensive literature review, I defined a set of 24 tentative design principles with respect to HCD, which served to direct the design of the pilot study (refer to Chapter 3). Following this, Phase 1C entailed review of scholarship around my personal philosophy of fashion design praxis as evident in literature pertaining to general design and professional fashion design. Based on this, I propose 34 tentative design principles for fashion design praxis (see Chapter 4) which may help educate students to enter the real-world of the fashion industry. Finally, Phase 1D involved review of scholarship around design education and culminated in the establishment of 32 tentative design principles pertaining to design education pedagogy (DEP).

The tentative design principles defined in Phases 1B, 1C and 1D were used as input into design of the pilot study intervention. In so doing, I draw on Anderson and Shattuck’s (2012:17) argument that DBR requires interventions to be designed based on a set of design principles. However, as noted in sub-section 2.2.3, DBR also requires input from practitioners in real-world settings. As such, discussion now shifts to the data collection methods employed in Phase 1E in which interviews and collection of artefacts were deployed as data collection methods.

2.8.2.2 Interviews as primary method of data collection

Phase 1E included individual and dyadic interviews as the primary method of data collection. The individual interviews aimed at gaining an in-depth understanding of the design process and design methods (positivist, constructivist and dual-mode model) used by the participants, as well as the role of user and extent of user participation in the participants’ fashion design

23As noted in section 1.5.2, the notion of fashion design praxis holistically comprises of constructs pertaining to the way one thinks about and approaches fashion design, the underlying volition, the conceptual knowledge and the actions undertaken within the design process, all of which culminate in a product.
practice\textsuperscript{24}. The dyadic interview aimed at evoking further data from Designer X with respect to the role that users play in the design process and to further explore how HCD unfolds in professional fashion design praxis. Furthermore, the dyadic interview offered an opportunity to elicit the views of User X in an attempt to explore and understand his/her specific role and active involvement in the design process activities carried out by Designer X.

Silverman (2014:43; 169; 173) expresses the view that interviews are commonly used in qualitative research to capture what happens in real-world settings but cautions that its purpose depends on the underlying research paradigm. Silverman (2014:173) goes on to argue that positivists use interviews to access factual information, naturalists to gain insights about peoples’ experiences and constructivists to mutually construct meaning around issues. In light of this, interviews serve multiple purposes in different research paradigms. However, Creswell (2014:190) suggests that open-ended questions are a primary characteristic of qualitative interviews. Since this study is grounded in an interpretive paradigm, interviews were used to explore and understand a situation through interpretation and socially-constructed meanings that represent individuals’ realities.

This study used individual, face-to-face, semi-structured interviews and one face-to-face, semi-structured dyadic interview. Face-to-face interviews were selected based on scholarship that argues that this form of data collection is generally carried out face-to-face (Babbie & Mouton, 2001; Creswell, 2014). Semi-structured interviews are characterised by real-world description by research participants but with the help of an interview guide that revolves around topical matters and flexible open-ended questions that direct participants (Flick, 2014; Kvale & Brinkmann, 2009; Thomas, 2011). Open-ended questions allow participants to respond as they deem necessary (Babbie & Mouton, 2001:233). Semi-structured interviews permit researchers to follow-up on responses through probing (Kvale & Brinkmann, 2009; Silverman, 2014; Thomas, 2011). Probing aims for in-depth data and allows participants to lead conversations and researchers to follow up on issues as they emerge (King & Horrocks, 2011:25; 53). This way of interviewing culminates in an engaged conversational style between researcher and participant (Yin, 2011:134). Based on these characteristics, I chose semi-structured interviews because it was appropriate to the line of inquiry: it allowed for identification of some guiding,

\textsuperscript{24} As noted in section 1.5.2, practice is the ‘know-how’, or application, of the dimensions of fashion design praxis.
open-ended questions, but also for engagement of participants in conversation and probing for clarification in the attempt to obtain in-depth data.

I conducted individual, face-to-face, semi-structured interviews with two professional fashion designers (Designers X and Y, respectively) in their natural setting. Based on the purpose of these interviews, as outlined earlier in this sub-section, I drafted a line of inquiry, as a guide, with some open-ended semi-structured questions (see Addendum A). The interviews commenced by asking if participants had any questions or concerns regarding informed consent. Subsequently, I followed a suggestion by King and Horrocks (2011:55) to commence with descriptive questions that segued into a two-way, engaged conversation that, without leading the participants, probed the participants’ views in a non-judgemental way, and allowed for clarification and the collection of rich information. This was done in order to cultivate a sense of trust and rapport with the participants, as suggested in the literature (King & Horrocks, 2011; Silverman, 2014). These interviews lasted approximately 25 minutes until a point of data saturation was reached. Saturation occurs when no new information emerges (Given, 2008:195).

In addition, I conducted one face-to-face, semi-structured dyadic interview with Designer X and User X. Dyadic interviews bring two participants together in one interview session (Morgan, Ataie, Carder & Hoffman, 2013:1276-1277) as opposed to focus groups that comprise of approximately six to ten people in one sitting (King & Horrocks, 2011; Silverman, 2014). Dyadic interviews allow for more in-depth data collection as participants lead the dialogue, and recall and reconstruct information that may have been otherwise disremembered (Morgan et al., 2013; Flick, 2014). Moreover, Flick (2014:243) posits that such a form of data collection has the potential to contextualise interaction between participants.

A dyadic interview was chosen so that both participants could steer the conversation and prompt each other for more in-depth data that Designer X may have otherwise overlooked in his/her individual interview. This interview was conducted around a few pre-determined topics but also adhered to the recommendation of Flick (2014:243) for the interviewer to merely act as mediator. In this way, I created the opportunity for an engaged conversational style between the participants without assuming a leading role. In doing so, User X evoked memories that allowed Designer X to reconstruct and remember information.
The dyadic interview took place in the retail space of Designer X hence his/her natural setting. However, this space was not the natural real-life environment of User X albeit that this participant was familiar and comfortable with the surroundings being a frequent consumer. Nonetheless, I ensured that User X was comfortable outside his/her natural environment by making sure that both participants had equal opportunity to express their views without much intrusion from myself but at the same time probing them in a non-judgemental or leading manner. The interview lasted 25 minutes. In addition to these interviews, artefacts were collected as a secondary form of data collection.

2.8.2.3 Artefacts as the secondary method of data collection

A secondary method of data collection in Phase 1E entailed collection of artefacts (also known as visual data) for empirical purposes. Artefacts comprise of, for example, photographs, videos, film, objects and drawings (Banks, 2009; Hatch, 2002; Silverman, 2010; 2014). Visual data has two very distinct methodological purposes. Banks (2009:6) argues that the first purpose is to create images for documenting social reality, and provide evidence in final documents. Prosser (2011:479) corroborates this by stating that researchers generate and use images for empirical purposes to construct linkages between visuals, trustworthiness and contextualisation. The second purpose stems from the fact that the nature of the research project is symbolic and visually oriented in that the gathering of visual material allows researchers to analyse the meanings attached to visual data (Banks, 2009; Prosser, 2011).

Considering the fact that this study was not visual in scope, I primarily deployed the first purpose and used artefacts, in the form of self-created photographs for three main reasons. Firstly, photographs served the empirical purpose of capturing the social reality of both fashion designers with respect to what they actually did when engaging in design process activities. Secondly, talk and text could not capture the true reality of these fashion designers’ design process activities. Thirdly, photographs served the empirical purpose of comprehensive evidence for trustworthiness and for contextual narration in this study.

I observed the design journals (notebooks) of both Designers X and Y as well as concept boards in the case of the former. I photographed approximately 45 visuals in order to capture the activities executed by these fashion designers during the conceptualisation stage of the design
process (some of these photographs are included as comprehensive evidence within Chapter 5).

2.8.3 Data collection methods for the pilot study

The pilot study utilised participant observation and self-administered, open-ended questionnaires as primary instruments for data collection, and collection of artefacts as a secondary method of data collection. In the sub-sections that follow, these data collection methods are further contextualised.

2.8.3.1 Participant observation

Qualitative observation is undertaken in order to observe human behaviour and activity in natural settings (Angrosino & Rosenberg, 2011; Creswell, 2014). Hatch (2002:72) contends that observation is valuable because researchers’ first-hand experiences allow for inductive discovery and a better understanding of social situations. Angrosino and Rosenberg (2011:467-470), writing about ethnographic research, promote classical, naturalistic, unobtrusive, objective observation using standardised, systematic methods of recoding data against contemporary subjective types with researchers assuming a participatory role and immersing themselves in the research settings with informed consent. Qualitative observations are carried out in the natural, real-world settings in which human behaviours and activities unfold, although the observational methods may differ. Flick (2014:308) posits covert versus overt and non-participation versus participation as dimensions for researchers to consider in observation methodology.

The notion of non-participant versus participant observation is problematic because there are varying degrees of participation and these have ethical implications. On the one hand, there is fully-immersed participation and, on the other end of the spectrum, lies the complete observer (Babbie & Mouton, 2001:293-296). Yin (2011:122) states that four types of observers exist: researchers can be merely participants or merely observers, or they can be participants who also observe or observers who also participate. Creswell (2014:191) draws attention to the observer as a participant and the participant as an observer, where observation is secondary in the latter situation.
In light of this, I opt for participant observation with observer being the primary role and participation as secondary. This is because I assumed the role of designing the interventions, and facilitating the theory sessions but not the practical (procedural knowledge) aspects thereof; hence, observation was the primary goal. However, my participatory role allowed immersion into the participants’ social and natural setting. In my participant capacity, I was able to walk around the studios and occasionally, but unobtrusively, pose questions to facilitators and students. In this way, I could engage with the natural teaching and learning environment whilst observing and understanding how the activities of a HCD process unfold. However, to align with stated ethical considerations and Flick’s (2014:308) covert versus overt dichotomy, these observations were conducted overtly with informed consent obtained from both facilitators and students (see Table 2.7).

The observations served the purpose of exploring and documenting the design-related activity tasks (ATs) and prototype evaluation stages of the design process as executed by students, and the manner in which these actions unfolded in a way that incorporated the design principles of HCD. However, I do note that I did not observe the technology-related ATs of pattern making and sewing of the prototype. As such, these observations were on specific student actions thus corresponding with Angrosino and Rosenberg’s (2011:468) contention that focused observation entails well-defined types of activity. However, observation also aimed at documenting unforeseen, emergent issues such as student attendance, punctuality or non-engagement with a HCD approach. To support this observation, artefacts were collected as a secondary form of data.

2.8.3.2 Artefacts

I collected artefacts in the form of self-created photographs that served to capture the observed social reality of students with regard to the executed HCD ATs, how these actions unfolded in the design process and the manner in which students engaged with the approach. In this way, photographs were used as evidence to support my interpretations and ensure trustworthiness (refer to Chapter 6 for the pilot study photographs). Approximately 150 photographs were taken during these participant observation sessions. In addition, to obtain the views of students and facilitators, self-administered, open-ended questionnaires were also employed.
2.8.3.3 Open-ended questionnaires

This inquiry also involved the use of self-administered, open-ended questionnaires to elicit information from both students and facilitators. Babbie and Mouton (2001:239) claim that questionnaires are often associated with survey research but they are widely used in social research design. Similarly, Thomas (2011:165) states that questionnaires can serve the purpose of exploring participants’ viewpoints about a topic of investigation.

Questionnaires can be designed to include closed or open questions with the latter directed towards exploration of feelings and attitudes (Thomas, 2011:165). I opted for open-ended questions so that participants could express their feelings and views in a way that they deemed fit. The questionnaire was self-administered in that, as Babbie and Mouton (2001:258) state, respondents completed the questionnaires by themselves.

I collected 24 self-administered, hard-copy questionnaires from students and electronic questionnaires from the two FD facilitators (refer to Addendum B for the facilitator questionnaire). To inform refinement and design of the main study, the pilot questionnaires served a four-fold purpose. Firstly, the student questionnaire aimed at ascertaining the main effects of the HCD approach and the underlying tentative design principles on FD education, as implemented in the pilot study. Secondly, the facilitator questionnaire aimed at determining the holistic effects (impact or outcomes) of the implementation of a HCD approach on FD education. Thirdly, following Babbie and Mouton’s (2001:239; 244) suggestion, the questionnaires served as pre-testing to check if questions were worded correctly and if they would yield accurate data and prevent confusion or ambiguity on the part of participants. Fourthly, the pilot questionnaire served to determine if questionnaires were indeed able to yield rich, thick data.

The student questionnaire contained 24 open-ended questions that were designed to correspond with the 24 design principles of HCD. At the end of the first intervention, students completed the questionnaire over a duration of approximately 45 minutes. Electronic questionnaires were distributed to facilitators (refer to Addendum B) for their completion, hence the time-span for completion is unknown. Based on their use in the pilot study, one instrument was amended in the subsequent main study.
2.8.4 Data collection methods for the main study

2.8.4.1 Retrospective analysis on data collection instruments

Based on the pilot study, I was able to reflect on the data collection instruments. In retrospect, the facilitator questionnaire was flawed because it did not allow opportunity to probe for clarification. Moreover, facilitators’ responses were wide-ranging and did not elicit data pertaining to the main effects of each of the 24 tentative design principles implemented as part of a HCD approach. Secondly, it was important to obtain information on participants’ overall experiences and, for this reason, the facilitator and student instruments were refined such that they included an overarching question pertaining to participants’ holistic experience of a HCD approach to FD education.

As such, the main study continued with open-ended, semi-structured student questionnaires as a primary data collection method. The data collection method for facilitators changed, as face-to-face, individual, semi-structured interviews were identified as a preferable method as this would allow opportunity to ask probing questions. In addition, participant observation continued as a primary data collection instrument, and the collection of supporting artefacts as a secondary method.

2.8.4.2 Participant observation and collection of artefacts

I employed participant observation in an identical manner and serving the equivalent purpose as was the case in the pilot study (see sub-section 2.8.3.1). In addition, artefacts were collected in the form of self-created photographs for the same purpose and in an identical manner as described in sub-section 2.8.3.2 (refer to Chapter 7 for discussion of these photographs), with the exception that approximately 276 photographs were taken. In addition, open-ended questionnaires were administered with students.

2.8.4.3 Open-ended questionnaires

Self-administered, open-ended, hard-format questionnaires (see Addendum C) were conducted with 23 students in their natural environment. The questionnaire was refined to serve a two-fold purpose. Firstly, it aimed at ascertaining the main effects of the HCD approach and the
underlying, refined 12 design principles for FD education as applied in the main study. Secondly, it aimed to explore students’ holistic personal experiences regarding implementation of a HCD approach within FD education. As such, the questionnaire contained 13 questions and took approximately 30 minutes to complete. Of these 13 questions, 12 of them revolved around the main effects of a HCD approach and the underlying, refined 12 design principles for FD education, and one question pertained to their personal experience of a HCD approach. The same line of questioning was used in the facilitator interviews.

2.8.4.4 Individual interviews

Regarding the facilitators, I conducted individual, face-to-face, semi-structured interviews with the two facilitators involved in the design and implementation of the main study. These interviews served a two-fold purpose. Firstly, they aimed at ascertaining the views of facilitators pertaining to the main effects of a HCD approach and the underlying, refined 12 design principles for FD education. Secondly, the interviews aimed to explore and describe the facilitators’ experiences regarding the implementation of a HCD approach within FD education. Considering these purposes, I developed a line of inquiry (refer to Addendum D) in the form of an interview guide with open-ended, semi-structured questions. I began the interview by thanking facilitators for their participation and queried if they had any questions. Following this, the discussion followed the format of a two-way, engaged conversation in which, without leading the participant, probing questions were asked in a non-judgemental way in order to get further clarification and information when needed.

The first interview was conducted in the facilitators’ natural setting and lasted approximately 32 minutes before a point of data saturation was reached. On the other hand, the second facilitator put forward a formal written request to be interviewed at my natural setting for three main reasons: it was more convenient for the participant, my natural setting was within a close proximity, and the participant’s natural setting was not conducive for an interview. To ensure that this particular participant was as comfortable as possible outside his/her natural setting, I transported the facilitator to and from my location and created a comfortable environment. This interview lasted approximately 60 minutes. The interviews were recorded, transferred and securely stored as described in the next sub-section.
2.8.5 Data recording, transfer and security methods

This sub-section draws on scholarship to elucidate the methodologies used to capture the empirical data collected in this study. Silverman (2010; 2014) recommends that interviews be captured with a recording device, and transcribed with inclusion of non-verbal sounds and pauses. This implies that interviews be transcribed verbatim to translate talk into text. For observations, scholars suggest that what is observed should be recorded in some form of observational schedule with the aid of open-ended field notes that are subsequently converted into an electronic format (Creswell, 2014; Yin, 2011). For visual material, Creswell (2014:197) suggests a cataloguing system. These methods were all applicable to this study but there is still a need, as Yin (2011:173) brings to light, to ensure the safety and security of data. In light of these recommendations, several methods were implemented to capture, transfer and safely store empirical raw data, as is summarised in Table 2.5.

From Table 2.5, it is evident that multiple methods of data collection necessitated different tools and methods for capturing, transferring and securing the raw data. In the same light, transferring data from talk to text and from hand-written to electronic formats entailed verbatim transcriptions, optical scanning of material and typing out of self-generated field notes. In doing so, raw data were prepared for systematic analysis as explained in the section that follows.

Table 2.5: Empirical data capture, transfer and security methods

<table>
<thead>
<tr>
<th>DATA COLLECTION METHOD</th>
<th>DATA CAPTURING METHOD</th>
<th>TRANSFER AND SECURITY METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-structured interviews</td>
<td>All interviews were captured with a digital recorder</td>
<td>All digital audio recordings were downloaded onto multiple external hard drives (MEHDs), saved with a password protect code (PPC) and safely stored at my living space. Audios on the digital recorder were deleted once transferred. For Phase 1E, I personally transcribed all three interviews; however, for the main study, interview transcriptions were commissioned to a professional transcription service provider.</td>
</tr>
<tr>
<td>Artefacts (photographs)</td>
<td>Photographs were captured with a high mega-pixel mobile camera</td>
<td>All images were transferred from the mobile device onto MEHDs and stored at my living space. Photographs were deleted from the mobile device.</td>
</tr>
</tbody>
</table>

Table 2.5 continues on next page
An observational schedule was developed (see Addendum E, for example) to document specific design process activities and, at the same time, to record other emerging issues during the interventions. Observations were recorded by way of hand-written field notes generated and compiled by myself for the duration of both interventions.

Electronically, observational field notes were typed using MS Word. Electronic documents were saved on MEHDs with a PPC and stored at my personal living space. All hard copies are stored under lock and key at my personal living space.

Electronic questionnaires were saved on MEHDs with a PPC and stored at my personal living space. Student questionnaires were optically scanned in PDF formats and transferred onto MEHDs, saved with a PPC and stored at my personal living space. Hard copies are stored under lock and key at my personal living space.

### 2.9 DATA ANALYSIS

#### 2.9.1 Contextualising data analysis

Data analysis involves separating data into segments and then arranging these together (Creswell, 2014; Stake, 2008). As such, it is a systematic process of synthesis entailing a search for patterns and regularities in the data and trying to make sense of why these exist (Bernard & Ryan, 2010; Stake, 2008). The notion of sense-making occurs in Flick’s (2014:370) discussion of the aim of data analysis, namely:

... to make statements about implicit and explicit dimensions and structures of meaning making in the material and what is represented in it. Meaning making can refer to subjective or social meanings. Often qualitative data analysis combines rough analysis of the materials (overview, condensation, summaries) with detailed analysis (development of categories or hermeneutic interpretations). Often the final aim is to arrive at statements that can be generalised in one way or the other by comparing various materials or various texts or several cases.
Data analysis involves segmenting raw collected data into chunks and synthesising these in order to create and assert implied meaning that is not directly expressed or explicitly communicated. However, to analyse data, researchers need to make two underlying decisions. First, they need to select a method of analysis that aligns with the research scope, question and paradigm (Babbie & Mouton, 2001:490). Second, they need to decide whether to execute the analysis manually or through Computer-Aided Qualitative Data Analysis software (CAQDAS) (Bernard & Ryan, 2010; Creswell, 2012; Saldaña, 2016). In this study, I opted for a constant comparative method of analysis and to predominately use CAQDAS.

Although the constant comparative method of data analysis emerged for grounded theory, it is widely used in qualitative research even though the research scope might not necessarily involve theory building (Merriam, 2009:175). Scholars concur that constant comparative analysis is an inductive process that necessitates that data first be fractured by comparing units of data in the search for patterns and then moved into categories (Babbie, 2008; Merriam, 2009). In light of this, I selected constant comparative method of analysis so that the raw data could be broken down into units of information, compared for recurring patterns and then moved into categories for meaning creation.

2.9.1.1 Software for data analysis

Several CAQDAS software packages, such as Atlas.ti, NVivo, MaxQDA, HyperRESEARCH and Transana, exist to assist qualitative researchers analyse large amounts of data (Babbie & Mouton, 2001; Creswell, 2012; Flick, 2014; Saldaña, 2016). Although CAQDAS is a valuable tool for qualitative analysis, it has received some criticism. One of the major oppositions to CAQDAS is that qualitative research is about understanding a situation and meaning creation but that computers do not know the meaning of words (Babbie & Mouton, 2001:503). Likewise, Flick (2014:471) remarks that CAQDAS has the ability to distance researches from the actual analytical work of reading, understanding and reflecting on textual material. Although I acknowledge these criticisms, for this study, Atlas.ti was predominately used due to its accessibility through a university licence and the availability of training opportunities for postgraduate students. As identified in the literature (Friese, 2014; Smit, 2002), Atlas.ti facilitated the process of creating meaning and analytical reflection through deployment of various tools and functionalities, including those listed below.
• Creation of hermeneutic units for each research phase
• Managing different data sets
• Storing, organising and managing databases
• Search and retrieval for contextualisation
• Coding segments of texts and overlapping codes where necessary
• Creating relationships between codes, categories and themes
• Attaching memorandums to coded texts
• Generation of graphical networks
• Export of themes, codes, quotations and memos to MS Word for peer investigation.

Although Altas.ti was used, it was only used to analyse the data obtained in Phase 1E and in the main study. Due to a period of restricted internet connectivity that was beyond my control, data from the pilot study was analysed manually and I saw no reason to re-analyse the data with Atlas.ti once connectivity was restored. However, manual execution of data analysis followed the same procedure outlined below.

2.9.2 Execution of data analysis

Systematic data analysis in this study was grounded in Creswell’s (2012; 2014) step-by-step, “bottom-up” model for qualitative data analysis as well as in Saldaña’s (2016) coding manual. I selected Creswell’s model because it provides a step-by-step guide for data analysis that takes place in an iterative manner in which collection of data and coding for themes and descriptions occur simultaneously. Saldaña’s (2016) guidance was used because it provides comprehensive coding methods that could be employed in this study.

According to Creswell (2012; 2014), the first step in data analysis involves organisation and preparation of collected raw data through, for example, transcription, optical scanning and typing out of field notes. Table 2.5 has already outlined the methods used for organising raw data and preparing it for analysis. In addition, as indicated in Table 2.5, raw data management methods were used, including electronic categorisation, storage and retrieval systems. In addition, the transcribed interviews were read several times in conjunction with the audio recordings to ensure accuracy.
Creswell (2014:197) then recommends that the raw data be read and re-read to get a general sense of what participants are saying. Based on this, as data collection unfolded, I read the data several times in order to get close to the data and to establish a set of pre-determined open codes, categories and themes evident in the data. Babbie and Mouton (2001:492-493) assert that pre-determining codes are generally drawn from the literature but can also be generated by looking for words or phrases in the data.

Creswell (2014:197) identifies the subsequent step in analysis as coding of raw data. However, there is debate in the literature as to how coding unfolds. It is generally agreed that analysis begins with coding words, phrases or even segments of data (Creswell, 2014; Saldaña, 2016) and then assigning it with what Saldaña (2016:4) refers to as a code. The debate arises where scholars remark that researchers code for themes (Bernard & Ryan, 2010; Creswell, 2014). However, Saldaña (2016:14) rejects this in a “streamlined codes-to-theory” model (refer to Figure 2.2) that argues that themes emerge as a consequence of codes, categories and systematic reflection that all lend themselves to theory development. This implies that a category is made up of what Saldaña (2016:14) refers to as a cluster of codes. Raw data are assigned codes, which are then clustered into categories and, from this, a theme emerges. However, it is possible that themes can be pre-determined, based on review of the literature, or based on the research aim, question and objectives of a study.

For this study, analysis predominately followed Saldaña’s (2016:14) “streamlined codes-to-theory” model as visualised in Figure 2.2 but pre-determined codes, categories and themes were established based on the overarching research purpose, question and objectives of the present study. These themes included activities in the design process and the effects of the underlying design principles of HCD for FD education. In the same light, each of the design principles of HCD became a pre-determined category.

In this study, data collection and coding transpired concurrently because the findings from each phase of the research informed the next. As promoted by Saldaña (2016:68; 234), data analysis unfolded in first and second coding cycles with the former aiming at initial data coding and the latter on a higher conceptual level aimed at integrating, linking, synthesising and conceiving categories for thematic interpretation.
2.9.2.1 First coding cycle

For the first coding cycle, in vivo, open coding and simultaneous coding methods were employed to code all data sets. In vivo coding is a method that draws on participants’ verbatim words or phrases (Saldaña, 2016:97; 105) while open coding entails the labelling of codes to fragment data into concepts and categories and then tagging segments of texts with that code (Corbin & Strauss, 2008; Smit, 2002). Simultaneous coding is when two or more codes are applied to the same data segment (Saldaña, 2016:94). In Vivo coding was selected in order to code participants’ actual words, phrases or sentences. Open coding was essential for this study because firstly, the design process could be fractured into its respective stages and secondly, because each design principle of HCD could be used as a concept, allowing the data segments to be clustered as a category. Simultaneous coding was used because initial readings of the raw data revealed that, in some instances, multiple meanings were evident.

The first coding cycle unfolded with the formation of colour coded, pre-determined open codes corresponding to the pre-set themes and categories. In this situation, open codes categorised descriptions of design activities associated with each stage of the design process. In doing so,
I implemented Creswell’s (2014:199) fourth step of analysis in which researchers code for detailed descriptions about cases and use such codes as categories or themes. In the same way, but explicitly related to the teaching and learning interventions, two open codes, categorised as positive and negative effects, were developed in parallel for each of the design principles of HCD. Addendum F is an example of this first coding cycle.

I read each data set line-by-line simultaneously highlighting fragments of raw data quotations and assigning a code using either in vivo, open or simultaneous coding methods. However, simultaneous coding was restricted to cases where data segments held multiple meanings and could meaningfully be included in two categories. As the process unfolded, supplementary free open codes arose due to recurring patterns. On completion of the first cycle of coding, all codes and quotations were read in context to verify the accuracy of the coding and simultaneous codes were specifically unlinked and re-assigned with existing codes once I decided on the meaning attached to quotations. In doing so, data and codes were prepared for the second coding cycle.

2.9.2.2 Second coding cycle

The second coding cycle involved axial and selective coding. However, as Friese (2014:20) notes, this did not mean that data was coded again. Corbin and Strauss (2008:199) advocate that axial and open coding cannot be separated because the latter breaks down data into concepts whereby the former puts the data back together by connecting concepts together. Likewise, scholars concur that axial coding links the dimensions and properties of a category together (Boeije, 2010; Charmaz, 2014). On the other hand, selective coding involves looking for connections and integrating categories (Boeije, 2010:114). As such, Saldaña (2016:250) postulates that selective coding is a stage in the analysis in which categories are systematically clustered into themes or core categories.

In light of this, this study employed two techniques of axial coding. Firstly, to reduce and unclutter code lists, coded quotations were compared and merged based on Friese’s (2014:95) recommendation of fusing two or more codes that essentially have the same meaning but may have been labelled differently. Secondly, codes were compared and linked where attributes and concepts related to the same category but also where contradictions were evident. In doing so, coding saturation was reached before moving onto selective coding.
Selective coding manifested itself in two ways and with a two-fold purpose. To achieve the first purpose, codes were compared and clustered together into categories and sub-categories where applicable (known as a code family in Atlas.ti). At this point, tentative categories were finalised and re-named where deemed necessary (Addendum G is an example of this second coding cycle). To fulfil the second purpose, categories were then grouped into main research themes (known as super families in Atlas.ti) thus concluding the coding process and constant comparative method of data analysis.

The conclusion of the coding process set the stage for the fifth step of Creswell’s (2014:200) bottom-up model concentrating on the manner in which descriptions and themes are presented. Creswell (2014:200) recommends conveying findings through narrative and visual material. I did this by narrating the findings such that they aligned with the main research themes that emerged from the coding cycles. Figures 5.1, 6.1 and 7.2 visualise these main research themes and categories in order to narrate the findings. To support this narration, photographs are presented to contextualise descriptions of the design process activities within professional fashion design praxis and in FD education.

Making interpretations is the final step in Creswell’s (2014:200) model; in this step, the researcher offers individual interpretations based on their culture, experiences and history in order to create meaning from the data. Creswell (2014:200) remarks that researchers could draw on literature on the topic of study to narrate the findings. As such, to narrate the findings of the present study, I drew on my personal experiences as a FD educator to interpret meaning and supported my interpretations with literature and raw data quotations as a means to ensure trustworthiness.

2.10 METHODS FOR TRUSTWORTHINESS

Terminology such as credibility, transferability, dependability, conformity, trustworthiness and authenticity are favoured for an interpretive constructivist paradigm (Denzin & Lincoln, 2011a; 2011b:13; 92). Then again, scholarship suggests that classifications of validity and reliability are also associated with qualitative research (Babbie & Mouton, 2001; Creswell, 2014:201). Reliability is ordinarily depicted as dependability, data collection consistency, repetition in analysis and interpretation that generates the same results on every occasion (Babbie, 2008; Given, 2008). Validity (trustworthiness and authenticity), on the other hand, is about the
“goodness or quality criteria” of a research project and the empirical measures undertaken to reflect interpretation and meaning creation around a phenomenon (Babbie, 2008; Lincoln, Lynham & Guba, 2011:99). Many scholars recommend methodological triangulation, member-checking, peer investigation, providing rich and thick description of the findings, clarifying any bias and maintaining a quality assurance or audit trail system as methods to ensure trustworthiness (Babbie & Mouton, 2001; Creswell, 2014; Golafshani, 2003; Merriam, 2009; Mouton, 2001; Van Niekerk, Ankiewicz & De Swardt, 2010). Table 2.6 illustrates the trustworthiness methods used in this study and the ways in which they were applied.

Table 2.6: Methods and application of trustworthiness

<table>
<thead>
<tr>
<th>METHOD</th>
<th>APPLICATION</th>
</tr>
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</table>
| Triangulation           | • Triangulation was achieved through multiple methods of data collection. For Phases 1A, 1B, 1C and 1D, a desktop method was employed. For Phase 1E, individual and dyadic face-to-face, semi-structured interviews were employed as primary methods and collection of artefacts as a secondary method. For Phases 2 and 3 (the pilot study), participant observation and self-administered, open-ended questionnaires were utilised as primary method of data collection, and artefacts as a secondary method. Phases 4 and 5 (the main study) employed participant observation, self-administered open-ended questionnaires and face-to-face individual semi-structured interviews as primary methods of data collection and collection of artefacts as a secondary method.  
• Triangulation of multiple sources of data was further achieved by cross-checking participant observation in the pilot and main studies, that is, at different times. Moreover, data was empirically collected from multiple participant sub-sets allowing for different perspectives.  
• Triangulation through member-checking was achieved by granting participants the opportunity to validate the accuracy of personal interview transcriptions. In the same way, participants were given an opportunity to review the emerging findings and validate accurate interpretation of data through follow-ups. In the educational context, the emerging findings were taken back to facilitators for discussion and feedback. |
| Use of peer investigators | All raw data, analysis codes, categories, research themes and emerging findings were forwarded for external peer validation by an experienced researcher and design educator. This was done for objective verification and feedback with respect to accurate data analysis, categorisation, thematic structuring and interpretation (refer to Addendum H for peer investigator report pertaining to the main study). Peer review suggestions were given consideration and incorporated into the final report. |

Table 2.6 continues on next page
<table>
<thead>
<tr>
<th>Using a rich, thick description to convey findings</th>
<th>The report entails detailed descriptions of participants’ natural setting. In the same light, the findings are narrated within categories and research themes to convey rich, thick descriptions and incorporate multiple perspectives on the same situation. Moreover, the findings are crafted such that they include raw data extracts to support interpretation, meaning creation and convey rich, thick description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report on negative responses</td>
<td>The report is narrated in a way that includes contradictory views evident within the raw data</td>
</tr>
<tr>
<td>Maintaining an audit trail</td>
<td>Throughout the study, a methodological audit trail was maintained electronically and through self-generated, hand-written journal entries. This audit trail recorded the following information:</td>
</tr>
<tr>
<td></td>
<td>• All meeting dates with facilitators, discussion points and feedback concerning the design and implementation of the interventions were recorded by way of journal entries</td>
</tr>
<tr>
<td></td>
<td>• All facilitators’ email communication with respect to the iterative design of both interventions were stored in electronic folders</td>
</tr>
<tr>
<td></td>
<td>• In the event of data collected via interviews, all email communication pertaining to the invitation to participate, information disclosures, informed consent sheets, interview transcriptions, and interview dates and locations were stored electronically</td>
</tr>
<tr>
<td></td>
<td>• Participants’ follow-up communication regarding review of the emerging findings were stored in electronic folders</td>
</tr>
<tr>
<td></td>
<td>• Peer investigator emails, reports and comments are also stored electronically</td>
</tr>
<tr>
<td></td>
<td>• Memos about pre-determined codes and categories were recorded</td>
</tr>
<tr>
<td></td>
<td>• Raw data management through electronic categorisation, storage and retrieval was undertaken</td>
</tr>
<tr>
<td>Cross-checking data to determine if it yields the same results</td>
<td>Every effort was made to cross check data to ensure that correct codes were assigned, that codes were clustered into the right categories and that categories were organised into accurate research themes</td>
</tr>
<tr>
<td>Clarify any bias at the onset of the study</td>
<td>At the beginning of the research, my biases and several years of experience as a FD educator were clarified. Against this backdrop, retrospective analysis was carried out on both interventions. In the same way, I reflected on the findings and interpreted them through my particular lens as a FD educator</td>
</tr>
</tbody>
</table>

Table 2.6 shows that trustworthiness was developed in a systematic and methodical manner in order to ensure and maintain quality and academic rigour. Moreover, any form of research necessitates that a study be conducted in an ethical manner, to which the current discussion now turns.
2.11 ETHICAL CONSIDERATIONS

Qualitative researchers cannot disassociate from ethical issues given the participation of people (Silverman, 2010:152). Regardless of the project nature, research in general mandates ethical considerations when researchers engage with human beings, animals and the environment (Babbie & Mouton, 2001; Creswell, 2014). Babbie and Mouton (2001:257) suggest that ethical issues come forth because researchers have a responsibility to society and should be accountable such that they “conduct their craft in a socially responsive and responsible manner”. Several norms for ethical research have been identified but I align myself with the guidelines put forward by scholars (Babbie & Mouton, 2001; Creswell, 2014; Silverman, 2010), as outlined in Table 2.7, which summarises ethical guidelines and illustrates how these guidelines were applied in the present study.

Table 2.7: Ethical considerations and application

<table>
<thead>
<tr>
<th>GUIDELINES</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ETHICAL CONSIDERATIONS FOR A RESEARCH PROBLEM</strong></td>
<td></td>
</tr>
<tr>
<td>Identify a problem that benefits participants</td>
<td>This inquiry explores an alternative to traditional design with the overarching aim of identifying, exploring and outlining a HCD approach within FD education at a HE level</td>
</tr>
<tr>
<td><strong>ETHICAL CONSIDERATIONS PRIOR TO CONDUCTING THE STUDY</strong></td>
<td></td>
</tr>
<tr>
<td>Ethical clearance obtained prior to conducting the study from:</td>
<td>This research study was conducted with ethical clearance number 2017-007 from the relevant Faculty Ethics Committee Review board (refer to Addendum I). In addition, a written application for informed consent was put forward to the FD department in order to gain access to the educational site and participants. Informed consent was granted without any conditions. In the case of professional fashion design praxis, Designer X acted as gatekeeper and granted permission to access User X</td>
</tr>
<tr>
<td>- Faculty Ethics Committee Review board</td>
<td></td>
</tr>
<tr>
<td>- Approval from gatekeepers</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.7 continues on next page
<table>
<thead>
<tr>
<th><strong>INFORMED CONSENT</strong></th>
<th>Participants were identified and invited to participate in this research endeavour. They completed written information disclosures that outlined:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Clearly state the purpose of the study</td>
<td>▪ the background of the study and nature of the research</td>
</tr>
<tr>
<td>▪ Informed consent from participants</td>
<td>▪ the intentions of the research project</td>
</tr>
<tr>
<td></td>
<td>▪ the research procedures, including the data collection methods, analysis techniques, and safety and security of data</td>
</tr>
<tr>
<td></td>
<td>▪ the potential risks and benefits of the study</td>
</tr>
<tr>
<td></td>
<td>▪ the procedures for maintaining confidentiality</td>
</tr>
<tr>
<td></td>
<td>▪ the voluntary nature of participation and possibility of withdrawal</td>
</tr>
<tr>
<td></td>
<td>Extra care was taken with the FD students to highlight the fact that their participation is voluntary and that their participation (or not) did not present any risk and would not affect their assessment outcomes or results. All participants granted permission to partake in this research by completing a pre-drafted informed consent sheet. Consent was also granted to audio record interviews (where necessary) and to capture photographs. In the case of two minor students, consent was obtained from parents.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ETHICAL CONSIDERATIONS IN DATA COLLECTION</strong></th>
<th>Although HCD is traditionally carried out with users in their capacity as non-designers, in the case of FD education, I ensured that students were not exposed to any harm or potential risks by simulating practice through a role-playing teaching and learning strategy. In this situation, one student assumed the role of the designer and the other the user. In doing so, opportunities were created for students to collaborate in design teams, choosing peers of their own free will and implementing teaching and learning interventions within their natural setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ No harm to participants</td>
<td>Another way of ensuring that no harm came to participant sub-sets was through the disclosure of information and avoiding making unnecessary demands in terms of their time and availability</td>
</tr>
<tr>
<td>▪ Build trust and rapport</td>
<td>I took steps to build rapport with participants by thanking them for their participation and making them feel as comfortable as possible. In the educational environment, I tried to be unobtrusive by merely walking around as teaching and learning unfolded. Where interviews were involved, I gained trust by granting opportunities for participants to lead and direct a reciprocal conversation, avoiding misleading questions and asking probing questions in a non-judgemental manner</td>
</tr>
<tr>
<td>▪ Avoid leading questions</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.7 continues on next page
ETHICAL CONSIDERATIONS IN DATA ANALYSIS AND INTERPRETATION

- Protect the confidentiality of participants
- Provide an accurate interpretation of data from multiple perspectives
- Report on contradictory findings
- Sharing of information
- Safety and security of data

All participants were assigned pseudonyms to protect their identity, culture and gender. Although the name of the department is mentioned, I took measures to conceal its identity by not revealing the SA HEI nor its geographical location. In the event of including photographs in the report, participants’ faces were edited out to prevent identification.

Every effort was made to accurately interpret data and present them without falsification. Interpretation of data was presented through multiple viewpoints and any contradictory findings that emerged were reported. Steps were taken to ensure accurate data analysis and interpretation through external peer validation.

Information was shared with facilitators as input to refine and design the main study. The study was made available to the FD department and participants where requested.

Stringent measures were taken to ensure the transfer, safety and security of data as outlined in Table 2.5. Where applicable, access to audio recordings was granted to one person for the purpose of professional transcription. Raw data and analysis will be retained for a period of five years.

The aforementioned ethical procedures align with my personal meta-physical belief that research be conducted in a rigorous and methodical manner.

2.12 META-PHYSICAL BELIEFS

Metaphysical beliefs pertaining to rhetoric, ontology, epistemology, methodology, and axiology directed this study. Rhetoric involves the person who narrates the research, the research language used and how different voices are brought into the research (Creswell, 2007; Guba & Lincoln, 2005). Ontology involves questions of the nature and reality of the human being in the world and considers the philosophical doctrines of relativism and co-constructed realities (Denzin & Lincoln, 2011a; Lincoln et al., 2011). Epistemology brings into question the association between the inquirer and the researched world but is subjective due to the co-creation of findings by the researcher, as the knower, and participants (Denzin & Lincoln, 2011a; Denzin & Lincoln, 2011b; Lincoln et al., 2011). Methodology is about the manner in which one comes to gain knowledge of the world (Denzin & Lincoln, 2011a:13), while axiology is grounded in the philosophy of values considering matters such as well-being, affection, autonomy and human life (Given, 2008:52). Ethics questions the manner in which
researchers assume a moral role in the world (Denzin & Lincoln, 2011b:91) and the values that
direct the inquiry process and the choices made with respect to, for example, the research
problem, research paradigm, theoretical framework, and context (Lincoln et al., 2011:116). In
Table 2.8, I summarize my meta-physical belief that guide this research endeavour and the
implications thereof for this study.

<table>
<thead>
<tr>
<th>METAPHYSICAL BELIEFS</th>
<th>IMPLICATIONS FOR THIS STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhetoric</td>
<td>I took ownership of the inquiry, making it personal hence opting to write in the first person. In addition, participants’ voices are included in the narrative to support interpretations</td>
</tr>
<tr>
<td>Ontology</td>
<td>I actively engaged in the research process, constructing and interpreting knowledge through the lived experiences of participants and their reality</td>
</tr>
<tr>
<td>Epistemology</td>
<td>I constructed knowledge in a socially collaborative manner through the lived experiences of the participants. In the same light, knowledge was generated through theory</td>
</tr>
<tr>
<td>Methodology</td>
<td>Systematic theoretical formulation and alignment with empirical research engineered a set of guiding design principles leading to the design and implementation of interventions that incorporated a HCD approach within FD education. Actions further unfolded in empirical data collection paving the way for interpretation and further action through rigorous ethical methods to ensure my social responsibility to participants</td>
</tr>
<tr>
<td>Axiology</td>
<td>Due to my intrinsic belief and approach to design praxis in FD education, I took a moral role in educating students to learn how to design with empathy, design with people and become agents of change</td>
</tr>
</tbody>
</table>

My meta-physical beliefs guide the manner in which I view the world and, as such, are an important part of the research design. In the section that follows, I conclude the present chapter by reflecting on the manner in which the purpose of this chapter has been achieved.

2.13 CONCLUSION

In this chapter, I set out to delineate the research design by working on the premise of describing the what, why and how of the present research. In section 2.2, I framed the study within DBR and its goal as aligned with the respective research phases of the study. Thereafter, in section 2.3, I aligned DBR with an interpretive paradigm and justified the selection thereof. Aligning with this paradigm, in section 2.4, a qualitative research approach was outlined,
including justification of its appropriateness to this investigation. Likewise, corresponding with DBR, the discussion then shifted to section 2.5 contextualising the primary and secondary units of analysis and the reason as to why the latter was necessary. Then, in section 2.6, I described how theoretical and empirical data was gathered.

Subsequently, I scoped the research methodology including what methods were used, why they were selected and how they were applied in this study. In section 2.7, I explained the sampling method used, which involved describing purposive sampling and outlining who the participants were and the criteria used to select them. Discussion then focused on the data collection methods (see section 2.8) employed to elicit both theoretical and empirical information. Moreover, I highlighted the methods to record, transfer and preserve the safety and security of data. Subsequently, discussion in section 2.9 shifted to the methodology used to analyse empirical data. I showed how data was coded and moved into categories and research themes for interpretation. The next two sections (sections 2.10 and 2.11 respectively) outlined the procedures employed to ensure research trustworthiness and ethical research practice, the latter aligned with my meta-physical position, as explained in section 2.12. Chapter 3 now moves on to discussion of Phases 1A and 1B of this inquiry in which I develop a personal philosophy of fashion design praxis and review scholarship in order to define the underlying design principles for HCD.
CHAPTER 3
THEORETICAL PERSPECTIVES ON PHILOSOPHY OF DESIGN
AND HUMAN-CENTERED DESIGN

3.1 INTRODUCTION

In Chapter 2, I scoped out the research design that informed this study. Chapter 3 addresses Phases 1A and 1B of the inquiry. Phase 1A involves defining a personal philosophy of fashion design praxis. For Phase 1B, I review literature on HCD with the aim of defining a set of tentative design principles for HCD that can inform the pilot educational intervention that constitutes Phases 2 and 3 of the present study.

To undertake Phase 1A, I ground the study in a philosophy of design that draws from Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design. A philosophy of design is useful, 1) to gain insight about design, 2) to understand what designers actually do, 3) to enable critical reflection and improvement on practice, and 4) for students in design education (Galle, 2002; 2007a). In light of this, and taking into account the research purpose, questions and objectives that guide this study, design theory is an appropriate theoretical positioning for this study.

However, Houkes et al. (2002:303) maintain that a valuable approach to the philosophy of design is to draw on a number of theories, philosophies and concepts. Flusser (2012:18-19) argues that design and technology are closely related constructs. These arguments serve as the rationale for also including theoretical perspectives regarding technology by drawing on Carl Mitcham’s (1994) framework for the four modes of manifestation of technology, which is discussed later in this chapter.

I select theoretical elements from Love’s (2000) meta-theoretical taxonomy of design theory and Mitcham’s (1994) framework to propose a philosophical framework for fashion design praxis, which I then use as a lens through which to structure the literature review in Chapter 4. I acknowledge that Love (2000) refers to it as a meta-theoretical taxonomy and Mitcham (1994) as a philosophical framework but, in this study, I simply refer to them both as frameworks
when juxtaposing them. However, I credit these scholars and refer to it as a meta-theoretical taxonomy as Love intended and a philosophical framework as Mitcham proposed when discussing them in their own right. In the discussion that follows, I motivate the selection of these two frameworks.

3.2 THEORETICAL FRAMEWORKS ON THE PHILOSOPHY OF DESIGN AND TECHNOLOGY

3.2.1 Overview and rationale

In this section, I describe Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design, and Mitcham’s (1994) philosophical framework in respect of the four modes of manifestation of technology and justify my reasons for selecting them.

Love (2000:293-305) critically analyses the problems associated with disarray, coalescence and multiplicity in design theory and puts forward a meta-theoretical taxonomy for general design theory. Galle (2007b) notes that discussion around the philosophy of design emerged in 1979 with the introduction of the journal Design Studies but that, in the first two decades, only a few publications were evident. Galle (2007b) goes on to acknowledge Love’s (2000) contribution to the philosophy of design in the first two decades since the rise of Design Studies. Beccari and Oliveria (2011:15-16) affirm that since Love’s 1998 publication about the socio-environmental and ethical factors of engineering design, Love has attempted to analytically and meta-theoretically develop a unified body of knowledge for an over-arching philosophy of design which investigates design theory, in general, as an entity of study in its own right. Beccari and Oliveria (2011:15-16) go on to claim that when Love, in 2000, developed the meta-theoretical taxonomy of design theory, philosophy of design was a relatively new discipline. Hence, Love’s meta-theoretical taxonomy may have been instrumental in developing a philosophy of design. For this reason, I selected Love’s (2000) meta-theoretical taxonomy for the philosophy of design for use in this study.

Turning to Mitcham’s (1994) four modes of manifestation of technology, Ankiewicz (2018) argues that this framework is gaining popularity in technology education. As such, Mitcham’s 25 Director of the Centre for Philosophy and Design at the Royal Danish Academy of Fine Arts School of Design
philosophical framework sets the backdrop against which to establish principles for curriculum development and evaluation for technology education (Ankiewicz, De Swardt & De Vries, 2006; Ankiewicz, 2015). However, Mitcham’s (1994) philosophical framework of technology is based on the Western technology knowledge system albeit that it was used to combine a Western perspective with indigenous knowledge of technology systems to assist teachers include indigenous knowledge in lesson planning (Ankiewicz, 2016:22; 29). As such, Mitcham’s (1994) technology-related framework was valuable in evaluating technology curricula, lesson planning and classroom pedagogy and may have the same potential for fashion design (FD) education.

In the sub-sections that follow, I describe the Love (2000) and Mitcham (1994) frameworks. Thereafter, I select elements from each of these frameworks to develop my own philosophical framework for fashion design praxis. I begin this discussion with consideration of Love’s (2000) meta-theoretical taxonomy since it serves as a point of departure for the present study.

3.2.2 Love’s philosophy of design

3.2.2.1 Framing Love’s meta-theoretical taxonomy

Figure 3.1 is adapted from and aims to represent Love’s (2000) meta-theoretical taxonomy for classification of the constructs of design theory on four core hierarchical levels, namely: 1) direct perceptions of reality, 2) objects, 3) design process and 4) philosophical matters. In Figure 3.1, these core levels are organised and alpha-numerically coded as direct perceptions of reality (L1), objects (L2), design process (L3) and philosophical matters (L4) respectively. Moreover, Figure 3.1 depicts the core levels of L2, L3 and L4 with further sub-levels, alpha-numerically coded with S to denote a sub-level. Descriptions (L2S1), for example, is the first sub-level of core level L2. Each of these core levels are discussed in the sub-sections that follow.
3.2.2.2 Direct perceptions of reality

In Figure 3.1, L1 refers to direct perception of realities, which Love (2000:305) argues is concerned with the senses, such as touch, sight and hearing. It is this perception of reality that might serve as the driver for design, its processes and the way designers view the world. Then again, Love (2000:308) cautions that L1 may have different interpretations because design may be seen as information processing or as a creative process. When design is viewed as a creative process, Love (2000:310) postulates that direct perception of realities relates to “observation through the senses” but when viewed from the lens of information processing, it is about the receiving and sending of information and its effects on the user. Although distinctions are drawn between design as a creative or information process, in my view, creativity and information processing cannot be separated, because some stages in design require creativity while others may rely on information processing.

3.2.2.3 Objects

Love’s (2000:305) objects (L2) include descriptions (L2S1) and behaviour of the elements (L2S2). L2S1 involves description of objects, processes or systems (Love, 2000:305) such as an art piece or clothing product. This entails interrelating the intrinsic properties and characteristics with external stimuli when design is viewed as a creative process (Love, 2000:310). On the other hand, L2S2 is concerned with how elements interact or work together.
in the designed objects, processes and systems (Love, 2000:305) such as the harmonisation of design elements of line, texture, colour and shape. Love (2000:307), however, argues that objects can exist either in physical or abstract forms and, as such, they “form two parallel but co-ordinated streams” with the subsequent design process (L3). If a designer or student sees objects in an abstract form, then I would agree that objects be positioned prior to the consequent design process level (L3). However, if objects are considered in physical form, then I would argue that objects are the tangible, material outcomes, manifested from a prototype, sketch or plan that emerge from the design process and should thus be considered as outcomes of, and positioned after L3. If in a physical form, by swapping L2 and L3, the activities that make up the design process can also be more logically described.

3.2.2.4 Design process

Love (2000:305-306) organises L3 into four tiers, namely: mechanisms of choice (L3S1), design methods (L3S2), design process structure (L3S3) and theories about the internal processes of designers and collaboration (L3S4). Mechanisms of choice (L3S1) refers to how selections are made between divergent objects, processes, or systems and in what way solutions are measured (Love, 2000:305). When design is viewed as a creative process, the prevalent mechanisms of choice involve making decisions, and evaluation is driven by human values or feelings (Love, 2000:310). Love (2000:306) maintains that L3S2 addresses the theories and proposals for describing design methods and techniques. When viewed as a creative process, design methods afford designers the opportunity to use a number of different “associative and analogical techniques”, visual creativity and manipulation of ideas depending on designers’ experience (Love, 2000:310). L3S3 is associated with theories relating to the fundamental organisation of design process models and the impact of area, culture and artefact type (Love, 2000:306). Such design process models will be discussed in Chapter 4.

In the final sub-level, Love (2000:306) argues for theories about the internal processes of designers and collaboration (L3S4). According to Love (2000:306), L3S4 pertains to individual designer’s thinking and cognition, collaborative design team negotiation and the cultural effects of designers’ output. As information processors, designers appear to select and connect data in a rational manner, but in creative procedures “intuition, experience, feelings and style” are core to the designer’s internal processes and collaboration (Love, 2000:311).
In summation, L3 is, in my view, broad but useful for categorising theories into the various sub-levels. I agree with the sub-tiers that form part of L3 for a number of reasons. First, designers do make certain choices and selections within the design process. Second, they use methods and techniques in this design process. Third, the design process has a start and an end so there is some logical structure. Fourth, the design process is informed by reasoning and rational thinking. Finally, designers may collaborate with different stakeholders such as users, material suppliers, and production and marketing teams.

However, I do not agree with Love’s (2000) categorisation of the design process as the core level of abstraction. In my view, design methodology should be the core level. My rationale for design methodology as the core level is in line with the previous discussion (refer to subsection 1.5.1) drawn from Cross’s (1984) earlier scholarship that design process is a field of inquiry known as design methods hence justifying design methodology as a core level as opposed to Love’s (2000) proposition of design process as the fundamental level. Furthermore, Houkes et al. (2002:312-317) and Kroes (2002:287-288; 291) agree that design process is founded within design methodology.

3.2.2.5 Philosophical matters

L4 relates to philosophical matters, that is, general design theories (L4S1), epistemology (L4S2) and ontology (L4S3). Love (2000:306) contends that L4S1 include all-inclusive design activity and its association with objects. The subsequent sub-level of epistemology (L4S2) includes theories that analyse and discuss the “critical study of the nature, grounds, limits and criteria or validity of design knowledge”. On L4S3, Love (2000:306) places human values, researchers’ core assumptions and theoretical critique.

I share the same view that L4S2 refers to the nature of design knowledge and appears as a key construct for inclusion in the philosophy of design, but would argue that L3S3 could also relate to the nature of designed objects. Love’s meta-theoretical taxonomy does not relate L4 to axiology but such a meta-physical position may bring in the notion of designer fallacy or the intended responsibility of designers to act as agents of change and perhaps design with empathy and with users.
Having concluded description of Love’s (2000) meta-theoretical taxonomy for classification of design theory, discussion now shifts to Mitcham’s framework of technology.

3.2.3 Mitcham’s modes of manifestation of technology

3.2.3.1 Outlining Mitcham’s framework

Mitcham (1994) puts forward a framework comprising of four modes of manifestation of technology, namely 1) volition, 2) knowledge, 3) activity and 4) object. Each of these modes of technology have been alpha-numerically coded as volition (M1), knowledge (M2), activity (M3) and object (M4) in Figure 3.2. In the discussion that follows, I expand upon Mitcham’s (1994) position by discussing each of the four modes of manifestation of technology in turn.

![Figure 3.2: Framework of the four modes of manifestation of technology (adapted from Mitcham, 1994)](image)

3.2.3.2 Technology as volition

Houkes et al. (2002:304) claim that intention in design theory is a combination of desire and belief, which Mitcham (1994) refers to as volition (M1). Mitcham (1994:247) asserts that volition is “will, drive, motive, aspiration, intention, and choice” and, as such, technology can be considered in three volitional senses. These include “technological desire, as technical motivation or movement, and as consent to technology” (Mitcham, 1994:255). Mitcham
(1994:255) claims that technological desire is supported by intrinsic motivation that supports and is reflected through knowledge creation and activity and culminating in the generation of objects. Mitcham (1994:251) cautions that volition raises tensions between subjectivity and objectivity because individual motivations are unique and one’s willingness is only brought to light through action.

In my view, volition is intrinsic because every individual has different beliefs, values, aspiration and intentions but these serve as the driver for the ways we think, the actions we take, the activities through which we design and, as such, they are reflected in the outputs or objects we create. In this study, volition is crucial because it is the will, desire, motivation and intentions of FD education to adopt a HCD approach as a way of educating students to become professional fashion designers who act as agents of change and transform fashion design praxis within the industry. Nonetheless, such volition supports and is reflected through knowledge.

3.2.3.3 Technology as knowledge

Etymologically, “techno-logy” implies knowledge and therefore echoes epistemological inclinations (Mitcham, 1994:192). However, technology knowledge (M2) is different from scientific knowledge because the rules and theories of the former support and interlink with action (Mitcham, 1994:197-198). Mitcham (1994:194) claims that the making and use of objects require different types of knowledge because principle-based knowing relates to “skills, maxims, laws, rules or theories” which interconnects with the experience-based skills acquisition of knowing-how. This means that knowing-how, or skills knowledge, cannot be separated from knowing-that, or conceptual knowledge. Moreover, Mitcham (1994:196) shares Donald Schön’s view that skills acquisition is an intuitive and tacit process of reflection-in-action. In Chapter 4, I expand on Schön’s reflective paradigm of design. Aligning these arguments to fashion design praxis, and the education thereof, different knowledge domains are required because conceptual knowledge, or knowing-that, is required to support knowing-how, or skills acquisition (as will be explained in Chapter 4). Nonetheless, these knowledge domains ultimately inform design activity, to which this discussion now turns.
Mitcham (1994:209) advocates that technology as activity (M3) is about diverse human behaviour but links volition and know-how to bring objects into existence. Mitcham (1994:210) maintains that “crafting, inventing, designing, manufacturing, working, operating and maintaining” are all basic types of behavioural activities with technology. As such, technology activities relate to design and operational processes such as “manufacturing, working, operating, and maintaining” (Mitcham, 1994:210). From Mitcham’s (1994:215) position, designing can be viewed either as being part of design development or as the manufacture of objects. Moreover, Mitcham (1994:217; 220-224) describes designing as intentional planning to solve problems using knowledge thus installing it as involving integration of design process activities and the different types of knowledge, skills and thinking associated with design. Taking into consideration intentional planning to solve problems, I note that discussions about design are found in design theory, as in the case of Love’s meta-theoretical taxonomy, but also in theory on technology.

Although Mitcham (1994) links activity to both designing and manufacturing, within the context of this study, I refer to design and technology activities as two different but integrated processes that require different skill-sets and knowledge. Within the context of this study, design process activities entail conceptualisation of abstract ideas, drawings, sketches or plans as possible design solutions. Based on these abstract ideas, technological process activities come into play as the sketch is transformed into a full-sized working pattern through pattern-making principles and skills. This technological process activity extends into manufacturing processes where the pattern is cut in muslin or calico fabric and a prototype of the design solution is brought to life through industrial manufacturing principles, skills and operations. Thereafter, the technological and design processes interweave through evaluation and refinement of design ideas and the working pattern is finalised. From here, the final product is manufactured via technological activities. My view aligns with arguments by scholars such as Cross (2008; 2011) and Aspelund (2010) who claim that the technological process is concerned with technical operations and industrial manufacturing, that is, the making of the object and its operational life-cycle.
Technology as object

Technology manifests itself in human fabricated artefacts or physical material objects (M4) such as “tools, machines, and consumer products” (Mitcham, 1994:161; 172). However, Mitcham (1994:172) questions both the conceptual and ontological nature of objects. In light of such ontological inquiry, Ankiewicz et al. (2006:139) positions Mitcham’s technology as object (M4) within questions of ontology. Conventionally, artefacts are in fact material objects, which are given form by human beings. These objects are materialised through human construction with the aid of tools through doing actions or making (Mitcham, 1994:162-163). Objects serve human purposes and include basic types of technology such as clothes, utensils, and machines (Mitcham, 1994:162). Despite the various types of technology, each has its individual historical background and analysis, its own set of features, functions and intrinsic and extrinsic uses that are fundamentally dependent on the social context in which the object is used (Mitcham, 1994:162-165; 181).

With this in mind, I move onto selecting theoretical elements from both Love and Mitcham’s frameworks to develop my personal philosophy of fashion design praxis.

3.3 PERSONAL FRAMEWORK FOR A PHILOSOPHY OF FASHION DESIGN PRAXIS

In this section, I fulfil the overarching purpose of this chapter by developing my own philosophical framework of fashion design praxis by drawing from the discussion in the previous sections. Borrowing from the frameworks offered by both Love (2000) and Mitcham (1994), I select four modes of: 1) volition, 2) design knowledge, 3) design methodology, and 4) product (these are visualised in Figure 3.3), as a framework for a philosophy of fashion design praxis. Although I acknowledge that Love and Mitcham refer to object(s), I opt for product because this is a commonly accepted term in FD education and professional fashion design praxis.
Borrowing from Mitcham (1994), I position volition first in this framework because it is the will, motivation and intentions of FD educators that inform what they teach, how they think about fashion design and the actions that they take in order to educate students to become agents of change. In the same light, the volition of professional fashion designers informs their purposes (what they design), how they think about fashion design and the actions that they take in order to achieve their intended goal. In this study, HCD is taken as a core underlying volition for FD education, hence it is presented as a sub-mode in Figure 3.3. If FD students are educated from a HCD standpoint (the volition) that aligns with the changing design landscape (as described in section 1.6), this might manifest in their practices upon entering the professional environment.

In addition, since this study focuses on FD education as a sub-discipline of design, I include design knowledge in the framework. Elements of design knowledge were selected from both Love (2000) and Mitcham (1994). In Figure 3.1, Love (2000:306) identifies general design theories (L4S1) and relates these to design activity as well as to epistemology (L4S2), which is concerned with the characteristics and grounds on which to base design knowledge. As such, these design theories are directed at conceptual knowledge. Conceptual knowledge also appears in Mitcham’s (1994: 196; 209) framework but he includes the dimension of practical
knowing-how knowledge, as well as knowing-that, as a crucial aspect of knowledge that supports design activity. In the same light, considering Gilbert Ryle’s (1949:28-29) view, as noted in sub-section 1.9.2, knowing-that and knowing-how cannot be separated from each other and, as such, both are included as sub-modes in Figure 3.3.

I opt for design methodology, as the third element of the framework because, as argued in sub-sections 1.5.1 and 3.2.2.4 respectively, design process is a field of inquiry known as design methods. Although Love (2000:305-306) positions L3S1, L3S2, L3S3 and L3S4 as sub-tiers in L3, for this study, I exclude mechanisms of choice (L3S1) and theories about the internal processes of design and collaboration (L3S4) from my philosophy of design because this inquiry does not explore the manner in which selections are made nor design cognition. For this reason, Figure 3.3 only includes design methods and design process models as attributes of design methodology selected from Love’s specific categorisation of L3S2 (design methods) and L3S3 (design process structure) in Figure 3.1. Mitcham links activity to design but does not specifically classify elements into design methods nor design process models.

As the final mode, I position products, as these are the tangible end-outcomes of the design and technological processes. The product mode was selected from both Love and Mitcham, but they both refer to it as object in their respective frameworks. However, in this study, the nature of the product is not the focus of study nor is the behaviour of its elements, as such, no sub-modes are included.

This personal philosophy of fashion design praxis acts as a point of departure from which to review literature regarding HCD, which is the underlying volition of this study. I begin by positioning HCD as a design paradigm.

3.4 DESIGN PARADIGMS

In section 1.6, I noted that Giacomin (2014:607-608) suggests that design today is characterised by three distinct paradigms and values, namely technology-driven design (TDD), HCD and environmentally-sustainable design. Given the scope of this study, the following sub-sections discuss the underlying ethos of the TDD and HCD paradigms.
3.4.1 Technology-driven design (TDD)

As noted in section 1.6, as early as the first industrial revolution, design was practiced within a TDD paradigm in which focus is given to the designer and their expert knowledge in shaping material products in large quantities for mass production and consumption (Krippendorff, 2006; Sanders & Stappers, 2012). This ethos is known as designer-centered design given the emphasis on product creation and designer intuition (Friess, 2010, Koskinen & Battarbee, 2003; Taffe, 2015).

In light of this, Sanders and Stappers (2014:27) argue that the 1980s saw design unfolding within a TDD paradigm, more specifically, a market-driven paradigm. In this paradigm, designers were considered experts responsible for the design of material products but these designers did not “explore what to design” but rather “how to design what the client asked for” (Sanders & Stappers, 2014:27). As such, the 1980s TDD movement was rife with market research as design was enacted for imagined customers or consumers and the entire enterprise operated within a marketplace context (Sanders & Stappers, 2014:26-27). As a result, TDD saw market researchers studying people by observing and surveying them, while the designer received this information and assumed the expert role (Stappers & Visser, 2007:1). This implies that the designer relied on secondary information generated by others and designed according to what they liked and preferred but for imagined target market consumers.

As argued in section 1.6, although TDD dominated the general design scene, scholars agree that the landscape of design is currently changing and the dominant design paradigm is shifting from TDD to HCD and sustainable design practices (Fry, 2009; Krippendorff, 2006; Sanders & Stappers, 2012; 2014). Despite this, scholars also agree that the challenges of TDD continue and recommend HCD approaches to counteract the situation (Endsley & Jones, 2012; Norman, 2013).

3.4.2 HCD as design paradigm

The shift toward HCD approaches paves the way for transformation. Sanders and Stappers (2014:28), writing about co-design (an approach to HCD), assert that HCD changes the manner of working, but also shifts mind-sets towards collaboration with people. Within this approach, design and research amalgamate and the roles of designer and researcher alter as designers
position themselves as team members in order to generate, analyse and interpret data and ideas produced by users (Sanders & Stappers, 2014:29-30). This is in line with Stappers and Visser’s (2007:1) earlier claim that, within HCD, designers assume researcher roles and adopt a more inclusive approach by involving users. Hanington (2010:18) asserts that HCD is a unified process involving active collaboration and consultation with users throughout the design development phases. In the same light, Steen (2011:45) claims that, in HCD, designers aim to collaborate with or learn from users with the specific intention to develop products that align with users’ practices, needs and preferences. It is thus evident that HCD has a different ethos and approach when compared with TDD. In the following sub-section, HCD and TDD are juxtaposed.

3.4.3 Juxtaposing HCD and technology-driven design (TDD)

Figure 3.4 juxtaposes the underlying ethos of TDD with that of the HCD school of thought. As can be seen in the figure, within TDD, designers are generally considered to be experts who hold knowledge which results in an inward-looking practice. However, this is not the case in HCD, in which users are involved and considered to also have expert knowledge. The TDD paradigm is market-driven, grounding itself in material products, production and consumption. In contrast, HCD is people-focused and, as such, an externally-driven practice. The mind-set within TDD is that designers consider how to design ‘for people’ but, in HCD, designers consider how to design ‘with people’ as per their preferences and needs. Hence, a significant differentiator is the underlying ethos of ‘design for’ as against ‘design with’.

<table>
<thead>
<tr>
<th>TDD PARADIGM</th>
<th>HCD PARADIGM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Designer's expert knowledge</td>
<td>• Users as experts</td>
</tr>
<tr>
<td>• Material products</td>
<td>• Change in method</td>
</tr>
<tr>
<td>• Mass production and consumption</td>
<td>• People-driven</td>
</tr>
<tr>
<td>• Market-driven</td>
<td>• Mind-set: Design with people</td>
</tr>
<tr>
<td>• Mind-set: Design for people</td>
<td>• What is designed?</td>
</tr>
<tr>
<td>• How to design for client</td>
<td>• What people may need</td>
</tr>
<tr>
<td>• Market research done by researchers</td>
<td>• Integration of design and research</td>
</tr>
<tr>
<td>• People are known as consumers/customers</td>
<td>• Integrating roles of designers, researchers and users</td>
</tr>
<tr>
<td></td>
<td>• People are known as users</td>
</tr>
</tbody>
</table>

Figure 3.4: Juxtaposing TDD and HCD paradigms
Given this, within TDD, market researchers gather and analyse data about people and designers use this data to design for people. In contrast, HCD integrates design and research with designers, researchers, and users all assuming roles in data gathering and analysis. To reflect the greater emphasis on people in HCD, they are referred to as users as opposed to consumers or customers as they are referred to within the TDD paradigm. For this reason, in this study, when presenting discussion from the lens of a TDD paradigm, I refer to people as ‘consumers’ but when framing the discussion within the context of HCD, I use the term ‘users’.

Having juxtaposed these two paradigms, the discussion that follows draw on theoretical perspectives to discuss HCD in greater depth.

3.5 BACKGROUND TO HCD

In this section, I provide background to HCD because it is important to understand the disciplines from which it emerged and clarify its attendant terminology.

3.5.1 Emergence and clarification of terminology

The term user-centered design (UCD) originally emerged in fields such as ergonomics, human-computer interaction, systems design, software development, usability and artificial intelligence (Endsley & Jones, 2012; Giacomin, 2014; Gulliksen, Göransson, Boivie, Blomkvist, Persson & Cajander, 2003; International Organization of Standards (ISO), 2010; Still, 2007). Later, UCD was adopted in disciplines such as architecture, engineering, interaction, industrial, interior, graphic and fashion design (Hanington, 2010; Rogers, Jans, MacLaughlin, Ivy & Park, 2015; Taffe, 2015). With such a diverse range of disciplines, UCD, user-centered system design, and HCD appear as three interchangeable constructs in the literature.

Scholars claim that UCD is the same as user-centered system design where the terms are used interchangeably (Gulliksen et al., 2003; Marti & Bannon, 2009). Scholars also agree that UCD is the same as HCD despite the different nomenclature (Friess, 2010; Hanington, 2003; Keinonen, 2010). I prefer the term HCD because it reflects human-ness and suggests a “concern for people” whereas UCD merely indicates “people’s roles as users” (Hanington, 2003; Steen, 2011:45). Furthermore, Sanders and Stappers (2012:13) maintain that there is a difference
between UCD and co-design (an approach to HCD) because UCD considers users as subjects of study whereas co-design views users as partners. This might be because of the disjuncture between the traditional scope of UCD (discussed in sub-section 3.5.2) and the current ethos of HCD (discussed in sub-section 3.5.3 and 3.5.5, respectively).

In my view, because shifts have occurred and the traditional philosophy of UCD has changed in that it now accepts that users have an active role to play within the design process, the notion of HCD emerged to reflect these shifts. However, in subsequent discussion, I acknowledge the views of scholars and use UCD and HCD interchangeably even though the traditional scope of UCD differs from the current school of thought as shown in Table 3.1.

3.5.2 The traditional scope of user-centered design (UCD)

Keinonen (2010:17) notes that, in 1986, Donald Norman and Stephen Draper first laid claim to the term UCD. As such, the original scope of UCD focussed on users and satisfying their needs as the locus of design, but viewed users as subjects to be “studied, questioned, observed and their performance on tasks measured” without active participation in the design process (Keinonen, 2010; Marti & Bannon, 2009:7). I agree with Sanders and Stappers (2012:23) that such traditionalistic UCD positioned users as passive objects of study.

Given this, UCD assumed an expert standpoint because trained researchers collected data from submissive users via observations and interviews to gain their opinions about products and explore how they performed tasks (Sanders & Stappers, 2008:5). Moreover, within such conventional UCD, data collection methods were rooted in quantitative methods (Keinonen, 2010:17). Similarly, Muratovski (2016:147; 150; 156) acknowledges that UCD continues to make use of practices such as survey and experimental research designs to gather information about users.

Sanders and Stappers (2012:23) maintain that the underlying crux of UCD is that researchers and designers assume different roles because the researcher generates knowledge, based on theory, about users through observations and interviews and report this to designers who then incorporate this information into the generation of design concepts. This approach is very similar to the TDD paradigm discussed in sub-sections 3.4.1 and 3.4.3. To counteract this situation, Friess (2010:42) argues that designers should collect primary data from real users.
and apply this in generating design solutions. However, Endsley and Jones (2012:7) contend that UCD is not about “asking users what they want and then giving it to them”.

Traditional UCD praxis saw users as subjects of study with no active voice or participation in design process activities. Moreover, designers applied secondary information about users to generate design ideas and concepts for them. The design intention here suggests giving users what they want without actual face-to-face interaction or engaging them in design process activities. The implication here is that design, within the traditional scope of UCD, was about and for users but not with users.

Nevertheless, this situation began to change to what is currently known as HCD, in which researchers, designers and users all assume roles within design praxis. In the sub-section that follows, I outline how and why this shift in scope occurred as well as the difference between UCD and HCD.

### 3.5.3 Shift from user-centered design (UCD) to HCD

The shift from conventional UCD occurred when Scandinavian researchers took an alternative approach and began to see users as joint partners in design (Marti & Bannon, 2009:8). The rationale for the Scandinavian praxis was that, although system designers engaged with people, such individuals were not real users of products (Holmlid, 2009:107). This situation implies that designers designed for imagined users of products as opposed to with actual users. Nevertheless, since the early 1970s, participatory design began to emerge in northern Europe and Scandinavia, supported by a call from the “design research community to design for society and to include non-designers in design collaborations” (Binder, Brandt & Gregory, 2008:1). As such, in 1971 the Design Research Society organised the first international conference focused on user involvement in the design process (Lee, 2008:31). As a result, participatory design praxis began to dominate the scene although scholars suggest that this is commonly referred to as co-design, which is an approach to HCD (Sanders & Stappers, 2008; Steen, 2011).

HCD approaches foreground differences between HCD and traditional UCD. To outline these differences, I refer back to the scholarship presented in this sub-section, as well as in sub-sections 3.5.1 and 3.5.2, and compare this with the forthcoming discussions in sub-sections
3.5.5 and 3.6. To explain the dimensions that differentiate HCD, at the risk of repetition, I note the sub-sections in which these discussions are found. Drawing from this scholarship, Table 3.1 summarises the differences between UCD and HCD from my perspective.

**Table 3.1: Difference between UCD and HCD**

<table>
<thead>
<tr>
<th>UCD</th>
<th>HCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users were seen as passive subjects of study</td>
<td>Users are no longer subjects of study (refer to sub-section 3.5.5.1). They are participants in data collection (refer to sub-section 3.5.5.2)</td>
</tr>
<tr>
<td>Users do not have an active role in design process activities</td>
<td>Users, including relevant stakeholders, assume the role of co-designers and collaborators in design and development process activities (sub-section 3.6.1.3)</td>
</tr>
<tr>
<td>Designers assume the sole role of designers, who give users what they want</td>
<td>Designers assume a collaborative role aimed at addressing users’ needs as opposed to giving users what they want (refer to sub-section 3.6.1.2)</td>
</tr>
<tr>
<td>Design is for users</td>
<td>Design is with users</td>
</tr>
<tr>
<td>Trained researchers assume the role of data collection instruments to gather information from submissive users</td>
<td>Designers assume the dual role of designer and primary research instruments in data collection, analysis and meaning creation (see sub-section 3.5.5.2)</td>
</tr>
<tr>
<td>Designers receive information from researchers and apply secondary research about users to generate design concepts</td>
<td>Data collection is rooted in qualitative methods (see sub-section 3.5.5.2)</td>
</tr>
<tr>
<td>Data collection is rooted in quantitative methods</td>
<td>Users are knowledge generators and experts (see sub-sections 3.5.5.1 and 3.6.1.3)</td>
</tr>
<tr>
<td>Trained researchers and designers are expert knowledge holders</td>
<td>Users assume the role of prototype evaluators providing critical feedback for refinement (see sub-section 3.6.1.4)</td>
</tr>
<tr>
<td>Measures how users merely perform tasks</td>
<td></td>
</tr>
</tbody>
</table>

Drawing from Table 3.1, in my view, UCD considers users as mere subjects of study whereas HCD eradicates user submissiveness by including them as participants in data collection. UCD utilises quantitative methods of data collection whereby HCD employs qualitative methods. Likewise, HCD designers assume the role of primary research instruments that collect, analyse and interpret data in contrast to UCD where trained researchers assume the task of data collection in order to gather information about users. As such, in UCD, designers receive information from researchers, assume the role of designers only and apply secondary research about users to generate design concepts for users with the purpose of giving them what they want. In contrast, in HCD, designers assume a collaborative role aimed at addressing users’...
needs. Hence, the fundamental difference pertains to giving users what they want, in UCD, as opposed to what they need, in HCD. This is why UCD involves design for users while HCD involves design with users.

HCD sees designers, users and relevant stakeholders assume the role of co-designers and collaborators in design and development process activities manifesting in the notion of design with. This includes users’ role as prototype evaluators in order to provide critical feedback for refinement, in contrast to UCD where users merely perform tasks that are quantitatively measured. As co-designers, prototype evaluators and feedback providers, HCD views users as expert knowledge generators, whereas in UCD, trained researchers and designers are seen as the only expert knowledge holders. In light of this, in my view, the HCD notion of co-designers and collaborators differs from UCD, wherein users do not play an active role in design process activities. Moreover, co-design can only involve two or more stakeholders (Sanders & Stappers, 2008; 2012). The implication of this is that stakeholders may well include one designer and one user in the case of a co-design approach to HCD.

3.5.4 HCD as approach and methodology

This study (as noted in section 1.11) is aligned with the views that HCD is an approach to design, and a philosophy or mind-set that changes the way that design and development processes are seen and approached (ISO, 2010; Norman, 2013; Sanders & Stappers, 2012). Given this, HCD praxis requires a will, motivation, choice and intent to change the way designers think about and approach design processes and the development of products.

As such, I agree with IDEO26 (2009:6) that HCD is a process and set of methods utilised to generate solutions in the form of products, services, environments, organisations and interactions. As a method, HCD involves tools and techniques for data collection such as “contextual inquiry or ethnographic fieldwork” (Sanders & Stappers, 2012:30). In light of this, HCD can be used as a research design and methodology in its own right.

26 In 2009, IDEO, a global design company put forwarded a human-centered design toolkit in collaboration with IDE, Heifer International and ICRW in order to create a method for guiding innovation and design for people living on under $2/day (IDEO, 2009).
3.5.5 Aim and HCD strategy in praxis

3.5.5.1 Aim and implementation strategies

ISO (2010:vi) advocates that HCD aims to make “systems usable and useful by focusing on the users, their needs and requirements”. This parallels Steen’s (2011:45) argument that HCD aims to develop products or services that correspond with “users’ practices, needs and preferences”.

To achieve this aim and implement strategies in praxis, it is evident that designers will have to ground themselves in HCD and place people (users) and their needs, desires, experiences, capabilities and behaviours as the nucleus of design (Devi, Sen & Hemachandran, 2012; Giacomin, 2014; Keinonen, 2010; Marti & Bannon, 2009; Norman, 2013; Steen, 2011). In my view, this means that users are no longer subjects of study to be observed and studied; rather, people and their voices are the source of inspiration (IDEO, 2015; Sanders & Stappers, 2014). With this in mind, a HCD process begins with desirability and the aim to examine and investigate the needs, aspirations and behaviours of individuals (IDEO, 2009:6). Positioning people as the inspiration for and core of design contradicts traditional design praxis and the TDD paradigm, which places greater emphasis on designers’ creative process and technological material products (Norman, 2013; Giacomin, 2014). These views lead to the following design principles for HCD.

| Users as core – users are not the subjects of study but rather the nucleus of design |
| Users as sources of inspiration – designers will have to accommodate actual, as opposed to imagined, users’ needs as the source of information and inspiration for design |

HCD proponents, writing about participatory design, concur that non-designers such as marketing experts and real future users of products should be considered experts with tacit knowledge and that designers, researchers and users all assume roles in the design project (Sanders, Brandt & Binder, 2010; Steen, 2011; Wilkinson & De Angeli, 2014). Sanders and Stappers (2008; 2012) suggest that such an approach to praxis brings about shared and collective creativity. Participation of users early in the design process eradicates the need for designers to draw on their personal knowledge, skills and attitudes (Wilkinson & De Angeli, 2014:615). This leads to identification of the following design principle.
Collaboration – users and designers should collaborate with each other

HCD is thus more inclusive because it represents multiple voices. This extends to data collection methods as well.

3.5.5.2 Data collection methods for HCD praxis

In conventional UCD and TDD (as discussed in sub-sections 3.5.2 and 3.4.1 respectively), market researchers study people and data collection is focused on obtaining information about users via what Marti and Bannon (2009:8) refer to as traditional forms of quantitative-based user surveys, interviews or evaluative testing mechanisms. These quantitative methods contradict IDEO’s (2015:39; 42; 45; 60) recommendation that HCD grounds itself in qualitative data collection methods such as semi-structured, individual and focus group interviews, narratives, observations and collages with actual users as participants. A further recommendation is that HCD ground itself in methods that allow designers to generate, analyse and interpret data and ideas produced by users (Hanington, 2010; Sanders & Stappers, 2014). This leads to identification of the following design principles for HCD.

<table>
<thead>
<tr>
<th>Users as participants in data collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary research – design should be grounded in primary as opposed to secondary research</td>
</tr>
<tr>
<td>Qualitative tools – designers should apply qualitative data collection methods rather than relying on quantitative data collected by researchers and about users</td>
</tr>
<tr>
<td>Integration of research and design – designers should assume the dual role of researcher and designer in order to integrate research and design</td>
</tr>
</tbody>
</table>

Having contextualised some of the strategies for implementing HCD data collection, the discussion now turns to framing of the theoretical perspectives regarding HCD in order to define a set of tentative design principles that can be used to steer a pilot educational intervention.
3.6 PRINCIPLES OF HCD

3.6.1 Theoretical perspectives on HCD

3.6.1.1 HCD principles as a point of departure

For over a decade, scholars have drawn on the ISO founding documents, ISO 13407 published in 1999 or the 2010 edition, ISO 9241-210\(^{27}\), to discuss the principles of HCD (Devi et al., 2012; Giacomin, 2014; Gulliksen et al., 2003; Maguire, 2001; Steen, 2011; Zhang & Dong, 2008). Similarly, I also borrow from ISO 9241-210 (ISO, 2010) as a point of departure.

From the perspective of ergonomics of human-system interaction and HCD for interactive systems, ISO 9241-210 (2010:5) states that HCD should abide by the following six principles regardless of design process.

a. the design is based upon an explicit understanding of users, tasks and environments
b. users are involved throughout design and development
c. the design is driven and refined by user-centred evaluation
d. the process is iterative
e. the design addresses the whole user experience
f. the design team includes multidisciplinary skills and perspectives

Although these six HCD principles are used as a point of departure, I incorporate multiple theoretical perspectives. With this in mind, the following sub-section deliberates on the premise that “design is based upon an explicit understanding of users, tasks and environments” as put forward by the ISO (2010:5).

3.6.1.2 Design is based upon an explicit understanding of users, tasks and environments

ISO (2010:5) advocates that “design is based upon an explicit understanding of users, tasks and environments” as designed products, systems or services should consider the users who use them and those directly or indirectly affected by their use. As such, ISO (2010:6; 11)

\(^{27}\) The ISO 9241-210 replaced the 13407 standards published in 1999 (ISO, 2010).
recommends that users and relevant stakeholders must be identified and users’ needs, goals\textsuperscript{28}, tasks\textsuperscript{29} and requirements must be established at the outset. Establishing and understanding such user needs, the design activities carried out by them, their goals and requirements resemble the HCD principles put forward by Maguire (2001:588) and Gulliksen et al. (2003:401). However, users’ needs, desires, and preferences differ because of aspects such as age, capability and socio-cultural background (Waller, Bradley, Hosking & Clarkson, 2015:298). The literature mentions user needs and preferences but also requirements, which raises the question as to whether these constructs are one and the same.

Cascini, Fantoni and Montagna (2013:637) posit a distinction between needs and requirements. These scholars remark that needs are explicit and derived from users as input into design activities, whereas requirements are the conversion of such needs into design constraints or technical specifications (Cascini et al., 2013:644). In addition to the dichotomy between needs and requirements, emphasis is also placed on users’ tasks (Gulliksen et al., 2003; ISO, 2010). Writing about technology-based systems design, Endsley and Jones (2012:10) emphasise the importance of carrying out task analysis to establish what users can or cannot do when products are utilised. Based on this, I identify the following design principles for HCD.

| Identify user needs, goals, tasks and preferences – first, establish users’ needs, goals, tasks and preferences as input into the design process |
| Translating user needs into requirements – establish user needs and translate these into a set of design requirements |

ISO (2010:6; 11) advocates that when users’ needs, goals and tasks are established, they must be applicable to the physical and social contexts in which the product is used. Likewise, scholars concur that an understanding of the design context or situation in which the product is used, coupled with an understanding of users’ needs in relation to that specific environment, serves as valuable input into the design process (Endsley & Jones, 2012; Marti & Bannon, 2009; Still, 2007; Wilkinson & De Angeli, 2014). Although, understanding users’ needs and context act as input into the design process, Wilkinson and De Angeli (2014616) argue that they inform the entire design process. This leads to identification of the following design principles for HCD.

\textsuperscript{28} The intended outcome (ISO, 2010:2)
\textsuperscript{29} The activities required to achieve the intended goal (ISO, 2010:3)
The design principles identified in this sub-section are supported by users’ active involvement in design process activities and product development.

### 3.6.1.3 Users are involved throughout design and development

ISO 9241-210 (2010:5) states that in HCD, “users are involved throughout design and development”. Users are seen as a valuable source of knowledge, and they should be active agents of design by partaking either in 1) design process activities, 2) as participants in data collection, or 3) in evaluating design solutions (ISO, 2010:6). More than a decade ago, scholars identified active user involvement as a key HCD principle (Gulliksen et al., 2003; Maguire, 2001). Subsequently, scholars have argued that joint partnership, active consultation and participation of users in design and development, particularly in ideation, conceptualisation and development stages are core to HCD (Sanders & Stappers, 2008; Meroni, 2008; Hanington, 2010, Marti & Bannon, 2009; Steen, 2011; Sanders & Stappers, 2012; Wilkinson & De Angeli, 2014). Regardless of the design process stage in which users are involved, scholars recommend that they should be made aware of their involvement from the onset with a clear understanding of their tasks (Gulliksen et al., 2003; Maguire, 2001). ISO (2010:6) specifies that the nature and frequency of user involvement are dependent on the project itself. These views lead to identification of the following design principles for HCD.

| **Active user involvement in design process** – users should be directly involved and actively participate early and continually in the design and development process |
| **Users as partners** – users are seen as partners in the design process and design should take place with users and not for users |
| **Design is with users and not for users** |
| **Aware of involvement** – as active participants in design and development, users should be made aware of their involvement from the onset |
| **Users should have a clear understanding of their functions and tasks in the project** |
Scholars further concur that users assume roles in design processes and collaborate and engage in mutual learning with designers and researchers (Sanders et al., 2010; Steen, 2011; Wilkinson & De Angeli, 2014). When users are involved in design processes, they are seen as knowledge generators who contribute to knowledge production and, as such, provide input into the design process (Still, 2007:106). The implication of this is identification of the following design principles for HCD.

| Knowledge generation – users are a source of knowledge and should contribute knowledge as input in the design process |
| Mutual learning takes place between designers, users and all stakeholders |

3.6.1.4  
**Design is driven and refined by user-centered evaluation**

ISO (2010:5) asserts that “design is driven and refined by user-centred evaluation”. Feedback is a critical source of information and designed products should be evaluated with and by users (ISO, 2010:6). The purpose of such feedback is to minimise risks, guide improvements and develop further solutions before designs are finalised (ISO, 2010; Maguire, 2001). Gulliksen et al. (2003:402) claim that user evaluation is a key principle but they also propose that designs should be tested in the context of use and judged against users’ goals, needs and requirements by observing, recording and analysing user feedback. I share the view of IDEO (2009:83) that the creation of multiple prototypes allows for several user evaluations, critical feedback and refinement. The focus on user evaluation, feedback and refinement until such time that the design solution is finalised leads to identification of the following design principles regarding HCD.

| User evaluation – users should evaluate a prototype of the product |
| User feedback and refinement – feedback is a critical source of information hence prototypes of designs should be evaluated with users and improvements should be based on this feedback |

3.6.1.5  
**The process is iterative**

I share ISO’s (2010:5-6) contention that the design “process is iterative”, that is, that steps should be repeated until the desired outcome is achieved. User needs impact on design and many of these needs materialise in the product development stage as designers better
understand these needs through user feedback (ISO, 2010:6-7). As such, the consensus is that an iterative process is key to HCD because user evaluations, feedback and iteration will support and improve the development of design solutions (Gulliksen et al., 2003; IDEO, 2015; Maguire, 2001). This leads to identification of the following design principle.

The process is iterative – iterations or repeated steps occur throughout design and development until the desired outcome is achieved

However, an iterative design process is not exclusive to HCD as this point is also made in the context of engineering design (Cross, 2008) and fashion design (Aspelund, 2010). This iterative process paves the way for design solutions that address users’ experiences.

3.6.1.6  

**Design addresses the whole user experience**

The HCD principle put forward by the ISO (2010:5) is that “the design addresses the whole user experience”. This signifies that design should take into account users’ “prior experience, attitudes, skills, habits and personality” to drive design decisions ISO (2010:7).

Although user experience is broad, Law, Roto, Hassenzahl, Vermeeren and Kort (2009:722-723) posit that when it comes to UCD, the notion of user experience is grounded in the five elements of 1) focus, 2) who, 3) what, 4) how, and 5) when. Law et al. (2009:723) define focus as the main concern to be addressed, who as the user who has the experience, what as the object that is experienced, how as how the experience takes place, and when as whether this experience occurs before, during or after interacting with the object. These five elements of user experience correspond with the findings of a human-computer interaction study conducted by Hassenzahl, Diefenbach and Göritz (2010:361) who found a direct link between users’ needs, the fulfilment thereof and a positive user experience. The implication of this leads to formulation of the following design principle for HCD.

**Design addresses the whole user experience – focus is on the user’s main concern to be addressed, who has the experience, the object experienced, how the experience takes place and whether this occurs before, during or after interacting with the object**
Positive user experience may be achieved when HCD is undertaken by design teams that encompass multidisciplinary skills and perspectives as opposed to the inward-looking practice of the designer as lone-genius.

3.6.1.7 The design team includes multidisciplinary skills and perspectives

ISO (2010:5; 8) suggests that “the design team includes multidisciplinary skills and perspectives” because design projects benefit from collaboration and collective creativity. As noted in sub-sections 3.4.2 and 3.5.5.1, scholars concur that HCD is about collaboration and collective creativity, in which various parties offer expertise and insights (Maguire, 2001; Sanders & Stappers, 2008; 2012; Zhang & Dong, 2008). This leads to identification of the following design principle for HCD.

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1</td>
<td>Users as core – users are not the subjects of study but rather the nucleus of design</td>
<td>3.5.5.1</td>
</tr>
<tr>
<td>HCD2</td>
<td>Design is with users and not for users</td>
<td>3.6.1.3</td>
</tr>
<tr>
<td>HCD3</td>
<td>Users as sources of inspiration – designers will have to accommodate actual, as opposed to imagined, users’ needs as the source of information and inspiration for design</td>
<td>3.5.5.1</td>
</tr>
<tr>
<td>HCD4</td>
<td>Integration of research and design – designers should assume the dual role of researcher and designer in order to integrate research and design</td>
<td>3.5.5.2</td>
</tr>
</tbody>
</table>

Table 3.2 continues on next page
| HCD5 | Identify user needs, goals, tasks and preferences – first, establish users’ needs, goals, tasks and preferences as input into the design process | 3.6.1.2 |
| HCD6 | Context of use – design should take into account the context or situation in which the product will be used | 3.6.1.2 |
| HCD7 | Understand users – an in-depth understanding of users’ needs, goals, tasks, preferences and context of use is required as input and throughout the design process | 3.6.1.2 |
| HCD8 | Translate user needs into requirements – establish user needs and translate these into a set of design requirements | 3.6.1.2 |
| HCD9 | Address user needs – as the ultimate aim, design should address users’ needs, preferences and desires | 3.6.1.2 |
| HCD10 | Users as partners – users are seen as partners in the design process and design should take place with users and not for users | 3.6.1.3 |
| HCD11 | Active user involvement in design process – users should be directly involved and actively participate early and continually in the design and development process | 3.6.1.3 |
| HCD12 | Users as participants in data collection | 3.5.5.2 |
| HCD13 | Primary research – design should be grounded in primary as opposed to secondary research | 3.5.5.2 |
| HCD14 | Qualitative tools – designers should apply qualitative data collection methods rather than relying on quantitative data collected by researchers and about users | 3.5.5.2 |
| HCD15 | Collaboration – users and designers should collaborate with each other | 3.5.5.1 |
| HCD16 | Knowledge generation – users are a source of knowledge and should contribute knowledge as input in the design process | 3.6.1.3 |
| HCD17 | Mutual learning takes place between designers, users and all stakeholders | 3.6.1.3 |
| HCD18 | Aware of involvement – as active participants in design and development, users should be made aware of their involvement from the onset | 3.6.1.3 |
| HCD19 | Users should have a clear understanding of their functions and tasks in the project | 3.6.1.3 |
| HCD20 | User evaluation – users should evaluate a prototype of the product | 3.6.1.4 |
| HCD21 | User feedback and refinement – feedback is a critical source of information hence prototypes of designs should be evaluated with users and improvements should be based on this feedback | 3.6.1.4 |
| HCD22 | The process is iterative – iterations or repeated steps occur throughout design and development until the desired outcome is achieved | 3.6.1.5 |
| HCD23 | Design addresses the whole user experience – focus is on the user’s main concern to be addressed, who has the experience, the object experienced, how the experience takes place and whether this occurs before, during or after interacting with the object | 3.6.1.6 |
| HCD24 | The design team includes multidisciplinary skills and perspectives – work in design teams for collaborative decision-making and implementation | 3.6.1.7 |
These 24 tentative design principles for HCD will be used to design the pilot study that constitutes Phase 2 of the study. However, I acknowledge that HCD does present some challenges and benefits for consideration in the proposed teaching and learning intervention.

### 3.7 AFFORDANCES AND CHALLENGES OF HCD

Wilkinson and De Angeli (2014:614-615) argue that conventional design approaches generally fail to take into account the views and needs of users effectively, and neglect to engage users in the design process. In my view, this is the case because designers see themselves as the lone-genius. However, HCD proponents believe that if users’ needs and preferences are not clearly understood, then designed products may fail because users may not necessarily want to or are unable to use such products (Steen, 2011; Van der Panne, Van Beers & Kleinknecht, 2003). Similarly, Binder et al. (2008:2-3) note that successful design becomes questionable without user involvement in the design process and a clear understanding of their practices and aspirations because, ultimately, products are designed and intended for such people.

A challenge however is that user involvement in the design process does not necessarily yield positive results. Taffe (2015:52), reporting on a co-design approach in graphic design, found that a hybrid situation emerged because actual users who were involved began to assume the role of designers and opted to design for other imagined users. This suggests that when actual users are involved, they may end-up designing inappropriate products for imagined users thus repeating the limitations of traditional UDC and TDD paradigms. This is possibly the reason that Norman (2005:16) argues that HCD is harmful.

However, I agree with the position of ISO (2010:vi) that a HCD approach has the potential to improve human well-being. Moreover, I agree with Meroni (2008:36) that the advantage of involving people is that it creates a culture of collective sharing, social cohesion and efficiency. Despite this, Norman (2005:17) posits that too much emphasis on user needs can result in a dearth of cohesion and lead to complexity in decision-making.

Friess (2010:40) notes that it was excessive empirical data obtained from users to drive design decision-making that led Google’s lead visual designer, Douglas Bowman, to resign. For this reason, Friess (2010:42; 44) argues that although user data may be a driving force for HCD praxis, designer agency and rhetoric should also be considered. As such, Norman (2005:17)
reasons that, in some instances, a “design dictator” is required to make distinctions between what users say they want and that which is actually necessary or appropriate.

As such, it is evident that HCD has its affordances for general design and, particularly, fashion design praxis albeit that one must acknowledge its challenges. In the section that follows, I conclude the present chapter by reflecting on the two-fold purpose thereof and how these objectives were achieved.

3.8 CONCLUSION

Chapter 3 has addressed Phases 1A and 1B of this inquiry by presenting a personal philosophy of fashion design praxis and a set of tentative design principles with respect to HCD, for application in a pilot educational intervention that will form Phases 2 and 3 of this inquiry.

In sub-section 3.2.1, I explain why Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design, and Mitcham’s (1994) four modes of manifestation of technology were selected. Thereafter, in sub-section 3.2.2, I investigated Love’s (2000) meta-theoretical taxonomy of design theory for the philosophy of design and its core levels of abstraction: 1) direct perceptions of reality, 2) objects, 3) design process and 4) philosophical matters. Similarly, in sub-section 3.2.3, I discussed Mitcham’s (1994) four modes of manifestation of technology: 1) volition, 2) knowledge, 3) activity and 4) object.

Borrowing from these frameworks, in section 3.3, I selected the modes of 1) volition, 2) design knowledge, 3) design methodology and 4) product as the overarching theoretical elements to propose a philosophical framework for fashion design praxis. In doing so, I achieved the first purpose of this chapter and completed Phase 1A of this study.

Turning to Phase 1B, the discussion in section 3.4 introduced design paradigms by contextualising the underlying design ethos of TDD and HCD and juxtaposed the two paradigms. In section 3.5, I provided background to HCD and clarified terminology with respect to UCD and HCD. I then contextualised and differentiated the underlying design ethos of conventional UCD and HCD. In section 3.6, I reviewed scholarship on HCD principles, which led to identification of 24 tentative design principles for HCD, with which it is possible
to design a pilot educational intervention. Deliberation on HCD concluded in section 3.7 with discussion of the affordances and challenges associated with HCD.

In Chapter 4, the proposed philosophical framework for fashion design praxis is used as a lens through which to structure the literature review. Chapter 4 also offers review of literature pertaining to design education.
CHAPTER 4

THEORETICAL PERSPECTIVES: FASHION DESIGN PRAXIS AND DESIGN EDUCATION

4.1 INTRODUCTION

Chapter 3 addressed Phase 1A of the present inquiry by presenting my personal philosophy of fashion design praxis that underpins HCD. In addition, Chapter 3 addressed Phase 1B of the study in that it identified a set of 24 tentative design principles for HCD. The current chapter addresses Phases 1C and 1D and, as such, has a two-fold purpose.

Phase 1C draws on the four modes identified in the previous chapter, namely: 1) volition, 2) design knowledge, 3) design methodology and 4) product (refer to section 3.3) in reviewing relevant theoretical perspectives and defining a set of tentative design principles for fashion design praxis. The discussion first deliberates on these four modes, and then contextualises them, first within general design discourse, and subsequently within professional fashion design praxis.

Thereafter, the discussion shifts in order to address Phase 1D and the latter parts of the chapter deliberate on the scope of design education and contextualises pedagogical strategies relating to design practice in fashion design (FD) education. This is done with the goal of defining a set of tentative design principles for design education pedagogy (DEP) that will be used to guide the pilot teaching and learning intervention. In the following section, I discuss volition, as the first mode in my personal philosophy of fashion design praxis.

4.2 VOLITION

Based on Mitcham’s (1994) modes of manifestation of technology framework (refer to Figure 3.2), as discussed in section 3.3, I position volition as the first mode in my philosophical framework of fashion design praxis, as depicted in Figure 3.3. Volition is important in this study because it refers to the motivation, choice and will of designers, which can lead them to act as agents of change and design-with-intent, which in this case pertains to HCD.
4.2.1 Agents of change through design-with-intent

As noted in sub-section 3.2.3.2, Mitcham (1994:247) refers to volition as “will, drive, motive, aspiration, intention and choice”. De Vries (2006:19) interprets Mitcham’s idea of volition as being intrinsic to one’s will, values and culture. Considering this, I define volition as the intrinsically embedded will, drive, motive, intention, choice and values of a person. I also concur with Mitcham (1994:254) who remarks that volition is subjective, as motivation is carried out in different ways, and idiosyncratic. As such, the act of will can only be determined by actions.

Although they use different terminology, Paulins and Hillery (2009:12) express the view that a principle-based approach of accountability is founded on intentions and motives that drive one to make right decisions based on what ought to be done, which they term ‘intended goodwill’. Similarly, Fuad-Luke (2009:18), writing from a design activism and ethical design perspective, expresses the view that designers can act as agents of change and can be driven by a “strong sense of altruism or morality” which in turn informs their purposes and goal-orientation in favour of social good. Paulins and Hillery’s (2009) emphasis on intended goodwill and Fuad-Luke’s (2009) emphasis on ethical design and social good are examples of what I refer to as design-with-intent. Based on this, the following design principle can be identified.

V1: Designers should become agents of change and design with intent

As agents of change who design with intent, Fuad-Luke (2009:18) argues that designers can be activists motivated by both external conditions and intrinsic factors.

4.2.2 Motivation and intentions as manifest in action

Perkins (2009:116) refers to external conditions as extrinsic motivational factors, which includes monetary gain, and cautions that such motivation may come to dominate and overwhelm intrinsic motivations. Fuad-Luke (2009:18) argues that intrinsically-embedded motivations resonate with a person’s “needs, desires, goals, a certain philosophical approach”. A HCD approach is one such philosophical approach that can prompt designer intentions.
Technology philosopher, Ihde (2008:51), refers to intentions as a designer fallacy, borrowing the idea from early 20th century literary theorists who coined the term “intentional fallacy”. Ihde’s (2006; 2008) main argument regarding designer fallacy is that the designer is not the lone-genius and can design with specific intent, purposes and uses in mind; however, the designers’ intent may be undermined by its actual use. As such, actual use defines the success or failure of the outcome.

Cila, Hekkert and Visch (2014:263) posit that when designing products, designers may aspire to provoke users’ senses, interest, pleasure and eagerness or convey ethical, environmental, or political messages. Scholars generally agree that designers can use design as a strategy to communicate their intentions within designed products and as a driver for creative thought (Crilly, Good, Matravers & Clarkson, 2008; Crilly, 2011; Cila et al., 2014; Giacomin, 2014). As such, designer intentions manifest in deliberate actions with the aim of evoking responses and interpretations (Cila et al., 2014; Crilly, Maier & Clarkson, 2008; Da Silva, Crilly & Hekkert, 2015).

Fuad-Luke (2009:18-19) claims that designer motivation acts as the trigger and stimulus for specific, goal-oriented actions, but that there is iterative questioning and review between purposes, actions and goals, with the ultimate aim being to move from an existing state to a preferred one. This argument parallels that of Mitcham (1994:255), who asserts that intrinsic motivation supports and reflects activity (design process activity) and objects (product), as noted in sub-section 3.2.3.2 (and visualised in Figure 3.2). In addition, Fuad-Luke’s notion of design as moving from an existing state to a preferred one aligns with Simon’s (1982:129) statement that design is a planned “course of action aimed at changing existing situations into preferred ones”, as was noted in section 1.1. These arguments led to identification of the following design principle.

V2: Volition should trigger and stimulate specific design actions that change design from an existing state to a preferred one

Contextualising volition in fashion design praxis, fashion designers’ seem to reflect volition in different ways as crafted in the subsequent section.
4.3 VOLITION MANIFESTATION IN FASHION DESIGN PRAXIS

As noted in section 1.6 and sub-section 3.4.3, I refer to people as consumers or customers to indicate fashion design praxis within a technology-driven design (TDD) paradigm, but refer to them as users to indicate a HCD lens. My rationale for this aligns with Sanders and Stappers (2014:27) statement that people were known as customers or consumers within TDD because they were seen as being served by design.

4.3.1 Volition manifestation as inward-looking practice

I believe that fashion designers make a conscious choice to consider themselves as experts and view themselves as a lone-genius in that they aspire to design for imagined users from their inward-looking perspectives by focusing on aspects such as personal feelings, self-expression, individual creativity, intuition, past experiences and sources of inspiration\(^{30}\) as triggers in the design process.

Au et al. (2003; 2004), in studies with Japanese and Hong Kong fashion designers respectively, found that these designers depend on inspirational sources, specific fashion themes, fashion trends and subjective personal interests, feelings and intuition. The implication of these studies is that fashion designers are motivated by and choose to depend on inspiration and an inward-looking practice to stimulate action in the design process. I acknowledge that these publications are fairly old but, more than a decade later, this situation remains.

Several scholars corroborate the fact that inspiration, designers’ personal feelings, imagination, creative self-expression, authenticity and a way of life appear as common practice in fashion design (Aspelund, 2010; Lee & Jirousek, 2015; Seivewright, 2007). In a later study involving architects, as well as fashion, textile and costume designers, Laamanen and Seitamaa-Hakkarainen (2014:202-204) found that these design practitioners rely on intrinsically-embedded personal experiences, memories of past design solutions and personal stories as stimuli for action within design processes. Moreover, Laamanen and Seitamaa-Hakkarainen

\(^{30}\) Such sources of inspiration include, for example, objects of art, photographs, travel, magazine pictures, nature, music, movies, theatre, previous designs and sketches.
(2014:202-208) establish that these designers depend on external motivational factors such as trending themes, past sketches and sources of inspiration as primary input with which to begin the design process. Similarly, Lee and Jirousek (2015:152; 154) find that a fashion designer selected a number of visual images as interesting inspirational ideas and borrowed elements from these, translating them into a series of sketches for the imagined user, again, basing this on their personal feelings and intuition. In another study, Min (2015: 229; 231; 233) concludes that Korean fashion designers fuse inspiration and their cultural identity with current fashion trends as a form of volition manifestation. Min (2015:231) also found that these Korean fashion designers draw on their cultural background to drive their aesthetic and personal design style. Although possibly a favoured approach to fashion design praxis, theoretical views suggest that this approach is problematic.

4.3.1.1 Problems with manifesting volition as inward looking practice

This expert, lone-genius mind-set possibly aligns with the motivation to gain power, control and enlightenment, as argued by Nelson and Stolterman (2012:14). Such intrinsic motivations ultimately inform intentions, actions and design purposes, such as the intention to design up-to-date, trending clothing products with the intent to persuade consumers to purchase them. With this in mind, I believe that fashion designers predominantly root their practice in a TDD paradigm, as was framed in sub-section 3.4.1 and 3.4.3 respectively.

Moreover, my view parallels with Cascini et al. (2013:644) who state that when designers predict people’s needs based on their own experiences, they are more inclined to work in a TDD paradigm. This creates a problem because when designers assume the role of experts and when design is approached from their perspectives only, they may lack empathy and fail to design with people who will ultimately use the product (Norman, 2011:112; 114). As such, I put forward the following design principle.

| V3: Fashion designers should aim to design with empathy with actual users |

The expert-designer mind-set expresses itself in the notion of ‘design for consumers’, as is discussed in the sub-section that follows.
4.3.2 Volition manifesting in design for consumer

4.3.2.1 Contextualising design for consumers

In my view, when fashion designer volition manifests in the intention to design for a target market\(^{31}\), this is typically associated with a market-driven design approach based on predominately quantitative strategies to collect data about people in which fashion designers are not the primary instrument for data collection.

Design for an intended consumer or target market places consumers at the core of marketing (Keiser & Garner, 2012:60), which suggests alignment with a TDD paradigm. It is commonly accepted that fashion designers manifest their volition in action by designing for an intended consumer, yet the market research about that consumer positions them as passive subjects in order to establish their needs (Laitala, Boks & Klepp, 2015; Markeviciute & Blazenaite, 2011; Mbonu, 2014; Ozipek, Tanyas & Dinc, 2012). Market researchers apply various data collection methods such as literature review, market analysis, direct and indirect participant observation, visual images, style-testing\(^{32}\) and Likert scale questionnaires to gather data about consumers in an attempt to establish their needs (Keiser & Garner, 2012; Tullio-Pow & Strickfaden, 2015). Keiser and Garner (2012:78-80) also note environmental scanning\(^{33}\), point-of-sale data\(^{34}\), data profiling and data mining\(^{35}\) as additional market research tools to obtain information about consumers.

Yet, scholars writing on fashion design frame design for consumer needs as UCD (De Wet, 2016; Tselepis, Mastame-Mason & Antonites, 2015). These views may be applicable to traditional UCD praxis but I disagree regarding their appropriateness within the current scope of HCD, given that design is no longer about establishing the needs of passive users and designing for imagined people. My rationale for this is the discussion presented in sub-section 3.5.2, in which it was argued that traditional UCD places emphasis on users as passive subjects.

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\(^{31}\) A target market is a distinct customer group (Keiser & Garner, 2012:60).

\(^{32}\) When retail buyers assist in refining prototype styles or when consumers afford their opinion at retail stores regarding prototypes (Keiser & Garner, 2012:84).

\(^{33}\) Political, social, economic and physiographic attributes that affect consumers’ buying behaviour (Keiser & Garner, 2012:78).

\(^{34}\) Software, scanners and product codes to capture data in relation to size, colour and style (Keiser & Garner, 2012:78).

\(^{35}\) Gathering information about consumers from databases (Keiser & Garner, 2012:79).
but designers use secondary information to trigger the design process. In the following sub-section, I argue that fashion designers continue to synthesise and interpret user needs against a backdrop of consumer need.

4.3.2.2 Theoretical approaches to human or consumer needs

Fletcher (2008; 2014) borrows Manfred Max-Neef’s matrix of needs and satisfiers to propose what she refers to as fundamental human needs. Fletcher (2014:121) organises human needs into both material and non-material needs categorising subsistence and protection as physical material needs while non-material needs include psychological needs such as affection, understanding, participation, creation, recreation, identity, and freedom. Although Fletcher refers to these as human needs, discrepancies in scholarship exist regarding the naming thereof as they are also referred to as consumer needs.

Whether human or consumer needs, identification thereof provides a structure with which to organise peoples’ needs and enable fashion designers to synthesise and interpret these needs and incorporate them into praxis. However, I question the manner in which actual users’ needs are established, understood and the actions undertaken by fashion designers to ensure that designed products actually address such needs. My argument is founded in studies pertaining to consumer need models.

For example, Lamb and Kallal (1992:42) argue that designers design functional clothing to address the physical disability needs of people. With this in mind, Lamb and Kallal developed a general functional, expressive and aesthetic (FEA) consumer needs model to enable fashion designers to synthesise and interpret such people’s needs by first developing a consumer profile as input into the design process (Lamb & Kallal, 1992:42-44). I acknowledge that the FEA is an early example, but I cite it here because several studies have drawn attention to and implemented this model in fashion design praxis.

Stokes and Black (2012:179; 181) utilise the FEA model to survey the clothing needs of United States adolescent girls and applied statistical tools to collect and analyse data. Likewise, Jin and Black (2012:145; 147-149) used the FEA model to investigate the clothing needs of young male tennis players, again employing quantitative surveys and statistical analysis. Later, An and Lee (2015:208-211) drew on the FEA model to develop a conceptual framework for
fashion design that considers Asian women’s emotional needs, but also utilise quantitative-based strategies to gather and analyse data for interpretation and application in the design process. Although, Lamb and Kallal’s (1992) FEA model is a valuable tool with which to establish user needs, quantitative-based strategies have predominantly been employed to collect and analyse data, again positioning people as passive, and giving designers the power to interpret and apply the information gathered as input into design processes.

Later, Romeo and Lee (2016:3) developed an Apparel Needs and Expectations (ANE) model framed along the lines of culture, apparel experience, technology, lifestyle and demographics in order to address target customers’ needs and expectations. The model was implemented and validated by universities as a successful tool with which to enable FD students’ to synthesise and interpret ANE attributes into their design process activities (Romeo & Lee, 2016:4-7). However, I question the validity of the ANE model given that, in the study on which it is based, FD students did not gather primary data from actual users but rather subjectively interpreted people’s needs as stimuli for design action, thus ultimately operating from an inward-looking perspective. Based on this, I am inclined to say that volition manifesting in such an inward-looking practice, and the design for imagined consumers, requires change.

4.3.2.3 Motivation to change volition within fashion design praxis

I concur with Aspelund (2010:55-56), who argues that fashion designers should not retain superannuated techniques and approaches based on traditions, but that they should rather question how and why things work and also embrace the notion of alternative values and beliefs to direct choices and decisions and bring about change. This argument is reflected in the design principle below.

V4: Fashion designers’ should change their volition so that they can think about and approach fashion design praxis from a different perspective

My reasoning for this design principle coincides with scholars who reject traditional TDD praxis and argue for change, as was discussed in sub-section 1.7.2 (Clark, 2008; Fletcher, 2008; Fletcher & Grose, 2012; Fletcher & Tham, 2015; Hethorn, 2015; Peterson, 2015; Walker & Giard, 2013). In the following sub-section, I show that a HCD approach is evident in fashion design praxis.
4.3.4 Volition manifesting in HCD praxis

4.3.4.1 Cases of misguided use of co-design

With the growth in collective, open-source, online and interactive platforms such as the web, fashion blogs and social networks, co-design practices are emerging. Despite this, when it comes to fashion design praxis, in my view there seems to be a misguided perception of the underlying scope of co-design (which is an approach to HCD).

Seeing it as co-design, Liao and Lee (2010:211; 213) find that manufacturers develop new designs for brassieres by allowing users the option of personal customisation by selecting design elements such as fabrics, necklines, colours and shoulder straps. This study employed statistical techniques to establish the design attributes with respect to users’ selected preferences (Liao & Lee, 2010:217-222).

In a later study, Smith, Blair and Cooper (2012:438) employ desktop research to explore co-design practices of 20 case studies in the fashion industry. In this study, Smith et al. (2012:437-438) find that fashion designers practice co-design in three distinct ways. Firstly, fashion designers use digital innovations, assume leading roles in the design process and follow traditional methods in that ready-made products are designed and made for consumers to purchase (Smith et al., 2012:437-438). Secondly, they found that toolkits or software instructions were used so that users could make their own products. Thirdly, for mass customisation, digital innovations were utilised in a way whereby people could co-design and “do-your-own” products by choosing from a range of pre-existing design elements (Smith et al., 2012:438).

Likewise, in a more recent study, Wu, Kang, Damminga, Kim and Johnson (2015:69) find that co-design practices in fashion design are seen as a process in which a user selects from pre-designed elements and adds features such as graphic images or texts to customise the product as per their personal preferences. Similarly, Peterson (2016:4) analyses the co-design process for mass customisation in a Japanese-based company, and finds that sales assistants aid consumers to co-design a product by choosing pre-designed style, material and colour options.
I disagree that this approach to fashion design praxis is actually co-design for a number of reasons. Firstly, co-design is an approach to HCD and therefore requires user involvement in the ideation, conceptualisation, prototyping and evaluation stages of the design process, and the design processes reflected in these studies do not align with the general HCD principles identified in section 3.6. Moreover, Liao and Lee’s (2010:217-222) incorporated statistical techniques which is in opposition to qualitative-based co-design strategies. Secondly, Liao and Lee’s (2010:211) study suggests that manufactures are actually designers. Likewise, Peterson’s (2016:4) study shows that sales assistants and consumers assume the role of the designer. These findings bring into question whether manufacturers and sales assistants are actually fashion designers. Thirdly, these studies show that users merely select design elements such as colour, style and fabrication from pre-existing digital repositories for personal customisation yet user and designer participation in the design process stages remains absent. If the argument is that co-design of fashion involves mass market customisation, I would counteract this by saying that technology is also developed for a mass market, yet companies such as Google, IBM and Apple are able to align their products and services with the underlying tenets of HCD (Friess, 2010; Muratovski, 2016; Elmansy, n.d). This gives rise to the following design principle.

V5: Fashion design praxis should not rely on misguided perceptions of co-design nor position volition within trending populism

One of the possible reasons that fashion design praxis may associate co-design with populism is that fashion brands such as Levi Strauss, Land’s End, Brooks Brothers and Nike (Wu et al., 2015; Peterson, 2016) all seem to claim co-design practices, yet little is known about the extent of nor the manner of users’ active involvement in the design process. Nonetheless, alternative cases of HCD within fashion design praxis are evident in the literature.

4.3.4.2 Cases of HCD

Rogers et al. (2015:1-2) report on an interdisciplinary inquiry aimed at the design, testing and evaluation of a fall-protective winter coat for elderly women. They claim that, to design the coat, an actual user was involved throughout the design process including prototype development, evaluation and feedback. In addition, the design of the coat required specialised technology that could detect when the user tumbles, hence the design team comprised of multi-disciplinary experts from design, science and engineering (Rogers et al., 2015:2). Rogers et al.
(2015:1) report that focus group interviews made provision for four elderly participants to certify the technology-related aspects of the design.

In another case of volition manifesting in service to society, Black and Torlei (2013) report on a UCD approach to the design of a new type of hospital gown. The Design Society36, in collaboration with a number of researchers, designers, practitioners and industry practitioners, responded to a call from the Department of Health in the United Kingdom to develop proposals to improve patient experiences through design innovation (Black & Torlei, 2013:154). As part of this team, Karina Torlei37 carried out ethnographic studies with staff and patients at Wolverhampton hospital and gained insight into the context of use and the needs of different role-players regarding the patient gown (Black & Torlei, 2013:153-154). This type of ethnographic research, contextual analysis and user need identification accords with what Steen (2011:51-52) refers to as contextual design (which is an approach to HCD).

Having collected ethnographic data, Torlei collaborated with Matthew Miller, a British fashion designer to design and prototype a universal38 gown (Black & Torlei, 2013:155). Torlei and Miller presented design ideas and several prototypes to nurses in five feedback sessions which yielded valuable new design insights and offered the fashion designer insight into the context as this particular fashion designer was unaccustomed to working with actual users nor considering the context of where the design would be used (Black & Torlei, 2013:155). The feedback sessions revealed that the initial designs and prototypes could not manifest in tangible products which prompted further investigation with nurses as well as contextual analysis (Black & Torlei, 2013:156-157). As a result, Torlei and Miller had to consider the feedback and redesign the patient gown which resulted in several further prototypes and evaluations (Black & Torlei, 2013:157-160).

Han, Shin and Chow (2016) describe a UCD approach to the design of a hydrotherapy wetsuit for users with limited mobility. As input into the design process, two physiotherapists and two patients (the users) were interviewed to establish the problems associated with hydrotherapy

36 The Design society is an international, non-governmental, non-profit organisation.
37 Torlei is an industrial designer and researcher at Hamly Center for Design at the Royal College of Art (Black & Torlei, 2013).
38 An inclusive design that will work well for all stakeholders and in all types of hospital wards (Black & Torlei, 2013:155).
wetsuits and the main features of a proposed new design (Han et al., 2016:17). However, they found that the physiotherapists were the primary users of the hydrotherapy device and that patients were secondary users; as a result, the physiotherapists’ feedback focused on design efficiency while patients’ responses were limited to clothing comfort. Based on their collected data, establishing a general set of design requirements for the hydrotherapy device proved challenging, which led the researchers to draw on desktop research and analysis of available devices (Han et al., 2016:118-19).

However, although the above-mentioned study did not indicate whether and how the participants were actually involved in the ideation and conceptualisation stages of the design process the study nonetheless demonstrates user evaluation of prototypes within the context of aquatic exercises and feedback by physiotherapists (Han et al., 2016:20-21). Following initial testing, and taking into consideration the feedback obtained, design iterations unfolded with prototype refinement and re-evaluation by a patient (Han et al., 2016:21).

Lobo, Koshy, Hall, Erol, Cao, Buckley, Galloway and Higginson (2016) report on the design process and testing of Playskin Lift, an exoskeletal garment for young children with weakness and poor motor control. In this study, multi-disciplinary team members, including academic experts in paediatric physical therapy and mechanical engineering, students from FD and mechanical engineering and “families of children with arthrogryposis”, were part of the Playskin Lift project team (Lobo et al., 2016:392). Against the FEA model (as discussed in section 4.3.2.2), four families with children diagnosed with arthrogryposis were interviewed in order to establish user needs with these interviews serving as input into the design process (Lobo et al., 2016:392). To evaluate the Playskin Lift with regard to the mechanical aspects, the effectiveness of the design, the feasibility of the product and behavioural assessment, a prototype design was tested on a toddler in the context of his/her home with the aid of video recording (Lobo et al., 2016:394-396). In addition, a questionnaire was used to measure the parents’ perceptions of the Playskin Lift. Despite this, the findings of the evaluation report predominately rely on statistics (Lobo et al., 2016:393-394).

I believe that the approach to fashion design praxis in the studies presented in this sub-section aligns with the general HCD principles identified in section 3.6. It can be argued that these

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39 A structure worn external to the body
HCD projects represent predominantly functional design products as opposed to fashionable, wearable clothing products but I take the position, as Aspelund (2010:55-56) does, that when values and will come into play, the practice itself is more important than the outcome. Moreover, I concur with Fuad-Luke (2009), who states that such actions stem from a designer-as-activist standpoint. Therefore, the volition manifesting in these HCD cases is different from that of fashion designers who see themselves as experts or who design for an imagined intended consumer. As such, the volition in the HCD studies presented in this sub-section, in my view, aligns with Simon (1982) and Fuad-Luke’s (2009) argument that design is about changing existing situations into preferred ones. As Mitcham (1994:255) states, volition supports and is reflected on through knowledge. In light of this, the subsequent section deliberates on design knowledge.

4.4 DESIGN KNOWLEDGE

4.4.1 Framing knowledge

Drawing from Love’s (2000) meta-theoretical taxonomy of design theory (refer to sub-section 3.2.2.5) and Mitcham’s (1994) modes of technology as knowledge (refer to sub-section 3.2.3.3), Figure 3.3 positions design knowledge as the second mode in my philosophical framework of fashion design praxis. Design and fashion design knowledge may differ from natural science knowledge since designers work and think differently to scientists. Müller and Thoring (2010:2), in their typology of design knowledge, note that knowledge often associates itself with “justified true belief”. This line of thinking parallels De Vries’s (2005:31-32) claim that knowledge, when articulated in propositions or justifications, is considered to be true. Likewise, Nonaka and Von Krogh (2009:636; 637; 640), from an organisational management standpoint, consider knowledge as warranted true belief. Plowright (2016:339) locates this justified belief in epistemology and the validity of knowledge.

However, scientist and philosopher, Michael Polanyi (2009:4), positions human knowledge in the profound statement that “we can know more than we can tell”. Polanyi (2009:4-5; 7; 20-21) contextualises this in physiognomy, arguing that a person may know a face but is unable to articulate just how they know this face; as such, knowledge encompasses both practical and theoretical knowing and the tacit, applied skill cannot be ignored as such knowledge may lead
to theory development. Taking the tacit into consideration, Polanyi (2009:6) argues that “all knowledge is discovered and, once discovered, is held to be true”. This implies that there are two distinct knowledge types that constitute true knowledge.

4.4.2 Knowledge types

Psychological research classifies conceptual and procedural knowledge as primary knowledge types, with each featuring distinct characteristics (Star & Stylianides, 2013:171). As mentioned in sub-section 1.9.2, these different characteristics are founded on what Ryle (1949:28-29) refers to as knowing-that and knowing-how.

4.4.2.1 Conceptual, knowing-that knowledge

As noted in sub-section 3.2.3.3, Mitcham (1994:194) asserts that knowing-that refers to principle-based knowledge relating to laws, rules and theories. Such knowing-that is usually referred to as conceptual knowledge (Rittle-Johnson, 2006, Star & Stylianides, 2013) but, writing about design and technology, Kimbell and Stables (2008:35) refer to it as propositional knowledge. There is thus little consensus regarding the naming of knowing-that knowledge but, in this study, I will refer to it as conceptual knowledge seeing as this is the more widely used name.

Rittle-Johnson (2006:2) defines conceptual knowledge as “understanding of principles governing a domain and the interrelations between units of knowledge in a domain”. More recently, Star and Stylianides (2013:169) identify conceptual knowledge as concerned with principles but also with concepts and definitions. De Vries (2005:31-32) takes the position that conceptual knowledge unfolds through articulation, hence it is considered as justified true belief. However, as McCormick (1997; 2006) argues, conceptual knowledge is not static and focused solely on factual knowledge; rather, it is concerned with developing a conceptual understanding of relationships and links between different knowledge domains.

Since conceptual knowledge involves understanding and articulating theories, laws, principles, concepts, rules and definitions, it is associated with what scholars refer to as explicit knowledge (Collins, 2010; Nonaka & Von Krogh, 2009). However, some scholars categorise explicit knowledge as a separate knowledge type (Collins, 2010; Seidler-de Alwis & Hartmann, 2008;
Takala, 2008). Others, such as Johannesson and Perjons (2014:25; 34), express the view that the explicit is knowledge that is embedded in materialisation such as in the case of a designed product. Drawing from these arguments, it is evident that multiple perspectives exist regarding whether explicit knowledge is a knowledge type or a knowledge form despite the fact that, as was mentioned in sub-section 4.4.2, Star and Stylianides (2013:171) argue that conceptual and procedural are the primary knowledge types.

Although explicit knowledge may be considered a third knowledge type, I align myself with Star and Stylianides (2013:171) and Johannesson and Perjons (2014:25; 34) that conceptual knowledge is a type of knowledge while explicit knowledge is a form of knowledge articulated and materialised through knowing and understanding. In addition, positioning myself as in agreement with the work of Rittle-Johnson and Alibali (1999:175) and Johannesson and Perjons (2014:25), my position is that conceptual knowledge is actually explicit.

Such explicit knowledge, as found in, amongst others, books, journals, newspapers and the internet, is stored information accessed through the consciousness and articulated, spoken, codified or formulated in sentences or captured in drawings (Johannesson & Perjons, 2014; Nonaka & Von Krogh, 2009; Seidler-de Alwis & Hartmann, 2008). Müller and Thoring (2010:3) add that this knowledge includes design terminology and design rules that are embedded in materialisation thus corresponding with the view of Johannesson and Perjons (2014:25; 34) that the explicit is embedded in materialisation. The implication of this is the following design principle.

**DK1: Fashion design praxis should include conceptual knowledge which should be first known and then made explicit through articulation and manifestation in practice**

The above design principle implies that conceptual explicit knowledge cannot be separated from knowing-how, which is discussed in the following sub-section.

**4.4.2.2 Procedural, knowing-how knowledge**

On the other side of the knowledge spectrum is knowing-how. As discussed in sub-section 3.2.3.3, Mitcham (1994:94) maintains that know-how is associated with experience and practical skill acquisition. Similarly, other scholars associate know-how with skill acquisition
or “know how to do it knowledge” which cognitive psychologists term procedural knowledge (De Vries, 2005; McCormick, 2006:34). Although know-how is commonly known as procedural knowledge, Kimbell and Stables (2008:35) refer to it as action knowledge. This corresponds with Star and Stylianides’s (2013:169) affirmation that procedural knowledge is affiliated with procedures and actions thus implying the know-how to carry out certain activities. Based on this, I am of the view that procedural knowledge is about practical skill acquisition or doing actions, but would oppose those in the natural science who argue that conceptual knowledge is true knowledge (Ankiewicz et al., 2006; De Vries, 2005).

Several scholars refer to skill acquisition or know-how as tacit knowledge (Collins, 2010; Crouch & Pearce, 2012; Müller & Thoring, 2010). These scholars borrow the notion of tacit knowledge from Polanyi who first laid claim to the term⁴⁰ (Collins, 2010; Crouch & Pearce, 2012; Nonaka & Von Krogh, 2009; Seidler-de Alwis & Hartmann, 2008; Sen, 2009; Takala, 2008).

Polanyi’s (2009:4; 5; 9; 19) argument is that we may know how to carry out a skill (such as operating a machine) but we may not know precisely or fully understand how it works and therefore explicit (conceptual knowledge) cannot replace the tacit knowing, nor can the explicit fully translate into the tacit. As such, Polanyi’s (2009:4) statement that “we can know more than we can tell” implies that we may know-how to operate a machine, for example, but we may not be able to express this in an explicit manner; we thus know more than we can tell.

Polanyi’s notion of tacit knowing paves the way for three observations relating to: 1) know-how knowledge, 2) tacit knowledge as unconscious, and 3) that tacit knowledge cannot be explicit. The first observation is that tacit knowledge is grounded in skills, action, procedures, practice and experience and is thus knowing-how knowledge (Crouch & Pearce, 2012; Nonaka & Von Krogh, 2009; Seidler-de Alwis & Hartmann, 2008). The second observation is that tacit knowledge is individual, based on personal experience, personified in the human body and minds of people and society, hence the tacit is considered as, and brought forward by, the unconsciousness (Collins, 2010; Crouch & Pearce, 2012; Johannesson & Perjons, 2014; Mahroelian & Forozia, 2012). The third observation is that tacit knowledge cannot be codified.

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⁴⁰ Polanyi first published his book *The Tacit Dimension* in 1962 based on the Terry Lectures he delivered at Yale University (Sen, 2009:vii).
articulated or made fully explicit (Collins, 2010; Seidler-de Alwis & Hartmann, 2008). However, as noted earlier, some scholars argue that the explicit is embedded in materialisation (Johannesson & Perjons, 2014; Müller & Thoring, 2010). The implications of this lead to identification of the following design principle.

**DK2: Fashion design praxis should include tacit know-how knowledge in practice**

Aligning myself with McCormick (1997; 2006), procedural and conceptual knowledge types cannot function exclusively on two opposite ends of the spectrum, and the explicit can manifest itself in the tacit when it comes to design praxis. In the sub-section that follows, I justify why, in design praxis, procedural (tacit) and conceptual (explicit) knowledge should co-exist.

### 4.4.3 Co-existence of procedural tacit and conceptual explicit

As outlined in sub-section 4.4.2.1, conceptual knowledge is explicit. Polanyi (2009:7; 22-23) argues that conceptual knowledge cannot be rationalised as scientific truth because the tacit and explicit should function together and not as two separate entities. Nonaka and Von Krogh (2009:638; 640; 643) concur, arguing that even though the tacit and explicit lie on opposite ends of the knowledge spectrum, they cannot be regarded as two separate entities but rather rely on one another for knowledge creation. Even though the tacit and explicit are features of the procedural and conceptual, respectively, I agree with both Polanyi (2009) and Nonaka and Von Krogh (2009) that these two knowledge types co-exist and that they depend on each other for knowledge creation. This leads to the following design principle.

**DK3: Conceptual and procedural knowledge depend on each other with the conceptual manifesting itself in design praxis**

When it comes to design praxis, the co-existence of procedural tacit knowledge and conceptual explicit knowledge is vital in order to articulate and write about design practice and develop design knowledge. For design practice, transforming the tacit into the explicit is fundamental to design knowledge, as Manzini (2009) argues:

> It must be explicit, discussable, transferable and accumulable. It must be knowledge that can be clearly expressed by whoever produces it, discussed by anyone who is interested, applied by other
designers and it must become the starting point that allows other researchers to produce further
knowledge (Manzini, 2009:5).

I concur with Manzini (2009:6) that knowledge produced by “research for and on design”
enables an understanding of the nature of designing. In the same way, I agree with Crouch and
Pearce’s (2012:38) call for the tacit to be made explicit in order to understand design practice.
These suggestions lead to the design principle below.

**DK4: That which is tacit in design practice should be made explicit in some way**

The above-mentioned design principle is reflected in the fact that several “think aloud protocol”
studies exist (Cross, 2011:19-26). Such studies are conducted in laboratories where designers
think-aloud and express their thoughts through commentary while simultaneously engaging in
design activities (Cross, 2011:26). Such a think-aloud protocol was evident in a doctoral study
conducted by Haupt (2013) with expert designers from architecture, mechanical engineering
and industrial design in the early stages of the design process. In that study, the designers were
able to sketch and articulate their thinking at the same time (Haupt, 2013), thus showing that
the tacit can be made explicit. In the same way, Groth (2016:1; 5-6), in a practice-led ceramic
craft study, utilises a video recorder to document and make explicit embodied cognition
(thinking) while simultaneously engaging with tacit skills in ceramic making. Groth (2016:17)
finds that it is possible to explicate embodied thinking about the tacit within ceramic design.
These studies show that it is possible to make the tacit explicit in design practice even though
several scholars argue that the tacit is difficult or cannot be completely articulated or made
explicit (Collins, 2010; Polanyi, 2009; Seidler-de Alwis & Hartmann, 2008). With this in mind,
the co-existence of tacit and explicit knowledge is fundamental to design praxis and research
on design for design knowledge creation.

**4.4.4 Contextualising design knowledge**

Jones, Plowright, Bachman and Poldma (2016:296) posit that design epistemology lacks clarity
because of the lack of lucidity in the underlying grounding of design itself. Design knowledge
is about the design outcome, its structure, and the conditions for evaluating the result (Jones et
al., 2016:298). I agree with Manzini’s (2009:5) affirmation that design knowledge is used by
designers in the design process but considering the move towards co-design (an approach to HCD), the same meaning can be extended to non-designers.

Since design knowledge is used by designers, I agree with Cross (2007:22-26) that designers have different proficiencies and work and think differently as opposed to, for example, those in the science discipline. Given this distinction, Burns, Ingram and Annable (2016:303; 306), in an analysis of publications from the international journal Design Studies, found that design knowledge is situated in the tacit and thus rooted in design practice and products. Given the emphasis on tacit, designers, within their respective design disciplines, are trained to have certain skill in making products, but they also possess knowledge and understanding to conceptualise, plan, communicate, rationalise and motivate (Buchanan, 1995; Cross, 2007). Müller and Thoring (2010:1) state that many aspects, including skill, gut feeling, rules, knowledge about theory, design process models and production methods, constitute design knowledge. This is perhaps why scholars concur that, when it comes to design knowledge, there are distinctions between knowing-how and knowing-that (Cross, 2007; Kimbell & Stables, 2008). More recently, Friedman (2016:xxiv) observes that designers work in a way that differentiates between knowing-that and knowing-how. This leads to identification of the following design principles.

| DK5: Designers carry out activities associated with design and technological (making) processes by applying both knowing-that and knowing-how knowledge |
| DK6: Designers require conceptual knowledge about rules, design theories and design process models |
| DK7: Designers need the know-how to make |

As such, conceptual and procedural knowledge co-exist within design praxis, as they do within fashion design praxis, to which this discussion now turns.

4.4.5  Fashion design knowledge

4.4.5.1  Knowledge required of professional fashion designers

In my view, fashion design praxis is more reliant on procedural knowing-how given its vocational scope, albeit that conceptual knowledge is also necessary. As mentioned in subsection 1.3.1, conceptual knowledge of fashion design is predominately rooted in theory from
the humanities and social sciences, including aspects such as trickle-down theories and theories about style, taste, dress, society, class divisions, material culture and identity. Then again, I believe that conceptual knowledge is also rooted in trade-related theory and technology-related aspects such as pattern-making, manufacturing and design-related rules. As such, fashion designers need to be equipped with conceptual and procedural knowledge in order for them to perform certain job-related functions in different spheres of the fashion industry.

However, the conceptual knowledge and skills required may differ depending on the job description of the fashion designer and the division of the fashion industry, whether design, production or retail. Kawamura (2005:63) claims that the job description for fashion designers changes from one situation to the next, and from one clothing manufacturing company to the next, due of the extent to which the fashion designer is involved in the design and technological processes. Some fashion designers may not necessarily require the technology-related skills associated with making because they might not be involved in the production of clothing (Loschek, 2009; Kawamura, 2005).

International literature suggests that fashion designers should have business skills, technical skills and knowledge about the production process (Andrews, 2011; Chapman, 2011). In addition, scholars also claim that fashion designers need soft skills such as teamwork, communication and networking to maintain good relationships with customers, suppliers and other professionals in the fashion industry (Chida & Brown, 2011; Gerber & Saiki, 2010). These suggestions culminate in the following design principle.

**DK8: Fashion designers need design and technology-related know-how**

Skjold (2008:38) finds that fashion designers should not only concentrate on the form and aesthetics of a designed product, but that they should also have problem-solving abilities. This finding corresponds with Chida and Brown’s (2011:73) conclusion that fashion designers must have the aptitude to solve problems. These findings suggest the design principle below.

**DK9: Fashion designers should be able to solve problems**

I consider problem-solving as fundamental for fashion designers because they do engage with design process activities, which is grounded in the field known as design methodology.
4.5 DESIGN METHODOLOGY

4.5.1 Historical overview of design methodology

Based on Love’s (2000) notion of the design process level, in his meta-theoretical taxonomy (as illustrated in Figure 3.1), and Mitcham’s (1994) notion of technology as activity, in his framework (see Figure 3.2), I position design methodology as a third mode in my philosophical framework for fashion design praxis which includes both design methods and design process models (refer to Figure 3.3 in section 3.3).

Design methodology originally emerged in engineering, industrial design, architecture and planning (Cross, 1993; 2001). According to Mitchell (1992:x), in the 1950s, John Christopher Jones, one of the founding fathers of design methods who practiced as an industrial designer, introduced the notion of design methods to improve the quality of design by questioning the “aims, goals and purposes of designing”. Although this may have been the original intention of design methods, the history of design methodology remains vague since it only gained recognition as an academic field of inquiry following the 1962 Conference on Design Methods (Cross, 1993; 2001).

Following this conference, Cross (2001:50) notes that the 1960s first-generation saw design science dominating the scene, which paved the way for new design methods culminating in Herbert Simon’s 1969 publication, The Sciences of the Artificial. This first-generation positions itself in a positivist, rational, problem-solving paradigm in that it seeks to apply systemic, rational and scientific methods to design (Cross, 1993:17). However, in the 1970s, early pioneers such as Jones and Christopher Alexander rejected first-generation design methods due to the language they employed and their rationalisation of design methods (Mitchell, 1992; Cross, 2001).

Cross (1993:16-17) contends that the first-generation was not very successful and that Rittle and Webber, in the 1970s, paved the way for a second-generation of design methods underscored by the idea that design and planning should deal with wicked problems. In line with this, Cross (2001:53-54) demonstrates that Donald Schön challenged the positive doctrine of design science, which resulted in the emergence of a series of conferences and publications in the 1990s.
As can thus be seen, design methodology originally emerged within the disciplines of engineering, industrial design, architecture and planning. However, design methodology has seen fundamental shifts since its inception in the 1950s. The 1960s was dominated by the positivist, rational problem-solving first-generation who grounded their work in design science, but this was rejected by later pioneers. As such, the 1970s bore witness to the emergence of a second-generation, grounded in design as the solution to wicked problems, which was further enhanced by Donald Schö̈n’s challenge of the positivist doctrine of design science.

4.5.2 Design method paradigms

In this section, I discuss three key paradigms on design method. I discuss the positivist, rational problem-solving school of thought put forward by Simon (1982) in a publication entitled, *The Sciences of the Artificial*. From a constructivist, reflective practice school of thought, I draw on Schö̈n’s (1995) publication, *The Reflective Practitioner: How Professionals Think in Action*. I then shift to the third school of thought, based on the doctoral thesis by Dorst (1997) entitled, *Describing Design: A Comparison of Paradigms*, in which he attempts to bridge the gap between the positivist and constructivist schools of thought by presenting a dual-mode model of design method. Discussion of these three movements will assist in establishing design principles based on an understanding of the transformation of design methods and the influence thereof on design process models. In the sub-section that follows, I begin with the positivist paradigm on design methods.

4.5.2.1 Positivist, rational problem-solving paradigm for design methods

Simon (1982), examining design methods through the lens of a positivist, rational problem-solving school of thought drew comparisons between the natural sciences and engineering, arguing that the natural sciences are concerned with natural objects and engineering with artificial, human-made things. Simon (1982:7) emphasises these comparisons by stating that science is concerned with analysis but engineering with synthesis. After identifying this analysis-synthesis dichotomy, Simon (1982) attempts to bridge this divide by formulating relationships between the natural sciences and the science of design.

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41 First published in 1969 and subsequently revised in 1982 and 1996 respectively.
42 Simon (1982) sees engineering as design.
In his argument for a science of design, Simon (1982:55-58; 67-68; 71; 133) claimed that design is a form of problem-solving that involves searching within the problem space in a systematic manner using algorithms, declarative logic and rationality in a structured fashion. Simon (1982:137) further called on design education to consider science of design and include utility and statistical decision theories as frameworks for rational decision-making.

Simon’s (1982) positivist standpoint led to three major themes in design discourse: the first is that there is a relationship between science and design, the second is that design is rational problem-solving, and the third is that design activities unfold in a structured, step-by-step manner. These three themes have gained significant influence, and many scholars consider Simon’s publication of *The Sciences of the Artificial* as a landmark in design methods (Farrell & Hooker, 2015; Galle & Kroes, 2013; Le Masson, Dorst & Subrahamanian, 2013).

The first theme regarding the dichotomy between science and design continues to be evident in more recent debates brought forward by Farrell and Hooker (2012; 2015) and Galle and Kroes (2013; 2015). However, the debate between science and design is not the only argument within design methods. Simon’s second theme, design as rational problem-solving, also attracted widespread criticism.

In a position paper, Rittle and Webber (1973:160), writing from a planning perspective, proffered the notion of “wicked problems” to counter the scientific approach applicable to solving “tame” problems. Rittle and Webber (1973:160-161; 163-164) argue that tame problems are definable whereas wicked problems are ill-defined because they are situational, specific, not easily understood, and have no criteria for evaluating solutions as either true or not. Farrell and Hooker (2013:681) claim that Rittle and Webber’s notion of wicked problem was influential in design discourse even though it contradicts Simon’s rational, problem-solving paradigm. As such, I identify the following design principle.

**DM1: Design problems are ill-defined, wicked problems that lack set design criteria**

In the same light, Simon’s third theme, regarding design activities occurring in a structured fashion, also caused debate. Curry (2014:636) advocates that Simon’s scientific, rational problem-solving paradigm, as well as work in artificial intelligence, favours prescriptive, step-by-step design process models and led to many valuable frameworks. However, this was
criticised by Schön (1995) in *The Reflective Practitioner*, which is discussed in the sub-section that follows.

### 4.5.2.2 Constructivist, reflective practice paradigm for design methods

Schön (1995:41), a proponent of the constructivist, reflective practice paradigm for design methods, opposes the positivist, rational problem-solving school of thought:

> Increasingly we have come to become aware of the importance of actual practice of phenomena – complexity, uncertainty, instability, uniqueness and value-conflict – which do not fit the model of Technical Rationality.\(^{43}\)

Schön (1995:47) rejects Simon’s (1982) science-design relationship claiming it does not exist. Schön (1995:47) goes on to criticise the positivist, rational problem-solving paradigm by claiming that it “can be applied only to well-formed problems”. This corroborates Rittle and Webber’s (1973:160) earlier claim that the scientific approach is applicable to tame problems rather than the solution of wicked problems. In contrast to Simon’s science-design relationship and the structured approach to rational problem-solving within the positivist paradigm, Schön (1995) proposes a theory of reflective practice for problem-solving, arguing that design is a process of reflection-in-action and reflection-on-action.

As a rationale for reflective practice, Schön (1995:79) draws on the case of an educational design project undertaken in an architecture design studio under the supervision of a designer and facilitator, named Quist, and a student, known as Petra. Petra could not move any further in the design project due to an inability to solve the design problem but Quist assisted by drawing while simultaneously talking, engaging in what is known as the “language of designing” (Schön, 1995:80). As this language of designing continues, Petra observes Quist’s actions and is exposed to the art of reflection-on-action, consequently engaging in a reflective conversation with design process activities. Quist goes on to reflect-in-action by moving backwards and forwards whilst trying to find the best possible solution to the problem (Schön, 1995:94-98).

\(^{43}\) The positivist, rational problem-solving paradigm is also known as technical rationality.
This case study, and Schön’s (1995) theory of reflective practice, suggests that design problems are solved through reflective conversations between drawing and talking, in which designers reflect on and in action in a non-linear and less-structured manner. This accords with the discussion presented in sub-section 4.4.3 in which it was observed that scholars identify think-aloud protocol studies as common practice in design (Cross, 2011; Haupt, 2013). Schön’s (1995) reflective practice theory contrasts with Simon’s (1982) scientific, positivist, rational approach to problem-solving and paved the way for the constructivist paradigm on design methods offering descriptive, iterative and less-structured design process models. I agree with Schön’s (1995) constructivist, reflective practice paradigm and use it to formulate the following design principles.

| DM2: Design is bounded by context and situation and is thus unique |
| DM3: The design process is constructivist, iterative and less-structured |
| DM4: Design is a process of reflection-in-action and reflection-on-action |

Schön’s notion of reflective practice continues to be influential in design discourse (Cross, 2011; Curry, 2014). Nonetheless, the tensions between the constructivist and positivist paradigms has led to the emergence of a dual-mode model of design methods, to which this discussion now turns.

4.5.2.3 Dual-mode model of design methods

This sub-section investigates the dual-mode model with particular reference to a doctoral thesis by Dorst (1997). I select this text because it analyses Simon’s positivist, rational problem-solving paradigm and Schön’s constructivist notion of reflective practice and attempts to bridge the gap between them by proposing a dual-mode model for design.

Dorst (1997:162) takes into consideration the objective framing and interpretation of a design problem and argues that the rational problem-solving paradigm is more relevant at the information stage but that the subjective nature of the reflective practice approach is more applicable in the conceptual stages. As such, Dorst (1997:171) recommends a dual-mode model of design method combining both positivist, rational problem-solving and constructivist, reflective practice, paradigms within the conceptual, information and embodiment stages of design activity.
The argument of the dual-mode model is that the designer has freedom of choice and interpretation but must first decide on which design tasks will involve objective and subjective interpretations (Dorst, 1997: 163; 166; 169). The second choice facing the designer is to select the dominant paradigm that will act as the underlining approach based on three factors: the goals, activities and object of the study (Dorst, 1997: 166). However, Dorst (1997:152; 163; 166; 169) claims that designers’ choices, motivations and interpretations are embodied in design activities, hence identification of an embodied stage of the design process. This aligns with Mitcham’s (1994:255) argument that volition supports, and is reflected in, design activities, as was outlined in sub-section 3.2.3.2.

Dorst’s (1997) recommendation of a dual-mode model enables designers to bridge the gap between the positivist and constructivist paradigms. Lawson and Dorst (2009:56) argue for the appropriateness of a dual-mode model of design methods by claiming that designers must make both subjective and objective evaluations. In light of this, I agree with the dual-mode model for design methods and use it to construct the design principles below.

| DM5: Rational problem-solving is more appropriate within the information stage |
| DM6: The conceptual stages of the design process align with the subjective, reflective practice school of thought |
| DM7: Design tasks involve both objectivity and subjectivity |
| DM8: Designers ought to justify their perceptions and analysis in an explicit, objective way to support subjectivity |
| DM9: Objectivity and subjective volition are embodied in design activities |

4.5.3 Overview of design process models

The design process is a broad and complex phenomenon and there are multiple perspectives regarding how it is viewed and approached with countless attempts to establish an explicit engineering design process model (Cross, 2008; Lawson 2010). Some design process models are descriptive in that they describe the solution-focused strategy and activities of designers, while others are prescriptive in which activities are ordered in a fixed manner (Cross, 2008:29). I would argue that prescriptive design processes align with a positivist, rational problem-solving paradigm and are thus more structured in nature, whereas the constructivist, reflective

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44 The object of study is based on the design activities, design process, individuality of designers and design tasks (Dorst, 1997:166).
practice paradigm aligns more closely with descriptive models that are less-structured. Regardless, I agree with Lawson (2010:33) in that there is a commonality between such representations: they consist of a “sequence of distinct and identifiable activities which occur in some predictable and identifiable logical order”. This sequence functions on the premise that design processes compose of analysis and synthesis (Mitcham & Holbrook, 2006:111) though some scholars also include evaluation as a core constituent (Cross, 2008; Lawson, 2010). The implications hereof lead to identification of the following design principles.

| DM10: The design process comprises of a sequence of activities unfolding in some logical manner |
| DM11: The design process is based on analysis, synthesis and evaluation |

In light of the aforementioned viewpoints, in the subsequent sub-section, I move the discussion to explore design process models common to fashion design praxis.

### 4.5.4 Fashion design process models

In this sub-section, I draw on the design processes of Aspelund (2010) and Lee and Jirousek (2015). These are purposefully selected because both models position inspiration as the first stage in the design process.

#### 4.5.4.1 Inspiration as first stage

Design professional and FD educator, Aspelund (2010) puts forward a general design process model that suggests that inspiration is the core driver of design. Although this design process is general, it specifically draws on fashion design. In this model, Aspelund (2010:6-9) classifies the design process into seven stages: inspiration, identification, conceptualisation, exploration/refinement, definition/modelling, communication, and production with iterative feedback loops. Table 4.1 describes these stages in the general design process through description of the design activities undertaken within each stage.
<table>
<thead>
<tr>
<th>DESIGN PROCESS STAGE</th>
<th>DESCRIPTION OF DESIGN ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inspiration</strong></td>
<td>Aspelund (2010:6; 17-21) argues that designers need inspiration, in the form of muses coupled with their own imagination, to tap into their creativity and move their designs forward. Aspelund claims that such inspiration can be obtained from a number of different sources and that it is the driving tool for further design.</td>
</tr>
<tr>
<td><strong>Identification</strong></td>
<td>The design project may emerge from a client, be self-derived by the designer, or emanate from a previous design solution. In this stage, the design problem is examined and defined as per users’ needs and constraints but there is continued reliance on sources of inspiration to develop design solutions (Aspelund, 2010:7; 39-41).</td>
</tr>
<tr>
<td><strong>Conceptualisation</strong></td>
<td>At this stage, the idea of the design forms in the mind of the designer who explores and analyses different concepts without being overly concerned with the design problem. The designer’s thinking is captured through written ideas or visualised through, for example, collages, brainstorming tools, sketches, design journals and concept boards (Aspelund, 2010:3; 7; 71-89).</td>
</tr>
<tr>
<td>** Exploration/refinement**</td>
<td>Exploration/refinement is a solution-oriented stage in which designers explore their design solution by generating further sketches, illustrations and technical drawings (Aspelund, 2010:8; 97; 99; 101). This is done to refine, if necessary, and ensure that the design needs and constraints are met and that the design aligns with its context (Aspelund, 2010:8; 97; 99; 101). However, this stage is predominantly dependent on the designer’s intuition as opposed to logic, reflection and iterative looping back to the conceptualisation stage (Aspelund, 2010:99; 109).</td>
</tr>
<tr>
<td><strong>Definition/modelling</strong></td>
<td>In this stage, designers make decisions against their own feelings regarding design needs, the design solution, functionality, reliability, usability, proficiency, creativity and detail (Aspelund, 2010:120-122; 126). Conceptual models such as samples, mock-ups or any form of physical representation of the design idea are created to bring the concept into the real-world (Aspelund, 2010:127-128). Aspelund notes that activities in this stage are carried out to enable designers to further explore, understand and solve issues concerning the design needs and manufacturing (technological) processes. At this stage, further refinement may be required hence there is a feedback loop between this stage and the previous exploration/refinement stage.</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>Communication is essential throughout the design process but is most crucial prior to the production (technological) stage because designers need to communicate with clients, multiple stakeholders, production teams and management (Aspelund, 2010:8-9). Effective communication is dependent on the designer’s understanding of the needs of multiple stakeholders including the client (Aspelund, 2010:143).</td>
</tr>
</tbody>
</table>
Aspelund’s (2010) model appears to function within the broad activities of analysis, synthesis and evaluation. However, the model clearly indicates that inspiration is the core volitional factor in the design process. Inspiration, as the first stage in Aspelund’s (2010) model, may bring about tensions and contradictions in the subsequent stage given that clients seem to have a voice only in some of the identified stages.

Aspelund (2010:7; 39-41) claims that designers identify the design problem as per user needs in the identification stage, yet there is no indication as to how such user needs are established. As such, it is unclear whether qualitative or quantitative methods are used to establish user needs and how the design problem and user needs are actually framed. In the conceptualisation stage, Aspelund (2010:49; 74) does indicate the possibility of designer-user engagement if designers create consultative opportunities for users to view sketches. Then again, designer-user engagement is evidently absent in the exploration/refinement stage but seems to reappear in the definition/modelling, communication and production stages. In the definition/modelling stage, Aspelund (2010:129; 144) recommends that designers bring the user into the process by showing them the design model, communicating with them and obtaining their feedback.

Inspiration appears to be commonly accepted as a first stage in the fashion design process given that Lee and Jirousek (2015), in their study that sought to capture the design process of a professional fashion designer, found the same. Figure 4.1 illustrates the design process identified by Lee and Jirousek (2015).
As input into the design process (as shown in Figure 4.1), Lee and Jirousek (2015:152; 154) find that the fashion designer selected a number of visuals as sources of interest and inspiration, and then chose one graphic image to carry over to the subsequent stage. Seivewright (2007:1-33) affirms the fact that the collection of visual inspiration and the documentation thereof is considered research within fashion design. However, writing on research in fashion design, Mbonu (2014:9) contends that primary research includes data collected by way of, for example, fabric experimentation, photographs and sketching when investigated by oneself but that secondary research is found in books or via online platforms. As such, it is not surprising that Lee and Jirousek (2015:152; 154) obtain the same findings regarding inspiration-based research as the driver of the design process.

In the early stage of the design process, Lee and Jirousek (2015:152; 154-158) find that the designer borrows elements from these visual inspirations to intuitively ideate a series of draft sketches whilst simultaneously making decisions regarding design goals, styles that may be applicable for imagined consumers, and design elements such as fabric, line, shape drape and proportion. However, they note the iterative feedback loop between inspiration and the early design process stages (as illustrated in Figure 4.1) before moving on to the final stage.

In the final stage, Lee and Jirousek (2015:158) find that the designer manipulates, edits and refines the draft sketches and then finalises these by selecting several of them for colour representation. This depicts the volition of an expert, inward-looking authoritarian mind-set (as was discussed in sub-section 4.3.1) given that inspiration is the only input into the design process and given that there is no consideration of actual users’ voices. I would thus argue that
this particular fashion design process represents the TDD paradigm. In light of these observations, the following design principles are identified.

**DM12:** The designer should not frame the design problem based on assumption

**DM13:** Fashion design praxis should consider alternative design process models in order to shift away from visual inspiration and inward-looking practice as drivers of design process activities

Although Aspelund’s (2010) design process model includes the possibility of designer-user engagement in the stages of conceptualisation, definition or modelling and communication, in my view, it contradicts a HCD approach in that it argues that designers draw on inspiration, from muses and their imagination, to drive the design process rather than on people and their voices. In the sub-section that follows, I draw on an alternative fuzzy front-end design process model put forward by co-design proponents under the banner of HCD. Fashion design praxis may do well to consider such a design process model.

### 4.5.5 Fuzzy front-end design process model

Sanders and Stappers (2008; 2012) put forward the fuzzy front-end design process model (illustrated in Figure 4.2), which reflects a design processes that is more in line with a HCD approach. I select this model because the developers are leading proponents of co-design, which falls under the banner of HCD and, as such, this design process model is specific to HCD.

![Diagram of Fuzzy front-end design process model](image)

**Figure 4.2:** Fuzzy front-end design process model (adapted from Sanders & Stappers, 2008; 2012)
I agree with Sanders and Stappers (2008; 2012) that traditional design processes place greater emphasis on ideation, conceptualisation, prototyping and product development, but that this creates a gap (as depicted in Figure 4.2). This leads to identification of the following design principle.

**DM14: The fuzzy front-end design process model is an alternative model to bridge gaps**

Designers work in teams to identify the challenges associated with wicked design problems at the fuzzy front-end and, as such, the design criteria stage is “messy and chaotic” with no clear design path (Sanders & Stappers, 2012:22). At this stage, designers utilise open-ended, qualitative questions, as opposed to quantitative means, to empirically collect data from actual users in order to establish their needs and context (Sanders & Stappers, 2008:7). This means that the design criteria stage frames the design problem and results in a set of design criteria and constraints which then then act as input for design actions in the idea, conceptualisation, prototyping and product development stages (Sanders & Stappers, 2008; 2012). Within such a model, designers are no longer the expert creative genius and users have a voice and are actively involved throughout the design process (Sanders & Stappers, 2008; 2012). These ideas foreground the design principles listed below.

| DM15: Designers work in teams |
| DM16: The design criteria stage investigates and frames the design problem via open-ended, qualitative strategies in order to establish actual user needs and context of use |
| DM17: The design criteria stage aims to establish a set of design criteria and constraints as input for design actions |
| DM18: Users are participants in data collection and are actively involved throughout the design process |

Based on the above, I align myself with the fuzzy front-end design process model as opposed to those applied within traditional fashion design praxis. My rationale for this is that the fuzzy front-end design process model does not see designers as only drawing on inspiration obtained from secondary research and as practicing inward-looking design of products for imagined people.
4.6 PRODUCT

Based on Love’s (2000) level of objects, in his meta-theoretical taxonomy (see Figure 3.1), and Mitcham’s (1994) notion of technology as object, in his framework (see Figure 3.2), in Figure 3.3 (refer to section 3.3), I posit product as a fourth mode in my philosophical framework for fashion design praxis. Drawing from sub-sections 3.2.2.3 and 3.2.3.5 respectively, Love (2000) and Mitcham (1994) refer to product as object which Ankiewicz et al. (2006:139) ground in ontology.

Love (2000:305) discusses object in terms of the description and behaviour of elements, that is, the physical characteristic of an object (Kroes, 2002). Linking this to fashion design, designed clothing products are made up of design elements in terms of their physical characteristics such as lines, shapes (silhouette), textures (fabric) and colours (Ellinwood, 2011; Volpintesta, 2014). As such, every designed clothing product can be described in terms of these characteristics and the manner in which each of these design elements behave. This leads to identification of the following design principle.

**P1:** Designed clothing products include physical characteristics or design elements such as line, shape (silhouette), texture (fabric) and colour

Meanwhile, Mitcham (1994) identifies objects as human fabrications emerging from doing actions. Others agree that objects are man-made, tangible creations but prefer the term ‘technical artefacts’ (Houkes & Vermaas, 2010; Kroes, 2002). Houkes and Vermaas (2010) favour this term as it takes into consideration the skills involved in ensuring that objects serve specific functions. Scholars claim that designers can purposefully build their intentions into human action to reach the goal of product creation but that this may or may not materialise in reality (Fuad-Luke, 2009; Ihde, 2008; Kroes, 2002). These arguments align with Mitcham’s (1994:255) claim that volition supports and is reflected in objects (products). Aligning myself with these views, I identify a subsequent design principle.

**P2:** The materialisation of products is a result of one’s volition, way of thinking, agency and intentional action
The design principles associated with volition (the first mode in my philosophy of fashion design praxis) may bring about an alternative way of thinking about and practicing fashion design in the educational context. In the same way, the modes of design knowledge, design methodology and product yield design principles for fashion design praxis, with which I will seek to develop a pilot educational intervention.

4.7 TENTATIVE DESIGN PRINCIPLES FOR FASHION DESIGN PRAXIS

In the preceding discussion pertaining to the four modes within my philosophy of fashion design praxis, I put forward various tentative design principles. Table 4.2 codes and summarises these tentative design principles for fashion design praxis, according to the four modes, and cross-references them to the respective sections in which they were introduced.

Table 4.2: Tentative design principles for fashion design praxis

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLITION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1</td>
<td>Designers should become agents of change and design with intent</td>
<td>4.2.1</td>
</tr>
<tr>
<td>V2</td>
<td>Volition should trigger and stimulate specific design actions that change design from an existing state to a preferred one</td>
<td>4.2.2</td>
</tr>
<tr>
<td>V3</td>
<td>Fashion designers should aim to design with empathy with actual users</td>
<td>4.3.1.1</td>
</tr>
<tr>
<td>V4</td>
<td>Fashion designers’ should change their volition so that they can think about and approach fashion design praxis from a different perspective</td>
<td>4.3.2.3</td>
</tr>
<tr>
<td>V5</td>
<td>Fashion design praxis should not rely on misguided perceptions of co-design nor position volition within trending populism</td>
<td>4.3.4.1</td>
</tr>
<tr>
<td>DESIGN KNOWLEDGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DK1</td>
<td>Fashion design praxis should include conceptual knowledge which should be first known and then made explicit through articulation and manifestation in practice</td>
<td>4.4.2.1</td>
</tr>
<tr>
<td>DK2</td>
<td>Fashion design praxis should include tacit know-how knowledge in practice</td>
<td>4.4.2.2</td>
</tr>
<tr>
<td>DK3</td>
<td>Conceptual and procedural knowledge depend on each other with the conceptual manifesting itself in design praxis</td>
<td>4.4.3</td>
</tr>
<tr>
<td>DK4</td>
<td>That which is tacit in design practice should be made explicit in some way</td>
<td>4.4.3</td>
</tr>
<tr>
<td>DK5</td>
<td>Designers carry out activities associated with design and technological (making) processes by applying both knowing-that and knowing-how knowledge</td>
<td>4.4.4</td>
</tr>
<tr>
<td>DK6</td>
<td>Designers require conceptual knowledge about rules, design theories and design process models</td>
<td>4.4.4</td>
</tr>
<tr>
<td>DK7</td>
<td>Designers need the know-how to make</td>
<td>4.4.4</td>
</tr>
</tbody>
</table>

Table 4.2 continues on next page
| DK8 | Fashion designers need design and technology-related know-how | 4.4.5.1 |
| DK9 | Fashion designers should be able to solve problems | 4.4.5.1 |

**DESIGN METHODOLOGY**

| DM1 | Design problems are ill-defined, wicked problems that lack set design criteria | 4.5.2.1 |
| DM2 | Design is bounded by context and situation and is thus unique | 4.5.2.2 |
| DM3 | The design process is constructivist, iterative and less-structured | 4.5.2.2 |
| DM4 | Design is a process of reflection-in-action and reflection-on-action | 4.5.2.2 |
| DM5 | Rational problem-solving is more appropriate within the information stage | 4.5.2.3 |
| DM6 | The conceptual stages of the design process align with the subjective, reflective practice school of thought | 4.5.2.3 |
| DM7 | Design tasks involve both objectivity and subjectivity | 4.5.2.3 |
| DM8 | Designers ought to justify their perceptions and analysis in an explicit, objective way in order to support subjectivity | 4.5.2.3 |
| DM9 | Objectivity and subjective volition are embodied in design activities | 4.5.2.3 |
| DM10 | The design process comprises a sequence of activities that unfold in some logical manner | 4.5.3 |
| DM11 | The design process is based on analysis, synthesis and evaluation | 4.5.3 |
| DM12 | The designer should not frame the design problem based on assumption | 4.5.4.1 |
| DM13 | Fashion design praxis should consider alternative design process models in order to shift away from visual inspiration and inward-looking practice as drivers of design process activities | 4.5.4.1 |
| DM14 | The fuzzy front-end design process model is an alternative model to bridge gaps | 4.5.5 |
| DM15 | Designers work in teams | 4.5.5 |
| DM16 | The design criteria stage investigates and frames the design problem via open-ended, qualitative strategies in order to establish actual user needs and context of use | 4.5.5 |
| DM17 | The design criteria stage aims to establish a set of design criteria and constraints as input for design actions | 4.5.5 |
| DM18 | Users are participants in data collection and are actively involved throughout the design process | 4.5.5 |

**PRODUCT**

| P1 | Designed clothing products include physical characteristics or design elements such as line, shape (silhouette), texture (fabric) and colour | 4.6 |
| P2 | The materialisation of products is a result of one’s volition, way of thinking, agency and intentional action | 4.6 |

These 34 tentative design principles will be used to develop a pilot teaching and learning intervention, which is important given that FD students are trained to enter the professional world of fashion design praxis. As such, this discussion now turns to design education in order to achieve the second purpose of this chapter and accomplish Phase 1D of the larger inquiry.
4.8 DESIGN EDUCATION

This section expands on the deliberations presented in section 1.8, beginning with discussion of the emergence of design education and then reflection on general movements that have occurred within design education.

4.8.1 Emergence of design education

In a research project commissioned by the Centre for Excellence in Teaching and Learning in Design (CETLD), Lyon (2011:3; 8) argues that design education originally emerged as a semi-formal tradition directed towards craft training within an apprenticeship model. In line with this, Lawson and Dorst (2009:220) argue that the design fields generally emerged as a result of craftsmen, rather than actual design educators, who trained their apprentices in areas related to what is currently known as design. Given this focus on craft training, design education has a long history of placing emphasis on the making of products (Breslin & Buchanan, 2008:38). However, design education has witnessed a number of movements, including its formalisation as a discipline in its own right, which was a result of the first industrial revolution (Lyon, 2011:8).

4.8.2 The first design education movement

This first movement was initially known as the atelier system (and is currently known as the design studio) and emerged from the Ecole des Beaux Arts school in France as an approach to problem-oriented education to enable students to find solutions to design problems (Oxman, 2001:271). As such, the atelier system grounded itself in professional design practice wherein students were taught about the design process through supervised practice and learning-by-doing (Oxman, 2001:271-72). Lyon (2011:8-9) argues that this educational model corresponds with the notion of craft making, which continued to dominate design education, as can be seen in the emphasis on skills demonstration in workshop settings and learning through making. Given this emphasis on craft and learning by making, the atelier system was later incorporated into a second movement within design education.

45 The CETLD was one of the 74 Centres of Excellence in Teaching and Learning set up as part of an educational initiative funded by the Higher Education Funding Council for England (Lyon, 2011).
4.8.3 The second design education movement

As noted in sub-section 1.8.1, a second school of thought emerged in the 20th century within the pedagogy used in foundation courses known as the Vorkurs and VKHUTEMAS offered by the Bauhaus and the Russian State Higher Art and Technical Studios, respectively (Oxman, 2001:272). These courses were not project based but were centred on visual design exercises in an attempt to advance visual literacy and improve understanding of prescribed principles as a foundation for design practice (Oxman, 2001:272). The Bauhaus model was instrumental in revolutionising the scope of design education given its grounding in a modernist philosophical paradigm that merged art, craft, design and industry (Lawson & Dorst, 2009:220). The Bauhaus mission was to “integrate artistic and practical pedagogy, aesthetics and applied skills” in order to produce designers and artists (Wax, 2010:31). Within such an educational model, design students are taught to apply artistic skills such as painting, drawing, sketching and making using technologies of production (manufacturing), but their education remains underpinned by aesthetic values of good taste and beauty (Muratovski, 2016:xxix-xxx).

The Bauhaus School placed students at the core of education and knowledge was constructed not only through the process of making (know-how) but also through developing conceptual understanding (know-that) (Lyon, 2011:47). Lawson and Dorst (2009:220-222) acknowledge that the Bauhaus pedagogy transcended the individual student-educator relationship and moved to a design studio-based (SB) pedagogy, which came to be taken up across the globe, including in South Africa, and also gave rise to the establishment of the prominent HfF Ulm German School. Overshadowed by the Bauhaus model and the later HfF Ulm School, global design education was transformed such that it not only addressed the object of design but also saw the introduction of formal content to develop understanding of design rules (Oxman, 2001:272-273). The implication of this was that modern design schools shifted in scope from procedural skill acquisition to inclusion of more conceptual knowledge in design curricula. Although the Bauhaus model was exceedingly influential and continues to dominate design education, as noted in sub-section 1.8.2, its relevance and appropriateness within the current design landscape is questionable. As such, a third design education movement is evident.
4.8.3 Emergent third design education movement

As early as 2007, Salama and Wilkinson (2007:4) acknowledged that change had occurred in all aspects of life, but the educational models of Ecole des Beaux Arts and Bauhaus remained prevalent in design education as professional designers moved into the academic arena, disassociating themselves from real-world human problems and neglecting to learn from social experiences. Similarly, Lawson and Dorst (2009:222) argue that the Bauhaus and HfF Ulm School principles have long been surpassed yet remain dominant within general design education.

As argued in sub-section 1.8.2, there are increasingly loud calls to shift design education from the conventional models of the first and second movements. Lawson and Dorst (2009:223-4) argue that design education should consider, amongst others, the impact of designed products on people’s lives, sustainability issues and the empowerment of users and their participation in design. In the same light, the International Council of Graphic Design Associations (Icograda, 2011:8-9), in their Design Education Manifesto, argues that global, social, environmental, economic and technological changes are evident and, as such, the role of the professional designer should change to one of global citizenship. To respond to these changes, and to develop future designers as global citizens, the Design Education Manifesto (Icograda, 2011:9) states several new dimensions for general design education including that of inclusive design and collaboration with users. I draw attention to this specific dimension given my focus on HCD in this study.

As outlined in sub-section 1.8.2, despite the appeals to shift design education away from the underlying philosophies of the Ecole des Beaux Arts and Bauhaus models to those that align with global shifts in design discourse, I would argue that design education continues to uphold the conventional frameworks of inward-looking practice, in which students design for themselves or for people (Lyon, 2011; Muratovski, 2016) even though this is no longer sufficient. As such, I identify the following design principle.

**DEP1:** Design education should shift from conventional educational models that foster inward looking-practice to those that foster inclusivity and collaboration with users
4.9 DESIGN EDUCATION PEDAGOGY (DEP)

4.9.1 The aim of design education

Scholarship suggests that there are multiple perspectives with respect to the aim of design education. Szeto (2010:81; 83-87), in a study conducted with design academics, researchers and practicing designers from across the globe, finds that there are fragmented and disjointed interpretations regarding the meaning of design itself as well as the aim of design education. In my review of the literature, in the discussion presented in section 1.2, I similarly found that, historically, design was seen as a multi-dimensional, mystifying and complex phenomenon with no explicit definition. Without such a common definition of design itself, the general aim of design education is subject to multiple interpretations and a lack of clear consensus. Nonetheless, a common theme in the literature is that design education is practice-based, directed towards industry needs and that it aims to prepare students to enter the professional world of design (Szeto, 2010; Tovey, 2015). As such, general design education places greater emphasis on skills development and less on theoretic development (Tovey, 2015:3).

To achieve the above-mentioned aim, however, scholars have generally agreed that SB pedagogies are a commonly accepted characteristic of design education (Brandt et al., 2013; Crowther, 2013; Lawson & Dorst, 2009; Tovey, 2015).

4.9.2 Studio-based (SB) pedagogy as constructivist approach to learning

Studio-based pedagogy is often equated with architecture since this particular discipline has received more widespread research attention (Crowther, 2013:18). This is possibly due to the prominence of Schön’s (1987; 1995) notion of reflective practice in the architecture studio (as discussed in sub-section 4.5.2.2). Despite this, SB pedagogy is widely used in all fields of design education.

Scholars concur that SB pedagogy is student-centered in that it fosters active learning; the role of the educator is to direct learning experiences as opposed to conventional lectures that are associated with the delivery and transfer of information in traditional university classroom settings (Brandt et al., 2013; Cennamo, Brandt, Scott, Douglas, McGrath, Reimer & Vernon, 2011; Taylor, 2009). Due to its non-conventional nature, within SB pedagogy, educators move
around studios engaging students in dialogue, probing and questioning them to support
decision-making, consider alternative design possibilities and determine a course of action
(Shreeve, 2015:85; 88). Within SB pedagogy, design educators assume the role of facilitators
that steer student learning experiences as opposed to traditional classroom situations in which
lectures are delivered and students are positioned as passive recipients of knowledge.

As such, SB pedagogy is a constructivist approach that supports deep, as opposed to surface,
learning as students are required to create new designs through contextual analysis, synthesis
and personal understanding of conceptual knowledge and learning experiences (Crowther,
2013:19). Crowther (2013:20) is of the view that deep learning accommodates “learning about
design” (conceptual knowledge), “learning to design” (procedural knowledge) and “learning
to become” (transforming the person). Shreeve (2015:83) postulates that learning to become
not only concerns learning about and knowing-how to design but requires a change in
knowledge, behaviours and emotions, which ultimately transforms the person. Through
transformative learning, future designers can become what Fuad-Luke (2009:18) refers to as
activists and agents of change, and what Icograda (2011:8-9), in their Design Education
Manifesto, call global design citizens. Based on this, I identify the following design principles.

<table>
<thead>
<tr>
<th>DEP2: Pedagogy should adopt a constructivist, student-centered approach that fosters active learning experiences on the part of students</th>
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</thead>
<tbody>
<tr>
<td>DEP3: Educators should assume the role of facilitators that guide learning experiences as opposed to transmitting knowledge</td>
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<td>DEP4: Students should acquire both conceptual knowledge about design and procedural knowledge to design</td>
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<tr>
<td>DEP5: Students should practice procedural knowledge to design</td>
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<tr>
<td>DEP6: Opportunities should be created for students to transform themselves through learning to become agents of change</td>
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</table>

Learning about design, learning to design or learning to become ultimately take place in a
studio, which typically follows a problem-based learning strategy (Brocato, 2009; Crowther,
2013). Historically, within SB learning, students were taught to solve design problems and, as
such, it has much in common with problem-based learning (Cennamo et al., 2011:12), albeit
that scholars claim that complexities reside in the ill-structured, opened-ended and uncertain
parameters of design problems and, for this reason, problem-based strategies may not be an
effective stratagem for student learning (Brandt et al., 2013; Jonassen & Hung, 2008). In light
of these arguments, scholars generally agree that SB pedagogies and project-based (PB)
learning, rather than problem-based, are commonly accepted in design education (Brandt et al., 2013; Breslin & Buchanan, 2008; Lawson & Dorst, 2009; Tovey, 2015). The implication hereof gives rise to the following design principles.

| DEP7: Teaching and learning should ground itself in studio-based pedagogy |
| DEP8: A project-based learning strategy is more appropriate to design education |

Theoretical constructs about SB and PB pedagogy are further explained in the sub-section that follows.

4.9.3 Dimensions of studio-based (SB) pedagogy

4.9.3.1 Characteristics of studio-based (SB) pedagogy

Kuhn (2001:349-351) posits that the features of SB pedagogy include: 1) projects structured around a complex, open-ended brief, 2) multiple and rapid iterations of student design solutions, 3) design critique, 4) heterogeneous issues, 5) student study of previous designs, 6) imposition of design constraints in order to navigate complex and open-ended problems, and 7) appropriate use of a variety of design media. Lawson and Dorst (2009:224) articulate that SB pedagogy includes features such as: 1) co-location, 2) learning-by-doing, 3) unrestricted timetabling, 4) integration, and 5) mimicking practice. More recently, Tovey (2015:3) highlight the following characteristics of SB pedagogy: 1) projects extending over long periods, 2) activity that is studio and workshop based, 3) critique and feedback, 4) peer learning, 5) learning-by-doing and 6) simulating professional practice. With the exception of study of previous designs, I agree with these SB features but am of the view that some may overlap or may go by different names. Hence, in the discussions that follow, I opt to combine some of these features and refer to them using my preferred nomenclature.

4.9.3.2 Simulating practice

It is generally agreed that the studio mirrors the workspace of professional practice (Crowther 2013; Tovey, 2015). However, Lawson and Dorst (2009:246-247) argue that mirroring professional practice may never offer a realistic view because of factors such as access to actual clients, consultants, users, manufactures and time constraints. Likewise, Crowther (2013:18-
19) acknowledges that realistic paralleling of professional practice requires students to work on design projects that respond to a simulated real-world of design. The implications here give rise to the following design principle.

**DEP9:** Role-playing is an effective pedagogical strategy to imitate professional design practice even though the teaching and learning setting and design problems can only imitate reality.

In architecture, for example, a student may work on a design problem in a studio environment but they are not actually going to construct a tangible building as an outcome of teaching and learning. Then again, in FD education, a tangible outcome is possible but students may not necessarily work with actual clients and users. Despite this, scholarship does suggest that constructive learning does occur within SB pedagogy.

4.9.3.3 *Constructive learning spaces*

The general consensus is that the studio is a pedagogical strategy but also a social and cultural learning space, a classroom and a workshop for students to learn about design and apply skills (Crowther, 2013; Lawson & Dorst, 2009; Muratovski, 2016; Tovey, 2015). In this co-located space, students have less contact with educators but more interaction with their peers which fosters a culture of socially-engaged learning, feedback and sharing of design ideas, with the ultimate intention of developing a community of shared values amongst like-minded individuals (Lawson & Dorst, 2009, Tovey, 2015). Access to educators and peers creates opportunities for students to learn via dialogue, demonstration of skills and design critique, which culminates in a more socially-engaging learning experience (Brocato, 2009:141). Likewise, other scholars (Cennamo et al., 2011; Shreeve, 2015; Tovey, 2015) corroborate the need for students to collaborate with peers as a means to support their learning. This foregrounds the following design principles.

**DEP10:** The studio is a constructive learning space that fosters a culture of socially-engaged learning through peer collaboration and dialogue.

**DEP11:** Opportunities should be created for more contact with peers and less with educators.

Nonetheless, students are allocated personalised work spaces within design studios, generally for the duration of the academic year, where individual learning takes place and design
knowledge is acquired (Brandt et al., 2013; Brocato, 2009). However, Shreeve (2015:86) posits that due to ongoing financial pressure, permanent and personalised studio spaces may no longer suffice albeit that shared learning areas continue to support the underlying learning ethos. Shared learning spaces are equipped with discipline-specific specialised resources which allow students to select those resources that are applicable to their particular design (Brocato, 2009:141). This suggests the following design principle.

**DEP12:** Learning spaces should be equipped with discipline-specific and specialised resources

Although I support the idea of personalised workspaces for the duration of the academic year, this may well create a culture that privileges individual identity and detracts from social belonging. However, in a SA situation, this might not be practical due to factors such as space allocation, timetable constraints and financial viability.

### 4.9.3.4 Timetabling

Lawson and Dorst (2009:230) explain that studio sessions comprise both scheduled and unscheduled blocks of time in which design activities, tutorials and critiques take place. Scholars agree that studio sessions, by and large, occur multiple times a week ranging between three and four hours per session (Brandt et al., 2013; Crowther, 2013). Lawson and Dorst (2009:230) recommend that the majority of studio sessions should be unscheduled in order to allow for student flexibility and freedom to work in the studio at any given point. This corresponds with ethnographic study conducted by Cennamo et al. (2011:19) who find that architecture and industrial design students had 24-hour, year-round access to studio spaces. However, Brandt et al. (2013:331) recommend that students work in these studios during allocated time frames as opposed to off-site. It is perhaps due to such unstructured, open access that Crowther (2013:19) mentions that SB pedagogy is flexible and lacks formality. Based on these considerations, I identify the following design principle.

**DEP13:** The timetable should be structured to include both formal and non-formal sessions in order to foster self-directed learning and freedom to work both inside and outside the boundaries of studio sessions
I support the idea of year round open access to studio spaces but this might not always be possible in reality for a number of reasons. Firstly, access to studio space must align with the policies of HEIs. Secondly, 24 hour access may be possible in a Western society but within a SA context, it may be made difficult due to issues such as public transportation and student safety. In conclusion, in my view, flexible open access to studio spaces depends on demographic location. In the next sub-section, discussion shifts to the types of projects that characterise SB pedagogy.

4.9.3.5 Projects structured around a complex, open-ended brief

Within PB learning, scholars agree that educators present students with a written project brief incorporating an ill-defined design problem (Brandt et al., 2013; Shreeve, 2015). This design problem ultimately revolves around a simulated real-world situation that can require students to work individually or in groups (Cennamo et al., 2011; Crowther, 2013). Kuhn (2001:349) finds that, in the architecture design studio, students began with a project brief that outlined the design problem and some design constraints such as the building to be designed and site size and shape. In the same study, Kuhn (2001:349) compared teaching and learning strategies between architecture and software design and found that in the latter discipline, students were given a more open-ended project brief outlining a design problem that required them to develop a conceptual design and a prototype, and to justify certain aspects such as who would use the product and where will it be used. These ideas give rise to the following design principles.

| DEP14: Students should be provided with a written project brief outlining a simulated wicked design problem |
| DEP15: Students can work individually or in groups to execute design projects |

Project design activities generally require students to use representational methods such as sketching and prototyping to demonstrate their designs (Brandt et al., 2013:331-332). Davies and Elmar (2001:163-164) refer to such representations as modelling that serves the purpose of communicating that which is cognitively embedded. As a means to externalise the internal thought process, students develop an audit trail recording all design activities (Brandt et al., 2013:332). This audit trail with respect to project activities serves multiple purposes. On the one hand, students get to see the tangible reality of their designs (Brandt et al., 2013:331-332). On the other hand, the project itself is the assessment, hence the design activities carried out
constitute the assessment task which aims to help students learn to design (Crowther, 2013:19). Therefore, the audit trail is a teaching and learning strategy that evaluates activities in the design process and the product, gives educators an indication as to whether students are developing design knowledge, and offers students insight into their own learning process (Brandt et al., 2013; Davies & Elmar, 2001). Based on this, the following design principles emerge.

| DEP16: The project is an assessment method that consists of both formative and summative assessment |
| DEP17: Design and technology-related activities constitute project-based assessment tasks |
| DEP18: Design activity tasks should include representational methods |
| DEP19: Activity tasks should include prototype development |
| DEP20: Activity tasks should include an audit trail to record and justify all design activities |

For this to occur, the timeframes for a design project may extend to as much as a quarter of the academic year or even a semester, though there is no definite duration (Cennamo et al., 2011; Crowther, 2013; Tovey, 2015). Shreeve (2015:86) recommends that a project brief should include a time frame for completion. As such, the following design principle is put forward.

| DEP21: The project brief should specify a time frame for completion |

In addition to the above design principle, design constraints and limitations should also be included in the project brief to help students navigate an open-ended design problem, as will be discussed in the following sub-section.

4.9.3.6 Design constraints to navigate a complex, open-ended problem

If a design project addresses a complex and open-ended design problem, Kuhn (2001:351) claims that students may find it difficult to navigate such complexity and may struggle with the design task. For this reason, Kuhn (2001:351) recommends that, from the onset, the design project should outline constraints such as specified limitations, materials and methods. Likewise, Shreeve (2015:86) recommends that a project brief should include design constraints and limitations. I agree with these scholars and put forward the following design principle.

| DEP22: The project brief should outline design constraints |
The reason to include design constraints as a design principle is two-fold. Firstly, design constraints provide a framework for students to narrow the scope of their problem-solution. Secondly, if SB pedagogy aims to imitate professional design practice, then real clients or users may introduce such design constraints. Whether design constraints are included or not, in SB pedagogy, the design project typically requires integration of heterogeneous issues.

4.9.3.7 Integration of heterogeneous issues

Lawson and Dorst (2009:234) view integration in two different ways: on the one hand, they mention multi-disciplinary consolidation and, on the other hand, they refer to bringing together theory and studio practice. Kuhn (2001:350) advocates that SB pedagogy accommodates “multidisciplinary and integrative education” as it provides a platform for dialogue about a number of significant issues. I agree with these theoretical views and posit the following design principle.

**DEP23:** Pedagogical strategies should incorporate heterogeneous issues pertinent to design and a multi-disciplinary approach to practice

Dialogue about heterogeneous issues such as democracy, politics, and social and environmental issues in design can inform practice and move design away from the simple making of products towards something that is more meaningful. It is this feature of SB pedagogy that the present study aims to initiate fresh dialogue with respect to what HCD is, how it is applied in practice and why it is important to design with users.

From another multi-disciplinary angle, I support the call to integrate research and design within design education (Lopes, 2008; Muratovski, 2016). Tillman (2013) reports on multi-disciplinary collaborative projects between different design disciplines or across academic institutions. Similarly, the literature is replete with examples of projects that include multi-disciplinary perspectives and the voices of users and stakeholders through HCD approaches (Emmanouil, 2015; Hall & Logo, 2015; Wormald, 2011). The implications hereof lead to identification of the following design principle.

**DEP24:** Opportunities should be created to integrate qualitative primary research with design
Regarding the integration of theory and practice, Breslin and Buchanan (2008:38-39) affirm the fact that design education emphasises the making of products and, for this reason, students are taught about the discipline through practice, albeit that the general principles thereof are embodied in theory. Conventionally, such universal principles are not presented as theory, per se, but rather as “rule-of-thumb” acquired via the master educator, hence the argument to integrate theory and practical application (Breslin & Buchanan, 2008:39). I support these arguments, and suggest the resulting design principle that follows.

**DEP25: Opportunities should be created to integrate theory (conceptual knowledge) and design practice (procedural knowledge)**

The design education principles proposed in this sub-section align with Crowther’s (2013:20) call for SB learning to foster deep learning that accommodates development of both “learning about design” (conceptual knowledge) and “learning to design” (procedural knowledge) from multiple perspectives. Nonetheless, deep learning may equally be supported through design critique.

### 4.9.3.8 Design critique

Design critique is one of the trademarks of SB pedagogy as, at various points in the design project lifecycle, students are expected to present their design ideas and prototypes to educators, professional experts and peers during critique sessions that aim to support reflection, knowledge acquisition and learning (Brandt et al., 2013; Kuhn, 2001). This corresponds with Brocato’s (2009:139) first and second stages in the propose-critique-iterate framework and helps students move to the final stage in which they draw on critique feedback and engage with the iterative nature of the design process through refinement. This foregrounds the following design principles.

**DEP26: Pedagogical strategies should include design critique sessions**

**DEP27: Pedagogical strategies should support an iterative design process with opportunities for refinement of design solutions**

A number of design critique strategies can be used for students to obtain feedback on work-in-progress. These techniques include pin-ups (where students pin their drawings and discuss their
work), desk critiques at students’ respective desks, and panel critiques comprising of external professional experts and educators at the end of the project (Brocato, 2009; Kuhn, 2001).

Regardless of the methods used, design critiques are beneficial, although some challenges are also mentioned in the literature. Crowther (2013:20) draws attention to the “hidden curriculum” pertaining to the values, attitudes and norms of outdated hierarchal systems where educators are masters and students are apprentices. As such, the master educator provides design critique that may well favour student coercion over dialogue (Crowther, 2013:20). Likewise, Travis (2013:77-78) also draws attention to the hierarchical relationship between educator and student in design critique and calls for educators to revisit their approaches by allowing for peer and self-critique with the intention of developing student identities and protecting their emotional well-being. The notion of emotional well-being is further brought to light by Shreeve (2015:89-90), who notes the traumatic nature of design critique and calls for positive feedback as a pedagogical strategy. I agree with these challenges, and propose the following design principles.

<table>
<thead>
<tr>
<th>DEP28</th>
<th>Opportunities should be created for peer feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP29</td>
<td>Feedback from peers and educators should be positive and conducive to student well-being</td>
</tr>
<tr>
<td>DEP30</td>
<td>Design critique should consider the values, attitudes and norms of students and the norms, values and attitudes of educators should not be imposed on student work</td>
</tr>
</tbody>
</table>

With regard to the previous design principle, about norms, values and attitudes, if educators have particular aesthetic and stylistic tastes, for example, that differ from those of the student, it is possible that design critique, furnished from the educator’s view, may privilege those tastes. If there is an imposition of educator values, attitudes and norms, the validity of design critique as an attempt to foster the development of student identities as future agents of change may be called into question. Students should not be expected to mirror their educators’ values. As such, I believe that design critique is advantageous for reflective practice, knowledge discovery, feedback and multiple iterations, provided that the values, attitudes and norms of students are considered during the critique.
4.9.3.9  Multiple rapid iterations of design solutions

Regardless of design discipline, design critique furnishes students with feedback for the purpose of refinement and iteration (Kuhn, 2001:350). Cennamo et al. (2011:26) find that pedagogical strategies, such as design critiques, role-playing and sketching, were implemented so that students could generate and refine solutions in support of multiple iterations. Brandt et al. (2013:331) attest that iteration is beneficial only if feedback is obtained. Based on this, the following design principle is proposed.

DEP31: Pedagogical strategies should include opportunities for multiple iterations before design solutions are finalised

By incorporating the above design principle, opportunities may be created for students to ultimately learn-by-doing.

4.9.3.10  Learning-by-doing

Scholars concur that design education pedagogy is usually associated with learning-by-doing (Lawson & Dorst, 2009; Lyon, 2011; Tovey, 2015). Efstratia (2014:1257) postulates that the notion of learning-by-doing stems from the constructivist learning theories of experiential learning put forward by prominent scholars John Dewey and, later, David Kolb. Writing specifically on design education, Donald Schön (1987) expands upon the learning-by-doing discourse with his notion of reflective practice. For this reason, in this sub-section, I opt to include the theories of these three prominent scholars in order to deliberate on the notion of learning-by-doing.

Dewey (1916:137) mentions that “doing requires observation, the acquisition of information, and the use of constructive imagination”, but this alone does not constitute learning. In Dewey’s (1916:139; 145) experiential learning theory, he argues that learning-by-doing does not result from mere execution of activities alone but that it comes about when something is done through active trial and error, experimentation and personal experience, which allows one to act, undergo passive consequences and make connections between the experience and aftermath through reflection. Dewey (1916:139) goes on to postulate that experience is about change but it is meaningless unless consciously linked to consequence because when change
is effected through action, it results in self-transformation and only can one be said to learn-by-doing.

Later, Kolb (2015:xviii) expanded on this theory, concurring that learning is based on experience. Kolb (2015:50-51) proposed a now-widely used learning cycle, based on the four stages of: 1) concrete experience, 2) reflective observation, 3) abstract conceptualisation, and 4) active implementation. Kolb (2015:50-51) argues that knowledge is only acquired when students go through a process of transforming their experience, reflection and thinking brought forward through abstract conceptualisation and transforming these into action. Efstratia (2014:1257) maintains that the first stage of Kolb’s learning cycle involves concrete experience in which students undergo an activity before moving on to the second stage by reflecting on their experience. This leads to the third stage of abstract conceptualisation wherein students develop a model or plan based on what they observed, before proceeding to the fourth stage where their idea is tested (Efstratia, 2014:1257). Drawing on Kolb’s learning cycle, it is clear that learning-by-doing necessitates experience and reflection which appear as core elements in Schön’s (1987; 1995) notion of reflective practice.

Schön (1987; 1995) further amplifies Dewey’s experiential learning theory by proposing the notions of reflection-on-action and reflection-in-action (these were discussed in sub-section 4.5.2.2), as two ways in which professional practitioners come to know and learn-by-doing. Reflection-on-action requires that professional practitioners think about what was done as well as the consequences thereof and/or unexpected outcomes so that future action can be shaped (Schön, 1987:26; 31). In contrast, reflection-in-action is an instantaneous process in which professional practitioners pause and reflect while they are doing the action (Schön, 1987; 1995). Such reflection-in-action stems from notions of learning-on-the-go and spontaneous experimentation, by thinking about the consequences of an action, rethinking and trying out new actions (Schön, 1987:26-28). These theoretical perspectives lend themselves to identification of the undermentioned design principle.

**DEP32: Pedagogical strategies should include opportunities for experimentation, reflection and learning-on-the-go**

Such an approach to learning, founded in experiential learning theories, remains as a core feature in SB pedagogy and resonates with PB learning (as described in sub-section 4.9.2) (De
Graaff & Kolmos, 2007:3-4). In the same light, SB pedagogy and PB learning commonly manifest themselves within FD education.

4.10 PEDAGOGICAL STRATEGIES IN FASHION DESIGN (FD) EDUCATION

This section expands on the discussion presented in section 1.10. In this section, I use international and local scholarship to show that FD education is reliant on secondary visual research and promotes inward-looking practice as a driver of design practice. In respective sub-sections, I draw on two international studies and two local studies in order to frame the typical pedagogical strategies applied within FD education.

4.10.1 International context

Aiming to explore the teaching and learning strategies used in the development of mood boards as triggers for design ideas, Cassidy (2008:43-44) conducted four undergraduate case studies at two United Kingdom HEIs across the three different but related areas of textiles, FD and fashion marketing. To execute their design projects, students worked in groups or individually to develop different mood boards but teaching and learning strategies typically directed students to consult past design solutions and conduct secondary research by collecting visual images as inspiration to trigger the design process (Cassidy, 2008:48-49). Thereafter, students collaged visuals onto mood boards to reflect their personal themes or, in one particular case, within the constraints of a prescribed theme (Cassidy, 2008:48).

Cassidy (2008:48-49) notes that the personal themes or moods revolved around, for example, the sky, lifestyle, sweets, styles from different periods, colour palettes and seasons. These themes set the stage for an inward-looking practice as students interpreted the visuals from their own perspectives in order to conceptualise abstract design ideas in the form of drawings or sketches. This imitates volition manifesting in inward-looking practice in professional fashion design praxis, as was described in sub-section 4.3.1. Such inward-looking practice was particularly evident in one case study, where Cassidy (2008:48-49) notes that students were also required to consider a consumer target market lifestyle profile and a company image, but the study does not show exactly how these considerations were established nor how such aspects were translated into design solutions. Design for a consumer target market is commonly
associated with TDD praxis but is also a common approach within professional fashion design praxis, as was shown in sub-section 4.3.2.

In another study, Lapolla (2014:175) reports on an inquiry conducted with undergraduate FD students at a United States HEI using the social media website, Pinterest. This study involved a collaborative PB teaching and learning strategy between FD students and young urban retail professionals who constituted the consumer target market (Lapolla, 2014:176; 178). In that study, Pinterest was used as a platform for individual customers to plot out their demographic profiles and to develop inspirational mood boards to reflect their personal aesthetic tastes (Lapolla, 2014:178-179). Students accessed this information via Pinterest to analyse the demographic information and inspirational mood boards in order to develop a customer profile, identify design elements pertaining to colour, texture and silhouette, interpret the data, and conceptualise design ideas (Lapolla, 2014:179).

As feedback mechanisms, peer in-class design critiques were conducted, after which students’ design sketches were posted on the respective customers Pinterest site for their feedback regarding whether they would purchase the product or suggest design revisions for better alignment with their preference and tastes (Lapolla, 2014:181). Lapolla contends that the FD students valued the learning experience of understanding and designing for a real customer as opposed to designing for themselves, but I would argue that secondary research remained a core trigger for this particular design process. Furthermore, the design unfolded through inward-looking practice, given that the customers merely provided input but were not involved in the ideation and conceptualisation of design solutions. The findings from these international perspectives parallel with the pedagogical strategies applied in the local context.

**4.10.2 Local context**

De Wet (2016:46-47) reports on a pedagogic initiative concerning the conceptual stage of the design process, with the aim of stimulating and encouraging awareness and promoting a culture in which students develop their own design authenticity while designing for consumer needs and requirements. In this inquiry, De Wet (2016:47; 50) took the position that authenticity is about creativity or artistic expression, originality, individuality, self-expression and personal style, that is, one in which volition manifests in inward-looking practice.
De Wet (2016:49) implemented a PB approach with undergraduate FD students, requiring them to select from two prescribed SA fashion retailers who constituted a consumer target market and design two concepts and illustrations for their selected retailer. However, in this teaching and learning initiative, students were required to view design themes on the retailers’ websites and interpret their meanings and feelings in order to imagine the customer’s requirements (De Wet, 2016:50). De Wet (2016:54) reports that elegance and escape were interpreted meanings that emerged whilst an earthy feel and crafty, unique and different were the feelings evoked by the respective websites. In addition, the FD students conducted store visits in order to understand the target market and establish what they perceived to be the customers’ expectations (De Wet, 2016:53). These store visits typically entailed observation of what is currently available in the retail space.

Later, De Wet (2017) reports on a tool implemented to improve undergraduate higher order thinking skills and visual literacy. De Wet (2017:16) shows that the teaching and learning strategies implemented conform to the SB pedagogy requirement of a design project brief that required students to select secondary visual images and develop mood boards. From these mood boards, students were required to identify, list, analyse, record and interpret the sensory and symbolic design elements and general principles in the visual images that they felt represented design concepts for intended consumers (De Wet, 2017:20).

Based on these local studies, it is evident that FD education within the SA HE landscape aligns itself with a TDD paradigm (refer to sub-section 3.4.1) wherein students adopt an inward-looking practice and ultimately design for imagined consumers; a HCD approach is manifestly absent. This situation thus parallels the international context presented in sub-section 4.10.1. As such, given the nature and scope of this study, discussions do not deduce any further educational design principles to design the pilot teaching and learning intervention.

4.11 TENTATIVE DESIGN PRINCIPLES FOR DESIGN EDUCATION PEDAGOGY (DEP)

Based on the discussion presented in sections 4.8 and 4.9 respectively, I put forward various tentative design principles for DEP, which are summarised and coded in Table 4.3.
### Table 4.3: Tentative design principles for DEP

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE</th>
<th>SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP1</td>
<td>Design education should shift from conventional educational models that foster inward looking-practice to those that foster inclusivity and collaboration with users</td>
<td>4.8.3</td>
</tr>
<tr>
<td>DEP2</td>
<td>Pedagogy should adopt a constructivist, student-centered approach that fosters active learning experiences on the part of students</td>
<td>4.9.2</td>
</tr>
<tr>
<td>DEP3</td>
<td>Educators should assume the role of facilitators that guide learning experiences as opposed to transmitting knowledge</td>
<td>4.9.2</td>
</tr>
<tr>
<td>DEP4</td>
<td>Students should acquire both conceptual knowledge about design and procedural knowledge to design</td>
<td>4.9.2</td>
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<tr>
<td>DEP5</td>
<td>Students should practice procedural knowledge to design</td>
<td>4.9.2</td>
</tr>
<tr>
<td>DEP6</td>
<td>Opportunities should be created for students to transform themselves through learning to become agents of change</td>
<td>4.9.2</td>
</tr>
<tr>
<td>DEP7</td>
<td>Teaching and learning should ground itself in studio-based pedagogy</td>
<td>4.9.2</td>
</tr>
<tr>
<td>DEP8</td>
<td>A project-based learning strategy is more appropriate to design education</td>
<td>4.9.2</td>
</tr>
<tr>
<td>DEP9</td>
<td>Role-playing is an effective pedagogical strategy to imitate professional design practice even though the teaching and learning setting and design problems can only imitate reality</td>
<td>4.9.3.2</td>
</tr>
<tr>
<td>DEP10</td>
<td>The studio is a constructive learning space that fosters a culture of socially-engaged learning through peer collaboration and dialogue</td>
<td>4.9.3.3</td>
</tr>
<tr>
<td>DEP11</td>
<td>Opportunities should be created for more contact with peers and less with educators</td>
<td>4.9.3.3</td>
</tr>
<tr>
<td>DEP12</td>
<td>Learning spaces should be equipped with discipline-specific and specialised resources</td>
<td>4.9.3.3</td>
</tr>
<tr>
<td>DEP13</td>
<td>The timetable should be structured to include both formal and non-formal sessions in order to foster self-directed learning and freedom to work both inside and outside the boundaries of studio sessions</td>
<td>4.9.3.4</td>
</tr>
<tr>
<td>DEP14</td>
<td>Students should be provided with a written project brief outlining a simulated wicked design problem</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP15</td>
<td>Students can work individually or in groups to execute design projects</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP16</td>
<td>The project is an assessment method that consists of both formative and summative assessment</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP17</td>
<td>Design and technology-related activities constitute project-based assessment tasks</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP18</td>
<td>Design activity tasks should include representational methods</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP19</td>
<td>Activity tasks should include prototype development</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP20</td>
<td>Activity tasks should include an audit trail to record and justify all design activities</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP21</td>
<td>The project brief should specify a time frame for completion</td>
<td>4.9.3.5</td>
</tr>
<tr>
<td>DEP22</td>
<td>The project brief should outline design constraints</td>
<td>4.9.3.6</td>
</tr>
<tr>
<td>DEP23</td>
<td>Pedagogical strategies should incorporate heterogeneous issues pertinent to design and a multi-disciplinary approach to practice</td>
<td>4.9.3.7</td>
</tr>
<tr>
<td>DEP24</td>
<td>Opportunities should be created to integrate qualitative primary research with design</td>
<td>4.9.3.7</td>
</tr>
</tbody>
</table>

Table 4.3 continues on next page
| DEP25 | Opportunities should be created to integrate theory (conceptual knowledge) and design practice (procedural knowledge) | 4.9.3.7 |
| DEP26 | Pedagogical strategies should include design critique sessions | 4.9.3.8 |
| DEP27 | Pedagogical strategies should support an iterative design process with opportunities for refinement of design solutions | 4.9.3.8 |
| DEP28 | Opportunities should be created for peer-feedback | 4.9.3.8 |
| DEP29 | Feedback from peers and educators should be positive and conducive to student well-being | 4.9.3.8 |
| DEP30 | Design critique should consider the values, attitudes and norms of students and the norms, values and attitudes of educators should not be imposed on student work | 4.9.3.8 |
| DEP31 | Pedagogical strategies should include opportunities for multiple iterations before design solutions are finalised | 4.9.3.9 |
| DEP32 | Pedagogical strategies should include opportunities for experimentation, reflection and learning-on-the-go | 4.9.3.10 |

These 32 tentative design principles for DEP will be used to develop a pilot teaching and learning intervention thus addressing Phase 1D of the present study.

### 4.12 CONCLUSION

Chapter 4 sought to complete Phases 1C and 1D of this inquiry with a two-fold purpose. Phase 1C required drawing on the four modes of volition, design knowledge, design methodology and product in my personal philosophy of fashion design praxis (crafted in section 3.3) in order to review literature and define a set of tentative design principles for fashion design praxis. Section 4.2 explored the notion of volition as pertaining to design-with-intent, motivation and intention manifesting in action. Section 4.3 explored volition in professional fashion design praxis highlighting the prevalence of inward-looking practice, design for consumers and the need for HCD approaches. Section 4.4 turned to design knowledge as the second mode in my personal philosophy of fashion design praxis, and explored the construct of knowledge and different knowledge types and filtered these concepts down to design and, specifically, fashion design. Subsequently, the chapter discussed design methodology as the third mode in my personal philosophy of fashion design praxis. Section 4.5 explained design methodology, providing a historical overview of the three paradigms of design methods. Furthermore, discussion focused on the design processes models applied in fashion design and HCD. In section 4.6, product, as the fourth mode in my personal philosophy of fashion design praxis, was addressed, before concluding with section 4.7, in which I proposed a set of 34 tentative design principles for fashion design praxis.
The present chapter also achieved Phase 1D of this inquiry, which pertains to the overall scope of design education, with the aim of defining a set of tentative design principles for DEP. Section 4.8 explored various movements in design education, while section 4.9 discussed DEP and the characteristics of SB pedagogy. Linked to this, section 4.10 discussed pedagogical strategies within FD education, before section 4.11 presented a set of 32 tentative design principles for DEP. Chapter 5 discusses the findings that emerged regarding professional fashion design praxis from Phase 1E of this inquiry.
CHAPTER 5

PROFESSIONAL FASHION DESIGN PRAXIS: DESIGN PROCESS AND ALIGNMENT WITH DESIGN PRINCIPLES OF HUMAN-CENTERED DESIGN

5.1 INTRODUCTION

In Chapter 4, I drew on my personal philosophy of fashion design praxis and reviewed literature pertaining to fashion design in the professional world; this process culminated in the identification of 34 tentative design principles for fashion design praxis. Chapter 5 addresses Phase 1E of the research, and has a two-fold purpose. Firstly, the present chapter aims to explore and describe design process activities in professional fashion design praxis. The second purpose of the chapter is to align these design process activities with the 24 tentative design principles for HCD established as part of Phase 1B (refer to Table 3.2). This is done in order to explore and describe the current role of HCD in professional fashion design.

To achieve these purposes, constant comparative analysis (introduced and described in section 2.9) of face-to-face, semi-structured, qualitative interviews (as described in sub-section 2.8.2.2) with two Johannesburg-based professional fashion designers and one actual user was undertaken. The discussion that follows is structured according to three main research themes that emerged from this analysis, namely: 1) design context and volition manifestation in practice, 2) design process, and 3) role of users in design process and alignment with design principles of HCD. These main research themes comprise of categories and sub-categories as illustrated in Figure 5.1. To support the interpretation provided in this chapter, I include raw data extracts from participants and the literature drawn on in Chapters 3 and 4.

To respect the privacy and anonymity of participants, I refer to them as Designer X, Designer Y and User X respectively. Participants’ raw data quotations are included in the discussion, accompanied by codes generated using Atlas.ti. An example of such a code is P6:81. P6 refers to the primary document number loaded onto the respective Atlas.ti hermeneutic unit, in this case, Designer Y. 81 is the coded quotation number. In the same way, P1 refers to the interview
with Designer X, while P4 refers to the dyadic interview with both Designer X and User X. In addition to the coded quotations obtained from the participants, I also use the secondary data collection method of artefacts in the form of self-created photographs in order to provide evidence to support the contextual descriptions of design process activities (refer to sub-section 2.8.2.3 for discussion of the collection of these artefacts). I cite the photographs with the dates on which they were captured.

**DESIGN CONTEXT AND VOLITION MANIFESTATION IN PRACTICE**

**Design context**
- Customer profile
- Lifestyle design

**Volition manifestation in fashion design practice**
- Volition: Designer as expert
- Volition: Design for and design with

**DESIGN PROCESS**

Approach to the design process
- Initial stage
- Conceptualisation stage
- Experimentation and prototyping stage
- Refinement and evaluation

**ROLE OF USERS IN DESIGN PROCESS AND ALIGNMENT WITH DESIGN PRINCIPLES OF HCD**

Non-alignment with design principles of HCD
- Creativity in the design process
- Primary technological versus secondary design activities
- Inward-looking and structured design process
- Less-structured dual-mode model design process

Design with: Users’ role in the design process
- Previous design solutions as trigger
- Customer feedback as trigger
- Inspiration as a trigger

Alignment of design principles of HCD with professional fashion design praxis
- Positioned in both TDD and HCD paradigms
- Lead user approach
- Co-design
- User evaluation of prototypes

**Figure 5.1: Research themes, categories and sub-categories**
I now turn to discussion of the findings as per the three main research themes depicted in Figure 5.1. When discussing the findings, I refer to people as ‘customers’ to capture the exact words of the fashion designers or to interpret the findings through the lens of a TDD paradigm, but as ‘users’ when interpreting the findings from HCD perspective. The first theme to be discussed is that of design context and volition manifestation.

5.2 DESIGN CONTEXT AND VOLITION MANIFESTATION IN PRACTICE

This research theme includes two categories: design context and volition manifestation in practice\textsuperscript{46}. The first category incorporates the designers’ customer profile and approach to design. In the second category, sub-categories include notions of the designer as expert, design for and design with.

5.2.1 Design context

5.2.1.1 Customer profile

The literature suggests that fashion designers design for a target market by first establishing a customer profile (Ellinwood, 2011; Keiser & Garner, 2012; Lamb & Kallal, 1992). However, Designers X and Y presented opposing views concerning the idea of design for a target market. Designer X was of the view that “it is important to identify … your target market” (P1:213) whereas Designer Y argued that such a target market was non-existent. Designer Y reflected: “people always say, who’s [who is] your target market? I don’t [do not] think such a thing exists” (P6:141). As such, Designer Y did not design for any particular target market but rather for a diverse customer base who appreciate uniqueness regardless of body size (refer to codes P6:72; P6:76; P6:77; P6:70 in Table 5.1). Designer X stated that he/she designs “for different shapes and sizes” (P1:258) albeit for a specific target market. In this case, the target market comprised of females over the age of 30 years, as shown in the data extract coded P1:143 in

\textsuperscript{46} As noted in section 1.5.2, when using the word ‘practice’, I refer to the know-how application of fashion design praxis constructs. Fashion design praxis is seen holistically to comprise of constructs pertaining to the way one thinks about and approaches fashion design, the underlying volition, the conceptual knowledge and the actions undertaken in the design process that culminate in a product. Therefore, fashion design praxis holistically encompasses the modes of volition, design knowledge, design methods and product.
Table 5.1. Based on these two opposing views, it is evident that fashion designers need not necessarily design for a specific target market despite what the literature suggests.

Table 5.1: Customer profile

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>P6:72</td>
<td>“it can be anybody”</td>
</tr>
<tr>
<td>P6:76</td>
<td>“size is no reflection on who buys my stuff”</td>
</tr>
<tr>
<td>P6:77</td>
<td>“So my client is completely diverse”</td>
</tr>
<tr>
<td>P6:70</td>
<td>“customer is a person that likes to be unique”</td>
</tr>
<tr>
<td>P1:143</td>
<td>“lot of my customers are women over 30 who have had children”</td>
</tr>
</tbody>
</table>

Although contradictory views emerged concerning the idea of a target market, both Designers X and Y claimed to be lifestyle designers.

5.2.1.2 Lifestyle design

Designer Y thinks about and approaches fashion design praxis through the lens of slow fashion as opposed to fast fashion. For Designer Y, there is no need to align with cutting-edge fashion trends: “I don’t [do not] have to be on trend” (P6:30). When design praxis aligns itself with trends, then fashion “is a shorter cycle” (P6:32), but slow fashion constitutes a slower “process” (P6:31) and for that reason, Designer Y believed that clothing products can be worn for “five, to ten, to 20 years, if it lasts” (P6:32). It is thus evident that Designer Y embodies slow as opposed to fast fashion design praxis and mirrors the perspective that fast fashion is often associated with frequency, ever-changing fashion trends, speed and short product life spans, as was discussed in section 1.7 (Fletcher, 2008; Fletcher, 2010; Keiser & Garner, 2012; Welters, 2015).

Due to this disassociation from fast fashion praxis and its association with fashion trends, Designer Y did not consider himself/herself as a “seasonal … or a fashion designer” (P6:26), but rather as a designer who “make[s] clothes” (P6:139) rather than designing fashion. Designer Y affirmed that “I don’t [do not] create fashion, I create more lifestyle” (P6:138). Such lifestyle design was predominately associated with customers’ identity and their need for comfort. Designer Y explicated that “comfort is the most important” (P6:119) but not “just in sense of the fit but also in the sense of who you are [and if] you comfortable wearing it” (P6:123).
Similarly, Designer X drew attention to lifestyle design by claiming that he/she “need[s] to design for users’ lifestyle as opposed to [his/her] own lifestyle” (P1:152). Literature argues that lifestyle is linked to consumers’ attitudes, interests, personality, social status, pricing and brand prestige (Ko, Kim, Taylor, Kim & Kang, 2007; Li, Li & Kambele, 2012). Given this, both Designers X and Y have the intention to design a lifestyle based on consumers’ attitudes, personality, interests and social status and these possibly act as the volitional triggers for their design.

5.2.2 Volition manifestation in fashion design practice

5.2.2.1 Volition: Designer as expert

In fashion design, it is generally accepted that designers rely on inspiration and subjective feeling to drive praxis. Scholars of fashion design have argued that inspiration, and designers’ personal feelings, imagination, creative self-expression, authenticity and personal experiences are key stimuli that drive praxis (Aspelund, 2010; Laamanen & Seitamaa-Hakkarainen, 2014; Lee & Jirousek, 2015). Within such a mind-set, volition manifests as an inward-looking practice in which the designer is the expert and lone-genius. This was true of Designer Y.

Designer Y approached fashion design praxis from a lone-genius perspective as confirmed in the statement: “you have to almost have to be a dictator” (P6:81). As design dictator, Designer Y practiced in a traditional technology-driven design (TDD) paradigm and placed greater emphasis on designers as expert, guru and lone-genius who design from the perspective of their knowledge in shaping material products for consumers (Krippendorff, 2006; Sanders & Stappers, 2012).

With fashion design praxis grounded in TDD and an expert dictator ethos, Designer Y valued design freedom over users’ voices and did not acknowledge user knowledge that could possibly guide and improve the design process. To support this, Designer Y expressed the view that users should “allow you [the designer] to be the way you are” (P6:82). Designer Y further elaborated on design freedom by associating it with his/her experience and knowledge, remarking that designers are the knowledge holders due to their professional expertise and, as such, they should be free to design what they feel is appropriate.
As such, users are not considered knowledge generators and their feedback was not seen as important. Designer Y claims, “they can give their opinion but I am not going to listen” (P6:87). Designer Y further states that he/she “can listen to people but you still going to do what you want to do” (P6:92). Neither user feedback nor their needs are considered, as Designer Y argues that he/she knows how and why activities are carried: “I still know what works” (P6:101) and “in the end you know why you’re [you are] doing things” (P6:84). For this reason, Designer Y adopts an approach to fashion design praxis in which users passively accept designed clothing products and allow designers the freedom to do what they want due to the preconceived notion that “people appreciate you for what you do” (P6:104) and therefore they should “accept what you are doing” (P6:85). Designer Y believes that designers should “stick to your own course” (P6:108) of action and not consider user feedback, thus promoting the idea that designers should have the freedom to design what they want. To further support these interpretations, Table 5.2 presents additional quotations obtained from Designer Y.

Table 5.2: Volition as an expert designer

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>P6:97</td>
<td>“they don’t [do not] really know, they don’t [do not] have the knowledge even”</td>
</tr>
<tr>
<td>P6:98</td>
<td>“I’ve [I have] got the knowledge”</td>
</tr>
<tr>
<td>P6:125</td>
<td>“after years of doing this, you almost – you know”</td>
</tr>
<tr>
<td>P6:127</td>
<td>“Because you’ve [you have] been doing it for a long time”</td>
</tr>
<tr>
<td>P6:93</td>
<td>“No, otherwise … then we are never going to do what I want to do”</td>
</tr>
</tbody>
</table>

This expert dictator ethos seems to have an informed purpose and guides his/her actions within the design process in order to reach the end goal. Users, and their knowledge, are not considered as input into this design process. Users and their needs are not positioned at the core of fashion design praxis as, in my view, Designer Y designs what he/she liked for an imagined user based on familiarity\(^{47}\). By this, I mean that Designer Y designed based on what he/she actually knows and appears comfortable with a dictator mind-set. I acknowledge that Designer Y has reached a point of expertise and experience that allows for reflection in and on action and, as such, has come to know what works. Nonetheless, users may potentially hold new knowledge that Designer Y may not yet know. If Designer Y were to consider the possibility of a HCD approach, this may eradicate the need to design with familiarity and from a lone-genius mind-

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\(^{47}\) Designer Y was granted an opportunity to follow-up and validate my interpretation of data but opted not to do so.
set. For these reasons, I conclude that the fashion design praxis of Designer Y does not align with the design principles of HCD.

However, this is not uncommon in fashion design praxis, as fashion designers in general seem to adopt an expert designer mind-set as reflected in the design process. This corresponds with a view put forward by Designer X that “some designers … can be a bit … unapproachable and it comes across in their work as well” (P4:64). However, this expert, dictator mind-set may not be the case with Designer X as User X viewed this particular designer as “totally unbiased” (P4:20) which suggests the possibility of an alternative mind-set and more inclusive approach to fashion design praxis.

Even though the perception might be that Designer X is unbiased and an alternative and inclusive approach to fashion design praxis might be evident, like Designer Y, Designer X confirmed that he/she was also inspired by external sources and subjective feelings (discussed further in sub-section 5.3.2.3). However, this was not the predominant volitional stimulus as he/she was also inspired by “people” (P1:13) thus aligning with the idea of design with.

5.2.2.2 Volition: Design for and design with

For Designer X, “customers [were the] number one inspiration” (P4:72) as it created opportunities to learn from users (refer to code P1:209 in Table 5.3). This finding aligns with HCD3 (refer to Table 5.9) and contradicts the lone-genius mind-set in which users have no voice. As such, this led me to classify Designer X as manifesting an alternative volition when compared to the dictator ethos of Designer Y where users were not seen as a source of inspiration. Designer X conforms to the suggestion of both Sanders and Stappers (2014:29) and IDEO (2015:52), that HCD should consider people and their voices as sources of inspiration.

However, Designer X was “customer focused” (P1:75) and clearly expressed volition to design for consumers: “I don’t [do not] design for myself, I design for my customer” (P4:72). This is contradictory because, on the one hand, people are seen as a source of inspiration, which aligns with HCD3 in Table 5.9, yet the designer designs ‘for customers’, which suggests a TDD paradigm. Sanders and Stappers (2014:26-27; 30) confirm that fashion design continues to function within the traditional TDD mind-set given the focus on design for customers or
consumers. Other scholars of fashion design corroborate this view that fashion design focuses on design for consumers (An & Lee, 2015; Lamb & Kallal, 1992).

Market research to gather information from people were strategies used by Designer X. Designer X engaged in market research in order to “study what’s [what is] selling well in different stores” (P1:210). Such market research or store investigation is common in fashion design praxis but usually associated with a TDD paradigm (Keiser & Garner, 2012; Sanders & Stappers, 2014; Tullio-Pow & Strickfaden, 2015). However, Designer X was the primary instrument in this market research, which contrasts with traditional user-centered design (UCD) praxis in which trained researchers and designers assume different roles in that researchers engage in market research and transfer the information obtained to designers who then design for the imagined consumers (Sanders & Stappers, 2008; 2012). As such, it is evident that Designer X integrated research and design.

Despite the focus on market research and design for customers, Designer X claimed to be user-centered arguing that she/he aimed to understand, study and examine the needs, desires and preferences of customers in order to enhance his/her business (refer to codes P1:251; P1:214; P1:260 in Table 5.3). However, design for customers and investigating user needs suggest alignment with conventional UCD practice rather than a HCD approach. This is based on the view of scholars who affirm that the traditional scope of UCD focussed on users and satisfying their needs as the locus of design, where users were positioned as passive subjects to be “studied, questioned, observed” (Keinonen, 2010; Marti & Bannon, 2009:7; Sanders & Stappers, 2012).

In addition to the traditional way of studying and examining user needs, Designer X also established such needs via direct qualitative information and feedback from actual users (this aligns with HCD4, HCD12, HCD13 and HCD14 in Table 5.9). As such, developing an understanding of users’ needs and addressing them was considered as major input into and a core driver of design intentions and volition manifestation for Designer X, which aligns with HCD9 in Table 5.9. However, this was a business strategy in that it was important for Designer X to get to know his/her customers (refer to code P1:253 in Table 5.3) and understand their needs. For this reason, Designer X considered himself/herself more of a “psychologist than a fashion designer” (P4:23) but I question whether this fashion designer is actually a trained psychologist.
From the assumed perspective of psychologist, Designer X claimed that it is important for him/her to be user-centered and “hear what they [customers] need … what they want, what they like” (P4:45) and to “listen to customer … feedback” (P1:3). This suggests that users are viewed as participants in data collection (HCD12 in Table 5.9). The problem with this is that there is a difference between giving customers what they like and what they actually need. Endsley and Jones (2012:7) clearly state that UCD (also known as HCD) is not about “asking users what they want and then giving it to them”. As previously noted (refer to sub-section 4.3.4.1), I question the misguided perception of HCD in fashion design praxis.

Designer X considered UCD as a business strategy and, for this reason, believed that it was important to build rapport and relationships with people in order to design for customers rather than solely exercising creative and artistic expression in design. Designer X expresses the volition to design for customers, develop relationships and rapport, understand and listen to user feedback, and undertakes qualitative research in order to gather information from users. For this reason, I classify Designer X as applying qualitative tools, such as note-taking and face-to-face discussions with users, in order to understand their needs and as integrating primary research into design. This aligns with HCD4, HCD13 and HCD14 in Table 5.9.

Table 5.3: Volition: Design for and design with

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1:209</td>
<td>“learning from them”</td>
</tr>
<tr>
<td>P1:251</td>
<td>“study and examine what my customers need”</td>
</tr>
<tr>
<td>P1:257</td>
<td>“I need to design a garment that is going to suit the needs of my customer”</td>
</tr>
<tr>
<td>P1:182</td>
<td>“more important driver is creating a garment that will suit the needs of the user”</td>
</tr>
<tr>
<td>P1:253</td>
<td>“So I like to get to know who my customers”</td>
</tr>
<tr>
<td>P1:137</td>
<td>“If it does not suit their needs, then they won’t [will not] buy it”</td>
</tr>
<tr>
<td>P1:214</td>
<td>“study them and get to know them and build a relationship with them so you can design for them”</td>
</tr>
<tr>
<td>P4:51</td>
<td>“but it not just where I put my head down and its, there’s [there is] no input coming from anywhere else”</td>
</tr>
<tr>
<td>P1:260</td>
<td>“as a designer, were I had to learn that if, if you want to grow a design business, as a business owner, as opposed to as an artist, it is about being user centred”</td>
</tr>
</tbody>
</table>

However, Designer X does also express the volition to design with users (and is thus in alignment with HCD2 in Table 5.9) which is more in line with the thinking and approach within HCD praxis. To avoid repetition, I report on ‘design with’ users under the main research theme of the role of users in the design process and alignment with design principles of HCD, in
section 5.4. In the following section, I discuss the design process activities of Designers X and Y.

5.3 DESIGN PROCESS

In sub-section 4.5.4.1, I deliberated on fashion design process models that predominately draw on inspiration as a first stage. In this section, the design process is structured in order to include five sub-categories, namely: 1) approach to the design process, 2) the initial stage in the design process, 3) conceptualisation stage, 4) experimentation and prototype stage, and 5) refinement and evaluation (as depicted in Figure 5.1). It should be noted that approach to the design process is not a stage of the design process, but I include it here in order to explore its alignment with design method paradigms.

5.3.1 Approach to the design process

5.3.1.1 Creativity in the design process

Scholars of fashion design draw attention to the importance of creativity in practice but do not locate themselves within any discourse of creativity (De Wet, 2016; Ruppert-Stroescu & Hawley, 2014). The notion of creativity is a broad, multimodal and complex phenomenon. Sawyer (2012:4) posits that the first wave of creativity studies in the 1950s and 1960s explored the personalities and behaviours of creators, while the 1970s and 1980s bore witness to studies on creativity that deployed a cognitive approach in which researchers studied the internal mental processes of creators. Subsequently, a third approach grounds itself in a sociocultural view of creative social systems. Sawyer (2012:7) advocates that research into creativity can be grouped into individualist and sociocultural approaches.

Despite the theoretical importance of creativity, for Designer Y, creativity is “not a big part” (P6:52) even though it is applied “in each … step” (P6:49) of the design process. In the same way, as noted in sub-section 5.2.2.2, Designer X acknowledges that he/she is not a “very creative designer” (P1:280) seemingly because artistic creativity may not suffice as a business strategy.Designer X exercises creativity in various stages of the design process such as conceptualisation, experimentation and adaptation. To avoid the risk of repetition, the application of such creative strategies is discussed in the respective design process stages, in
the sub-sections that follow. Meanwhile, the discussion now turns to the fact that the two designers approached the design process from different perspectives regarding technological and design activities and levels of engagement.

5.3.1.2 Primary technological versus secondary design activities

For Designer Y, making of a product is primary while the conceptualisation of design ideas and engagement with design process activities are secondary. For this reason, Designer Y predominately bypasses the design thinking, problem identification, ideation, conceptualisation, prototyping, evaluation and refinement stages of the design process, and moves directly into the technology-related activities of pattern making and manufacturing. Designer Y states that the “patterns, the cutting, the making, the selling, everything else is. The idea is actually not worth a lot” (P6:149). There are three possible reasons for the positioning of the design process as secondary.

Firstly, greater emphasis is placed on the technical aspects of pattern making, cutting and making of the product, which corresponds with a TDD paradigm in which material and technological artefacts (products) take centre stage (Giacomin, 2014; Norman, 2013). Linked to this is pricing of the designed clothing product, as Designer Y argues that “people always say design process. People think the ideas are so amazing but it’s [it is] actually nothing in the actual cost” (P6:40). For this reason, Designer Y places greater emphasis on the making of products as opposed to the design thereof.

However, a second reason as to why Designer Y appears to ignore all the intermediating design process stages and the activities associated therewith in favour of the making of the product, may be his/her level of expertise and experience, having practiced design for a lengthy period. Schön (1995:55) posits that when professionals repeat the same thing that previously proved to be successful, they reflect on and in action, think on their feet, and come to learn-by-doing. Lawson and Dorst (2009:99) note that when a designer reaches a level of expertise, they are comfortable with what they do and take appropriate action instantaneously without the need for problem-solving and reasoning. Having reached such a level of competence, Designer Y may have reflected in and on action and is now well-placed with what he/she does and thus no longer sees the different stages of the design process as important, even though they do take place albeit not in a concrete, observable manner.
A third reason is that Designer Y may view design and technological processes as one and the same, despite the fact that scholars agree that the technological process is concerned with the technical operations and industrial aspects of manufacturing the product (Cross, 2008; 2011; Aspelund, 2010). Regardless, in the case of Designer Y, the design process is structured and driven by inward-looking practice.

5.3.1.3  **Inward-looking and structured design process**

For Designer Y, the first step in the design process is a “feeling” (P6:2), presumably the designer’s intuition. Such feeling is also a feature within Schön’s (1995:55) notion of reflection-on-action: because of repeated practice, when one gets a feeling then that feeling allows one to duplicate the same thing. Lawson and Dorst (2009:99) note that when a designer accomplishes a certain level of expertise, they will respond to situations in an intuitive manner based on their experience. Borrowing from these scholars, I would argue that the design process employed by Designer Y begins from a point of feeling, or intuition, possibly due to his/her level of expertise.

Following this feeling, Designer Y proceeds with “looking [at] proportions” (P6:2) of a physical body. From these proportions, Designer Y continues to get “physical with … garments” (P6:4) implying the handling of the product in relation to the “feel on the body” (P6:5). Subsequently, Designer Y moves forward through the sequential steps of “drawings” (P6:8), making “patterns” (P6:9) and then “to find fabric” (P6:10). In the comments put forward by Designer Y, I notice two contradictions. Firstly, Designer Y mentions that drawings are done before fabric selection, yet the raw data codes P6:12, P6:15 and P6:16 presented in Table 5.4 dispute this and suggest that the designer first identified fabrics and then conceptualised the design during the technology-related activities. A second contradiction is that the sequential steps of looking at body proportions and the product’s feel on the body appear to take place before the design process activities of abstract conceptual drawings, fabric selection and prototyping. However, I question the validity of this on the basis that a design idea is abstract and only the actual physical product is tangible. These contradictory findings suggest that Designer Y may not know how to explicitly and rationally communicate what actually happens during the design process.
Designer Y made a point of noting prescriptive and structured steps in the design process. In my view, this step-by-step design process corresponds with Simon’s (1982) positivist, rational problem-solving paradigm, which Curry (2014:636) confirms is a step-by-step design process model. However, the difference between the design process carried out by Designer Y in comparison with the positivist paradigm is that Simon (1982:55-58; 67-68; 71, 133) views design as a rational form of problem-solving whereas Designer Y did not mention that design was a form of problem-solving. Regardless, the positivist, rational step-by-step process of Designer Y embodies rationality in its emphasis on technological processes such as pattern making, industrial manufacturing, product body fit, fabric and colour selection and pricing (refer to codes P6:38; P6:35; P6:39; P6:53 in Table 5.4).

However, Designer Y’s subjective feelings, interpretations, intuition, experience and reflection on practice came into play, which is more in line with Schön’s (1995) constructivist, reflective practice paradigm (discussed in sub-section 4.5.2.2). Designer Y’s volition and subjective interpretations manifest in embodied activities. In this way, the design process of Designer Y aligns with Dorst’s (1997) dual-mode model of design methods (discussed in sub-section 4.5.2.3) with the positivist paradigm dominant but incorporating aspects of the subjectivity of constructivist, reflective practice (in the conceptual stage) in order to manifest the embodied activities. This aligns with the fundamental argument of the dual-mode model that the designer has personal freedom of choice and interpretation but must first decide on which design tasks will involve objective and subjective interpretations (Dorst, 1997: 163; 166; 169). The second choice is for the designer to select a dominant paradigm as the underlying approach with

Table 5.4: Inward-looking and structured design process

<table>
<thead>
<tr>
<th>CODE</th>
<th>CODE MEMO</th>
<th>RAW DATA</th>
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</thead>
<tbody>
<tr>
<td>P6:12</td>
<td>Work out things in respect of the design</td>
<td>“... there is no use I work out things before hand and then it doesn’t [does not] exist”</td>
</tr>
<tr>
<td>P6:15</td>
<td>Match fabric to design at the point of cutting</td>
<td>“I do it right at the moment where I need to cut”</td>
</tr>
<tr>
<td>P6:16</td>
<td></td>
<td>“that I start thinking what I’m [I am] cutting”</td>
</tr>
<tr>
<td>P6:38</td>
<td></td>
<td>“[making] patterns, is completely with rationality”</td>
</tr>
<tr>
<td>P6:35</td>
<td></td>
<td>“when you have to physically cut”</td>
</tr>
<tr>
<td>P6:39</td>
<td></td>
<td>“actually noting in the actual cost”</td>
</tr>
<tr>
<td>P6:53</td>
<td></td>
<td>“You care more if the bias binding’s colour is gonna [going to] run and … the colour you using”</td>
</tr>
<tr>
<td>P1:53</td>
<td></td>
<td>“very rational and strategic planning of production”</td>
</tr>
</tbody>
</table>
freedom of choice, motivation and interpretation embodied in design activities hence the embodied stage of a design process (Dorst, 1997:152; 163; 166; 169).

Dorst’s (1997) dual-mode model of design methods was also evident in the case of Designer X, who exercised rationality in technological processes (refer to code P1:53 in Table 5.4) and “stock planning” (P1:51). Stock planning was based on rationality because quantities, related to different sized offerings, were the result of strategic decision-making. Moreover, for Designer X, the capital funds required when purchasing fabrics required rationality and “calculated decision” (P1:55) making to avoid over-expenditure. Although rationality is more applicable to a positivist, rational problem-solving paradigm, in contrast to Designer Y, Designer X approaches the design process in a less-structured manner.

5.3.1.4  Less-structured dual-mode model design process

Designer X notes that, in professional practice, the design process is “organic” (P1:19) since “sometimes the order of things can get switched around” (P1:20) through refinement and iterative feedback loops that unfold in a less-structured manner. This less-structured design process aligns with Schön’s (1995) constructivist, reflective practice paradigm, as described in sub-section 4.5.2.2. Schön (1995) proposes the theory of reflective practice to argue for design as an iterative process of reflection-in-action and reflection-on-action. The rationality of Designer X regarding technological processes, stock planning and capital funds, combined with his/her subjective feelings and interpretations, intuition, experience and reflection on practice in a less-structured manner, manifest in embodied activities. For this reason, it can be said that the design process of Designer X aligns with Dorst’s (1997) dual-mode model of design methods, with the less-structured constructivist paradigm as dominant.

Although in professional practice, Designer X practices a less-structured method, during his/her formal educational training, design was taught in a structured way as “it was very much a process of you come up with the design, then you buy the fabric, then you do the pattern” (P1:18). This suggests that fashion design (FD) education, at least within the SA HE context, may educate FD students in a manner that promotes a tightly structured design process model. Another interesting finding here is that both Designers X and Y do not mention design as a form of problem-solving, which could also be a result of their education. During their formal education, the participating fashion designers may not have been introduced to conceptual
knowledge regarding design as the co-evolution of problem and solution, hence the idea of framing a design problem is not core to the initial stage of their design processes\(^{48}\).

5.3.2 Initial stage of the design process

As discussed in sub-section 4.5.4.1, design process models privileged within fashion design discourse such as those put forward by Aspelund (2010) and Lee and Jirousek (2015) suggest that inspiration is the first stage in the design process. In this section, I discuss previous design solutions, customer feedback and inspiration as three prominent triggers with which to begin design action. These three main triggers set the course for subsequent stages in the design process.

5.3.2.1 Previous design solutions as trigger

In their practice, fashion designers borrow from previous design solutions and adapt them to conceptualise new abstract designs (Ellinwood, 2011:3). This study yielded similar findings as Designers X and Y both embraced previous design solutions and adapted these for forthcoming designs. Former successful designs and feedback from customers determined which previous design solutions were selected for adaptation. Designer X was found to “design from existing elements” (P1:249) and “work from past best sellers” (P1:7). Similarly, Designer Y affirmed that he/she does “make the same stuff again” (P6:146) by utilising “patterns that [he/she] will sometimes just change … for the next season” (P6:146). In both cases, Designers X and Y had several years of professional experience and may well have reflected on action in order to determine which past designs were successful. The implication here is that fashion designers do not necessarily have to continually think about or generate new design ideas but that they can actually analyse, synthesise and re-design based on what already exists. The reliance on previous design solutions appears as a leading strategy in the practice of fashion design, but customer feedback is another trigger, as well as a basis on which to select previous design solutions.

\(^{48}\) Through member-checking, Designer X interpreted conceptual knowledge as the know-how to design for a target market as opposed to theory about design as co-evolution of problem and solution.
5.3.2.2 Customer feedback as trigger

Although Designer Y does not take into account customer feedback (as noted in sub-section 5.2.2.1), the designer drew attention to an instance in which a former design solution was modified based on customer feedback. In this situation, Designer Y designed and made a specific clothing product, but believed that it was not wearable and thus inappropriate for a commercial market. On showing this particular clothing product to a customer, the customer “actually convinced me [Designer Y] that it’s [it is] actually very wearable piece” (P6:111). Based on the customer’s advice, in this particular instance, Designer Y considered the feedback and changed the design to “commercialise” (P6:143) the product.

In contrast, for Designer X, “customer feedback” (P1:3) for the purpose of revising previous design solutions was “very important in [the] design process” (P4:53). Such customer feedback was predominately obtained through direct face-to-face contact, “social media” (P1:234) sites and “trade events” (P1:268) in which Designer X exhibited his/her clothing products. In addition, as I show in sub-sections 5.4.2.2 and 5.4.2.3, actual users’ voices were also incorporated as a constructive feedback mechanism.

Customer feedback, as a design strategy, played a fundamental role in the design practice of Designer X because, if “general feedback” (P1:215) and if “the same comment from a number of different users” (P1:174) emerged, Designer X would “know that it’s … worth adapting” (P1:220). Based on these findings, I argue that reliance on previous design solutions and customer input, particularly in the case of Designer X, is a prominent activity in the design process that informs the conceptualisation stage, albeit that inspiration also emerged as an important stimulus.

5.3.2.3 Inspiration as trigger

Designer Y primarily relied on inspirational muses, personal subjective feelings, intuition and design expertise: “there is a bit of a muse and a kind of a feeling” (P6:7). This feeling and intuition is likely a result of reflection-on-action and expertise. However, Aspelund (2010:6; 17-21) affirms that inspiration is the first stage in the design process claiming that designers need muses and a world of imagination to motivate their creativity and drive their designs.
Multimodal sources of inspiration such as “something … seen somewhere” (P1:242), “beautiful fabrics” (P1:10), an “inspiring colour palette (P1:30), “beautiful silhouette[s] (P1:241), “travel” (P1:217), “history” (P1:11) and “art” (P1:12) all seem to evoke design ideas for Designer X. Beyond these inspirational triggers, intuition and subjective feelings came into play in stimulating the design process, as seen in the fact that Designer X affirmed that if he/she saw an aesthetically pleasing fabric, he/she “just have [had] to have” (P1:23) it. Such reliance on graphic inspiration and subjective feeling is generally the catalyst for fashion design praxis, as it is identified in several studies (Laamanen & Seitamaa-Hakkarainen, 2014; Lee & Jirousek, 2015; Ruppert-Stroescu & Hawley, 2014). These empirical findings, as well as the literature, thus confirm that fashion designers generally design what they like through inward-looking practice, possibly because this is the only way they know how to conceptualise design solutions. The implication here is that it confirms the fact that neither Designer X nor Y appear to view design as a form of problem-solving in which problem identification is a first stage in the design process; rather, they are triggered by other factors such as inspiration, customer feedback and previous design solutions which then set the course of action for the conceptualisation stage.

5.3.3 Conceptualisation stage

5.3.3.1 Creativity and innovation in the conceptualisation stage

The conceptualisation stage of the design process is associated with generation of new design ideas. As noted in sub-section 4.5.4.1, in this stage, design ideas are abstract, formed in the mind of the designer by exploring and analysing the different concepts acquired in the initial stage of the process (Aspelund, 2010:3; 7). As such, thinking is brought forward as written ideas and visualised by way of, for example, collages, brainstorming tools, sketches, design journals and concept boards (Aspelund, 2010:71-89). These activities all form part of the conceptualisation stage, which is considered the creative stage in the design process. For Designer Y, creativity in the conceptualisation stage of the design process was not important as “the idea is actually not worth a lot” (P6:42) and “not a big part” (P6:52). In contrast, Designer X expressed the view that the conceptualisation stage is a “creative” (P1:96) and “flexible” (P1:99) stage of the design process, even though this particular designer did not think that he/she was a creative designer. In the case of Designer X, creativity and flexibility
in generating a “new idea” (P1:266) was, for the most part, guided by “listening to feedback” (P1:266) and “being inspired by … different experiences” (P1:266).

For Designer X, the voices of users were an important driver of the conceptualisation stage, in addition to external stimuli such as graphic inspiration, as was noted in sub-section 5.3.2.3. As such, in the conceptualisation stage, Designer X reflects on and thinks about abstract design ideas “based on customer feedback” (P1:119) in an attempt to modify former design solutions. Designer X mentions that he/she incorporates such customer feedback in conceptualising abstract design ideas (refer to code P1:166 in Table 5.5) in order to ensure that future design solutions better align with users’ physiological needs (refer to codes P1:170 and P1:186 in Table 5.5). However, as a business strategy, creativity came into play in the conceptualisation stage due to the fact that, when adapting past design solutions, these had to be different from the original: “creative and innovative in adapting … or changing them that will make them sell” (P1:107) and “base my new designs on that style or garment” (P1:116).

However, this call into question the design’s newness or innovation. My interpretation of innovation is when a designed product has neither been conceptualised nor made tangible before. If a fashion designer were merely adapting existing design solutions, I would argue that this might not constitute innovative design. Rather, it appears to constitute re-interpretation and re-design. My view on innovation corresponds with discourse on creativity within a sociocultural perspective, in which creativity is defined as “the generation of a product that is judged to be novel and also to be appropriate, useful, or valuable by a suitably knowledgeable social group” (Sawyer, 2012:7). This means that the product or process is new to the world, has never been done before and must be appropriate to the creativity of that specific domain (Sawyer, 2012:209; 214). In a systems approach to creativity, the person is the source of innovation because they begin the process of creating a product but that alone cannot constitute creativity or innovation as the product might not be original or it might not be appropriate hence, originality alone is insufficient (Sawyer, 2012:209; 214-216). Originality and appropriateness are judged by a complex network of experts, in a particular domain or field, who act as gatekeepers and validate the innovativeness of a product, and only once validated as such, is it disseminated as an innovative product (Sawyer, 2012:214-215). With this in mind, although Designer X may claim to be creative and innovative in adapting past designs into new ones, I question the validity of this because these designs are simply adapted; as such, they may not be judged as original by domain experts.
Table 5.5: Conceptualisation of new design ideas

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>P1:166</td>
<td>“And then when I design the garment in the future”</td>
</tr>
<tr>
<td>P1:170</td>
<td>“addressing their needs and making them feel good about themselves”</td>
</tr>
<tr>
<td>P1:186</td>
<td>“their body concerns or things that might worry them about their bodies”</td>
</tr>
<tr>
<td>P1:278</td>
<td>“going into each new season, I reflect on past designs and build on them and improve … and if need be, scrap ones that did not work at all and create new ones”</td>
</tr>
</tbody>
</table>

I would argue that reflection on practice and decision-making strategies have more currency in this stage of the design process, in the case of Designer X, rather than innovation. Designer X reflects on past designs and then makes informed decisions with respect to which previous designs should be maintained, modified or discarded in forthcoming design collections (refer to code P1:278 in Table 5.5). Although reflection, strategic decision-making and customer feedback were fundamental factors for consideration in the conceptualisation stage, intuition also played a role.

5.3.3.2 Role of intuition in conceptualisation

As noted in sub-section 5.3.2.3, Designer X relies on intuition to conceptualise new abstract design ideas as visual inspiration triggers the “design process or spark[ed] off an idea” (P1:32). In contrast, Designer Y exclusively relies on muses, subjectivity and intuition based on his/her experience to generate abstract design sketches (refer to sub-section 5.3.2.3). This corroborates the results of a study conducted by Lee and Jirousek (2015:152; 154) in which it was found that a fashion designer borrowed design elements from visual inspiration to intuitively ideate a series of draft sketches in the early stage of the design process. Application of designer intuition in the conceptualisation stage is a generally accepted form of practice in fashion design and mirrors the argument put forward by Aspelund (2010:71). Although such intuition is generally accepted, in the case of Designers X and Y, it may be a result of their expertise in that both have reached a level of expertise that enables them to rely on their own intuition, based on the success of their previous practice.

49 A collection, sometimes known as a range, is a series of designs made into tangible clothing products that share a common theme and design element such as colour, silhouette, fabric and design detail.
Since design ideas originate in the mind of the designer, both Designers X and Y engaged in activities such as sketching and handwriting notes in order to translate abstract ideas. Although both designers pursue associated activities in this stage, a fundamental difference lies in their attitudes towards the conceptualisation stage, the time they devoted to it, and the additional activities they engage in during this stage of the design process.

As noted earlier, Designer Y expresses the view that the idea is unimportant and that there is no need to engage with associated conceptualisation activities. Another reason for this is time constraints in that Designer Y admits that he/she does not “have time to ponder too much (P6:17). No. I think it’s [it is] just a very quick. I … just have a [an] exercise book that I make quick drawings in” (P6:18). Figure 5.2 shows that Designer Y developed rough sketches in a design notebook but also captured abstract thinking by drawing and planning geometric shapes (depicted in Figure 5.3) and written dimensional specifications to support these sketches (illustrated in Figure 5.4). Similarly, Designer X also wrote notes in a design journal with the purpose of planning and categorising design collections, which he/she referred to as ‘looks’, as seen in Figure 5.5.

Figure 5.2: Rough sketches developed by Designer Y. Photographed by author (6/7/2016)
Figure 5.3: Sketches of geometric shapes developed by Designer Y. Photographed by author (6/7/2016)

Figure 5.4: Sketch with dimensional notes developed by Designer Y. Photographed by author (6/7/2016)
Another commonality between these participants is that they both carried out drawing activities. However, Designer X seems to have devoted more time and effort to this since his/her process involved initial sketching, refinement of drawings and the generation of concept boards. As seen in Figure 5.6, Designer X begins by drawing multiple “very rough sketches” (P1:36) in a notebook or on pieces of paper to “remember the shape …” (P1:37). Such drawing of multiple sketches corresponds with the finding of Lee and Jirousek (2015:152; 154) that the fashion designer drew a series of draft sketches. Following the initial sketching, Designer X proceeded to refine these rough sketches by translating them into more detailed line drawings (refer to Figure 5.6) but such detailed line drawings were not undertaken by Designer Y. The practice of refinement of initial rough sketches, as carried out by Designer X, again mirrors the findings of Lee and Jirousek (2015:158) who found that the fashion designer manipulated, edited and refined sketches, before final sketches were selected. However, Lee and Jirousek (2015:158) also found that the fashion designer illustrated the final sketches with colour representations. However, in the present study, neither Designer X nor Designer Y included colour representations in their sketches, as can be seen in Figures 5.2 and 5.6. This implies that, in reality, time constraints may prevent fashion designers from illustrating two-dimensional sketches with colour.

Another activity carried out by Designer X, but not found in the case of Designer Y, is the development of concept boards. Figure 5.6 shows that Designer X generated concept boards comprising of detailed refined line drawings, “swatch boards” (P1:34) and palettes for “mood colours” (P1:35). In fashion design practice, concept boards generally include a collage of
graphic inspirational images (Aspelund, 2010:7). Despite the fact that this is generally accepted practice in fashion design, in this study, neither designer generated such concept boards to include a collage of inspirational ideas (as seen in Figures 5.2, 5.3, 5.4 and 5.6).

![Concept boards developed by Designer X. Photographed by author (20/6/2016)](image)

**Figure 5.6: Concept boards developed by Designer X. Photographed by author (20/6/2016)**

In light of the aforementioned, the conceptualisation stage of the design process is associated with abstract generation of new design ideas. This stage can be carried out through a number of activities such as sketching, written ideas, collages, generation of concept boards and instructional plans to manufacture a clothing product. In this study, Designer X considers this stage of the design process as a creative stage and engages in a number of associated activities such as drawing, refinement of sketches, written notes and the development of concept boards. However, these concept boards did not include a collage of graphic inspirational ideas as commonly accepted in professional practice. In comparison, Designer Y does not place much emphasis on this stage as he/she sees abstract ideas as insignificant. For this reason, Designer Y progresses swiftly through this stage, merely drawing rough sketches accompanied by written notes, plans and dimensional specifications, but not investing time in refining these
sketches or developing concept boards. Perhaps this is the case because Designer Y continues to align his/her practice with the TDD paradigm and thus views design and the technological processes associated with it as one and the same, that is, as requiring the same skill-set. Another possibility is that Designer Y ignores conceptualisation activities because he/she grounds his/her practice on experience.

Another finding common to both designers is that neither of them represent their rough or refined sketches as colour illustrations despite the fact that this is commonly accepted practice in fashion design. The findings in this study suggest that the conceptualisation stage of the design process can be executed in different ways depending on the activities a designer chooses to engage with and the time and effort invested in this stage. In other words, there is no recipe for design conceptualisation. This stage gives way to the subsequent stages of experimentation and the translation of a design sketch into a tangible prototype through the application of the technology-related skills of pattern making and manufacture.

5.3.4 Experimentation and prototype stage

The prototype stage of the design process goes by different names. Aspelund (2010:127) refers to it as ‘definition/modelling’ while Ellinwood (2011:4) names it ‘implementation’. Irrespective of how it is named, the core activity is that conceptual models, such as samples, mock-ups or any form of physical representation of the design idea are developed in order to bring the concept into the real-world (Aspelund, 2010:127). In light of this, in this section, I discuss the activities and creativity associated with the prototype stage but I also consider experimental activities, based on Ellinwood’s (2011:4) claim that this stage may involve fabrication techniques.

As noted in sub-section 5.3.1.2, Designer Y concentrated on the making of the product and, as such, predominately forfeited prototyping in favour of advancing promptly to the manufacture of the product. Designer Y explains that he/she “make[s] a pattern, grade[s] it and put[s] it in production without even making a sample” (P1:29). Manufacturing a product is a technological process concerned with technical operations and industrial aspects (Aspelund, 2010; Cross,

50 In fashion design practice, grading is a technological process whereby a pattern is scaled according to different body sizes by applying algorithmic rules to specific points on the pattern.
2008; 2011) and prototyping involves generating a prototype to test and refine design solutions before production begins. In light of this, I would argue that Designer Y’s practice contrasts the perspectives of scholars of fashion design process, who argue that prototyping is essential to evaluation and refinement of design solutions before production begins (Aspelund, 2010; Ellinwood, 2011). As such, these findings again confirm that the fashion design praxis manifested by Designer Y mirrors a TDD paradigm in which the focus is on the tangible technological product rather than design process activities. However, given that Designer Y reproduces previous designs and reflects-on-action, it is possible that prototypes might not be necessary.

In contrast, Designer X tests design solutions by making prototypes, as confirmed in code P1:70 in Table 5.6. As part of the prototype stage, Designer X executes experimental activities either during (refer to code P1:70 in Table 5.6) or after prototype development (refer to code P1:103) but before design solutions are finalised (refer to code P1:72 in Table 5.6) and the technological process begins. Such experimental activities included creative application of fabrication techniques such as texturing of fabrics, draping, paint applications and testing alternative design features such as collars. Raw data extracts obtained from Designer X outlined in codes P1:56, P1:59, P1:68, P1:102 in Table 5.6 verify this.

Table 5.6: Experimentation and prototype stage

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>P1:56</td>
<td>“experiment with drape”</td>
</tr>
<tr>
<td>P1:59</td>
<td>“fabric painting technique”</td>
</tr>
<tr>
<td>P1:68</td>
<td>“different collars applied”</td>
</tr>
<tr>
<td>P1:102</td>
<td>“being creative on how to texture”</td>
</tr>
<tr>
<td>P1:70</td>
<td>“experimenting in the mock-up phase”</td>
</tr>
<tr>
<td>P1:103</td>
<td>“spray garments, after they have been completed, with fabric paint”</td>
</tr>
<tr>
<td>P1:72</td>
<td>“before the final design … is decided on”</td>
</tr>
</tbody>
</table>

As part of the design process, Designer X chooses to perform experimental techniques as an adaptation strategy in order to improve the aesthetic appeal of fabrics and modify unsuccessful prior designs as articulated in the statement: “… got a plain fabric … changing a garment that previously hasn’t [has not] done well” (P1:264). Prototyping and experimental activities are carried out in order to evaluate and refine design ideas before the technological processes begin.
5.3.5 Refinement and evaluation

Both designers were found to refine their design ideas. However, in the case of Designer Y, such refinement did not occur during the prototype stage but occurred in the conceptualisation stage, in an attempt to achieve commercial appeal (see codes P6:107 and P6:117 in Table 5.7). Despite this, Designer Y was of the opinion that, due to his/her intuition and professional expertise, refinement within the design process was minimal: “I can … but after years of doing this, you almost … know” (P6:152) thus linking to know-how procedural knowledge.

In contrast, for Designer X, refinement is seen as a form of decision-making and is a reflective strategy carried out in the conceptualisation stage. Designer X mentions that, in some instances, he/she may have a “specific fabric in mind for the design” (P1:21) but upon viewing fabrics at retail outlets, alternative ones are selected even though they may not be applicable to the initially conceptualised design idea (refer to code P1:121 in Table 5.7). In a situation such as this, Designer X intuitively makes decisions to select alternative fabrics for aesthetic reasons, which aligns more with an expert mind-set.

Designer X also makes refinements whilst engaging in the prototype stage, which involves the technology-related activity of pattern making. As Designer X states: “halfway through a pattern … realise that maybe it will look better if the back was longer than the front” (P1:98). This is the result of reflection-in-action, which Schön (1995:55) argues involves one learning-by-doing or thinking about doing something whilst actually doing the action. As such, iterative feedback loops occur between conceptualisation and prototyping in the design practice of Designer X.

Regardless of these iterative feedback loops and the stages of the design process in which refinement occurs, reflection and evaluation are the underlying rationale for such refinement, as least as far as Designer X’s practice is concerned. For Designer X, reflection is an important form of evaluation in that it assists in establishing reasons why former design solutions were successful and, based on this, how designs can be refined in order “to improve on them and if need be” (P1:22) to “perfect the look and the design” (P1:43). Designer X also mentions reflection and evaluation occurring during the prototype stage. Given that experimental activities are carried out as part of this stage, before finalising the design solution, Designer X
tests prototypes to ascertain if the “fabric washes well with the technique applied” (P1:61) and this prompts further refinement if needed.

Although evaluation is linked to the design process, both Designers X and Y view this as outside the scope of the design process. Given that both designers are business owners, they both evaluate designs in terms of their sales potential. Designer Y states that “the selling” (P6:44) is more important, while Designer X affirms that evaluation is for “a large part … based on sales” (P1:230). As further support for this point, I include raw data quotations from Designer X (refer to code P1:222) and Designer Y (P6:130) in Table 5.7. The implication of this is that sales potential may be a predominant factor and driver within the evaluation stage through a process of reflection-on-action.

Table 5.7: Refinement and evaluation

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>P6:107</td>
<td>“So you have your core idea and you do water down your core idea to accommodate commerciality”</td>
</tr>
<tr>
<td>P6:117</td>
<td>“You don’t [do not] create these costumes …”</td>
</tr>
<tr>
<td>P1:121</td>
<td>“go to the fabric shop … see a beautiful fabric that’s [that is] not really appropriate for the design I had in mind”</td>
</tr>
<tr>
<td>P1:222</td>
<td>“… after you’ve [you have] finished your collection and it’s gone into stores, that’s [that is] when you really find out if it was successful or not”</td>
</tr>
<tr>
<td>P6:130</td>
<td>“And then you put it in the shop and then that becomes … determines if it is a success or not”</td>
</tr>
</tbody>
</table>

This concludes discussion of the design process as a core research theme. The discussion now turns to the final research theme, namely the role of users in the design process and alignment with the design principles of HCD.

5.4 ROLE OF USERS IN DESIGN PROCESS AND ALIGNMENT WITH DESIGN PRINCIPLES OF HCD

This research theme comprises of three categories, namely: 1) non-alignment with design principles of HCD, 2) design with: users’ role in the design process, and 3) alignment of design principles of HCD with professional fashion design praxis. To establish non-alignment or alignment, I make use of the 24 tentative design principles for HCD proposed in Table 3.2.
5.4.1 Non-alignment with design principles of HCD

As noted in sub-section 5.2.2.1, Designer Y approaches fashion design praxis as a design dictator. From such a perspective, users have no role or voice and do not actively engage in the design process. Designer Y reinforced this point by saying: “I would say no” (P6:100) because users “don’t [do not] really know, they don’t [do not] have the knowledge even” (P6:97). Designer Y further reiterates that non-designers, or users, may assume that they have the ability or knowledge of a practicing fashion designer but this is not the case in reality: “I think most people think they can be a designer but it’s [it is] not as easy as people think” (P6:99). I acknowledge that Designer Y has experience and domain-specific knowledge whereas users do not, but I would assert that users might possess other knowledge unknown to Designer Y. This corresponds with literature that suggests that users are knowledge generators and can contribute to knowledge production (Still, 2007:106). Despite this, Designer Y does not recognise users as knowledge producers. With these findings in mind, the fashion design praxis of Designer Y does not align with the tentative design principles of HCD presented in Table 3.2. Rather it resonates with a TDD paradigm despite the paradigm shifts evident in the design landscape.

5.4.2 Design with: Users’ role in the design process

5.4.2.1 Positioned in technology-driven design (TDD) and HCD paradigms

Designer X claims to be “customer orientated” (P1:219), yet he/she studies and ‘designs for them’ (refer to code P1:214 in Table 5.3). This continues to resonate with the TDD paradigm rather than with HCD, albeit that users do play a role in the design process of Designer X. As such, the fashion design praxis of Designer X appears to be positioned within both TDD and HCD depending on whether design is ‘for’ or ‘with’ users. At the same time, Designer X interchangeably refers to people as customers and users despite the fact that the notion of a customer aligns with TDD. However, it is likely that Designer X is not familiar with these theoretical debates regarding terminology, but confirmed that he/she usually refers to people as customers.51

51 Confirmed through Designer X follow-up through member-checking.
When engaging with fashion design praxis from a TDD paradigm, Designer X sees consumers as passive subjects of study but when practicing from a HCD lens, the designer aligns with the design principle of positioning users as the nucleus of design (HCD1 in Table 5.9). Designer X agrees that users play a fundamental role in his/her design process because the intention is to design clothing products that address the needs of users. This finding parallels the exact words of Designer X: “hundred percent agree” (P1:150) and “critical role in that I have to design a garment that will suit the needs of my customer” (P1:139). Based on these findings, I would argue that Designer X aligns with HCD9 (in Table 5.9), that design should seek to address user needs. The discussion presented in the following sub-sections shows that Designer X designs with actual users by adopting the HCD approaches of lead user and co-design.

5.4.2.2 **Lead user approach**

Designer X practices fashion design by adopting two different HCD approaches: co-design, or participatory design, and a lead-user participation approach. In HCD, within a lead-user participation approach, businesses aim for commercial improvement by inviting users to participate in the design process and assist designers improve on or develop new products (Steen, 2011:51). Such lead user participation is evident in the design practice of technology forerunners such as Google, IBM and Apple (Elmansy, n.d; Friess, 2010; Muratovski, 2016). In the same way, Designer X adopts lead user participation by “developing … very good relationships” (P1:82) with “very loyal customers” (P1:73) to the extent that the designer was able to “call them up” (P1:83) and actively involve them in the design process stages of conceptualisation, prototype, evaluation and refinement.

Aligning with HCD4, HCD11, HCD12, HCD13 and HCD14 (refer to Table 5.9), Designer X confirms that he/she consults with lead users by “showing them colours” (P1:85) that might be incorporated into design concepts. By doing this, Designer X creates the opportunity for lead users to voice their opinion regarding design elements. Designer X integrates users’ voices as a decision-making strategy that informs the conceptualisation of design ideas. Such a lead user participatory approach is one way to involve users in the conceptualisation stage of the design process but Designer X also adopts a co-design approach.
5.4.2.3 Co-design

From a co-design perspective, Designer X collaborated with User X in the conceptualisation stage of the design process even though this particular user was a non-designer (this corresponds with HCD11 and HCD15, in Table 5.9). Inclusion of non-designers in the design process aligns with the literature put forward by HCD proponents (Sanders et al., 2010; Steen, 2011; Wilkinson & De Angeli, 2014).

As an inclusive design strategem, and aligning with HCD11 and HCD12 (refer to Table 5.9), Designer X presented User X with design sketches in order to obtain feedback and refine design ideas. User X confirmed: “like those sketches we were working on” (P4:30). As a result, a collaborative partnership developed between Designer X and User X, as feedback obtained from the user was used to refine design concepts. Designer X remarks that User X “actually gave some really good … pointed out some really nice [design] features I could add in” (P4:33). Designer X seemed to value such advice as “constructive” (P4:14) and “honest feedback” (P4:17) even though User X was a non-designer. It should be noted that Designer X might have mentioned this since he/she was in the presence of User X.

In addition, User X also furnished Designer X with his/her own design ideas which aligns with HCD2 (in Table 5.9), that design should be undertaken with users rather than for users. Designer X confirms that he/she designs with User X, as explicated in the raw data presented in Table 5.8. Based on this, it is clear that collaboration and partnership occurred between User X and Designer X, thus corresponding with HCD10 and HCD15 in Table 5.9.

Table 5.8: A co-design approach

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>P4:1</td>
<td>“[he]/she given me such amazing ideas”</td>
</tr>
<tr>
<td>P4:2</td>
<td>“was her/[his] idea actually”</td>
</tr>
</tbody>
</table>

These co-design activities correspond with the view of Sanders and Stappers (2008, 2012), who claim that, in HCD, collaboration occurs between designers and non-designers to bring forth shared collective creativity. As a non-designer, User X pooled resources with Designer X, thus aligning with HCD24 (in Table 5.9) in that the design team included multidisciplinary skills and perspectives. Design teams with multidisciplinary skills and perspectives are beneficial for
collective creativity (ISO, 2010; 8) even though non-designers may not have discipline-specific knowledge.

User X acknowledges that he/she does not have domain-specific knowledge, expertise, or the motivation to engage in the sketching activities required in the conceptualisation stage of the design process: “I don’t [do not] know how” (P4:59) and “… I’m [I am] never going to be that that person that’s [that is] suddenly inspired to sketch” (P4:56). However, he/she did possess knowledge regarding design ideas and his/her needs: “I got a very clear sense of what I like and what I want” (P4:56). This aligns with HCD16 (refer to Table 5.9) and reiterates the HCD view that users are knowledge generators due to the fact that they possess expert knowledge (Sanders & Stappers, 2008; 2012; Still, 2007). However, the concern here is that HCD is not about giving users what they like and want. Therefore, in the case of User X, it may be the case that he/she knows what he/she likes and, as such, may possibly like only what he/she knows.

Recognising the knowledge that User X possesses, Designer X joined forces with this particular user to improve on and translate design ideas and needs into realistic design requirements and “adapted the design” (P1:4) ideas put forward by User X. The design ideas put forward by User X were then translated into a prototype. For this reason, I argue that Designer X mirrors HCD8 (refer to Table 5.9) by translating user needs into design requirements. However, given the knowledge of User X and the discipline-specific knowledge of Designer X, mutual learning unfolded in the design process through collaboration, which aligns with HCD17 in Table 5.9.

User X attests to the fact that he/she valued being actively involved in the design process, viewing it as “a lot of fun” (P4:49) even though he/she did not have any professional knowledge or know-how to “put a range [of designed clothing products] together” (P4:29). Based on this finding, I claim that Designer X creates a holistic and inclusive user experience, thus aligning with HCD23 (refer to Table 5.9), in that the design addresses the whole user experience including prototype evaluation.

5.4.2.4 User evaluation of prototypes

User X, along with other lead users, participated in the prototype, evaluation and refinement stages of the design process. Designer X developed relationships and good rapport with lead users and was in a position to “call up [lead users and] show them a mock-up” (P1:279). Users
tested prototypes for aspects predominately relating to usability, wash-ability and comfort, as evident in comments such as “tell me this … did not wash well” (P4:13) and “feedback on what makes them feel comfortable” (P1:79). Based on this, the practice of Designer X corresponds with HCD20 in Table 5.9.

As a result of user evaluation of prototypes, Designer X acquired user feedback and refined design ideas: “[could not] get her foot through so I knew I needed to adapt the pattern and fix it” (P4:58). Taking these findings into consideration, user feedback and refinement (HCD21 in Table 5.9) was another design principle that Designer X aligned with. These design principles of user evaluation (HCD20 in Table 5.9) and user feedback and refinement (HCD21 in Table 5.9) match with the ISO’s (2010:5) general HCD principle that “design is driven and refined by user-centred evaluation” because feedback is a critical source of information and, as such, designed products should be evaluated with and by users.

User evaluation, feedback and refinement suggest that Designer X employs a less-structured and iterative design process (aligning with HCD22 in Table 5.9). However, iterations, user evaluations and refinement occur before the technological or manufacturing stages begin, as expressed in the statement, “get feedback on the sample before putting it into production” (P1:64). This implies that Designer X considers design and the technological process as two separate processes, in contrast to Designer Y who views them as one and the same (as discussed in sub-section 5.3.1.2). In the same light, discussion of this research theme has shown that Designer Y does not align with the design principles of HCD (refer to sub-section 5.4.1) that are visible in the fashion design practice of Designer X.

5.4.3 Alignment of design principles of HCD with professional fashion design praxis

In sub-section 3.6.2, Table 3.2 proposed 24 tentative design principles for HCD. Of these, the empirical findings discussed in this chapter suggest that Designer X aligns with 19 of these 24 tentative design principles, as summarised in Table 5.9. To justify the alignment between HCD theory and Designer X’s practice, I include summary of the findings presented in this chapter.
Table 5.9: Alignment of tentative design principles for HCD with professional fashion design praxis of Designer X

<table>
<thead>
<tr>
<th>PRINCIPLE</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1</td>
<td>When practicing from a HCD lens, Designer X positions users as the nucleus of design and as sources of inspiration. This is evident in the fact that users, particularly User X, are involved in the design process.</td>
</tr>
<tr>
<td>HCD2</td>
<td>By way of collaboration, Designer X designs with actual users, particularly with User X.</td>
</tr>
<tr>
<td>HCD3</td>
<td>Designer X clearly states that he/she is inspired by customers.</td>
</tr>
<tr>
<td>HCD4</td>
<td>Designer X assumes a dual role in that he/she is the primary instrument in data collection and integrates research into design.</td>
</tr>
<tr>
<td>HCD8</td>
<td>Designer X recognises the knowledge possessed by User X and utilises this, coupled with domain-specific knowledge, in order to improve on and translate design ideas and user needs into realistic design requirements and adapt design ideas.</td>
</tr>
<tr>
<td>HCD9</td>
<td>Designer X notes that users play a critical role in the design process, particularly in ensuring that design solutions address users’ needs.</td>
</tr>
<tr>
<td>HCD10</td>
<td>A collaborative partnership developed between Designer X and User X throughout the design process.</td>
</tr>
<tr>
<td>HCD11</td>
<td>Designer X implements lead user and co-design approaches to actively involve users in the conceptualisation, prototype, evaluation and refinement stages of the design process.</td>
</tr>
<tr>
<td>HCD12</td>
<td>For Designer X, user feedback and design with users are core aspects of users’ critical role in the design process. Users’ participate in the design process by furnishing information as input for the initial and conceptualisation stages.</td>
</tr>
<tr>
<td>HCD13</td>
<td>Designer X was the primary instrument in data collection.</td>
</tr>
<tr>
<td>HCD14</td>
<td>Since users are active in the design process through providing feedback and collaboration, Designer X develops rapport with users and engages them in dialogue. Developing rapport and dialogue with people are characteristics of qualitative approaches.</td>
</tr>
<tr>
<td>HCD15</td>
<td>Designer X and User X collaborate with each other as input for and throughout the design process.</td>
</tr>
<tr>
<td>HCD16</td>
<td>Although User X does not possess domain-specific knowledge, he/she does have knowledge regarding what he/she likes and wants.</td>
</tr>
<tr>
<td>HCD17</td>
<td>User X does not possess the domain-specific knowledge of Designer X. On the other hand, User X did furnish design ideas and provide feedback. As such, mutual learning occurred through collaboration.</td>
</tr>
<tr>
<td>HCD20</td>
<td>Actual users tested prototypes for aspects predominately related to design usability, wash-ability and comfort.</td>
</tr>
<tr>
<td>HCD21</td>
<td>Prototypes were evaluated with actual users. Designer X obtained feedback from users’ and refined design solutions based on this feedback.</td>
</tr>
<tr>
<td>HCD22</td>
<td>The fact that Designer X evaluated prototypes with users and then obtained feedback for refinement indicates an iterative design process. Such iterations and refinement occur before the technological (manufacturing) stages begin.</td>
</tr>
<tr>
<td>HCD23</td>
<td>Active involvement of User X in the design process resulted in a valuable and enjoyable experience for him/her.</td>
</tr>
<tr>
<td>HCD24</td>
<td>Co-design between User X and Designer X shows that a non-designer can be included as part of a multidisciplinary design team.</td>
</tr>
</tbody>
</table>
Although Table 5.9 posits 19 design principles of HCD that correspond with the empirical findings, no new tentative design principles were included with which to design the pilot teaching and learning intervention.

### 5.5 CONCLUSION

Drawing from the 24 tentative design principles of HCD presented in sub-section 3.6.2, this chapter set out with a two-fold purpose. Firstly, it aimed to explore and describe the design process activities within professional fashion design praxis. Secondly, it sought to align these design process activities with the tentative design principles of HCD in order to explore and describe the role of a HCD approach in professional fashion design praxis. Discussion in this chapter categorised the findings into three main research themes: 1) design context and volition manifestation in practice, 2) design process, and 3) role of users in design process and alignment with tentative design principles of HCD. These main research themes were further divided into categories and sub-categories as depicted in Figure 5.1.

Section 5.2 outlined the customer profile of two fashion designers and their intention to offer lifestyle design. The discussion then shifted to how their respective volition manifested in fashion design practice exemplifying the notions of designer as expert, design for and design with. Section 5.3 presented discussion of the design process, contextualising the manner in which each fashion designer approached the design process and aligned with the respective design method paradigms. Design process activities were described for the initial, conceptualisation, experimental and prototype stages, concluding with refinement and evaluation. Section 5.4 described the role of users in the design process and discussed alignment with the 24 tentative design principles for HCD.

In light of the above, Phase 1E of this inquiry has been completed. In Chapter 6, the focus shifts to the design and implementation of the pilot teaching and learning intervention, and a summary of the findings thereof.
CHAPTER 6
PILOT STUDY: DESIGN, IMPLEMENTATION AND
SUMMARY OF FINDINGS

6.1 INTRODUCTION

Chapter 5 addressed Phase 1E by deliberating on the design process within professional fashion design praxis, the role of users in the design process and alignment thereof with the tentative design principles of HCD previously identified. Against the backdrop of these tentative design principles (Phase 1B - refer to Table 3.2), fashion design praxis was framed around the four modes of volition (V), design knowledge (DK), design methodology (DM) and product (P) (Phase 1C - refer to Table 4.2) and design education pedagogy (DEP) (Phase 1D - refer to Table 4.3). Chapter 6 now addresses Phases 2 and 3 of this inquiry in the form of a pilot study (first intervention cycle), and has a three-fold purpose.

The first purpose is to describe a pilot teaching and learning intervention that took the form of a project grounded in a HCD approach to fashion design (FD) education. The pilot study is aligned with the design principles of HCD, fashion design praxis and DEP developed as part of Phases 1B, 1C and 1D, respectively. The second purpose of this chapter is to present a summary of the findings that emerged from the pilot study. Thereafter, the third purpose is to provide retrospective analysis in order to refine the study and engineer a main study as a second iteration.

To achieve the first purpose, section 2.7.3 is expanded in order to deliberate on the module scope for which the pilot study was designed. The discussion then shifts to the design and implementation of the pilot study, which deploys studio-based (SB) pedagogical strategies. Subsequently, I present a summary of the findings of this pilot study. These emerge from data collected and analysed, and is structured around three research themes: 1) design process activities, 2) facilitator perspectives on the HCD approach to FD education, and 3) student perspectives on the effects of a HCD approach and its underlying tentative design principles to FD education. At the risk of repetition, section 6.6 and Figure 6.1 respectively map out the structure of the findings, the research themes, categories and sub-categories (where applicable).
Against this backdrop, I move on to the third purpose, that is, a retrospective analysis revolving around two main dimensions, namely: 1) refinement of the tentative HCD (24), fashion design praxis (34) and DEP (32) design principles, in order to propose a refined set of design principles, and 2) refinement of the SB pedagogical strategies used. In the following section, this discussion begins by framing the pilot study.

6.2 FRAMING THE PILOT STUDY

The pilot study was designed for implementation with first-year FD students (simply known as students) at an urban SA HEI, registered in a first-semester module entitled Fashion Design and Technology 1A (FDT1A) forming part of a BA FD programme. FDT1A serves the objective of applying conceptual knowledge and interpreting and exploring the essentials of design and technological processes (refer to Addendum J for the module purpose extracted from the relevant learner guide). FDT1A is structured in a manner that includes and integrates the components of design as well as technology-related activities, with each having specific aims and outcomes and requiring different skill-sets. Design-related activities include aspects such as information gathering, drawing, sketching and fashion illustrating\(^{52}\), in order to conceptualise a two-dimensional sketch of a design solution. Technology-related activities pertain to pattern making and industrial manufacturing operations.

For the pilot study, only one learning unit was selected, namely unit three, the unit outcome for which (UO3) is outlined in sub-section 6.4.2.2. To achieve UO3, dedicated academic facilitators responsible for teaching design and technology-related activities in FDT1A needed to develop conceptual understanding of the design principles of HCD given the novelty of this as an approach to FD education. For this reason, I presented the tentative design principles for HCD to all academic staff in the department where this study was conducted. This allowed the participating facilitators an opportunity to ask questions regarding the design principles and provide input into the design of the teaching and learning intervention.

Given that FDT1A comprises two integrated processes (design and technological processes), two facilitators were involved in the pilot study (as also noted in section 2.7.3). For this reason,

\(^{52}\) Fashion illustrating involves applying different medium (for example paint, pantone markers) techniques to visually communicate an artistic representation of a design concept.
the design of the pilot study took an inclusive consultative approach with both facilitators while I assumed a leading role in my capacity as researcher. To conceptualise the pilot study, several meetings were held with both facilitators to obtain their input and feedback until such time that the teaching and learning intervention was finalised.

However, given the objective of FDT1A regarding application of conceptual knowledge into practice, participating students had to be provided with a theoretical understanding of HCD and its underlying design principles along with basic research constructs. The facilitators and I opted to include conceptual knowledge aspects in a supporting module in order to prepare the participating students prior to its implementation in the design and technology-related module.

6.3 PREPARATION OF STUDENTS PRIOR TO IMPLEMENTATION

6.3.1 Framing the supporting module

To provide participating students with conceptual knowledge prior to execution of the pilot study, a supporting module, Fashion Design Theory 1 (FDTY1), part of the BA FD programme, was selected. The conceptual knowledge acquired during this module was to later inform and be applied in the design and technology-related practicum.

FDTY1 is a year-long theoretical module with the objective of gaining conceptual knowledge with respect to basic research, key concepts of fashion design history and fashion-related theory. The curriculum content for this module was specifically designed to include two learning units on HCD (referred to as Unit one in this chapter) and basic research (known as unit two). Unit one was selected due to the relevance of the content pertaining to HCD while unit two was selected because some of the tentative design principles for HCD involved qualitative research strategies. For unit one, the unit outcome (UO1) was to develop conceptual understanding of HCD and its underlying tentative design principles (refer to Addendum K for UO1, as extracted from the relevant learner guide). For unit two, the unit outcome (UO2) aimed at introducing students to the basic constructs of qualitative research regarding data gathering, probing, analysis and categorising information (refer to Addendum L for UO2, as extracted from the relevant learner guide). In the sub-section that follows, the learning environment is described.
6.3.2 Contextualising the learning environment

To achieve UO1 and UO2, my participant role was dominant as I assumed a facilitator position, rather than that of observer researcher. I facilitated theoretical lecture sessions with the classroom set up with digital projectors and movable desks to accommodate interactive peer and group work as opposed to traditional amphitheatre style venues. This created opportunities for simultaneous engagement with students through dialogue and peer learning, as opposed to merely transmitting knowledge. Such theory sessions were formally structured with one and a half hours per week with unit one extending over a duration of two weeks and unit two over three weeks. In the sub-section that follows, the conceptual knowledge curriculum content presented to achieve UO1 and UO2 is described.

6.3.3 Conceptual knowledge content and pedagogical strategies

6.3.3.1 Unit outcome 1 (UO1)

To achieve UO1, I presented the theoretical underpinnings of HCD by explaining what such an approach entails in design praxis and how it differs from the way fashion design is traditionally practiced by drawing comparisons between the lone-genius and design for consumer models. In addition, the tentative design principles of HCD were also presented and discussed so that students could develop an understanding thereof for application into praxis.

To further develop students’ conceptual understanding, I presented the five-stage fuzzy front-end design process model (as discussed in sub-section 4.5.5 and depicted in Figure 4.2). This was done for several reasons. Firstly, it served to contextualise the tentative design principles of HCD in relation to the different stages of the model and how they are applied in each stage. Secondly, it was used so that students could understand the different activities associated with each stage in the process. Thirdly, this particular design process model was selected for implementation in practice (in unit three) because the fuzzy front-end model was put forward by Sanders and Stappers (2008; 2012), who are renowned for their scholarship on co-design (an approach to HCD). Fourthly, this design process model contrasts with mainstream fashion-specific models in which inspiration and secondary research trigger design ideas (as noted in sub-section 4.5.4). Thus, students were exposed to conceptual understanding of alternative design process models rather than conventional ones.
To enable students to draw linkages between theory and practice, I presented case studies of a HCD approach in professional fashion design praxis to create awareness and exposure in terms of the value of adopting such a design strategy to address the needs of actual users. Drawing from these case studies, students were required to work in groups of two and discuss which of the tentative design principles of HCD they felt were applied, thus aligning with the design principles DEP2 and DEP3 in Table 4.3. Having contextualised the curriculum content to achieve UO1, the discussion now shifts to UO2.

6.3.3.2 Unit outcome 2 (UO2)

UO2 was intentionally planned to run concurrently with the implementation of the pilot study (in FDT1A). This was done because some tentative design principles for HCD necessitated primary (HCD13 in Table 3.2), qualitative-based research strategies (HCD14 in Table 3.2) rather than secondary methods of data collection. Furthermore, a HCD approach would require that students include users as participants in data collection (HCD12 in Table 3.2) to qualitatively (HCD14 in Table 3.2) identify and gain an in-depth understanding of user needs, goals, tasks, preferences and contexts of use (HCD5, HCD6 and HCD7, respectively, in Table 3.2), and then categorise this information so as to integrate research and design (HCD4, in Table 3.2). As such, UO2 aimed to prepare students to engage in basic research for application in FDT1A.

The first session focused on conceptual constructs of research as a systematic process to explore and understand a situation to inform design practice. This was achieved by introducing students to the constructs of qualitative research, the difference between primary and secondary data gathering, instruments used for qualitative-based data collection, field notes as a means of data capturing and probing techniques. To translate theory into practice, an activity was included in the theory session whereby students selected peers to engage in dialogue and probing. This activity was structured around a specified design problem with the intention of familiarising students with the techniques of conversation and probing. The second session aimed at developing conceptual understanding regarding analysis and categorisation of information. I achieved this by explaining the basic constructs of analysis along with practical demonstrations to categorise information. In this way, students could prepare themselves to integrate research and design (HCD4 in Table 3.2) in a systematic way.
By the final session, students had begun with implementation of a pilot study in practice. As such, this particular session entailed design teams (described in sub-sections 6.4.2.1 and 6.4.2.4) presenting their interpretation of user needs, goals, tasks, preferences and contexts of use (HCD5, HCD6 and HCD7 in Table 3.2). This created an opportunity of peer probing and questioning for clarification. In this situation, I assumed the role of passive facilitator, allowing the students to direct the dialogue.

In light of the discussion presented above, although UO1 and UO2 took the form of theory sessions, the pedagogical strategies employed created opportunities for student engagement and dialogue rather than positioning them as passive recipients of information. In the same way, when presenting conceptual curriculum content, information was not merely transmitted to students; rather, opportunities were created for them to raise questions and engage in dialogue. In addition, the pedagogical strategies used allowed for group work, peer learning and the activities used directed student learning experiences in preparation for implementation of the pilot study.

6.4 DESIGN AND IMPLEMENTATION OF PILOT STUDY

6.4.1 Overview

As noted in sections 6.2 and 2.7.3, I assumed a leading role in the design of the pilot study but opted not to act as the facilitator thereof in order to maintain objectivity as a researcher without any biases that could jeopardise the study. Hence, I assumed a role of passive observer participant. The pilot study was designed using SB pedagogy in order to align with DEP7 (refer to Table 4.3), given its common use in design education (Brandt et al., 2013; Crowther, 2013; Lawson & Dorst, 2009; Tovey, 2015). In the section that follows, I contextualise the design and implementation of the pilot study.

6.4.2 Strategies of design education pedagogy (DEP)

6.4.2.1 Role-playing as a strategy to simulate practice

A HCD approach places users at the core of design activities that unfold with users as active and collaborative partners in the design process. For this reason, this study could not fully
mirror professional fashion design practice given the predominant disposition in which volition manifests in inward-looking practice and design for an imagined consumer (discussed in sub-sections 4.3.1 and 4.3.2). Scholars also acknowledge that it is unrealistic to expect SB pedagogy to mirror professional practice (Crowther, 2013; Lawson & Dorst, 2009). For this reason, I followed Mathews’ (2010:89) suggestion of a simulated situation.

The pilot study was thus designed to align with DEP9 (refer to Table 4.3) in terms of role-playing to imitate professional design practice. Killen (2010:306-307) remarks that role-playing is a teaching and learning strategy to imitate representative situations so that students can enact behaviours and understand the feelings and perspectives of others. I opted for role-playing to get as close as possible to an authentic real-world situation so that students could learn to become agents of change by thinking about and approaching design from a HCD perspective. Likewise, in a role-playing situation, students could learn about HCD and learn to design from a HCD perspective so that when they enter the professional world they are equipped with the knowledge and strategies needed to engage in HCD.

In the simulated situation, participating students role-played in design teams comprising of two students with one assuming the role of designer and the other that of user (further discussed in sub-section 6.4.2.4). This study promotes a HCD approach that necessitates inclusion of non-designers in the design process, and may be directed at community-oriented situations but I opted for role-playing (DEP9) for a number of reasons, as outlined in Table 6.1. The implementation of DEP9 to execute a HCD approach unfolded in the project described in the following sub-section.

<table>
<thead>
<tr>
<th>REASON</th>
<th>CONSIDERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD as an approach</td>
<td>As noted in sub-section 1.11, I view HCD as a mind-set (philosophy or way of thinking) and an approach to engaging with design and generation of products. As such, a HCD approach could be contained within an education setting</td>
</tr>
<tr>
<td>Implemented with first-year students</td>
<td>Participants were first-year FD students who were still adjusting to an academic environment. Exposing them to a learning space outside the academic environment, with real-world non-designers as users, may have presented them with discomfort due to their unfamiliarity with such settings</td>
</tr>
</tbody>
</table>

Table 6.1 continues on next page
### Access to external users

Use of non-designers from outside the educational environment may have posed challenges for students regarding continuous accessibility of external users throughout all the design process stages. In addition, such accessibility issues may have presented challenges regarding systematic control and collection of comprehensive evidence for this inquiry.

### Ethics in research

I considered several ethical issues. Firstly, involvement of external users in the design process would necessitate their consent to participate in this study. Secondly, I took into consideration the facts that some of the students were still minors and that I had an obligation to prevent harm to participants.

#### 6.4.2.2 Project structured around a brief

To implement DEP8 (refer to Table 4.3), the pilot study was designed to reflect project-based (PB) learning. This project served as the assessment method (DEP16 – Table 4.3), using the four assessment instruments of a design journal, a two-dimensional fashion illustration of the final design solution, a flow diagram and a three-dimensional prototype (discussed further in sub-section 6.4.2.3). Although the project consisted of both formative and summative assessments, this study did not focus on summative assessment hence discussion does not pertain to the assessment criteria, the strategies applied to assess student projects or to student assessment results.

The project aligned with UO3, which aimed to integrate and apply conceptual knowledge regarding the design principles for HCD as an underlying design approach in order to design and prototype a solution. The overarching purpose of FDT1A (as noted in section 6.2) allowed for flexibility and, as such, the unit outcomes were not static nor were they stated in the learner guide. Instead, they were formulated according to the nature and scope of assessment methods provided they aligned with the approved module purpose and outcomes. The nature of this particular research led to formulation of UO3 to align with the module purpose and outcomes.

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53 Users who are not from the educational setting
54 Also known as an audit trail.
55 The fashion illustration is an artistic two-dimensional sketch completed in colour with the application of medium techniques.
56 I opted for a prototype as opposed to a final product due to academic time constraints.
57 In the case of projects as an assessment method, the underlying nature of the project determines the unit outcome.
58 As approved by the Council on Higher Education in SA.
outcomes. To achieve UO3 and align with the project scope, the specific learning outcomes (SLOs) presented in Table 6.2 were developed.

Table 6.2: Specific learning outcomes for pilot study

<table>
<thead>
<tr>
<th>CODE</th>
<th>SPECIFIC LEARNING OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO1</td>
<td>The design problem: Establish a set of design criteria and requirements through in-depth understanding of user needs, goals, tasks, preferences and contexts of use in order to design and prototype a solution in response to a problem</td>
</tr>
<tr>
<td>SLO2</td>
<td>Integrate conceptual knowledge about the fuzzy front-end design process model for application in design and technological process activities</td>
</tr>
<tr>
<td>SLO3</td>
<td>Using multi-disciplinary skills and perspectives, design and prototype a solution through collaboration and partnership with the user to address their needs, goals, tasks and preferences and contexts of use</td>
</tr>
<tr>
<td>SLO4</td>
<td>Learn to become agents of change to design with intent and empathy with actual users through collaboration and partnership</td>
</tr>
<tr>
<td>SLO5</td>
<td>Generate a flow diagram illustrating designer and user involvement, tasks, functions and design and technological process activities for all stages of the fuzzy front-end design process model</td>
</tr>
<tr>
<td>SLO6</td>
<td>Compile a design journal to record and justify all design and technological process activities in an attempt to visualise and communicate internal thought processes</td>
</tr>
<tr>
<td>SLO7</td>
<td>Apply a diverse range of design-related skills to demonstrate illustration techniques and drawing ability</td>
</tr>
<tr>
<td>SLO8</td>
<td>Apply technology-related skills to develop a working pattern and construct a prototype</td>
</tr>
</tbody>
</table>

To align with DEP14 in Table 4.3, students were presented with a written project brief incorporating an ill-defined design problem that simulated a real-world situation. Beyond that, the project brief included the timeframe for completion (DEP21 in Table 4.3), format requirements and project-specific design constraints (DEP22 - Table 4.3) (refer to sub-section 6.4.2.4 for discussion of the project-specific design constraints). Moreover, for the sake of clarity and transparent communication, the project brief outlined the tentative design principles of HCD, UO3, SLOs, summative assessment criteria and design and technology-related activity tasks (ATs). ATs were scheduled with dated timeframes as guidelines to self-direct learning during formal and non-formal sessions (DEP13 – Table 4.3), with the flexibility to iterate between ATs and the freedom to work both inside and outside the boundaries of formalised studio sessions (DEP13 in Table 4.3) in order to engage with the four assessment

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59 Although this study does not focus on formal summative assessment, assessment criteria were provided to students for the purpose of transparency.
instruments mentioned in the project brief. Addendum M presents the project brief but excludes the assessment criteria given that this study does not focus on formal summative assessment.

6.4.2.3 Assessment instruments in the project brief

As noted in the above sub-section, the project brief was structured around four assessment instruments: a design journal, a two-dimensional fashion illustration of the final design solution, a flow diagram, and a three-dimensional prototype. The design journal was used throughout the project as a teaching and learning strategy that enabled design teams to record and justify all design process activities in an attempt to visualise and communicate their internal thought processes and balance objectivity with subjectivity in the design process. In addition, the facilitators used the design journal to assess (summative assessment) the design process activities. I opted to include a design journal in order to align with DEP20 in Table 4.3.

The fashion illustration entailed an artistic sketch and technical drawings\(^{60}\) of the final design solution subsequent to prototype evaluation and refinement via iteration cycles. The flow diagram holistically visualised the design process to communicate activities, justify design choices, and indicate designers and users respective involvement, tasks and functions, thus also aligning with DEP20 (refer to Table 4.3). These three assessment instruments entailed design process activities but a tangible design solution could not materialise without integration of the technological process of prototyping.

The prototype assessment instrument involved translating the two-dimensional rough sketch into a three-dimensional, tentative, human-sized working pattern, which was then cut in calico fabric to make up a toile\(^ {61}\). To engage with these assessment instruments and fulfil the SLOs, students had to engage with specific activity tasks, as described in the sub-section that follows.

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\(^{60}\) I acknowledge that technical drawings relate to the SA engineering drawing standards and practices but, in fashion design, technical drawings are a commonly accepted terminology. In fashion design, such technical drawings are hard-edged line drawings that include, for example, design detail, dimensions and specifications for manufacturing.

\(^{61}\) Mock-up of a prototype
As seen in SLO1 (Table 6.2) the design problem was framed by first establishing a set of design criteria and constraints through in-depth understanding of user needs, goals, tasks, preferences and contexts of use before designing and prototyping a solution in response to the problem. In the same way, SLO2 (Table 6.2) requires application of the fuzzy front-end design process model including the four stages of design criteria, idea, concept and prototype. This particular design process model was selected for the reasons outlined in sub-section 6.3.3.1. However, application of this design process model did not mean that students had no flexibility in iterating between design and technology-related ATs even though timeframes were stipulated in the project brief. To engage with design and prototype activities, Table 6.3 presents coded ATs that correspond with the weekly schedule presented in the project brief (refer to Addendum M for the project brief).

Table 6.3: Activity tasks (ATs)

<table>
<thead>
<tr>
<th>CODE</th>
<th>ACTIVITY TASKS (ATs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WEEK ONE</td>
</tr>
<tr>
<td>AT1</td>
<td>Students had agency to select a team member of their choice to form a design team with one student role-playing the designer and the other the user</td>
</tr>
<tr>
<td>AT2</td>
<td>Designers assume the role of researcher and place the respective user as a source of inspiration and nucleus of design by qualitatively engaging them in dialogue to gain an in-depth understanding about their needs, goals, tasks, preferences and contexts of use, which are used as input to drive the design process</td>
</tr>
<tr>
<td>AT3</td>
<td>Design teams were required to record and make explicit collected data by way of, for example, field notes and flow diagrams in a design journal</td>
</tr>
<tr>
<td>AT4</td>
<td>Design teams were required to objectively frame the design problem in design journals by organising and categorising primary data to establish a set of user-specific design criteria and constraints (requirements) that best address the users’ needs, goals, tasks, preferences and contexts of use</td>
</tr>
<tr>
<td>AT5</td>
<td>Design teams were required to engage with the idea stage of the fuzzy front-end design process model by collaboratively working together to integrate primary research with design and brainstorming several possible incubated design ideas</td>
</tr>
<tr>
<td>AT6</td>
<td>Design teams had to jointly generate an ideation tool in the design journal in order to visualise, communicate and justify their rough ideas</td>
</tr>
<tr>
<td>AT7</td>
<td>As part of the ideation tool, design teams were required to generate an action plan by objectively framing and making explicit how users’ needs, goals, preferences and contexts of use will be addressed, and which team member would be responsible for design and technology-related activities</td>
</tr>
</tbody>
</table>

Table 6.3 continues on next page
## WEEK TWO

<table>
<thead>
<tr>
<th>AT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT8</td>
<td>Designers were required to translate users’ needs and design constraints into requirements by engaging the user in further dialogue (if necessary) and by collaboratively (with the user) generating multiple experimental abstract design ideas, reflecting on these, engaging in multiple iterations and conceptualising several roughly-drawn sketches and making the tacit skills employed explicit in their design journal</td>
</tr>
<tr>
<td>AT9</td>
<td>To support their abstract sketches, tentative colourations and fabrications along with supporting justifications of their choices and design ideas were required</td>
</tr>
<tr>
<td>AT10</td>
<td>From these abstract, roughly-drawn sketches and experimental ideas, design teams were required to reflect on and jointly select one abstract sketch as a possible design solution and bring it to life by translating it through technology-related knowledge of pattern making and manufacturing of a tangible prototype</td>
</tr>
</tbody>
</table>

## WEEK THREE

<table>
<thead>
<tr>
<th>AT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT11</td>
<td>Design teams were required to engage in a constructivist, reflective, iterative design process with continuous backward and forward movements between technology and design-related activities</td>
</tr>
<tr>
<td>AT12</td>
<td>Design teams were required to engage with the facilitator who moved around critiquing the prototype and furnishing design teams with feedback</td>
</tr>
<tr>
<td>AT13</td>
<td>Users were required to evaluate the prototype and provide designers with feedback allowing for both technology-related and design-related refinement</td>
</tr>
<tr>
<td>AT14</td>
<td>Design teams were required to reflect in and on action, executing multiple and rapid refinements and iterative actions between design criteria, idea, concept, preliminary working patterns and prototype</td>
</tr>
</tbody>
</table>

## WEEK FOUR

<table>
<thead>
<tr>
<th>AT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT14</td>
<td>Continue with AT14</td>
</tr>
</tbody>
</table>
| AT15| • Develop a flow diagram illustrating designer and user involvement, tasks, design process activities and justifications as per each stage of the fuzzy front-end design process model  
• Finalise the two-dimensional design solution through practical application of drawing skills, media and fabrication techniques to generate a fashion illustration and generate both back and front-view technical drawings |

To engage with design and technology-related activities, AT1 granted students the agency to jointly decide who would assume the role of designer and user, culminating in 12 design teams (one designer and one user per design team). Justifications for a role-playing strategy are presented in sub-section 6.4.2.1 and Table 6.1 respectively. With role-playing, the teaching and learning strategy aligned with DEP2 (refer to Table 4.3) in fostering an active student experience.

On completion of AT1, the design criteria stage (the first stage in the fuzzy front-end design process model) unfolded with objective framing of the design problem. To support SLO1 (Table 6.2) and align with DEP22 (Table 4.3), limited project-specific design constraints were
presented to assist students work through the intricacies of and narrow the scope of the design problem. These project-specific design constraints included the category of a wearable dress with experimentation in silhouettes. I opted to include these limited project-specific design constraints for two reasons. Firstly, I had to take into consideration that the pilot study was designed for implementation with first-year students. Secondly, HCD is seen as an approach and not a research strategy. However, I note that, as seen in Addendum M, the project-specific design constraint did not specify what dress to design, hence designers had to take into account the imperative user-specific design criteria and constraints jointly decided upon with their respective users.

To respond to the design problem and establish a set of user-specific design criteria and constraints, design teams engaged in AT2 but they were not permitted to draw inspiration from secondary visual data. AT2 created an opportunity for designers to objectively gather information about the design problem through in-depth understanding of the design situation. Although AT2, AT3 and AT4 unfolded through an objective lens, subjectivity came into play with ATs in the idea, concept and prototype stages aimed at achieving a less-structured, reflective process.

The idea stage of the design process began with AT5. AT6 was implemented in order to support subjectivity with objective justification. With AT7, an action plan with clear indication of designers’ and users’ respective roles in the design process was essential for users to become aware of their involvement and have a clear understanding of their tasks. However, the project brief did not stipulate a stringent formula for the ideation tool, which created freedom for design teams to decide on the manner of visualisation.

With AT8, design-related activities advanced to the concept (third) stage of the design process, aligning with HCD8 (in Table 3.2), where designers had to translate users’ needs and design constraints into requirements. AT9 was implemented in order to balance objectivity with subjectivity. AT10 saw technology-related activities begin to unfold, which involved integrating tacit skills with conceptual principles in order to develop a preliminary working pattern and utilise specialised industrial machinery to make a tangible prototype. As such, prototype development corresponded with the fourth stage of the fuzzy front-end design process model, giving way to a formal design critique session (formative assessment) implemented as part of AT12, and subsequent iterations and refinement in AT14.
AT14 continued until such time that the design solution was finalised and addressed the design problem, and user needs, goals, tasks, preferences and contexts of use. AT14 provided designers and users with an opportunity to engage with the learning experience of active trial and error experimentation allowing them to pause and reflect-in-action while carrying out design and technology-related activities and to think about the consequences of their actions. In this way, design teams could rethink and try out alternatives through learning-on-the-go. Furthermore, AT14 made it possible to engage in reflection-on-action, where designers and users could rethink and recollect on what was done, what was successful or unsuccessful and further actions to undertake. AT15 was implemented once all iterations and refinements ended.

It is clear from the aforementioned discussion that the teaching and learning strategies employed in the pilot study stand in contrast to conventional design-related projects offered within FD education, as was seen in the studies presented in sub-sections 4.10.1 and 4.10.2 respectively. The pedagogical methodologies of a HCD approach did not warrant secondary visual inspiration to trigger the design process, nor did they foster an inward-looking practice in which students, in general, design for themselves or an imagined user. Rather, the pilot study was specifically designed to foster an external-looking practice that places people and their needs at the core of design. In doing so, students could learn to become agents of change and design with an alternative volition of empathy, understanding and design with users in a collaborative and inclusive manner. In the same light, the ATs presented show that design practice changed from an existing situation of reliance on secondary visual inspiration to one of objective framing and navigation of a complex design problem unfolding in a constructive learning space.

6.4.2.5 Constructive learning space

Due to the stages in the fuzzy front-end design process and the integration of design and technological processes, the pilot study was carried out in two respective studios. Aligning with DEP12 in Table 4.3, the design studio included teaching and learning resources in the form of a digital projector, interactive screen, specialised art desks and pin boards. Each design team worked at an individual desk of their choosing. Pin boards provided design teams with the means to pin up their work for discussion purposes, if deemed necessary. Adjoining the design studio, common shared spaces were equipped with design-specific resources in the form of light boxes for drawing or tracing.
Also aligning with DEP12, for technology-related activities, the venue took the form of a combined studio and workshop setting in one co-located space. The incorporation of both studio and workshop spaces for technology-related activities is consistent with the view expressed by Tovey (2015:3) that SB features include actions that are both studio and workshop based. The studio section comprised of specialised resources such as cork-top pattern-making tables, tailor dummies and pin boards. The workshop section was equipped with discipline-specific industrial machinery. In addition, design teams had access to discipline-specific resources applicable for their particular design solution, which were housed in common shared workshop spaces. Given the combined studio and workshop setting, in this study I simply refer to it as a technology studio.

The learning space as design and technology studio contradicts theoretical views that co-located spaces are planned to provide students with apportioned individualised workspaces throughout the academic year (Brandt et.al, 2013; Brocato, 2009). Although I acknowledge these views, both design and technology studios could not afford participating students with personalised workspaces mainly due to insufficient space and sharing of venues to accommodate all department-specific undergraduate study. This situation is not far from reality considering Shreeve’s (2015:86) affirmation that permanent and personalised workspaces may no longer suffice but that shared learning studios continue to support the underlying constructive learning ethos.

Aligning with DEP10 and DEP11 (refer to Table 4.3), both the design and technology studios provided a social and cultural learning space for participating students to learn about design and technology and apply related skills through peer collaboration under the guidance of two facilitators (one for design and one for technology-related aspects). Facilitators had less contact with students as they moved around the studios directing learning experiences and creating a culture of engaged learning via peer dialogue and learning, demonstration of skills, feedback and sharing of design ideas. Moreover, since a HCD approach grounds itself in collaborative design, it matches scholarly arguments that students need to collaborate with peers as a means to support learning and social cohesiveness (Cennamo et al., 2011; Shreeve, 2015; Tovey, 2015). Discussion around the strategies employed here align with DEP3 and DEP11, as presented in Table 4.3.
Such constructive, socially-engaged learning spaces had to be carefully planned in order to accurately capture data when observing design and technology-related activities. For this reason, each art desk in the design studio and each pattern-making table\textsuperscript{62} in the technology studio were assigned with a design team number. In addition, labels were allocated to each team member so that I could distinguish between designer and user. Both these schemes were executed during formally timetabled sessions allocated to the project, as described in the following sub-section.

6.4.2.6 Timetable

The project timeframe was structured to align with DEP13 (refer to Table 4.3) and theoretical recommendations that studio sessions should comprise of both scheduled and unscheduled time slots extending over multiple weeks with approximately three to four hours per session (Brandt et al., 2013; Crowther, 2013; Lawson & Dorst, 2009). For the pilot study, the duration of the project extended over a four-week block comprising of both contact sessions with facilitators and non-contact sessions for self-directed student learning.

Design activities were formally timetabled with three hours and 45 minutes contact session per week. Technology-related activities were allocated seven hours and 30 minutes contact session per week. However, I note that for week one, technology-related ATs were not included, as seen in Table 6.3. Formalised non-contact sessions amounted to one hour and 30 minutes per week, during which students could engage in either design or technology-related activities. However, students could work beyond the formalised non-contact session pending availability of the studio space. Two reasons hindered availability. Firstly, studio timetables are set by the respective department to accommodate six undergraduate levels, hence space is a challenge in its own right. Secondly, after-hour access to studios was restricted in order to align with institutional policy.

This concludes discussion of the design and implementation of the pilot teaching and learning intervention. In the subsequent section, I explicate how the pilot study aligned with the tentative design principles of HCD, fashion design praxis and DEP.

\textsuperscript{62} Design team numbers were only included on pattern-making tables when observing the activities around prototype evaluation.
6.5 **ALIGNMENT WITH TENTATIVE DESIGN PRINCIPLES**

In this section, I refer to the tentative design principles of HCD (presented in Table 3.2), fashion design praxis (V, DK, DM and P - presented in Table 4.2) and DEP (presented in Table 4.3) in order to align them with the UOs, SLOs and ATs of the pilot study. To do this, I structure alignment as either specific or general. Specific alignment refers to alignment with ATs or precise SLOs, as outlined in Table 6.4.

<table>
<thead>
<tr>
<th>AT</th>
<th>HCD</th>
<th>FASHION DESIGN PRAXIS</th>
<th>DEP</th>
<th>AT or SLO</th>
<th>HCD</th>
<th>FASHION DESIGN PRAXIS</th>
<th>DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AT1</td>
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<tr>
<td>AT1</td>
<td></td>
<td></td>
<td>DEP15</td>
<td>AT10</td>
<td>HCD9</td>
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<td>HCD1</td>
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</tr>
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<td>DM7</td>
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<tr>
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</tr>
<tr>
<td></td>
<td>HCD7</td>
<td>DM16</td>
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<td>AT4</td>
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<td>DK4</td>
<td>DEP24</td>
<td>AT13</td>
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Table 6.4 continues on next page.
Given that the teaching and learning intervention was structured to constitute a HCD approach, some tentative design principles were generally aligned with the UOs as they manifested holistically. In the same light, some tentative design principles relate to information presented in the project brief, the constructive learning environment or the timetable and, as such, they are generally aligned to the discussion presented in the respective sections. Table 6.5 outlines general alignment with the tentative design principles.

Table 6.5: General alignment with tentative design principles

<table>
<thead>
<tr>
<th>GENERAL ALIGNMENT</th>
<th>HCD</th>
<th>FASHION DESIGN PRAXIS</th>
<th>DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit outcome one (UO1)</td>
<td>V5 DK1 DK6</td>
<td>DEP4 DEP23</td>
<td></td>
</tr>
<tr>
<td>Strategies of DEP grounded in SB (framed in sub-section 6.4.2)</td>
<td></td>
<td>DEP7</td>
<td></td>
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</tbody>
</table>

Table 6.5 continues on next page
Explicating specific and general alignment with the tentative design principles concludes discussions of the design and implementation of the pilot study. As such, attention now shifts to a summary of the findings obtained from for the pilot study, which emerged through data collection and analysis.

6.6 SUMMARY OF FINDINGS

As discussed in sub-section 2.8.3, the pilot study employed participant observation and self-administered, semi-structured, open-ended questionnaires as primary methods of data collection, and artefacts as a secondary method. As noted in sub-section 2.8.3.1, the participant observations served the purpose of exploring and documenting (with field notes) the design-related ATs and prototype evaluation stages of the design process executed by students, and the manner in which these actions unfolded whilst simultaneously incorporating the design principles of HCD. However, I did not observe the technology-related ATs of pattern making and sewing the prototype, hence discussion in this chapter does not focus on these activities. To support my observations, I collected artefacts in the form of self-created photographs with the purpose of obtaining comprehensive evidence to support interpretation and meaning creation and ensuring trustworthiness. Self-administered, semi-structured, open-ended questionnaires were employed with the 24 participating students (in hard-format) and two
facilitators (electronically collected) involved in the pilot study. The student questionnaires aimed at ascertaining the main effects of a HCD approach and its underlying design principles to FD education while the facilitator questionnaires aimed at determining the holistic effect (impact or outcome) of implementation of a HCD approach to FD education.

Following data collection, as noted in section 2.9, a constant comparative method of data analysis was employed but, as I noted in sub-section 2.9.1.1, the pilot study data were manually analysed. Despite this, I deployed first and second coding cycles to analyse the raw data. The first coding cycle entailed initial fragmentation, tagging and coding of all data sets. Second cycle coding involved clustering data into categories and grouping them into research themes for interpretation and meaning creation. Figure 6.1 depicts the three research themes that emerged from the data analysis, namely: 1) design process activities, 2) facilitator perspectives on the HCD approach to FD education, and 3) student perspectives on the effects of a HCD approach and its underlying tentative design principles to FD education. Similarly, these research themes comprise of categories, as shown in Figure 6.1. Although the research themes form part of the summary of findings section, I purposefully opt, in the discussion that follows, to include research themes as first-level headings and categories as second-level headings (with the exception of sub-sections entitled overview) when presenting the discussion.

To summarise the findings, raw data extracts are cited. However, to maintain participants’ confidentiality, letters and numbers are used as pseudonyms. Given that data for the pilot study was analysed manually, raw data citations are different to the Atlas.ti codes presented in Chapter 5. As such, when presenting the findings in this chapter, the alphabetic codes PO (participant observation), U (user), D (designer) and F (facilitator) are used. Numbers are assigned to differentiate between facilitators (eg. F1 and F2), and between users and designers in the respective design teams. However, in order to protect the identity of participating students in their user and designer roles, when presenting the findings, the design team numbers are different from those allocated to them during studio activities. PU10, for example, refers to user number 10, while PD10 refers to the designer in the same design team.
In addition to pseudonyms, I cite raw data with the recorded date in the case of participant observation and artefacts (self-created photographs). Similarly, when it comes to facilitators, page and quotation numbers are included. The number attached to the design principle for HCD is included in the case of student responses. F1-1:11 is an example of a response obtained from F1 found on page one with a quotation number of 11. Likewise, PU10:1 is a response to HCD1 obtained in the pilot study from user number 10 while PO:5/5/2017 is a dated citation.

Figure 6.1: Research themes and categories

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63 Quotation numbers are included to cross-reference narration with quotation.
from a participant observation field note. Having explained the coding system used to present the findings, discussion in the subsequent section reports on the first research theme, namely design process activities.

6.7 DESIGN PROCESS ACTIVITIES

6.7.1 Overview

In this research theme, I report on my observations pertaining to design-related activities and prototype evaluations as they unfolded during studio activities. Since this study focuses on a HCD approach rather than the making of the product, as noted earlier, I did not observe the technology-related activities of pattern making and prototype making. However, I did observe activities surrounding user evaluation (HCD20 in Table 3.2), user feedback and refinement (HCD21 in Table 3.2) and the unfolding of the iterative design process (HCD22 in Table 3.2). The discussion in the sub-sections that follow reports on my observations within the categories of design criteria, idea, concept and prototype stage as elements of the fuzzy front-end design process model.

6.7.2 Design criteria stage

Four design teams were unable to sufficiently engage with the ATs during studio sessions and, as such, did not obtain an in-depth understanding of user needs, goals, tasks, preferences and contexts of use. This was a result of early exit from the studio contact sessions, which occurred repeatedly and resulted in these four particular design teams lagging behind in the design criteria stage, ultimately impacting on the subsequent stages of the design process. This is seen in the quotations: “receive their project brief and then left class” (PO:26/4.2017) and “the establishment of user needs only started to take place during the concept stage” (PO:3/5/2017).

Despite this, the majority of designers positioned users at the core of their design and as a source of inspiration. As such, the activities associated with the design criteria stage involved the majority of designers and users engaging in primary research through lengthy conversation and probing strategies to “qualitatively collect information” (PO:26/4/2017) and gain an in-depth understanding of the users’ needs, goals, tasks, preferences and contexts of use. This is further supported by the field note: “both parties spent a lot of time conversing with each other
to understand needs” (PO:26/4/2017). Some designers and users drew on visual communication strategies in two prominent ways. Firstly, design team members physically pointed to areas of the body as a way to explicate design detail: “designer was very expressive in communicating and clarify ideas to and with user. Designer used ways to do this by pointing out to his/her body” (PO:26/4/2017). Secondly, some design teams utilised hand-held devices to access online platforms in order to communicate design elements such as colour palettes: “user very active in using technology to visually communicate and show designer” (PO:26/4/2017). Despite this, design teams did not utilise online platforms to access visual images or study past design solutions as inspirational triggers or as a research strategy to drive their design, as is often the case in conventional FD education.

Designers recorded qualitative information collected from their respective users, with field notes and initial rough sketches giving way to the framing of a set of design criteria. This finding is supported in the field note observing that students “... made a lot of written notes” (PO:26/4/2017), and in Figure 6.2, which provides an example of possible design criteria and an initial rough sketch developed during the design criteria stage.

Based on Figure 6.2, three suppositions can be drawn. Firstly, user experience (HCD23 in Table 3.2) was considered in the sense that user feelings were evoked and underlined in red in

![Figure 6.2: Design criteria and initial rough sketch. Photographed by author (26/4/2017)](image-url)
Secondly, students fast-tracked to the concept stage which required design teams to collaboratively engage in design experimentation, reflection-in-action and iteration to conceptualise several abstract, roughly-drawn sketches. Thirdly, the students fast-tracked AT4 (refer to Table 6.3) regarding objective framing of the design problem through systematic categorisation of data in order to establish a set of user-specific design constraints and requirements, as well as ATs 5, 6 and 7 (refer to Table 6.3) associated with the idea stage.

### 6.7.3 Idea stage

Fast-tracking the idea stage emerged as a recurring pattern amongst all the design teams. The idea stage of the fuzzy front-end design process model required engagement with ATs 5, 6 and 7 (refer to Table 6.3) and involved collaborative brainstorming of possible design ideas, and generation of an ideation tool and action plan. However, this was evidently lacking during the contact sessions and even more so in the design journals. Also, the observation data showed this recurring pattern: “no ideation tool done” (PO:26/4/2017) and “sketches were done before generating ideas were done” (PO:26/4/2017).

Three assertions can be drawn from this finding. Firstly, students considered the activities associated with the idea and concept stages of the design process as one and the same. Secondly, design teams did not systematically plan their actions from the onset regarding how users’ needs, goals preferences and context of use would be addressed in the design solution. Thirdly, due to insufficient organisation, from commencement of the project, designers and users were uncertain of their respective roles and activities in the design process. With this in mind, it was noted that the different activities associated with the idea and concept stages of the design process required enhanced conceptual understanding in the main study. Also, considering the argument put forward in the literature that design is a plan and intention (Flusser, 2012; Giacomin, 2014), the main study would require the development of an ideation tool to assist students to better plan their project and design solution. Without a well-developed ideation tool, design teams leapt into the concept stage of the fuzzy front-end design process.

### 6.7.4 Concept stage

Iteration did occur in that some design teams collaboratively “... began to refer to their notes they made from the previous week regarding user needs” (PO:3/5/2017) before engaging in the
concept stage. The concept stage bore witness to both designers and users actively and collaboratively conceptualising multiple abstract design sketches along with possible colourations, as shown in Figure 6.3. As supporting evidence, the following quotation was obtained from my field notes: “team members made a series of conceptual sketches and both discussed and actively engaged in conceptualising ideas” (PO:3/5/2017). To support the concept stage, one particular design team experimented with paper modelling representations to create florets as a design detail (shown in Figure 6.4). In this situation, the user was involved in the paper modelling.

Figure 6.3: Abstract sketches in the concept stage of the fuzzy front-end design process. Photographed by author (3/5/2017)

Figure 6.4: Paper modelling representation. Photographed by author (3/5/2017)

These design-related activities unfolded during the second week of the project but it became clear that insufficient time was allocated to the pilot study, given that design teams were not ready to jointly select one sketch and bring it to life through the technology-related activity of
pattern making. For this reason, the technology-related activities lagged behind. To counteract this situation, in consultation with both facilitators, an additional non-contact week was included for pattern making and prototype manufacture. This non-contact week created an opportunity for three of the four design teams that lagged behind in first three stages of the design process, to draw themselves back on schedule regarding the design and technology-related activities and engage with the prototype stage.

6.7.5 Prototype stage

One design team was not ready to evaluate the prototype during the studio contact time despite the opportunity mentioned in the above sub-section. The implication of this is that the user did not have an opportunity to evaluate the prototype and provide feedback to the designer to refine the design solution. Despite this, 11 of the 12 design teams did engage in the prototype stage of the design process. In these instances, the facilitator along with the users evaluated the prototype with the respective designers and furnished feedback for refinement and better alignment to the users’ needs. Figure 6.5 shows a user evaluating a prototype.

![User evaluation of prototype. Photographed by author (16/5/2017)](image)

Following the prototype evaluation, the majority of designers and users jointly and actively engaged in an iterative process of refinement though multiple backward and forward movements between the stages of design criteria, idea, concept (design-related), preliminary
working pattern and prototype (technology-related): “user and designer tested and refined and adjusted prototypes” (PO:9/5/2017). In some cases, “two prototypes” (PO:9/5/2017) were developed due to refinement of the first. Subsequent to these iterations, finalisation of the two-dimensional design solutions unfolded through collaborative application of drawing skills, media and fabrication techniques to develop a fashion illustration and technical drawings: “user and designer jointly engaged with the [fashion] illustration and technical drawing” (PO:17/5/2017).

Based on the above, it is evident that fashion design praxis unfolded in collaboration with the user and not through inward-looking practice or through design for an imagined consumer. However, some issues emerged during the design process.

6.7.6 Emerging issues during the pilot intervention

In one particular design team, the user (known as PU10 in this chapter) “took control” (PO:26/4/2017; PO:9/5/2017) and dominated the ATs from the onset while the designer (referred to as PD10) became a predominantly silent partner. Also, PU10 constantly reverted to online inspirational visual images to drive praxis. In this particular design team, PU10 manifested praxis through traditional technology-driven design (TDD), designing from an expert lens for himself/herself even though he/she assumed the role of the user. As such, this design team, PU10 in particular, did not follow the design principles of HCD, instead adopting a traditional approach to fashion design praxis and FD education.

I note the situation of PU10 and PD10 because, in section 6.9, I refer to these students due to the reoccurrence of this pattern. In the same light, recurring responses obtained from another user (whom I refer to as PU2 in this chapter) also expressed negative comments despite the fact that the observational field data shows that PU2 and his/her respective design partner (known as PD2) developed a good working relationship with both actively engaging with and jointly executing all design ATs. The discussion presented thus far reports on my observational field notes but attention now shift to facilitators’ perspectives regarding a HCD approach to FD education.
6.8 FACILITATOR PERSPECTIVES ON THE HCD APPROACH TO FASHION DESIGN (FD) EDUCATION

6.8.1 Overview

As noted in sub-section 2.8.3.3 and section 6.6, data was collected from two facilitators through electronic-based, self-administered, semi-structured, open-ended questionnaires aimed at determining their view of the holistic effects (impact or outcomes) of implementation of a HCD approach to FD education. Both F1 and F2 were extremely enthusiastic in their attempts to implement an alternative FD educational model in terms of educating students about design and learning to design, despite the fact that they were both accustomed to conventional frameworks and inward-looking design practice. The research theme regarding facilitators’ perspectives on the HCD approach to FD education comprises of three categories, namely: 1) challenges, 2) affordances, and 3) design quality versus quantity duality.

6.8.2 Challenges

At the commencement of the project, designers and users experienced challenges. Firstly, designers found that a HCD approach did not allow them to “design what they like” (F1-1:1) from an inward-looking practice as it “made it difficult to distance themselves from the users’ needs” (F1-1:2). As further evidence, F2 stated that “students struggled with a new approach that did not solely focus on their own preferences and style” (F2-1:1). A second challenge was that mainstream FD education placed greater emphasis on harnessing personal design aesthetics as opposed to placing users’ needs at the core of design. That is to say, designers were not accustomed to the idea of first identifying users’ needs and designing with users. This can be seen in the data codes presented in Table 6.6 (F1-1:3 and F2-1:2). Thirdly, at the beginning of the project students leapt into the concept stage of the design process and “struggled with the idea that design does not begin by sketching ideas but rather by collecting ideas, establishing user needs and setting design criteria” (F2-1:3). This corroborates the findings in sub-section 6.7.3 that support the need for deeper conceptual understanding about the fuzzy front-end design process model. Fourthly, integration of design and technology-related activities and the iterative nature of the HCD process proved to be time consuming, hence the facilitators urged that more time be allocated to the project in the main study, as confirmed in the response coded F2-2:4 in Table 6.6.
Table 6.6: Facilitator perspectives regarding challenges

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<thead>
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<th>CODE</th>
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<tbody>
<tr>
<td>F1-1:3</td>
<td>“In the past fashion design education has focused on the aesthetic aspects of fashion rather than the functional aspects and the needs of the users. Fashion design has been traditionally driven by the ‘vision’ and aesthetic of the designer”</td>
</tr>
<tr>
<td>F2-1:2</td>
<td>“In contrast to traditional fashion design projects, for this subject ... primary data collection allowed for the design of a product that does not focus solely on satisfying the student’s own perspective, preferences, tastes and/or style”</td>
</tr>
<tr>
<td>F2-2:4</td>
<td>“By the second week of the project it became clear that not enough time was allocated for the project. Due to its integrative nature with the patterns class, students fell behind with the design class as they had not caught up with the pattern making. This resulted in the conceptualising and [fashion] illustration boards receiving a lacked investment of attention and time as the students were focused on finalising their design”</td>
</tr>
</tbody>
</table>

Despite these challenges, as the project unfolded, design teams adapted and became more “comfortable” (F2-1:5) with the project ATs and embraced HCD “enthusiastically” (F2-1:6).

### 6.8.3 Affordances

The HCD approach afforded students, as designers and users, with a “more realistic view of discipline of fashion design” (F1-1:4). This was the result of heightened understanding of users and their specific needs, goals, preferences and contexts of use, as can be seen in responses F1-1:5, F2-1:7 and F2-5:8 in Table 6.7. However, the recommendation was made that there needs to be deeper conceptual understanding of user needs at the beginning of the main study: “allow the students to understand the user needs concept ... prior to the start of the human-centered design [HCD] project” (F1-1:6).

The facilitators concurred that the HCD approach placed greater emphasis on users and their needs as the nucleus of design thus eradicating the “notion that they [students] are star designers as seen in media” (F2-4:9) who design for themselves as the lone-genius. In addition, the HCD approach created an opportunity to create “awareness of designing with the user rather than designing for the user” (F1-1:7) as habitually practiced in the TDD paradigm. Designers and users were jointly active partners in the design process thus adding value through teamwork and collaborative design. Such teamwork and collaboration also led to collective knowledge development and heightened communication skills given that students learnt from each other about the discipline and how to connect more effectively with people from different cultural backgrounds, as confirmed in the quotation F2-1:10 in Table 6.7.
Table 6.7: Facilitator perspectives regarding affordances

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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</thead>
<tbody>
<tr>
<td>F1-1:5</td>
<td>“The human centred design approach students thus develop a better understanding the end-user(^{64}) and the specific needs of the end-user”</td>
</tr>
<tr>
<td>F2-1:7</td>
<td>“... assisted them in reflection on user needs and asking deeper questions such as where are you wearing this to and what qualities should this product possess? What activities will you need to able to perform? What fabric qualities do you prefer? Which body areas do you feel uncomfortable in accentuating?”</td>
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<tr>
<td>F2-5:8</td>
<td>“The students really engaged with the project and I highly recommend this approach as, at the very least, a supplement to the curriculum. This project reflects industry practice to a much greater degree than the traditional fashion design project”</td>
</tr>
<tr>
<td>F2-1:10</td>
<td>“... this project encouraged them to engage and get to know one another. It also assisted them in learning to communicate about fashion design concepts in a universal language as the students come from different backgrounds, cultures and languages with their own knowledge of what fashion is”</td>
</tr>
<tr>
<td>F2-1:12</td>
<td>“This allowed for in-depth primary data collection which formed the design criteria for each groups’ product. In contrast to traditional fashion design projects for this subject which focused on secondary data collection, primary data collection allowed for the design of a product...”</td>
</tr>
<tr>
<td>F2-2:13</td>
<td>“This project encouraged them to critically reflect on what they need to learn in order to construct the necessary design and how they will learn it. By constructing the pattern, students can implement changes, refine ideas and evaluate their work before the final design. ... stronger designs can develop because of this ongoing integrated development ... developing an idea before any prototyping can result in failed attempts to prototype ... and bad design decisions. This project gave the students opportunity to think about, reflect, experiment and learn from these considerations whilst the project is progressing rather than the design having to be changed after completion during pattern making and going back to design and fixing it”</td>
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</table>

Furthermore, the HCD approach saw designers engaging in primary research via face-to-face interaction with actual users, which seemed to afford favourable effects. Primary research endorsed the development of a set of design criteria that informed fashion design practice. In addition, primary research evoked an “an empathic approach in which the designer had to empathise with the user in order to gain a better understanding of what the user required from their product, for example the context of use, silhouettes for different body shapes and the selection of colour and fabrics” (F2-1:11). Finally, primary research challenged the traditionalist model of FD education and its overreliance on secondary visual data to drive and inspire design ideas (this is evident in code F2-1:12 in Table 6.7).

\(^{64}\) End-user refers to the user.
In addition, the integrated design and technology-related ATs and the iterative nature of HCD afforded positive outcomes regarding prototyping, user evaluation, feedback and refinement prior to finalisation of design solutions. Hence, the HCD approach seemed to shape a more holistic learning experience that involved learning-by-doing, self-directed learning, critical and reflective thinking, and led to better quality designs. To validate this, see code F2-2:13 presented in Table 6.7.

### 6.8.4 Design quality versus quantity duality

Responses obtained from F2 show a disjuncture between design quality and quantity with respect to the design and technology-related ATs; however, F1 did not comment on this issue. F2 questioned whether a “well-developed final design shows a thoroughly engaged design process or whether a thoroughly engaged (or well-documented) design process results in a well-developed final design” (F2-4:14). This doubtfulness came about in response to the design journals, which, as noted in sub-section 6.4.2.3, served as a teaching and learning tool through which design teams could record and justify all design process activities in an attempt to visualise and communicate their internal thought processes, thus balancing objectivity and subjectivity in the design process.

F2 expressed the view that a few design teams neglected timeous engagement with their design journals resulting in a “hind-sight documentation that did not adequately show their real-time ideation and conceptualisation. However, this could be attributed to their creative process ... that some students ... are not focused on documenting but rather collecting data in a more relaxed way” (F2-2:15). Despite this, the majority of design journals were well documented with “data [that] was rich” (F2-2:16) along with “ideas and sketches in their visual diary, including refinement and evaluation notes” (F2-3:17). However, “visual diaries were not as filled up as with traditional fashion design [FD] projects” (F2-2:18) which placed greater emphasis on including secondary visual inspirational images. F2 admitted that the “lack of inspirational images was at first disconcerting ... as a facilitator used to traditional fashion [design] projects” (F2-2:19). However, the HCD approach allowed for design teams to spend more time on design activities and “engaging with the process rather than sticking pretty

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65 Referring to the design journal.
pictures in a diary for the sake of filling up the diary for marks and using ideas from secondary sources” (F2-2:20).

The issue of voluminous design journals resurfaced in follow-up member checking with F2, who believed that concept stage design sketches should focus on quantity. Deducing from these findings, it can be argued that conventional FD education promoted quantifiable, inspirational, image-ridden design journals that are used for summative assessment purposes despite the fact that it is questionable whether the abundance of stimulating imagery constitutes quality design. Hence, a duality emerged between design quantity and quality.

F2 advanced this debate from the perspective of design and technology and design versus presentation skills; however, F1 did not comment on this. From a design and technology standpoint, the recommendation was that, for the main study, the project brief should include more “detailed [design] criteria that reflects the students’ level of sewing ability” (F2-2:21). F2 made this recommendation on the premise that broad-ranging, project-specific design constraints proved to be beyond first-year students’ technological manufacturing skill. I agree with this call for more detailed constraints but F2 confirmed through follow-up member-checks that his/her justification was based on past experience, understanding and knowledge regarding students’ level of technological know-how, which was gained from the vocationally-focused diploma programme and not in the BA FD programme. In addition, through member-checking, F2 confirmed that this HCD project was the first project to bring design and technology-related activities together at a first-year level in the BA FD programme; as such, there was no baseline evidence to support the claim. F2 also claimed that, in some instances, design solutions were extremely basic and lacked sufficient design detail to reflect “the level of work content in the final design” (F2-4:22) in terms of the technological manufacturing operations required to translate and make a design solution into a prototype.

Another contrast was with respect to design journals versus presentation skills, where the former was well-documented and far outbalanced the latter given that overall presentations of the project “were in general under-developed” (F2-3:23). F2 believed that this was due to the “larger focus on the design process and developing a well-rounded [prototype of the] final product” (F2-3:24) as opposed to “building a good presentation board” (F2-3:25). However, F2 acknowledge that these statements were “influenced by the fact that as a facilitator [he/she was] used to the presentation boards being a larger focus of a design project” (F2-3:26). From
these responses, it is evident that aesthetically pleasing project presentation was important in previous FD projects as opposed to information-rich, well-documented design journals.

Although this study did not focus on formal summative assessment, F2 did comment on this. F2 remarked that assessing the design criteria, idea and concept stages of the design process outweighed the prototype stage and, for this reason, recommended that assessment of the prototype required a higher weight and should reflect more technological manufacturing operations in an attempt to increase work content. This finding is validated in the statement that “the prototype ... in this project deserves a higher weight on the mark sheet as well as the level of work content”\(^\text{66}\) in the final design” (F2-4:27). Another recommendation put forward was that the prototype should be assessed “similar to how garment technology in the diploma program was marked” (F2-4:28).

These findings show a disjuncture between design-related activities, technological manufacturing and presentation skills. This implies that quality design may not be measured in terms of thinking, justification, brainstorming ideas and conceptualisation that best addresses users’ needs. From a design versus technology perspective, the findings bring into question whether quality design is measured in terms of, for example, its intended use, feasibility, desirability, functionality and user satisfaction, or if it is measured in terms of the more quantifiable technological manufacturing operations. Follow-up member-checking with F2 confirmed that, in an educational setting, technological process work content regarding manufacturing operations is important as it differentiates assessment results: “from an educational point of view, the work content is important ... it is what differentiates a distinction from an average mark”(F2-4:29). In my view, a simplistic design solution can align with its intended use, feasibility, desirability, functionality and user satisfaction. To support this view, I draw on the case of Alessi’s Juicy Salif, designed by Philippe Starck. The Juicy Salif is an iconic, aesthetically pleasing designed product but it is problematic with regard to technological manufacturing impracticality because it does not fulfil its intended use (Muratovski, 2016:xxvii-xxviii). Hence, more technological manufacturing operations may or may not result in good quality design.

\(^{66}\) Through follow-up member check, F2 confirmed work content in terms of technological manufacturing operations.
Moreover, design experimentation through active trial and error reflects learning-by-doing and may possibly yield quality design. FD education may do well to consider design activities associated with developing design criteria, generating ideas, conceptualising possible design solutions, evaluating prototypes and iteration as being at the core of design rather than manufacturing operations. Placing greater emphasis on making aligns with TDD, as noted in sub-section 3.4.1, and with the first and second general design education movements discussed in sub-sections 4.8.2 and 4.8.3 respectively. Moreover, thinking about and application of teaching, learning and assessment strategies in a vocational programme should differ from that of a BA programme given their different scope and purposes. However, the recommendation put forward by F2 suggests that the industrial aspects of making should be assessed in the same way that they are in a vocational (diploma) programme.

Despite these contradictions in the findings, it should be acknowledged that the facilitators were once students educated to become professional fashion designers through mainstream FD educational models and, as such, may well replicate the manner in which they were taught. That is to say, a HCD approach is novel to them as well. However, facilitator perspectives were insightful in paving the way for design of the main study, as well as for possible future studies. Discussion now turns to student perspectives regarding the effects of a HCD approach and its underlying design principles.

### 6.9 STUDENT PERSPECTIVES ON THE EFFECTS OF THE HCD APPROACH AND ITS UNDERLYING TENTATIVE DESIGN PRINCIPLES TO FASHION DESIGN (FD) EDUCATION

#### 6.9.1 Overview

As noted in sub-section 2.8.3.3 and section 6.6, self-administered, semi-structured, open-ended questionnaires were completed by the 24 participating first-year students. These aimed at ascertaining the effects of a HCD approach and each of the 24 design principles of HCD (presented in Table 3.2) to FD education. This section summarises the empirical findings based on the student perspectives. The summary is presented within categories (refer to Figure 6.1) in an order that corresponds with the design principles of HCD. As such, discussion commences with the effects pertaining to HCD1.
6.9.2 Effects of HCD1

A majority of students viewed HCD1 as "eye-opening" (PD6:1) seemingly because it gave them insight into how fashion design can be practiced by "putting the user as the core inspiration" (PD3:1) and their needs at "the core of ... design" (PU1:1). HCD1 supports out-of-the-box thinking, as evident in the statement that "it made me think outside the box" (PD7:1) and is thus opposed to mainstream thinking about fashion design praxis. Moreover, HCD1 supports listening skills due to the need to engage in conversation in order to understand users' needs: "listening to what they say – their needs" (PU8:1). In doing so, students realised the value of incorporating users into the design process, as HCD1 makes provision for collaborative design between users and designers thus encouraging user pro-activeness. To further support these findings, the following raw data quotations refer.

<table>
<thead>
<tr>
<th>Quote</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;... made me more pro-active and made me want to do more to have the design come to life&quot;</td>
<td>(PU9:1)</td>
</tr>
<tr>
<td>&quot;Both I and the user benefited a lot from seeing each other’s viewpoints and collaborating on the project. I also noticed the user didn’t [did not] feel like a subject but rather and active participant&quot;</td>
<td>(PD2:1)</td>
</tr>
</tbody>
</table>

On the one hand, HCD1 afforded what students perceived as "quality" (PU6:1) design in that designers and users consolidated ideas whilst taking account of user needs. The responses below support this view.

<table>
<thead>
<tr>
<th>Quote</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;It works because in the end after all the research we are able to come up with a design well-suited design based on users’ needs&quot;</td>
<td>(PD6:1)</td>
</tr>
<tr>
<td>&quot;After the observation we had many ideas that led to changing of many designs we wanted. So it was so important for us to work together and understand each other to have a solid outcome&quot;</td>
<td>(PU4:1)</td>
</tr>
</tbody>
</table>

Despite these positive outcomes, mixed views also emerged albeit a limited number. A disadvantage of HCD1 identified is that it removes the notion of designer freedom: “not having much freedom cause [because] you have the needs of the user to think about” (PD5:1). Furthermore, HCD1 brought about "complexities during the process" (PU6:1) due to design team dynamics and the need to work together. PU2 asserts that the "designer thought of [him/her] as a subject resulting in the designer thinking that they are in charge" (PU2:1). Although this was the situation, the respective designer disputed the negative effect, as seen in
earlier quotation code PD2:1. From another angle, PU10 found it “difficult to assert [his/her] preferences as a user” (PU10:1), but HCD1 is not about the user dominating the design situation.

6.9.3 Effects of HCD2

A positive outcome of design with the user rather than for the user was evident in an overwhelming majority of responses. “Teamwork” (PU5:2) was a fundamental, constructive effect because HCD2 created opportunities for users and designers to “learn the importance of working hand-in-hand with the user” (PD8:2), “to work with others” (PD11:20 and “co-operate with one another” (PU1:2). This led to accelerated and greater productivity concerning execution of the ATs largely due to shared collective ideas and improved communication skills. Students remarked that HCD2 supported communication skill because users had to explicate their needs in a manner that allowed designers to understand them. To support these interpretations, the following raw data evidence refers.

| “We were able to work faster and more efficient. The work, ideas are shared so it comes easier” (PD4:2) |
| “To ensure there is collaborative creativity” (PD12:2) |
| “... communication for understanding” (PD1:2) |

It seems like understanding users’ needs also created a sense of awareness about design in that designers designed with empathy towards users: “... empathise throughout the process making them [user] be part of the entire process” (PD9:2). Despite these favourable effects, a limited number of unconstructive outcomes also emerged, possibly because design teams failed to establish an action plan outlining the respective roles of user and designer and the distribution of ATs. In these situations, collaboration and communication seemed problematic. Once again, PU2 expressed negative views with respect to HCD2, stating that “things had to be done according to what designer desired instead of taking into account users suggestion” (PU2:2), thus implying that the user was not the source of inspiration (HCD3).

6.9.4 Effects of HCD3

The majority of students found HCD3 beneficial because it allowed users to be the source of inspiration and information generators regarding their needs, preferences, norms and values.
This finding was found in responses such as: “use the information given to me as inspiration of the design” (PD1:3) and “I got more information from the user than from outside sources or from general knowledge” (PD6:3). Despite this, a limited number of negative effects also emerged. PD10 claimed that, as the designer, he/she did not have a voice because of the dictatorial attitude of PU10. PD10 explicitly stated that “the user can’t [cannot] hear out. Try to give the designer a voice to talk more half information on the design” (PD10:3). The respective user, PU10 remarked that “this back and forth delayed our early research stage ...” (PU10:3). Based on this, it is evident that PU10 did not seem to understand that HCD3 supports research but, more so, links with HCD4.

6.9.5 Effects of HCD4

The majority of students communicated favourable outcomes regarding HCD4, perhaps because they carried out primary research through probing strategies for “depth to receive the best outcome” (PD11:4) and “clarity” (PU11:4). Primary research is about knowledge generation so HCD4 led to “better insight into user needs and context of use” (PD2:4) to inform design practice. However, one student commented that the primary research delayed the design process activities: “it slow down or halt the process” (PU9:4). This linked with HCD5 in terms of identifying user needs, goals, tasks and preferences.

6.9.6 Effects of HCD5

A majority responded that identifying user needs, goals, tasks and preferences was advantageous because it installed users and their needs as the core of design: “designing a design that is centred around your user to create shared meaning” (PD5:5). In doing so, students indicated that “users’ needs, goals [and] preferences were established” (PU2:5) which allowed them to “narrow down the [design] possibilities” (PU3:5). In other words, HCD5 assisted in developing a set of design constraints and in framing a course of tangible action. Students commented that it “help[ed] with the ideation and conceptualisation of the design process and the prototyping as well” (PD4:5) and “gave us a vision of what we are doing and what we want to achieve” (PU4:5). To achieve the planned course of action, designers learnt to put aside their subjective feelings and prioritise design as per the users’ needs as evident in the response, “I learnt [to] put my needs or what I want aside and focus on the user” (PD8:5). Users expressed that their needs were in fact implemented in the design solution.
Regardless, limited adverse effects also emerged. “Timing” (PD11:5) constraints and “complications” (PU6:5) in the design process such as changes in design ideas were unfavourable. From another angle, PU10 confirmed that he/she “being the user, would largely dictate the general design aesthetics” (PU10:5) causing PD10 to become a passive designer without opportunity to engage with HCD5. Interestingly, HCD5 also focuses on tasks but none of the students commented on this.

6.9.7 Effects of HCD6

For the majority, HCD6 afforded designers awareness and understanding that context of use is an important aspect (refer to cited quotations PD7:6 and PD6:6 below). Similarly, designers were of the view that having an understanding of where the design will reside informed the purpose of the design solution and guided design decisions (refer to cited quotations PD12:6 and PD5:6 below).

| “Made me aware of such conditions and situations” (PD7:6) |
| “It makes one realise that context is important in design” (PD6:6) |
| “To ensure there is purpose for the dress” (PD12:6) |
| “Having to adjust … to be ideal for context of use and finding the right colour and fabric” (PD5:6) |

In addition, HCD6 allowed for establishment of design requirements narrowing the scope for design teams, allowing them to better frame what should be incorporated or eliminated from the design solution. This finding is grounded in responses such as, “helps eliminate what should not be done” (PU3:6) and “was able to use this in the design process and user requirements” (PD9:6). In contrast, for PU10, HCD6 was an “afterthought in comparison to the focus on … aesthetic choices” (PU10:6) hence aesthetics-oriented decisions took centre stage.

6.9.8 Effects of HCD7

Most students found HCD7 advantageous because it took into account 1) a better understanding of users’ needs rather than assuming these, 2) it prevented misunderstandings and misinterpretation, and 3) it ultimately resulted in a better holistic design. These interpretations emerged from comments such as those below.
Remarkably, students also argued that HCD7 created a sense of respect and trust between designer and user with an empathic design outcome. This is evident in comments such as, “respect of each others’ backgrounds and cultural values” (PU5:7), “end-user will trust you as designer” (PD5:7) and “being empathetic” (PD3:7). In contrast, a limited number of students found HCD7 unfavourable as it proved challenging to reach consensus, as seen in the comment that “it was hard to come to a conclusion with some of the choices in design” (PD8:7). As such, indecision brought about “frustration, possibly causing a lack of enthusiasm” (PU9:7). PU10 “was not sure if it [HCD7] had a significant effect” (PU10:7) but this particular user took control of the design process, ultimately designing for him/herself.

6.9.9 Effects of HCD8

Most students claimed that HCD8 afforded development of a “design framework” (PU10:8) with which to practice design by “avoid[ing] unnecessary information” (PU3:8). Students confirmed that users’ tangible “needs were successfully translated into [design] requirements” (PU2:8) which ultimately informed the design solution. Despite this, one student expressed a dual view because, on the one hand, HCD8 was a priority but, on the other, it was difficult at the beginning. This is evident in the response that “making your user a priority, getting the user needs right at first attempt was a struggle” (PD5:8). Moreover, some students did not respond regarding the effect of HCD8.

6.9.10 Effects of HCD9

HCD9 focuses on addressing user needs, which the majority of students felt centred on the user and their goals and needs rather than those of the designer. One user stated that “this [design] principle enables the designer to design according to your needs and preferences – not what he/she desires” (PU1:9). Designers felt that HCD9 afforded a culture of designing in a more thoughtful way with constant feedback from users as communicated in the comment that “this [design] principle makes sure that the user is happy with the process and through the process of constant feedback, a more thoughtful dress was produced” (PD2:9).
6.9.11 Effects of HCD10

HCD10 revolves around users as partners. A few students noted that partnership did not actually manifest itself in the design process. From a user perspective, one noted that “as the user, I tried as best as I could to come up with ideas but the designer wanted things to be their way” (PU2:10). In the same light, a few designers claimed that users did not furnish them with sufficient feedback as expressed in the statement that the “user was not giving feedback to the designer” (PD10:10). Again, such negative effects emerged from PD10, PU10 and PU2 suggesting tensions regarding team dynamics. Despite this, the majority of students responded to HCD10 noting its valuable effects in that it contributed to “teamwork and good communication (PU5:10) resulting in “… collaborative creativity - the designer does not design for but with the user” (PD12:10). As such, designers and users were viewed as “… equal partners in the design process” (PD9:10) adding value to and supporting the notion of inclusive design whilst overcoming the exclusive lone-genius approach.

6.9.12 Effects of HCD11

Active user involvement in the design process, for most students, was valuable albeit for different reasons. One of the main effects was user satisfaction with the design solution: “helped my designer create something to better satisfy my needs” (PU9:11). This was perhaps due to partnership with designers and active involvement throughout the design process. Interestingly, as was the case regarding HCD7, HCD11 also afforded a sense of shared trust between users and designers: “it taught me a lot about trusting the user” (PD8:11). From a different perspective, the partnership with and active involvement of users made it more manageable for students to engage with the ATs set out in the project brief, hence lightening students’ individual workload. As such, students expressed the view that HCD11 made it possible for them to execute their ATs more efficiently and timeously in order to meet assessment deadlines. This finding emerged from comments such as “what tasks are shared equally, the time it takes to go through the process was greatly reduced and used more effectively” (PD2:11).

Although this was the case for most students, PU10 once again furnished an adverse effect, stating that he/she felt “it was hard to maintain who was meant to do what and this contributed to the very uneven work split” (PU10:11). This could be attributed to a lack of an action plan
within this particular design team rather than the actual design principle itself. Moreover, limited disadvantages emerged in that implementation of HCD11 resulted in “disagreements” (PD1:11) and “frustration” (PD7:11) between designer and user.

6.9.13 Effects of HCD12

The overwhelming majority of students noted the value of users as participants in data collection. HCD12 “improved communication” (PD7:12) skills as designers “asked relevant questions” (PD3:12) and probed user responses in order to understand their needs. Beyond that, students were of the view that HCD12 afforded clarity with which to develop a “research purpose” (PD5:12). However, some responses show that data collection was one of the roles assigned to the user as evident in the statement that the “user got information on the thing I did not look at” (PD1:12). This implies that students may not have fully understood that users are the people who actually provide the relevant information. For this reason, I argue that the concept of HCD12 is perhaps too advanced for undergraduate, entry-level students, even though the findings show that designers actually engaged in primary research (HCD13) strategies to collect data from users and frame the design problem.

6.9.14 Effects of HCD13

The majority of students conveyed encouraging effects regarding primary research, viewing it as “mind-opening” (PD11:13) in moving beyond the mainstream reliance on secondary visual information, seeing that “information was from no external sources” (PD12:13). Students expressed the view that HCD13 allowed for primary data collection of insightful, accurate information obtained directly from users. As such, students gained insight, shared knowledge and generated valid data to inform design praxis, rather than assuming what users’ need, thus producing good designs. These assertions are based on raw data quotations such as those below.

<table>
<thead>
<tr>
<th>Quotation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Doing research yourself is more insightful – one works more accurately”</td>
<td>(PD4:13)</td>
</tr>
<tr>
<td>“This ensured valid information that can be traced directly to the user –</td>
<td>(PD2:13)</td>
</tr>
<tr>
<td>was the basis of our design and provided a more accurate design product”</td>
<td></td>
</tr>
<tr>
<td>“Shared knowledge = good research = good design”</td>
<td>(PU11:13)</td>
</tr>
<tr>
<td>“Avoids the problem of making false assumptions or collecting filtered</td>
<td>(PU3:13)</td>
</tr>
<tr>
<td>information”</td>
<td></td>
</tr>
</tbody>
</table>
Contradicting the above, PU10 notes that “I think in this instance relying solely on primary research would have slowed down the design process drastically. Secondary research (esp. images) help communicate ideas effectively” (PU10:13). The implications here is that PU10 prefers use of secondary visual research, which aligns with a traditional approach to FD education, despite the fact the HCD13 is grounded in the use of qualitative tools (HCD14).

6.9.15 Effects of HCD14

Although the majority found HCD14 beneficial, a recurring pattern emerged in that the responses related to “clear understanding” (PD7:14) and “comprehensive … information to use” (PD9:14) which ultimately emerges from qualitative research. However, student responses linked tools to teaching and learning equipment such as “laptop, pen, pencil” (PU12:14) but not to qualitative tools to engage with research strategies. For this reason, I assert that the focus of HCD14 on qualitative tools is more applicable to postgraduate students.

6.9.16 Effects of HCD15

HCD15 revolves around collaboration, which students affirmed was instrumental to prompt execution of ATs. This is supported by statements such as: “the workload was shared and provided a much easier working environment” (PD2:15) and “makes design process much faster” (PD5:15). Another interesting effect of HDC15 was that it afforded an opportunity to learn to work in a collaborative way by drawing on each other’s strengths and weaknesses in order to self-direct learning. This was made possible through a trusting relationship between user and designer. This was evident in responses such as: “I learnt the importance of working and trusting my partner (user)” (PD8:15) and “we were able to focus on each other’s strengths and weaknesses” (PU5:15). From a design solution perspective, HCD15 “helps stimulate ideas and better the project” (PU3:15) to ensure that “goals are achieved” (PU1:15) to generate what students perceived as “good design” (PD1:15). In contrast, collaboration “made progress a bit slower” (PD7:15). PU10 felt that the designer did not engage with HCD15 to execute ATs as “my designer become more of a sounding board who contributed ideas but was only nominally involved in the practical work” (PU10:15). Similarly, tensions emerged for PU2 in that the “designer thought [he/she] was boss” (PU2:15), which suggests a design dictator attitude rather than a collaborative approach.
6.9.17 Effects of HCD16

HCD16 revolves around knowledge generation. A majority of students acknowledged the impact of an understanding that design be undertaken with actual users and not for imagined users. By engaging in such an approach to design, students gained new knowledge about HCD and the manner in which such an approach manifests itself in design process activities. Moreover, the notion of design with a user fostered deeper student learning in terms of acquiring new knowledge through peer engagement. Some raw data extracts that support these assertions are presented below.

|“The designer can learn things that they did not know before” (PU3:16) |
| “Yes, I did learn a lot and gained knowledge through this process and hearing one out and giving feedback and most working together. Designer learnt a lot in the design process and starting to learn that it was not for the user but with the user” (PD10:16). |
| “A huge amount of learning happened between us and this grew our knowledge of the design process” (PD2:16) |

However, one user mentioned that HCD16 had “no effect – but the user did not had [have] knowledge about fashion” (PU6:16) while one designer argued that this design principle “didn’t [did not] work out because user takes the designer as source of knowledge and verification” (PD4:16). The implication here is that users may not see themselves as knowledge generators. Despite this, learning emerged, often in the form of mutual learning (HCD17).

6.9.18 Effects of HCD17

Remarkably, most responses show that HCD17 supported collaborative and self-directed learning due to user and designer partnerships that created a “study buddy system” (PD11:17) of learning. This is self-directed learning as evident in recurring student comments such as: “we could teach each other different ways of doing things. I learnt from my designer. I could teach my designer new techniques” (PU3:17). Linked to this, HCD17 promotes a culture of building relationships between users and designers: “you create a better relationship with each other” (PU8:17). From a dual standpoint, PU10 notes that although mutual learning did occur, he/she “don’t [did not] know that this impacted on the project outcome” (PU10:17). This leads one to question why this particular student does not see the value of mutual learning for fashion
design praxis. PU2 voiced a negative effect due to the fact that PD2 did not actually listen to him/her despite constant repetition of information.

6.9.19 Effects of HCD18 and HCD19

HCD18 focused on users being aware of their involvement. A few responses from designers related to users being aware of their involvement in the design process. On the one hand, one designer mentioned that the “user was aware of [his/her] involvement thus provided a much better working experience” (PD2:18) but, on the other hand, another designer commented that the “designer and user were not aware of involvement cause [because] did not plan out” (PD10:18). In contrast to the underlying scope of HCD18, most students responded from the perspective of collaborative engagement, which evoked users’ valued sense of purpose: “it helps user feel involved and included and worthy” (PD4:18).

Students’ misinterpretation regarding HCD18 reoccurred in HCD19 where responses showed positive effects of HCD19 but comments were linked to understanding user needs (HCD7) and active user involvement in the design process (HCD11), due to data saturation. Based on this, it seems that the majority of users were not fully aware of their involvement nor did they have a clear understanding of their functions and tasks, possibly due to the evident lack of an action plan outlining the responsibilities of each team member as was required in AT7 (as presented in Table 6.3).

6.9.20 Effects of HCD20, HCD21 and HCD22

For HCD20, an overwhelming number of students promoted the affordances of user evaluation of prototypes because it created opportunity for “feedback and criticism as the process moved on” (PD9:20), “constantly refined according to the user evaluation” (PD2:20) and “begin finalisation” (PD11:20) of the design solution to ensure that user needs were actually addressed. In doing so, HCD20 afforded multiple refinements and user satisfaction. Another interesting outcome was that HCD20 paved the way for students to self-assess their design and technology-related progress and understand that what might be considered as good ideas in two-dimensional sketches, might not be as good when brought to life in a three-dimensional prototype. This was evident in responses such as “you get to see how far you are with your
progress” (PU8:20) and “understanding that certain ideas are only good in ideation, not in the design process” (PD6:20).

The effects of HCD20 linked to those of HCD21, with feedback and refinement emerging as common responses. HCD20 and HCD21 both linked to HCD22 regarding an iterative process that allowed for prototype evaluation, feedback, backward and forward movement and refinement before finalising the design. This ultimately led to user satisfaction. These assertions are drawn from responses such as: “evaluating and adjusting or prototype” (PD3:22) and “repeating steps ensures that a much better satisfying product is made for the user” (PD2:22). However, some students found HCD21 and HCD22 time-consuming due to “time management” (U6:22).

### 6.9.21 Effects of HCD23

HCD23 involves design that addresses the whole user experience, of which a majority of students expressed a favourable view. Favourable responses linked again to aspects such as design with users, user involvement and users as focus, but responses did not relate to the HCD23 focus on users’ main concerns being addressed, who has the experience, the object experienced, how the experience takes place and whether this occurs before, during or after interacting with the object. For this reason, HCD23 might also be too advanced for first-year students to understand.

### 6.9.22 Effects of HCD24

HCD24 focused on the design team as including multidisciplinary skills and perspectives. The majority of students noted constructive effects as both users and designers had different skills that were brought together in a team effort. In addition, HCD24 led to further insight concerning how to design and improved skill acquisition culminating in what they perceived as a good design product. However, students were not specific in terms of which skills were developed. Comments such as “much bigger insight was created by this and ensured a much better product” (PD2:24) and “combining user skills and views together to achieve a great product” (PD1:24) support these assertions.
Regarding non-constructive effects, PU10 believed that “much of the decision-making was led by [himself/herself]” (PU10:24). Furthermore, PU2 claimed that PD2 “hardly agreed to what [he/she] suggested” (PU6:24). This concludes summary of the findings that emerged from the pilot study. Deliberation now turns to retrospective analysis thereof.

6.10 RETROSPECTIVE ANALYSIS

In this section, I draw on the summary of findings to address the third purpose of this chapter. This retrospective analysis revolves around two main dimensions, namely: 1) refinement of the tentative HCD, fashion design praxis and DEP design principles in order to propose a refined set of design principles, and 2) refinement of the SB pedagogical strategies. The retrospective analysis commences by first reverting to the tentative design principles of HCD (refer to Table 3.2), fashion design praxis, framed around volition (V), design knowledge (DK), design methodology (DM), and product (P) (refer to Table 4.2), and DEP (refer to Table 4.3) and their implementation in the pilot study. Subsequently, I reflect on the tentative design principles based on the findings of the pilot study and consolidate or eliminate them in order to develop a refined set of design principles with which to design and implement the main study (as a second intervention cycle). Following this, I reflect on the pilot study findings in order to develop pedagogical refinements to design and implement the main study. The following subsections reflect this structure and, as such, discussion commences with refinement of the tentative design principles.

6.10.1 Refinement of tentative design principles

As the pilot study unfolded, it became evident that there were too many tentative design principles for HCD, fashion design praxis and DEP. Analysis of student data supported the need for refinement through consolidation or elimination of the tentative design principles for HCD (as can be seen in Table 6.8). In the same way, reflecting on the pilot study, the tentative design principles for fashion design praxis and DEP were refined through consolidation and elimination (these are presented in Table 6.9 and Table 6.10, respectively).
Table 6.8: Refinement of tentative design principles for HCD

<table>
<thead>
<tr>
<th>DESIGN PRINCIPLES TO BE CONSOLIDATED</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1, HCD3</td>
<td>Both design principles focus on users as the core of design</td>
</tr>
<tr>
<td>HCD5, HCD9</td>
<td>The findings showed that both design principles relate to user needs, goals and preferences. Students did not respond to the issue of tasks</td>
</tr>
<tr>
<td>HCD4, HCD13</td>
<td>Both design principles relate to research and design with recurring information obtained from students</td>
</tr>
<tr>
<td>HCD10, HCD11</td>
<td>Both design principles explicate notions of partnership within the design process</td>
</tr>
<tr>
<td>HCD16, HCD17</td>
<td>Both design principles found learning as a common effect</td>
</tr>
<tr>
<td>HCD20, HCD21</td>
<td>Common categories of user feedback and refinement emerged in both design principles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN PRINCIPLES TO BE ELIMINATED</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD7</td>
<td>Similar information with respect to understanding users’ needs was found in design principles HCD1, HCD2, HCD4, HCD12 and HCD19</td>
</tr>
<tr>
<td>HCD12, HCD14, HCD23</td>
<td>These design principles are more applicable to postgraduate students employing HCD as a research strategy</td>
</tr>
<tr>
<td>HCD18</td>
<td>The majority of responses did not relate to users actually being aware of their involvement in the design process from the onset</td>
</tr>
<tr>
<td>HCD19</td>
<td>Data saturation was reached in that responses did not link effects with a clear understanding of users’ functions and tasks</td>
</tr>
</tbody>
</table>

Table 6.9: Refinement of tentative design principles for fashion design praxis

<table>
<thead>
<tr>
<th>DESIGN PRINCIPLES TO BE CONSOLIDATED</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1, V2</td>
<td>Both design principles relate to changing design</td>
</tr>
<tr>
<td>V3, V4</td>
<td>Both design principles relate to an alternative volition that informs thinking about and approach to design practice</td>
</tr>
<tr>
<td>DK1, DK3, DK5</td>
<td>All design principles relate to co-dependency between conceptual (know-that) and procedural (know-how) knowledge types</td>
</tr>
<tr>
<td>DK2, DK7, DK8</td>
<td>All design principles relate to tacit know-how knowledge</td>
</tr>
<tr>
<td>DM3, DM4, DM6</td>
<td>All design principles relate to subjective, constructivist, reflective practice approaches as more appropriate to the conceptual stage of the design process</td>
</tr>
<tr>
<td>DM7, DM8</td>
<td>Both design principles relate to objectivity and subjectivity</td>
</tr>
</tbody>
</table>

Table 6.9 continues on next page
Based on retrospective analysis, the tentative design principles were refined through consolidation or elimination. The 24 tentative design principles for HCD originally proposed were thus refined to 12. In the same way, the 34 tentative design principles for fashion design praxis were reduced to 19, while the initial set of 32 DEP design principles now includes 19 design principles. In the following sub-section, the refined set of design principles used to engineer the design of the main study are proposed.

<table>
<thead>
<tr>
<th>Table 6.10: Refinement of tentative design principles for DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESIGN PRINCIPLES TO BE ELIMINATED</strong></td>
</tr>
<tr>
<td>DM10, DM11</td>
</tr>
<tr>
<td>DM13, DM14</td>
</tr>
<tr>
<td>DM16, DM17</td>
</tr>
<tr>
<td><strong>DESIGN PRINCIPLES TO BE CONSOLIDATED</strong></td>
</tr>
<tr>
<td><strong>JUSTIFICATION</strong></td>
</tr>
<tr>
<td>DEP2, DEP10, DEP11</td>
</tr>
<tr>
<td>DEP4, DEP5, DEP24, DEP25</td>
</tr>
<tr>
<td>DEP7, DEP8</td>
</tr>
<tr>
<td>DEP14, DEP21, DEP22</td>
</tr>
<tr>
<td>DEP16, DEP17</td>
</tr>
<tr>
<td>DEP27, DEP31</td>
</tr>
<tr>
<td><strong>DESIGN PRINCIPLES TO BE ELIMINATED</strong></td>
</tr>
<tr>
<td>DEP23</td>
</tr>
<tr>
<td>DEP29, DEP30</td>
</tr>
</tbody>
</table>
6.10.2 Refined design principles for design of main study

Through consolidation, the design principles that will be used to inform the design and implementation of the main study are re-named and re-coded. Similarly, V2 in Table 6.12 and DEP4 in Table 6.13 were re-named to correspond with a HCD focus. The re-named and re-coded design principles for HCD are presented in Table 6.11, which includes the code, design principle and description. Similarly, the re-named and re-coded design principles for fashion design praxis, within the four modes of volition (V), design knowledge (DK), design methodology (DM) and product, are presented in Table 6.12, and the revised design principles for DEP are outlined in Table 6.13.

Table 6.11: Refined design principles for HCD

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1</td>
<td>Users as core and source of inspiration – focus is on the user as the nucleus for design and source of inspiration but not the subject of study</td>
</tr>
<tr>
<td>HCD2</td>
<td>Design is with users and not for users - design is no longer for people but rather with people</td>
</tr>
<tr>
<td>HCD3</td>
<td>Integration of primary research and design - designers assume a dual role of researcher and designer, meaning that design grounds itself in primary as opposed to secondary research</td>
</tr>
<tr>
<td>HCD4</td>
<td>Identify and address user needs, goals and preferences - first, establish users’ needs, goals and preferences through engaged dialogue as input into the design process before addressing these needs, goals and preferences</td>
</tr>
<tr>
<td>HCD5</td>
<td>Context of use - design should take into account the context or situation in which the user uses the product</td>
</tr>
<tr>
<td>HCD6</td>
<td>Translate user needs into requirements - translate users’ needs into a set of design requirements (design criteria and constraints)</td>
</tr>
<tr>
<td>HCD7</td>
<td>Users as partners with active involvement - users are seen as partners in the design process and design should take place with users rather than for users. Users should be directly involved and actively participate early and continually in the design process</td>
</tr>
<tr>
<td>HCD8</td>
<td>Collaboration - users and designers should collaborate with each other</td>
</tr>
<tr>
<td>HCD9</td>
<td>Knowledge generation and mutual learning - users are a source of knowledge and should contribute knowledge as input into the design process. Mutual learning takes place between all stakeholders</td>
</tr>
<tr>
<td>HCD10</td>
<td>User evaluation, feedback and refinement - users should evaluate prototypes and provide feedback as a critical source of information. Designers should evaluate designs with users and improve designs based on the feedback obtained</td>
</tr>
<tr>
<td>HCD11</td>
<td>The process is iterative - iteration or repeated steps should occur throughout the design and development process until the desired outcome is achieved</td>
</tr>
<tr>
<td>HCD12</td>
<td>The design team includes multidisciplinary skills and perspectives - work in design teams for collaborative decision-making and implementation</td>
</tr>
</tbody>
</table>
Table 6.12: Refined design principles for fashion design praxis

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>VOLITION</strong></td>
</tr>
<tr>
<td>V1</td>
<td>Volition to change design – designers should be agents of change to transform design from an existing situation to a preferred one</td>
</tr>
<tr>
<td>V2</td>
<td>Change in volition from an inward-looking practice to alternative ways of thinking about and approaching design practice through a HCD approach</td>
</tr>
<tr>
<td>V3</td>
<td>Eradicate misguided approaches to HCD in practice</td>
</tr>
<tr>
<td></td>
<td><strong>DESIGN KNOWLEDGE</strong></td>
</tr>
<tr>
<td>DK1</td>
<td>Fashion designers require conceptual knowledge about rules, design theories and design process models</td>
</tr>
<tr>
<td>DK2</td>
<td>Fashion designers require know-how knowledge for practice</td>
</tr>
<tr>
<td>DK3</td>
<td>Co-dependency between conceptual and procedural knowledge – know-that is first acquired and understood before being applied to know-how</td>
</tr>
<tr>
<td>DK4</td>
<td>The tacit in design practice should be made explicit in some way</td>
</tr>
<tr>
<td></td>
<td><strong>DESIGN METHODOLOGY</strong></td>
</tr>
<tr>
<td>DM1</td>
<td>Design problems are ill-defined, wicked and have no set design criteria</td>
</tr>
<tr>
<td>DM2</td>
<td>Design is bounded by context and situation and is thus unique</td>
</tr>
<tr>
<td>DM3</td>
<td>The conceptual stages of the design process align with a constructivist, reflective practice paradigm</td>
</tr>
<tr>
<td>DM4</td>
<td>A positivist, rational problem-solving paradigm is more appropriate to the information stage of the design process</td>
</tr>
<tr>
<td>DM5</td>
<td>Design tasks involve both objectivity and subjectivity in that objective justification and analysis support subjectivity</td>
</tr>
<tr>
<td>DM6</td>
<td>Objectivity and subjective volition are embodied in design activities</td>
</tr>
<tr>
<td>DM7</td>
<td>The design process comprises of a sequence of activities that unfold in a logical manner through analysis, synthesis and evaluation</td>
</tr>
<tr>
<td>DM8</td>
<td>The fuzzy front-end design process model is an applicable and alternative model with which to bridge gaps and move away from inspiration as the first stage</td>
</tr>
<tr>
<td>DM9</td>
<td>Designers work in teams</td>
</tr>
<tr>
<td>DM10</td>
<td>The design criteria stage navigates and frames the design problem via open-ended, qualitative strategies aimed at establishing a set of design criteria and constraints as input for design actions</td>
</tr>
<tr>
<td></td>
<td><strong>PRODUCT</strong></td>
</tr>
<tr>
<td>P1</td>
<td>Designed clothing products include the physical characteristics or design elements of line, shape (silhouette), texture (fabric) and colour</td>
</tr>
<tr>
<td>P2</td>
<td>The materialisation of products is a result of one’s volition, way of thinking, agency and intentional action</td>
</tr>
</tbody>
</table>
Table 6.13: Refined design principles for DEP

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP1</td>
<td>Design education should shift from conventional educational models that foster inward looking-practice to those that foster collaboration and design with users</td>
</tr>
<tr>
<td>DEP2</td>
<td>Pedagogy should be grounded in a constructivist, student-centered approach that fosters socially-engaged, active learning experiences through greater peer collaboration and dialogue</td>
</tr>
<tr>
<td>DEP3</td>
<td>Educators should assume the role of facilitators that guide learning experiences as opposed to transmitting knowledge</td>
</tr>
<tr>
<td>DEP4</td>
<td>Conceptual knowledge about HCD, qualitative primary research strategies and design process models need to be understood and then integrated and applied within know-how, or procedural knowledge</td>
</tr>
<tr>
<td>DEP5</td>
<td>Opportunities should be created for students to transform themselves to become agents of change</td>
</tr>
<tr>
<td>DEP6</td>
<td>Teaching and learning should be grounded in studio-based pedagogy through project-based learning</td>
</tr>
<tr>
<td>DEP7</td>
<td>Role-playing is an effective pedagogical strategy that imitates professional design practice</td>
</tr>
<tr>
<td>DEP8</td>
<td>Learning spaces should be equipped with discipline-specific, specialised resources</td>
</tr>
<tr>
<td>DEP9</td>
<td>The timetable should include formal and non-formal sessions that foster students self-directed learning, as well as freedom to work both inside and outside the boundaries of studio sessions</td>
</tr>
<tr>
<td>DEP10</td>
<td>Students should receive a written project brief outlining a simulated wicked design problem, a time frame for completion and design constraints</td>
</tr>
<tr>
<td>DEP11</td>
<td>Students should work in groups to execute design projects</td>
</tr>
<tr>
<td>DEP12</td>
<td>The project is an assessment method that consists of both formative and summative assessment as well as both design and technology-related activity tasks</td>
</tr>
<tr>
<td>DEP13</td>
<td>Design activity tasks should include representational methods</td>
</tr>
<tr>
<td>DEP14</td>
<td>Activity tasks should include prototype development</td>
</tr>
<tr>
<td>DEP15</td>
<td>Activity tasks should include an audit trail to record and justify all design activities</td>
</tr>
<tr>
<td>DEP16</td>
<td>Pedagogical strategies should include design critique sessions</td>
</tr>
<tr>
<td>DEP17</td>
<td>Pedagogical strategies should support an iterative design process that provides opportunities for multiple iterations and refinement before design solutions are finalised</td>
</tr>
<tr>
<td>DEP18</td>
<td>Opportunities should be created for peer-feedback</td>
</tr>
<tr>
<td>DEP19</td>
<td>Pedagogical strategies should include opportunities for experimentation, reflection and learning-on-the-go</td>
</tr>
</tbody>
</table>

These refined design principles for HCD (Table 6.11), fashion design praxis (Table 6.12) and DEP (Table 6.13) will be used to design the main study. However, based on the findings of the pilot study, improvement to the pedagogical strategies deployed is also required for better alignment with the refined design principles.
6.10.3 Improvement of pedagogical strategies

To improve on the pedagogical strategies for the main study, I discussed the findings with both facilitators due to the fact that they were to be involved in the design and implementation of the main study. Although I did not agree with the suggestion put forward by F2 regarding design quality versus quantity (discussed in sub-section 6.8.4), particularly with respect to the design journal and the work content related to technological manufacturing operations, I took into consideration some of the recommendations. Regarding the design journal, I opted not to change the scope or purpose of the design journal because a soundly crafted design journal is an essential tool in visually and explicitly communicating one’s thinking, justifications and abstract design solutions. In Table 6.14, the teaching and learning strategies that required improvement and the strategies used to design the main study are defined. In Table 6.14, I align the required improvement and strategies with the refined design principles (from Tables 6.11, 6.12 and 6.13 respectively), where applicable.

Table 6.14: Improved teaching and learning strategies for main study

<table>
<thead>
<tr>
<th>REQUIRED IMPROVEMENT</th>
<th>STRATEGIES TO DESIGN THE MAIN STUDY</th>
<th>ALIGNMENT WITH REFINED DESIGN PRINCIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time allocation</td>
<td>Extend formal timetabled studio contact sessions and timeframe for the project</td>
<td>DEP9</td>
</tr>
<tr>
<td>Monitor student progress with more formalised design critique</td>
<td>Include three formal studio sessions for design-related critique and feedback in order to monitor design team progress</td>
<td>DEP16</td>
</tr>
<tr>
<td>Differentiate between the different stages of the fuzzy front-end design process model and the activities associated with each stage</td>
<td>In order to develop deeper conceptual understanding, allocate a formal theory session to reintroduce the fuzzy front-end design process model and the activities associated with each stage</td>
<td>HCD4, DK1, DK3, DM7, DM8, DEP4, DEP17</td>
</tr>
<tr>
<td>Conceptual understanding of user needs</td>
<td>To foster deeper conceptual understanding of user needs, include theoretical user need models</td>
<td>HCD4, DK1, DK3, DEP4</td>
</tr>
</tbody>
</table>

Table 6.14 continues on next page
| Uncertainty regarding design activities necessary for idea stage of the fuzzy front-end design process model | Implement a tool comprising of four main dimensions, namely: 1) what to design in context, 2) design criteria and constraints 3) idea brainstorming, and 4) how (action plan). Present the tool as part of a theory session aided by tangible pragmatic examples for contextualisation | DK1 DK3 DM7 DM8 DEP4 |
| Establishing respective roles of users’ and designers’ | | |
| Differentiate between user needs, goals and preferences | Specify a minimum number of design sketches in the project brief | HCD4 |
| Limited two-dimensional design sketches in the concept stage of the design process | Design project brief to include two formal contact sessions dedicated to the concept stage of the design process | DEP9 |
| Additional time to engage with the concept stage of the design process | Design project brief to include additional project-specific design constraints | DEP10 |
| Include more precise project-specific design constraints | Project timeframe to include a formal design studio session focused on enhancing overall presentation skills | |
| Presentation skills | Formalise the project assessment weighting for design and technology-related activities. Design-related activities should culminate in an assessment weighting of 60% and technology-related activities should carry a weighting of 40%. Design activities are the core driver of design as opposed to the making of a product thus justifying a higher assessment weighting | |
| Assessment weighting between design and technology-related activities | Incorporate the product stage into the fuzzy front-end design process model. This entails developing a final, tangible product in addition to a prototype. In this way, the HCD approach culminates in engagement with all five stages of the fuzzy front-end design process model | P1 P2 |
| Product development as final stage in the design process | | |

The retrospective analysis presented in this section concludes discussion of the three overarching purposes of this chapter. In Chapter 7, I discuss the main study, scoping out the manner in which the teaching and learning intervention was designed and implemented.
6.11 CONCLUSION

This chapter set out to address Phases 2 and 3 of the present research inquiry. It sought to achieve a three-fold purpose, namely: 1) to contextualise the pilot teaching and learning intervention that was grounded in a HCD approach to FD education, 2) to present a summary of the findings obtained in the pilot study, and 3) to execute a retrospective analysis of these findings in order to refine and engineer the main study.

Regarding the first purpose, section 6.2 described the module and programme for which the pilot study was designed and in which it was implemented. Section 6.2 also outlined the strategies undertaken to design the pilot teaching and learning intervention. Section 6.3 described the supporting module, the conceptual knowledge content and pedagogical strategies employed in order to prepare students prior to implementation of the pilot study. Discussion then shifted, in section 6.4, to the design and implementation of the pilot study. Achieving the first purpose concluded in section 6.5 in which the UOs, SLOs and ATs were aligned with the design principles for HCD, fashion design praxis and DEP.

Thereafter, the second purpose of Chapter 6 was addressed in section 6.6, which mapped out the structure used to summarise the findings of the pilot study, which was framed according to the main research themes: 1) design process activities, 2) facilitator perspectives on the HCD approach to FD education, and 3) student perspectives on the effects of HCD and its underlying design principles to FD education. These main research themes were further categorised as per Figure 6.1. The first of the themes was discussed in section 6.7, where I reported on my participant observations, supported with self-created photographs, regarding the design process activities executed by the students. Discussion then shifted to the second research theme, in section 6.8, where I drew on analysed data obtained from facilitators to narrate their perspectives on a HCD approach to FD education. Achievement of the second purpose of this chapter concluded in section 6.9, which addressed the third research theme through analysis of student data. In that section, I reported on findings pertaining to students’ perspectives regarding the effects of HCD and its underlying design principles as implemented in the pilot study.

The third purpose was achieved in section 6.10 through retrospective analysis that revolved around two main dimensions, namely: 1) refinement of the tentative HCD, fashion design
praxis and DEP design principles, and 2) refinement of the SB pedagogical strategies deployed. The tentative design principles were consolidated or eliminated giving rise to a refined set of 12 design principles for HCD, 19 design principles for fashion design praxis, and 19 design principles for DEP. Discussion then shifted to the SB pedagogical strategies that required improvement and the strategies used to effect such improvement. These refined design principles and pedagogical strategies set the backdrop against which to design the main study. In Chapter 7, I outline the design, implementation and findings of the main study, which culminates in identification of a final set of design principles for HCD, fashion design praxis and DEP.
CHAPTER 7

MAIN STUDY: DESIGN, IMPLEMENTATION AND DISCUSSION OF FINDINGS

7.1 INTRODUCTION

Chapter 6 addressed Phases 2 and 3 of the present inquiry by describing the design and implementation of a pilot study as well as discussing the findings that emerged from the pilot study. This paved the way for refinement of the design principles used to develop the pilot study, including 12 design principles for HCD (presented in Table 6.11), 19 for fashion design praxis, framed within the four modes of volition (V), design knowledge (DK), design methodology (DM) and product (P) (illustrated in Table 6.12), and 19 for design education pedagogy (DEP) (shown in Table 6.13). Chapter 6 also outlined the studio-based (SB) pedagogical strategies that required improvement along with strategies to design the main study (refer to Table 6.14). These refined design principles and pedagogical strategies were used to design the main study.

Chapter 7 now addresses Phases 4 and 5 of this research, and serves a three-fold purpose. Firstly, it aims to describe the design and implementation of the main study, framed within SB pedagogy and a project-based (PB) learning strategy. The second purpose is to ascertain the effects of a HCD approach, and its underlying design principles, to fashion design (FD) education. This is achieved through discussion of empirical findings emerging from data collection and analysis. Thereafter, the third purpose of the present chapter is to put forward a final set of design principles for HCD, fashion design praxis and DEP as the overall theoretical contribution of this research, along with a refined teaching and learning intervention for adaptation, as a contribution to FD educational practice and future research.

To achieve the first purpose, discussion commences with the design and implementation of the main study, which is framed within the refined set of design principles and improved SB pedagogical strategies. Following this, I shift to the second purpose of the current chapter, which is, discussing the empirical findings. These findings address four main research themes, namely: 1) activities in the HCD fuzzy front-end design process, 2) emergent issues during the
main intervention, 3) effects of the HCD approach and its underlying design principles to FD education, and 4) participant experiences of a HCD approach to FD education. Each of these main research themes is discussed along with possible relationships between the main research themes and findings. Section 7.4 maps out the data collection and analysis procedures through which these research themes were obtained and also provides an overview of the structure within which the findings are presented. Discussion then shifts to the third purpose, where the empirical findings are used to refine and propose a final set of design principles for HCD, fashion design praxis and DEP along with a proposed and refined teaching and learning intervention for adaptation. Chapter 7 concludes by summarising the manner in which this three-fold purpose have been achieved, and sets the stage for the subsequent, concluding chapter.

7.2 DESIGN AND IMPLEMENTATION OF MAIN STUDY

7.2.1 Overview

In this section, the main study is described in terms of its stakeholders, when it was conducted, as well as the programme and module for which it was designed and implemented. As in the case of the pilot study, the same two facilitators were involved in design of the main teaching and learning intervention and facilitated the implementation thereof, so that I could maintain objectivity as researcher without biases that could possibly jeopardise the study. However, due to my conceptual knowledge about HCD and its underlying design principles and about the fuzzy front-end design process model (seen in Figure 4.2), I presented the theory sessions before assuming a role as passive participant observer, observing the design activities and prototype evaluation stages of the design process.

The main study was implemented with the same group of first-year FD students at the same urban SA HEI. However, as noted in sub-section 2.7.3, it was designed for a second-semester module known as Fashion Design and Technology 1B (FDT1B), which formed part of the same Bachelor of Arts (BA) FD programme. As also noted in sub-section 2.7.3, only 23 students were involved in the main study due to non-returning students.

FDT1A (the module in which the pilot study was implemented) is a pre-requisite for entry into FDT1B, hence the latter module is structured along the same line of integrating design and
technology-related activities. FDT1B serves the overarching purpose of investigating, experimenting and applying knowledge gained in FDT1A and develop fashion design practice in order to design solutions (refer to Addendum N for the module purpose, as extracted from the relevant learner guide). From FDT1B, unit one was selected for implementation of the main study, which takes the form of a project (discussed in detail in sub-sections 7.2.2.4 and 7.2.2.5) that was designed using SB pedagogy in order to align with DEP6 in Table 6.13. In the sub-section that follows, I describe how design and implementation of the main study was framed by these DEP strategies.

7.2.2 Implementing strategies for design education pedagogy (DEP)

7.2.2.1 Overview

This discussion draws on the DEP strategies presented in sub-section 6.4.2 and Table 6.14. Between the pilot and main study, one DEP strategy (developing a constructive learning space) was applied without change while the remainder underwent refinement. Table 7.1 outlines the DEP strategies used in the pilot study as well as the refinement (or not) undertaken for the main study. Table 7.1 also illustrates the teaching and learning strategies that required improvement after the pilot study, and the manner in which these were refined in the main study.

Table 7.1: Strategies for DEP - from pilot study to main study

<table>
<thead>
<tr>
<th>FROM THE PILOT STUDY</th>
<th>TO THE MAIN STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role-playing as a strategy to simulate practice</td>
<td>As in the pilot study, the rationale for role-playing students as designers and users within design teams remained grounded in the justifications presented in sub-section 6.4.2.1 and more specifically in Table 6.1. However, the scope of one design team changed for the main study: this is discussed in sub-section 7.2.2.3</td>
</tr>
<tr>
<td>Projects structured around a brief</td>
<td>Refined and discussed in sub-section 7.2.2.4</td>
</tr>
<tr>
<td>Contextualising the assessment instruments of the project brief</td>
<td>Refined and discussed in sub-section 7.2.2.5</td>
</tr>
<tr>
<td>Framing activity tasks (ATs)</td>
<td>Refined and discussed in sub-section 7.2.2.6</td>
</tr>
</tbody>
</table>

Table 7.1 continues on next page
<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a constructive learning space</td>
<td>No change from pilot. Unfolded in the same manner as per discussion in sub-section 6.4.2.5, briefly reiterated in sub-section 7.2.2.7</td>
</tr>
<tr>
<td>Timetable and time allocation</td>
<td>Time allocation refined to seven weeks, as discussed in sub-section 7.2.2.8</td>
</tr>
<tr>
<td>Monitor student progress with more formalised design critique</td>
<td>Three formal studio sessions for design-related critique and feedback (refer to AT34 and AT37 in Table 7.3) included</td>
</tr>
<tr>
<td>Differentiate between the different stages of the fuzzy front-end</td>
<td>Formal theory session allocated in which to reintroduce the fuzzy front-end design process model and the activities associated with each stage. This is depicted in Table 7.3 under week one (conceptual knowledge session)</td>
</tr>
<tr>
<td>design process model and the activities associated with each stage</td>
<td></td>
</tr>
<tr>
<td>Conceptual understanding of user needs</td>
<td>Theoretical user need models included as part of week one conceptual knowledge session (refer to Table 7.3)</td>
</tr>
<tr>
<td>Uncertainty regarding the design activities necessary for the idea</td>
<td>Designed and implemented a tool referred to as an ideation tool (seen in in Figure 7.1). The ideation tool is discussed in sub-section 7.2.2.2 and was presented as part of the formal theory session aided by tangible practical examples (refer to Table 7.3 under week one: conceptual knowledge session)</td>
</tr>
<tr>
<td>stage of the fuzzy front-end design process model</td>
<td></td>
</tr>
<tr>
<td>Establishing respective roles of users’ and designers’ (students)</td>
<td>Project brief refined to include a minimum of 20 design sketches (refer to AT25 in Table 7.3)</td>
</tr>
<tr>
<td>Differentiate between user needs, goals and preferences</td>
<td>Two formal contact sessions included that were dedicated to the concept stage of the design process (refer to AT25 in Table 7.3)</td>
</tr>
<tr>
<td>Limited abstract two-dimensional design sketches in the concept</td>
<td>Additional project-specific design constraints included, as discussed in sub-section 7.2.2.4</td>
</tr>
<tr>
<td>stage of the design process</td>
<td></td>
</tr>
<tr>
<td>Additional time to engage with the concept stage of the design</td>
<td>Presentation skills AT39 (refer to Table 7.3) included, which focused on enhancing overall presentation skills</td>
</tr>
<tr>
<td>process</td>
<td>Assessment weighting between design and technology-related activities Project assessment weighting for design and technology-related activities formalised. Design-related activities contribute an assessment weighting of 60% and technology-related activities a weighting of 40%. Design activities are the core driver of design rather than the making of a product, thus justifying a higher assessment weighting (refer to Addendum O)</td>
</tr>
<tr>
<td>Include more precise project-specific design constraints</td>
<td>Product development as final stage in the design process Incorporated the product stage in the design process, which entailed developing a tangible product in addition to a prototype, as shown in AT38 in weeks six and seven in Table 7.3</td>
</tr>
</tbody>
</table>
In the following sub-sections, I deliberate on the DEP strategies used to engineer the main study, beginning with the discussion of the developed ideation tool.

7.2.2.2 Ideation tool

The ideation tool was designed as a teaching and learning strategy aimed at assisting students in three ways. Firstly, it sought to help students differentiate between user needs, goals and preferences. Secondly, it framed the wicked design problem and narrowed the activities associated with the design criteria and idea stages within the fuzzy front-end design process into four dimensions, namely: 1) identifying user needs, goals and preferences and deciding on what to design in context, 2) establishing user-specific design criteria and constraints, 3) brainstorming ideas, and 4) developing an action plan for translating two-dimensional design ideas into tangible solutions. Thirdly, the tool offered a means for students to plan their respective designer and user roles and tasks. As such, the ideation tool was designed to correspond with Dorst’s (1997:162; 171) notion of a dual-mode model for design methods (refer to sub-section 4.5.2.3) which sees the positivist, rational problem-solving paradigm being used to objectively frame and interpret a design problem in the information stage.

![Figure 7.1: Ideation tool designed for main study](image)
Development of such an ideation tool was not the intention of this inquiry and, as such, I did not set out to evaluate or refine it for the purposes of FD education. However, such a tool may well be investigated, tested and refined as part of a possible future study in FD education, as is noted in Chapter 8.

7.2.2.3 Role-playing as a strategy to simulate practice

In sub-section 6.4.2.1, I argued the case for role-playing in order to simulate and get as close as possible to an authentic, real-world situation. Table 6.1 summarised the justifications for such an approach. As such, the main study aligned with DEP7 (refer to Table 6.13) by adopting a role-playing strategy in order to provide students an opportunity to simulate a real-world situation. In this way, participating students could learn to become agents of change by thinking about and approaching design from a HCD perspective. Participating students role-played in design teams comprising of two students with one assuming the role of a designer and the other a user. However, given the uneven number of participating students in the main study (23), one design team comprised of three members, but these particular students purposefully opted to be part of a three-member design team and collaboratively decided on one designer and two users. As such, the main study featured 11 design teams engaged in a project.

7.2.2.4 The project

To implement DEP6 (refer to Table 6.13), the main study was designed using SB pedagogy and PB learning. Aligning with DEP12 (refer to Table 6.13), the project served as an assessment method comprising of both formative and summative assessments pertaining to design and technology-related activities. The project featured four assessment instruments, namely: a design journal, a two-dimensional fashion illustration\(^{67}\) and technical drawing\(^{68}\) of the final design solution, while the technology-related aspects included a three-dimensional prototype and a product (these four assessment instruments are further discussed in sub-section 7.2.2.5). Although the project was used for assessment, it should be noted that this study is not

\(^{67}\) The fashion illustration is an artistic, two-dimensional sketch completed in colour through the application of medium techniques.

\(^{68}\) I acknowledge that technical drawings relate to SA engineering drawing standards and practices but, in fashion design, technical drawings are a commonly accepted terminology. In fashion design, such technical drawings are a hard-edged line drawing that includes, for example, design detail, dimensions and specifications for industrial manufacturing operations.
focused on assessment, hence discussion does not pertain to formal summative assessment results, the assessment criteria nor the manner in which students were assessed.

The project aligned with the first unit outcome (UO) aimed at integrating and applying conceptual knowledge with respect to the design principles of HCD as an underlying design approach and volition within praxis in order to design, prototype and manufacture a wearable product. The overarching purpose of FDT1B (as noted in sub-section 7.2.1) allowed for flexibility, hence the unit outcomes are not static\(^{69}\) nor stated in the learner guide but are formulated according to the nature and scope of the assessment method as long as they align with the approved\(^{70}\) module purpose and outcomes. Despite this, the unit number and underlying scope of the unit (in this case, HCD) were stipulated in the learner guide. As such, the nature of this particular research led to the formulation of a UO that aligned with the module purpose and outcomes. To achieve the UO and align with the project scope, the specific learning outcomes (SLOs) listed in Table 7.2 were developed.

To align with DEP10 (refer to Table 6.13), students were presented with a written project brief (refer to Addendum O) outlining a number of dimensions, including:

- UO and SLOs
- Project-specific design constraints
- Format requirements
- The 12 design principles of HCD, with a description of each
- A working schedule detailing dates for design and technology-related ATs, design critique sessions and final submission
- Assessment criteria\(^{71}\)

\(^{69}\) In the case of projects as assessment method, the underlying nature of the project determines the unit outcome.

\(^{70}\) As approved by the Council on Higher Education in SA.

\(^{71}\) Although this study does not focus on formal summative assessment, assessment criteria were provided to students for the purpose of transparency. The assessment criteria are excluded from Addendum O because this study does not focus on formal assessment.
<table>
<thead>
<tr>
<th>CODE</th>
<th>SPECIFIC LEARNING OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO1</td>
<td>Develop a conceptual understanding of the design principles of HCD</td>
</tr>
<tr>
<td>SLO2</td>
<td>Develop a conceptual understanding of user needs</td>
</tr>
<tr>
<td>SLO3</td>
<td>Differentiate between user needs, goals and preferences</td>
</tr>
<tr>
<td>SLO4</td>
<td>Develop deeper conceptual understanding about the activities associated with each stage of the fuzzy front-end design process model</td>
</tr>
<tr>
<td>SLO5</td>
<td>Frame the design problem by establishing user-specific design criteria and constraints through in-depth understanding of user needs, goals, preferences and contexts of use and then design, prototype and manufacture a product in response to the problem</td>
</tr>
<tr>
<td>SLO6</td>
<td>Integrate conceptual knowledge of the design principles of HCD, user needs and the fuzzy front-end design process model for application in design and technology-related activities</td>
</tr>
<tr>
<td>SLO7</td>
<td>Incorporate multi-disciplinary skills and perspectives in order to design, prototype and make a product as a solution, through collaboration and partnership with the user to address their needs, goals, preferences and contexts of use</td>
</tr>
<tr>
<td>SLO8</td>
<td>Learn to become agents of change in order to design-with-intent and empathy for actual users through collaboration and partnership</td>
</tr>
</tbody>
</table>
| SLO9 | Develop an ideation tool to visually and explicitly (put into words) communicate the following:  
  - Users’ needs, goals and preferences  
  - Context of use  
  - Design criteria and constraints  
  - Brainstorming ideas (written)  
  - An action plan to translate ideas and define user/designer project learning tasks |
| SLO10 | Conceptualise and justify a series of design sketches to visually reflect the ideation tool |
| SLO11 | Compile a design journal to record and justify all design and technological process activities in an attempt to visualise and communicate internal thought processes |
| SLO12 | Apply a diverse range of design-related knowledge to demonstrate illustrative techniques and drawing ability |
| SLO13 | Apply technology-related knowledge to develop a pattern, make a prototype and product |

Limited project-specific design constraints were included. These required that students develop a wearable skirt made from a natural fibre encapsulating experimental design detail to assist students navigate through the intricacies of a design problem and narrow the scope of the design problem. As in the case of the pilot study (discussed in sub-section 6.4.2.4), I opted to include these limited project-specific design constraints for two reasons. Firstly, I had to take into consideration that the study was designed for implementation with first-year students. Secondly, HCD was seen as an approach and not as a research strategy. However, I note that, as seen in Addendum O, the project-specific design constraints did not specify what wearable skirt to design hence student designers had to also take into account the user-specific design
criteria and constraints put forward by their respective users. In addition, to align with DEP9 (in Table 6.13), the working schedule formalised self-directed learning so that students could engage with ATs and the four assessment instruments of the project brief. In the same way, the working schedule included formalised design critique sessions, corresponding with DEP16 in Table 6.13. The nature of these formalised design critique sessions is described in Table 7.3 as corresponding with the respective ATs.

7.2.2.5 Assessment instruments within the project brief

The four assessment instruments of the project comprised of: 1) a design journal, 2) a two-dimensional fashion illustration along with technical drawings of the final design solution, 3) a three-dimensional prototype, and 4) a product. Corresponding with DK4 and DEP15 (illustrated in Tables 6.12 and 6.13, respectively), the design journal was used throughout the project as a teaching and learning strategy that allowed design teams to record, justify and make explicit all design and technological process ATs in an attempt to visualise and communicate internal thought processes. In addition, the facilitators used the design journal to assess the design process activities.

The fashion illustration entailed an artistic sketch and technical drawings (both front and back views) of the final design solution after prototype evaluation and refinement via iteration cycles had taken place. This assessment instrument related to design process activities but a tangible design solution could not materialise without integration of the technological process of making a prototype. Prototyping is what linked the design and technological processes, because a prototype is made through technology-related activities and know-how, but a two-dimensional design solution is only finalised once the prototype is made, evaluated and refined.

The prototype component involved translating the two-dimensional rough sketch into a three-dimensional, tentative, human-sized working pattern, which was then cut in calico fabric to make up a toile. Once prototypes were evaluated and patterns refined, the product assessment instrument entailed developing a three-dimensional tangible and materialised form cut and manufactured in the actual fabric selected for the design solution. As such, the prototype and product assessment instruments entailed technology-related activities and know-how. To

72 Mock-up.
engage with these four assessment instruments and fulfil the SLOs, the project extended over a duration of seven, formally-structured academic weeks with specific ATs as outlined in the sub-section that follows.

7.2.2.6 Activity tasks (ATs)

As seen in SLO5 (Table 7.2), the design problem required framing by first establishing a set of user-specific design criteria and constraints through in-depth understanding of user needs, goals, preferences and contexts of use before students could design, prototype and manufacture a product in response to the problem. In the same light, SLO6 (Table 7.2) required application of the fuzzy front-end design process model, which includes the five stages of design criteria, idea, concept, prototype and product. This particular design process model was selected for the reasons provided in sub-section 6.3.3.1. However, application of this five-stage model did not mean that students had no flexibility regarding the design and technology-related ATs, even though timeframes were stipulated in the project brief. In Table 7.3, I present coded ATs that correspond with the weekly schedule given in the project brief (refer to Addendum O for the project brief).

Table 7.3: Activity tasks (ATs)

<table>
<thead>
<tr>
<th>CODE</th>
<th>ACTIVITY TASKS (ATs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>WEEK ONE (Conceptual knowledge session)</strong></td>
</tr>
<tr>
<td>AT1</td>
<td>Incorporated teaching and learning tools in the form of an interactive PowerPoint presentation and student learning material(^{73})</td>
</tr>
<tr>
<td>AT2</td>
<td>Clarified feedback on the pilot study findings and explained why the design principles for HCD were consolidated or excluded</td>
</tr>
<tr>
<td>AT3</td>
<td>Developed deeper conceptual knowledge by presenting and describing the refined set of design principle for HCD</td>
</tr>
<tr>
<td>AT4</td>
<td>Engaged students in dialogue to informally test understanding of the refined design principles for HCD</td>
</tr>
<tr>
<td>AT5</td>
<td>Explained fashion design user need models(^{74}) in order to develop understanding around different user need concepts</td>
</tr>
<tr>
<td>AT6</td>
<td>Linked theoretical user need models with pragmatic consideration of fashion design practice in order to assist students recognise and differentiate between fundamental user needs and the dimensions attached to each user need</td>
</tr>
</tbody>
</table>

\(^{73}\) Learning material included user need models, the fuzzy front-end design process model, and the ideational tool.

\(^{74}\) User need models included those put forward by Lamb and Kallal (1992), Fletcher (2008; 2014) and Romeo and Lee (2016), as presented in sub-section 4.3.2.2.
Presented the ideation tool (Figure 7.1) defining, and differentiating between, the concepts of need, goal and preference contextualising this through consideration of practice

Linked theory to practice by applying and contextualising the ideation tool in framing the dimensions of: 1) user needs, goals, preferences and contexts of use, 2) the attributes of design criteria and constraints, 3) brainstorming ideas, and 4) the features of an action plan

Evoked student dialogue to informally test differentiation between a need, a goal and a preference

Re-introduced and clarified the activities associated with the different stages in the fuzzy front-end design process model for deeper conceptual understanding

Pragmatically contextualised, with visual material, the design activities associated with the idea and concept stages

Linked theory to practical application with tools and techniques such as post-it stickers, highlighters and coloured post cards in order to demonstrate the manner in which data categorisation and idea generation can unfold

Linked theory to practice through visual images of rough sketches to demonstrate design-related activities pertaining to the concept stage of the design process

Students had autonomy to select a team member of choice to form a design team, with one student playing the role of designer and the other the user. Students had autonomy to decide who would assume the role of designer and user

Designers were required to assume the role of researcher and position their respective user as the source of inspiration and nucleus of design and trigger the design criteria stage

As input into the design criteria stage, designers, in their researcher role, were required to engage their respective users in qualitative dialogue through probing strategies in order to collect primary information and identify user needs, goals, preferences and context of design usage

Design teams were required to document the primary data through, for example, field notes using the ideation tool as a point of departure

Design teams were required to frame the design problem by objectively and systematically categorising primary data into user needs, goals, preferences and contexts of use

Design teams were mandated to develop a tentative set of user-specific design criteria and constraints (requirements) based on the user’s needs, goals, preferences and contexts of use

Design teams had to jointly narrow down and finalise a set of user-specific design criteria and constraints

Design teams also integrated primary research into their design activities by collaboratively reflecting on the primary research and brainstorming several possible design ideas (responding to project-specific constraints and user-specific design criteria and constraints). Post-it-stickers, colour coded cards or roughly drawn ideas to explicitly and visually communicate these design ideas could be used

Table 7.3 continues on next page
**AT22**  
Design teams were tasked with developing an action plan that clearly indicated what is required to translate the design ideas into solutions and also to identify their respective roles and tasks in executing the HCD project.

**AT23**  
Design teams had to develop a personal ideation tool\(^75\) summarising the following information:  
- User needs, goals and preferences  
- Context of use  
- Design criteria and constraints  
- Brainstorming ideas (written)  
- An action plan to translate ideas and define user/designer project tasks

**AT24**  
Design teams engaged in the concept stage by reflecting on and iterating between design criteria and idea stages.

**AT25**  
Design teams were required to translate brainstormed ideas into possible design solutions by engaging in further dialogue (if necessary), tacit experimentation of design detail, iteration and were required to develop a minimum of 20 abstract sketches.

**AT26**  
Design teams supported their abstract sketches with tentative colouration and fabrication along with supporting justification regarding their design choices and ideas.

**WEEK THREE**

**AT25 and AT26 continued**

**AT27**  
Design teams were required to jointly select one abstract sketch as a possible design solution.

**AT28**  
Design teams were required to engage in prototyping and apply technology-related knowledge to translate the two-dimensional abstract sketch into a preliminary working pattern.

**WEEK FOUR**

**Continue with AT28**

**AT29**  
Design teams cut the preliminary working pattern onto calico fabric, integrating and applying technology-related knowledge and specialised industrial machinery in order to make a three-dimensional prototype.

**WEEK FIVE**

**AT30**  
Users were required to evaluate the prototype and provide designers with feedback.

**AT31**  
Design teams presented prototypes to facilitators for formal critique and feedback.

**AT32**  
Design teams worked iteratively between the design criteria, idea, concept and prototype stages by reflecting in and on action and executing multiple and rapid refinements in order to finalise the two-dimensional sketch, preliminary working pattern and prototype until the design solution addresses the user’s needs, goals, preferences and context of use.

**AT33**  
Upon finalisation of these refinements, design teams were required to apply a diverse range of knowledge in order to sketch out an artistic fashion illustration and draw hard-edged, pencil, back and front technical drawings.

Table 7.3 continues on next page.

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\(^{75}\) The ideation tool was not a separate project assessment instrument but formed part of the design journal. The ideation tool presented and issued to students provided an example, but students had the freedom to develop their own ideation tool. As such, there was no stringent formula.
Design teams were required to engage in a formal design critique session and received facilitator feedback on drawing accuracy and alignment between pencil drawn illustrations, technical drawings and prototypes.

Design teams had to apply a diverse range of media and fabric rendering techniques in order to illustrate the final design solution as a fashion illustration and outline the pencil-drawn technical drawings in black pen.

Design teams labelled their technical drawing with design terminology and technical specifications.

WEEK SIX

Design teams engaged in formal design critique and obtained facilitator feedback on their medium and fabrication application techniques.

Design teams integrated and applied technology-related knowledge in order to manufacture a wearable product that addresses the user's needs, goals, preferences and context of use.

WEEK SEVEN

Continued with AT38

Design teams were required to synthesise their design journals and engage in overall presentation, planning and synthesising of the fashion illustration and technical drawings onto one, A3-sized board.

To engage with conceptual knowledge, the ATs undertaken in week one were facilitated by myself due to my knowledge of HCD and the fuzzy front-end design process model. Thereafter, I stepped into a passive role of participant observer. In the discussion that follows, I draw on the ATs presented in Table 7.3 to briefly justify why certain ATs were included.

AT2 was included because it was necessary for students to understand that their responses to the pilot study were valued and used to design the main study. AT7 and AT8 were developed because multi-dimensional aspects would ultimately inform the design-related activities associated with the design criteria and idea stages of the fuzzy front-end design process model. As such, the ideation tool was explained and practically contextualised through demonstration. AT11, AT12 and AT13 saw inclusion of visual material to support the link between theory and practice because FD students, in general, are visually oriented. To engage with AT15, AT16, AT17, AT18, AT19, AT20, and AT21, design teams were not permitted to draw inspiration from secondary visual data.

Regarding the technology-related activities (AT28, AT29, AT32 and AT38), these involved tacit skills underpinned by conceptual principles aimed at developing a preliminary working pattern, a prototype and a final product. AT32, in particular, offered opportunities for active learning through trial and error experimentation allowing students to pause and reflect-in-
action while carrying out design and technology-related activities by thinking about the consequence of their actions. In this way, design teams could rethink and try out alternatives through learning-on-the-go. Furthermore, iteration made it possible for students to reflect-on-action, rethink what was done, what was successful or unsuccessful and what actions might be needed to improve. To support active learning, AT31, AT34 and AT37 involved formal critique sessions in which facilitators moved around furnishing design teams with feedback. Although these formal critique sessions were linked to specific ATs, for the duration of the project, informal critique occurred during formal contact sessions, in line with a desk critique strategy with facilitators moving around studios spontaneously critiquing work and furnishing feedback for improvement (this aligns with DEP3 in Table 6.13). As such, design teams did not only draw on the multi-disciplinary skills of designers and users, but also on facilitators’ expert knowledge and experience. ATs undertaken in week seven culminated in submission of all four assessment instruments within the project.

It is worth noting that AT14 (implemented in week one) through to AT39 (implemented in week seven) all pertained to application in practice which required recording, justification and making explicit all design and technology-related actions in the design journal in order to visualise and communicate internal thought processes and balance objectivity with subjectivity in the design and technological processes. All ATs presented in Table 7.3 were carried out in a constructivist learning space, namely the design and technology studios, respectively.

7.2.2.7 A constructive learning space

Sub-section 6.4.2.5 described the learning space, namely the two separate design and technology studios. To align with DEP8 in Table 6.13, the main study was implemented in the same design and technology studios, which, as noted in sub-section 6.4.2.5, were equipped with discipline-specific, specialised resources along with a digital projector and screen in the design studio. The studios provided a social and cultural learning space that accommodated engagement and active learning through peer collaboration and dialogue, with less contact maintained with facilitators, thus aligning with DEP2 and DEP3 in Table 6.13. A HCD approach grounds itself in collaborative design; as such, in this study, the role-playing strategy enhanced engaged student learning through peer collaboration (also aligning with DEP2 in Table 6.13).
As in the pilot study (refer to sub-section 6.4.2.5), the constructive learning space was planned in order to accurately capture data when observing design and technology-related activities. In the design studio, each art desk was assigned a design team number. In the same way, when observing the technology-related activity of prototype evaluation and refinement, each pattern table was assigned the same design team number. Furthermore, labels were allocated to each design team member so that I could distinguish between student designer and user. This was done during formally timetabled sessions allocated to the project as described in the following sub-section.

7.2.2.8 Timetable

Aligning with DEP9 in Table 6.13, the project timeframe was formally structured, for the most parts, to include three days per week extending over a seven-week block. For weeks one and two, only two days were scheduled per week because the students were not expected to engage with technology-related ATs (refer to Addendum O for the project brief). The seven-week block comprised of both contact and non-contact sessions in order to accommodate self-directed learning. Within this seven week block, design and technology-related activities were structured in a non-linear manner. That is to say, as can be seen in ATs presented in Table 7.3, it is evident that weeks one, two and the early part of week three were dedicated to design, whereas technology-related activities dominated the latter part of week three and weeks four, six and seven. ATs for design and technological integration unfolded in weeks three, five, six and seven (refer to Addendum O). This structure was purposefully designed for three reasons. Firstly, it was necessary for students to engage with associated design criteria, idea and concept stage ATs before moving on to the prototype and product stages. Secondly, there was a need to accommodate iteration, multiple refinements and finalisation of two-dimensional sketches, working patterns and prototypes before manufacturing the product through application of industrial operations. Thirdly, it was necessary to integrate design and technological processes and eradicate the notion that design activities end when technology-related activities begin.

This concludes deliberation on the DEP strategies used to implement the main study, and attention now turns to alignment thereof with the refined design principles that underpin the main study.

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76 Three hours and 45 minutes were allocated to each day.
7.3 ALIGNMENT WITH REFINED DESIGN PRINCIPLES

In this section, I refer to the refined design principles for HCD (presented in Table 6.11), fashion design praxis (including V, DK, DM and P, as presented in Table 6.12) and DEP (illustrated in Table 6.13) and align them either with the UO discussed in sub-section 7.2.2.4, the SLOs (refer to Table 7.2), ATs (from Table 7.3) or to specific sub-sections. As seen in Table 7.4, this is done by organising the alignment as either specific or general. Specific alignment refers to those design principles aligned with ATs or SLOs while general alignment refers to those implemented throughout the teaching and learning intervention.

Table 7.4: Alignment with design principles

<table>
<thead>
<tr>
<th>ATs</th>
<th>HCD</th>
<th>FASHION DESIGN PRAXIS</th>
<th>DEP</th>
<th>ATs</th>
<th>HCD</th>
<th>FASHION DESIGN PRAXIS</th>
<th>DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPECIFIC</td>
<td></td>
<td></td>
<td>SPECIFIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT1</td>
<td>Do not link to any design principles</td>
<td>AT21</td>
<td>HCD3</td>
<td>DM3</td>
<td>DEP13</td>
<td>DEP19</td>
<td></td>
</tr>
<tr>
<td>AT2</td>
<td>HCD3</td>
<td>AT22</td>
<td>DM4</td>
<td>DEP13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT3</td>
<td>DK1</td>
<td>AT23</td>
<td>HCD3</td>
<td>DEP13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT4</td>
<td>Linked to general alignment</td>
<td>AT24</td>
<td>HCD11</td>
<td>DM3</td>
<td>DEP13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT5</td>
<td>DK1</td>
<td>AT25</td>
<td>HCD11</td>
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<td>DEP13</td>
<td>DEP19</td>
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<td>AT6</td>
<td>DK1</td>
<td>AT26</td>
<td>Linked to general alignment</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AT7</td>
<td>DK1</td>
<td>AT27</td>
<td>Linked to general alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>AT8</td>
<td>DK1</td>
<td>AT28</td>
<td>Linked to general alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT9</td>
<td>Linked to general alignment</td>
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<td>DM5</td>
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<td>AT10</td>
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<td></td>
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</tr>
<tr>
<td>AT11</td>
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</tr>
<tr>
<td>AT13</td>
<td>DK1</td>
<td>AT33</td>
<td>Linked to SLO12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT14</td>
<td>Linked to general alignment</td>
<td>AT34</td>
<td></td>
<td></td>
<td>DEP16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT15</td>
<td>HCD1</td>
<td>AT35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT16</td>
<td>HCD3</td>
<td>AT36</td>
<td>Linked to SLO12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.4 continues on next page
Due to the nature of the project, the UO (sub-section 7.2.2.4) and, more specifically, SLO6, SLO7 and SLO8 in Table 7.2, know-how knowledge manifested throughout design and technology-related activities, aligning with SLO6 (Table 7.2). SLO11 in Table 7.2 achieved through a design journal used to record and justify all design and technological process activities in an attempt to visualise and communicate internal thought processes. Role-playing as a strategy to simulate practice (sub-section 7.2.2.3).

<table>
<thead>
<tr>
<th>AT17</th>
<th>HCD3</th>
<th>DM4</th>
<th>DEP13</th>
<th>AT37</th>
<th>DEP16</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT18</td>
<td>HCD3</td>
<td>DM2</td>
<td>DEP13</td>
<td>AT38</td>
<td>P1</td>
</tr>
<tr>
<td>AT19</td>
<td>HCD3</td>
<td>DM2</td>
<td>DEP13</td>
<td>AT39</td>
<td>Linked to SLO12</td>
</tr>
<tr>
<td>AT20</td>
<td>HCD3</td>
<td>DM4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| GENERAL |

<table>
<thead>
<tr>
<th>HCD2</th>
<th>HCD7</th>
<th>HCD8</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD9</td>
<td>HCD12</td>
<td>V1</td>
</tr>
<tr>
<td>V2</td>
<td>V3</td>
<td>DM6</td>
</tr>
<tr>
<td>P2</td>
<td>DEP1</td>
<td>DEP5</td>
</tr>
</tbody>
</table>

| DM9 | DEP2 | DEP7 |
| DEP18 | DEP11 | |

| DEP3 | DEP6 |
| DEP8 | DEP9 |
| DEP10 | DEP12 | |

| DEP11 | DEP12 | |
This concludes discussion aimed at achieving the first purpose of Chapter 7. Attention now shifts to the second purpose, namely discussion of the findings that emerged from the data collected and analysed.

### 7.4 DISCUSSION OF FINDINGS

#### 7.4.1 Mapping the research methodology

As discussed in sub-section 2.8.4, the main study employed participant observation and self-administered, semi-structured, open-ended questionnaires, as well as face-to-face, semi-structured interviews as primary methods of data collection. Moreover, artefacts were collected as a secondary method. Participant observation served to explore and document (through field notes) the design-related ATs and prototype evaluation stage of the design process as executed by the students, as well as the ways in which their actions incorporated the design principles underpinning HCD. However, I did not observe the technology-related ATs of pattern making, sewing the prototype or manufacturing the product, hence discussions in this chapter does not focus on these activities. To support my observations, I use artefacts in the form of self-created photographs in order to ensure trustworthiness. Self-administered, semi-structured, open-ended questionnaires were administered with the 23 participating first-year students; these served a two-fold purpose. Firstly, they sought to ascertain the main effects of the HCD approach and its underlying design principles to FD education. Secondly, it aimed to explore and describe students’ holistic experience regarding implementation of a HCD approach to FD education. Serving the same two-fold purpose as the student questionnaires, individual, face-to-face, semi-structured interviews were conducted with the two facilitators involved in design and implementation of the main study.

As noted in section 2.9, Atlas.ti was used to analyse the raw data using a constant comparative method of data analysis, through two coding cycles. The first coding cycle entailed initial fragmentation, tagging and coding of all data sets. Second cycle coding involved clustering data into categories, sub-categories (where necessary) and grouping them into research themes for interpretation. Four main research themes emerged, namely: 1) activities in the HCD fuzzy front-end design process, 2) emergent issues during the main intervention, 3) the effects of the HCD approach and its underlying design principles to FD education, and 4) participant experiences of a HCD approach to FD education. Figure 7.2 visualises the research themes and...
categories presented in this chapter. Due to the number of research themes and categories, sub-categories are not included in Figure 7.2, but categories that include sub-categories are shaded in green. To ensure trustworthiness of data collection, analysis, interpretation and reporting, several methods were employed, as discussed in section 2.10 and summarised in Table 2.6.

Figure 7.2: Research themes and categories
Although the above-mentioned research themes form part of the present, discussion of findings section, I purposefully opt to include research themes as first-level headings, categories as second-level headings (with the exception of sub-sections entitled overview) and sub-categories as third level headings in my reporting of the results below.

7.4.2 Mapping the narrative

When narrating the findings, to respect the privacy and anonymity of participants, I assign letters and numbered codes as pseudonyms to differentiate between students (in their roles as users and designers), facilitators and my voice as participant observer. For example, F2 is a pseudonym used to capture the viewpoints and cite raw data from facilitator number two. Similarly, SRU1 is an example of a response from a student who assumed the role of user, while SRD1 is a response from the designer in the same design team. However, I ensured that the numbers allocated here differ from those allocated to design teams during the studio activities. In addition, PO is used to reflect my participant observation field notes.

In addition to these coded pseudonyms, raw data extracts are included in the text itself or in table form, and cited with Atlas.ti codes. One such example is F2-24:81. Here, 24 refers to the primary document number loaded onto the respective Atlas.ti hermeneutic unit, which in this case is the data collected from facilitator number two, whilst 81 is the coded quotation number. In addition, in this chapter, I also use self-created photographs as a means of supporting my description of design process activities. I cite these photographs with the dates on which they were captured. To further support interpretation, literature (from Chapters 3 and 4) is also drawn upon.

In some instances, I specifically refer to participating students as student users or student designers in order to capture these particular voices but, in instances where generalisations are drawn, I merely refer to them as students. For further clarity, I draw a distinction between students and professional designers by identifying the former as student designers and the latter as professional designers. The facilitators drew distinctions between conventional pedagogical strategies, applied with the general student population, and the HCD approach designed for the students participating in this study. For this reason, in this chapter, when referring to the traditional situation, I refer to the general student population as FD students, but when reporting from the lens of this particular study, I refer to participating students simply as students.
I acknowledge that, on the one hand, students role-played as either designers or users but, on the other hand, they were registered for FDT1B. However, following the same line of thinking presented in sub-section 6.4.2.1, in sub-section 7.2.2.3, I maintain the case for role-playing as a strategy to simulate a real-world situation and enabling students to learn to become agents of change and engage in HCD. Furthermore, as noted earlier, the purpose of the student questionnaire was to elicit their responses regarding the effects of HCD and its underlying design principles within FD education; however, they inevitably reflected on the role of the user or designer given the nature of some design principles, such as HCD8 (collaboration) and HCD7 (users as actively involved partners). With these considerations in mind, discussion now turns to the first research theme, namely activities in the HCD fuzzy front-end design process.

7.5 ACTIVITIES IN THE HCD FUZZY FRONT-END DESIGN PROCESS

7.5.1 Overview

This research theme emerges from participant observation aimed at describing the design process ATs executed by students. The theme is further categorised in accordance with the respective stages of the fuzzy front-end design process model: 1) design criteria stage, 2) idea stage, 3) concept stage, 4) prototype stage and 5) product. In addition, I include a further category, alignment with design methods, in which I reflect on the activities that unfolded during the various stages and align these to Dorst’s (1997) dual-mode model for design methods. Again, it should be noted that activities associated with the making of the product were not observed, hence I draw on photographs of the product to describe final products and link the design detail to the idea and concept stages. Discussion in the sub-section below commences with the first stage of the design process, namely the design criteria stage.

7.5.2 Design criteria stage

7.5.2.1 Framing the design problem

As noted in sub-section 4.5.5, the design criteria stage is the “messy and chaotic” fuzzy front-end of the design process where designers work in teams to identify and frame wicked design problems (Sanders & Stappers, 2012:22). As such, students in their respective roles of
designers and users worked together to navigate this fuzzy and messy terrain by first framing the wicked design problem and then developing a set of design criteria and constraints as input.

To frame the design problem, student designers “placed the user at core and the source of inspiration” (PO-26:30) because they were the knowledge generators and could drive the design criteria stage. In the early design criteria stage, student designers assumed the role of primary instruments of data collection and empirical research in order to engage their respective users in qualitative, engaged conversations through probing the users in order to elicit information about their needs, goals, preferences and context of design usage (refer to codes PO-26:15, PO-26:70 and PO-26:69 in Table 7.5). This corresponds with Sanders and Stappers’ (2008:7) claim that, in the design criteria stage, designers utilise open-ended qualitative questions, as opposed to quantitative means, to empirically collect data in order to establish user needs and context.

Table 7.5: Framing the design problem

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO-26:15</td>
<td>“Designer was very engaging in conversation with user. Designer started to collect information from user”</td>
</tr>
<tr>
<td>PO-26:70</td>
<td>“The designer probed the user to get clarification”</td>
</tr>
<tr>
<td>PO-26:69</td>
<td>“The designer probed both users to come up with a joint set of needs”</td>
</tr>
</tbody>
</table>

To glean this information, students, both designers and users, adopted whatever strategies they deemed appropriate. Interestingly, one student designer commenced by asking the user “what do you not need” (PO-26:85) rather than asking what the user did need. Although this was an isolated incident, I found it thought-provoking, as it implied versatility in eliciting information from actual users when given the opportunity. In addition, an interesting recurring pattern emerged in that some design teams utilised hand-held devices as a communication tool to glean insights and understanding.

7.5.2.2 Online platforms as a tool to frame the design problem and criteria

As a communication strategy, design teams utilised hand-held devices to access online visual images of past design solutions and colour palettes. Although this situation may resonate with mainstream FD education, in this study, student designers and users refrained from utilising secondary visual images as a means to drive inspiration but rather used online platforms as a
communication tool to clarify and explicate user needs. Such needs were then translated into written form to guide establishment of a set of design criteria and direct decision-making processes. These interpretations are supported by the raw data quotations presented in Table 7.6.

Table 7.6: Online platforms as tool to frame design problem and criteria

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO-26:70</td>
<td>“Designer referred to technology to look at colour palettes”</td>
</tr>
<tr>
<td>PO-26:64</td>
<td>“The user contributed by looking at visual images on the Internet as a way to communicate to the designer”</td>
</tr>
<tr>
<td>PO-26:41</td>
<td>“Designer looking at visual images on google while user was verbalising needs”</td>
</tr>
</tbody>
</table>

Based on this, I would argue that online platforms have contributed to an unavoidable visual communication culture, but when students are given an opportunity to gather primary data from actual users, they do not rely on such a visual culture to evoke and drive their design ideas. To support this, I observed student design journals at the end of the teaching and learning intervention and found no evidence of visual images to support cognitive processes, justification or idea generation and development. However, there was evidence to support the affordances of the ideation tool as well as user need models in assisting students to navigate through the design criteria stage.

7.5.2.3 Affordances of ideation tool and user need models in framing design problem and criteria

In addition to the use of online platforms, the majority of design teams drew on the provided teaching and learning material with respect to the newly-implemented ideation tool and user need models, as a point of departure and reference with which to explore and identify user needs, goals, preferences and context of use. This finding is corroborated in my observational field notes: “... members referred to the theoretical needs model to establish user needs, goals and preferences” (PO-26:5) and “referred to the ideation tool to help structure the user needs, goals, preferences and context of use” (PO-26:22).

The ideation tool and user needs models streamlined the data collection process and supported navigation of the disordered wicked design problem. Based on this, conceptual knowledge of user need models and the ideation tool afforded students the ability to differentiate between a
need, a goal and a preference thus proving advantageous to systematic and rational framing and narrowing of the scope of a wicked design problem through data collection, analysis and synthesis.

7.5.2.4 Data capturing, analysis and synthesis

The majority of design teams captured raw data in design journals which constituted an audit trail. As noted in sub-section 4.9.3.5, Brandt et al. (2013:331-332) claim that an audit trail is a means to externalise internal thought processes and record all design activities so that students see how the tangible reality of their designs is made manifest. Raw data extracted from observation field notes, including observations such as “team members documenting primary information in design journals” (PO-26:24) and “designer documented what user said in design journal” (PO-26:20), support the finding that students actively recorded raw data in their design journals. Despite this, a few student designers did not record raw data, as noted in a field note, “designer was not capturing user information in design journal” (PO-26:42).

Regardless, as a result of primary research obtained from actual users, design journals foreground thinking and justifications and offer rich information (as seen in Figures 7.3 and 7.4, respectively). Based on their primary research, the majority of design teams engaged with the raw data by methodically and objectively analysing, categorising and synthesising information with the ultimate aim of developing a set of design criteria and requirements. Design teams mostly utilised the ideation tool as a framework with which to analyse information by fragmenting raw data and moving them into categories such as needs, goals, preferences, context of use, colour and fabric (refer to code PO-26:52 in Table 7.7). From this, they collaboratively synthesised information by justifying, selecting and deciding on a set of design criteria and requirements.

To execute and document the analysis and synthesis process, the majority of design teams employed different methodologies such as highlighting information with different colours (as illustrated in Figure 7.3 and outlined in code PO-26:52 in Table 7.7) and mind-mapping a personal ideation tool (depicted in Figure 7.4 and captured in raw data code PO-26:77 in Table 7.7). Although the development of personal ideation tools was allocated studio time, and while the majority engaged with this tool during the dedicated time-frame, some design teams did
not do so within the allocated studio activity (as supported by raw data coded PO-26:50 in Table 7.7).

Figure 7.3: Colour coding as a method of analysis. Photographed by author (2/8/2017)

Table 7.7: Data capturing, analysis and synthesis

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO-26:52</td>
<td>“Jointly used the ideation tool as a departure point and used highlighters to colour code and categorise. Example, design constraints were highlighted in pink”</td>
</tr>
<tr>
<td>PO-26:77</td>
<td>“Design team developed a mind-map synthesising information in design journal”</td>
</tr>
<tr>
<td>PO-26:50</td>
<td>“Although design teams wrote out detailed notes in design journals under each aspect of the ideation tool such as user, needs, goals and preferences, context of us, design criteria and constraints, brainstormed ideas and action plan, but by the end of this lesson, some did not synthesise this information to develop one overall ideation tool/plan”</td>
</tr>
</tbody>
</table>
Given these methodological strategies, two assertions are drawn. Firstly, a HCD approach fosters higher-order, research-related thinking skills of analysis and synthesis in the design of clothing products. Secondly, the design criteria stage of the design process unfolded in an objective manner, hence it was dominated by Simon’s (1982) positivist, rational problem-solving paradigm of design methods given the systematic and logical manner in which the fuzziness of the design problem was framed. However, Schön’s (1995) constructivist, reflective practice paradigm for design methods unfolds in a less-structured manner in the idea, concept and prototype stages, which aligns with Dorst’s (1997) argument for a dual-mode model for design methods (discussed in sub-section 4.5.2.3). To avoid repetition, alignment of activities in the idea, concept and prototype stages of the design process with design method paradigms will be discussed in sub-section 7.5.7.

7.5.3 Idea stage

The fuzzy front-end informs the idea stage and bridges the gap between the design criteria stage and subsequent idea stage (Sanders & Stappers, 2008; 2012). In the idea stage, the majority of design teams reflected on the information derived in the design criteria stage and collaboratively began to incubate design ideas. A recurring pattern emerged in that design
teams engaged with the idea stage through design activities such as “... brainstormed ideas in written form with each idea having a little sketch” (PO-27:73) and experimentation through paper representational models as confirmed in the field note, “made paper models as a means to show and visually communicate with user” (PO-26:47). Figure 7.5 is an example of a rough drawing of geometric shapes incubated as part of the idea stage. In sub-section 7.5.4.2, I draw on Figure 7.5 to show how this incubated idea was translated and incorporated into abstract, two-dimensional concept sketches (part of the concept stage) of possible design solutions.

![Rough idea of geometric shapes drawn in the idea stage. Photographed by author (2/8/2017)](image)

Figure 7.5: Rough idea of geometric shapes drawn in the idea stage. Photographed by author (2/8/2017)

However, before proceeding to the design activities associated with the concept stage, the majority of student designers and users jointly engineered an action plan and included this as part of their personal ideation tool, as evident in Figure 7.4 and further supported in the raw data: “both members developed an ideation tool with an action plan” (PO-26:68). The action plan served the purpose of project managing the responsibilities and tasks of each team member and the manner in which user needs, goals, contexts of use, design constraints and requirements would be translated into tangible solutions. This finding implies that students not only acquired procedural knowledge on how to design with users but also acquired project management skills, which in my view, are not commonly included in a FD curriculum at a first-year level of study. Project management skills are necessary given Muratovski’s (2016:xxi) claim that design is a process involving strategic goals and planning actions aimed at attaining objectives. Such planning and attainment of objectives also became manifest in the concept stage of the design process.
7.5.4 Concept stage

7.5.4.1 Deeper engagement with concept stage

In contrast to the pattern that emerged in the pilot study, where design teams fast-tracked to the concept stage of the design process without sufficient engagement with the design criteria and idea stages (refer to the discussions in sub-sections 6.7.2 and 6.7.3), in the main study, only three of the 11 design teams repeated this swift movement. This finding is observed in the field note: “without engaging with identifying user needs, design criteria and ideas, designer fast-paced into the concept stage and started sketching” (PO-26:252). The fact that the majority of design teams did not fast-track to the concept stage appears to be a result of the pedagogical refinements aimed at developing deeper conceptual understanding and differentiating between the design-related activities associated with the different stages of the design process. As such, the main study saw a majority of design teams engaging with the design criteria and idea stages in much greater depth, which then informed the abstract, two-dimensional sketching of design solutions as required in the concept stage.

7.5.4.2 Abstract two-dimensional sketching and experimentation

To engage with and drive the concept stage, design teams collaboratively engaged in iterative looping between the design criteria and idea stages by reflecting on the information and ideas captured in their design journals (refer to code PO-26:130 in Table 7.8). As evident in code PO-26:121 in Table 7.8, the majority of student designers and users cooperatively engaged in detailed sketching activities that resulted in a series of abstract, two-dimensional design solutions in response to the design problem. The notion of sketching is a commonly accepted design activity (Flusser, 2012; Giacomini, 2014).

Interestingly, accessing online platforms resurfaced as a tool to support two-dimensional sketching activities because students used them as a communication strategy and a means to practice drawing know-how (refer to code PO-26:113 in Table 7.8). Regardless, in my interpretation, incubated design ideas were well conceptualised as two-dimensional sketches. To evidence this, I refer to Figure 7.5, which shows an incubated idea of geometric shapes in the idea stage that was then translated as a core concept of abstraction for possible design solutions, as seen in the red circled areas in Figure 7.6.
Figure 7.6: Incubated idea translated into possible design solutions. Photographed by author (2/8/2017)

Table 7.8: Abstract two-dimensional sketching and experimentation

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO-26:130</td>
<td>“team looked at the design constraints and ideas in design journals and then</td>
</tr>
<tr>
<td></td>
<td>translated information into sketches”</td>
</tr>
<tr>
<td>PO-26:121</td>
<td>“Design teams conceptualised very detailed rough drawings and sketches – done in</td>
</tr>
<tr>
<td></td>
<td>design journals”</td>
</tr>
<tr>
<td>PO-26:113</td>
<td>“user referred to technology to look at visual images – communicated to designer</td>
</tr>
<tr>
<td></td>
<td>who was sketching”</td>
</tr>
<tr>
<td>PO-26:119</td>
<td>“Users were very engaging with experimenting with pleats on fabric”</td>
</tr>
<tr>
<td>PO-26:165</td>
<td>“First made experimental samples and ½ scale prototype as part of the conceptualisation stage”</td>
</tr>
</tbody>
</table>

In addition to sketching, design teams jointly experimented with paper representational models and prototyping fabric texturing\(^{77}\) techniques as a prominent design activity during the concept stage. Figure 7.7 shows a prototype of a fabric textured design detail and a paper model representation that was translated into a drawing of a possible design solution. Such experimentation is further evident in raw data codes PO-26:119 and PO-26:165 in Table 7.8. The implications of these findings are that the concept stage is not only about sketching but also about experimentation and learning-by-doing. This corresponds with the literature, where Brandt et al. (2013:331-332) assert that students generally use representational methods such as sketching and prototyping to show their designs within design ATs.

\(^{77}\) These fabric-texturing techniques were undertaken with industrial machines.
Although fabric prototyping experimentations were included in the design journals as part of the concept stage, they required the use of specialised machinery and, as such, could not be executed during formal design studio contact time due to the unavailability of the required resources in the learning space and the manner in which the timetabled is structured. The challenges of timetable and learning resources in studio spaces are discussed in sub-section 7.6.4. In addition to this, tensions also emerged regarding justification for the selection of one design sketch.

7.5.4.3 Justifying one possible design sketch

Although the design teams succeeded in developing a series of abstract, two-dimensional concepts, challenges emerged in terms of justifying the selection of one possible design sketch. The majority of student users and student designers mutually selected one possible abstract sketch for translation into tangible form. However, a recurring pattern emerged in informal design critiques sessions, where design teams did not justify their selection nor were design elements such as colour and fabric choices included (refer to codes PO-26:132 and PO-26:115 in Table 7.9). This pattern was found in a number of design teams including the three design teams who fast-tracked to the concept stage without sufficient engagement with the design criteria and idea stages (noted in sub-section 7.5.4.1).
Two assertions are deduced from this. Firstly, students might not have given attention to, nor saw the relevance of, combining abstraction and specific design elements such as colour and fabric selection. Secondly, when the idea stage is fast-tracked into conceptualisation, then thinking and justification becomes haphazard. However, some design teams gave thought to fabrication and sound justification regarding technical design aspects, as seen in code PO-26:105 in Table 7.9. In such situations, cognitive processes appeared as more prominent in that thinking extended beyond abstraction to how the idea would materialise into reality, thus bridging the gap between design and technology-related activities.

Table 7.9: Justifying one possible design sketch

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO-26:132</td>
<td>“No inclusion of colour, fabric choices and limited justification notes for selection in design journals”</td>
</tr>
<tr>
<td>PO-26:115</td>
<td>“No fabric choices and justification notes for selection in design journals”</td>
</tr>
<tr>
<td>PO-26:105</td>
<td>“Designer discussed fabrications with user and selected one sketch. Both members finalised the technical detail of the sketch”</td>
</tr>
<tr>
<td>PO-26:124</td>
<td>“Selected one possible design and discussed with facilitator – facilitator made suggestions”</td>
</tr>
<tr>
<td>PO-26:141</td>
<td>“Consulted with facilitator on fabric choices and colours”</td>
</tr>
</tbody>
</table>

To assist design teams select one possible design solution, students (both users and designers) consulted with the facilitator as part of an informal critique session. The design critique session contributed to not only directing the selection of one design solution but also to attaining feedback in terms of fabric, colour and abstract concept appropriateness. In addition, facilitator feedback also afforded opportunity for planning translation of the design from abstract, two-dimensional sketch into a tentative, human-sized working pattern in order to bring the selected concept into reality during the prototype stage. This is supported by codes PO-26:124 and PO-26:141 presented in Table 7.9. With this in mind, the subsequent stage deliberates on the prototype stage and the refinements that occurred within this stage of the design process.

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78 As noted in sub-section 1.9.2, Ashdown (2013:114) associates technical design (technology-related) with activities pertaining to pattern making, fit and proportions and industrial manufacturing processes.
7.5.5 Prototype stage

7.5.5.1 Prototype evaluation

Of the 11 design teams, only eight presented prototypes of their possible design solution for user evaluation and formalised facilitator design critique as three of the teams fell behind in the previous ATs and were therefore not ready (refer to code PO-26:149 Table 7.10). From the eight design teams who were ready to execute this stage, students (both users and designers) engaged in a collaborative process in which users evaluated prototypes and provided constructive feedback to student designers, as seen in codes PO-26:181 and PO-26:162 in Table 7.10. In the same way, both facilitators carried out desk critiques by roaming around the studio evaluating prototypes and furnishing design teams with feedback to improve where necessary.

Table 7.10: Prototype evaluation

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO-26:149</td>
<td>“Only 8 [eight] design teams’ evaluated prototype ...”</td>
</tr>
<tr>
<td>PO-26:181</td>
<td>“User evaluated the prototype providing detailed and clear feedback to designer”</td>
</tr>
<tr>
<td>PO-26:162</td>
<td>“Designer and user very engaging in evaluating prototype”</td>
</tr>
<tr>
<td>PO-26:66</td>
<td>“The user changed needs but clearly documented this in the design journal”</td>
</tr>
</tbody>
</table>

From the prototype evaluation, it became apparent that most design teams were successful in addressing user needs, goals, preferences and context of use with one prototype. However, a few design teams developed and evaluated two or more prototypes. This is confirmed in the raw data quotations: “one side of second prototype79” (PO-26:177) and “made 2 [two] prototypes because design ideas were not working on the initial prototype” (PO-26:254). From this finding, it is evident that abstract, two-dimensional concepts might not always successfully translate into three-dimensional tangible reality. In addition, in the case of one design team, user satisfaction was another factor that contributed to the making of a second prototype because the user needs changed upon evaluating the first prototype (refer to code PO-26:66 in Table 7.10). Upon evaluating the second prototype, this particular student user was instrumental in “cross-check[ing] the changes to needs” (PO-26:67).

79 Left and right side of the first prototype was constructed but the second only involved either the left or right side of the body.
From the aforementioned, three assertions are drawn. Firstly, although student designers may intend to address user needs, in reality this may not always manifest itself. Secondly, user needs are not static and can change if they are not addressed or satisfied. These assertions correspond with the argument that the specific intent, purposes and uses of design may or may not materialise (Ihde, 2006; 2008). Thirdly, prototype evaluations are of paramount importance in creating opportunities for an iterative design process to unfold through refinement before finalising the design solution but prior to the making of the product.

7.5.5.2 Iteration and refinement

The extent of iteration and refinement was reliant on the outcome of the prototype evaluations. In most cases, limited refinement to tentative working patterns and rough concept sketches was required. In such cases, refinement entailed going back to modify, for example, “one aspect of the design solution [that] did not work so design team had to go back and refine the design sketch accordingly. Design team went back to change the [working] pattern” (PO-26:158).

However, in some cases major and multiple iterations and refinements were necessary, resulting in design teams moving backwards and forwards between design criteria, idea, concept and prototype stages culminating in two or more prototypes. One particular design team made three prototypes because further refinement was necessary, as made evident in the field note quotation, “this group had refinements to make on the second prototype” (PO-26:230) but “evaluated second prototype as well but further refinements [were] needed hence design detail and [working] patterns were refined” (PO-26:178). This situation might have occurred because this particular design team fast-tracked to the concept stage, which suggests that without a set of well-defined design criteria and well thought-out ideas, design solutions may not successfully materialise resulting in multiple rapid prototyping.

In addition, the same design team did not engage in qualitative strategies of note-taking during prototype evaluation. In comparison, most design teams were strategic in documenting prototype evaluation feedback in their design journals and reflecting on this in order to justify their design decisions and set a course of action for refinement of both the tentative working pattern (technology-related activity) and the rough two-dimensional sketch. This was done in order to ensure that user needs and preferences were addressed through the refinements. To
validate this interpretation, quotation codes PO-26:195 and PO-26:191 are included in Table 7.11.

Table 7.11: Iteration and refinement

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>PO-26:195</td>
<td>“... made detailed notes during the prototype evaluation and reflected on what changed and why such changes were required ...”</td>
</tr>
<tr>
<td>PO-26:191</td>
<td>“User and designer jointly worked out a plan from the original user needs and preferences and compared that to the changes from the prototype evaluation”</td>
</tr>
</tbody>
</table>

Based on this, when given an opportunity, students can design with actual users and they can strategize iteration and refinement until such time that design solutions address user needs, goals, preferences and context of use. In doing so, design solutions are refined through prototype evaluation and multiple iterations before finalisation.

7.5.5.3 Finalisation of design solutions

Once refinement had reached a point of finalisation, the process of translation from rough concept sketch to final design solution unfolded in the form of an artistic, illustrative two-dimensional sketch and technical drawings (both front and back views). Once again, reflection in a well-documented design journal ensured that design detail was accurately drawn. This is evident in the raw data extracts coded PO-26:189 and PO-26:196 in Table 7.12.

Table 7.12: Iteration and refinement leading to finalisation of design solutions

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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</thead>
<tbody>
<tr>
<td>PO-26:189</td>
<td>“User referred to these detailed notes from the design journal to start sketching the final design in an illustration”</td>
</tr>
<tr>
<td>PO-26:196</td>
<td>“The user continuously reflected on the design journal notes to cross-check that the designer was drawing the fashion illustration correctly”</td>
</tr>
<tr>
<td>PO-26:232</td>
<td>“Facilitator then compared prototype, fashion illustration and technical drawing to check that design detail matched”</td>
</tr>
<tr>
<td>PO-26:233</td>
<td>“Facilitator asked questions, showed through demonstrations, and then reflected by saying if you do that, then, this will happen”</td>
</tr>
</tbody>
</table>

To support the drawing of a final, artistic, illustrative sketch and technical drawings, as seen in Figure 7.8, online platforms again resurfaced as a tool to self-direct acquisition of procedural knowledge regarding drawing and media techniques. This implies that commonly used
textbooks, as a point of reference with which to acquire drawing and media know-how, may no longer suffice.

Figure 7.8: Online platform as a tool for drawing and media application. Photographed by author (23/8/2017)

In addition to design teams’ self-directed know-how acquisition, a formalised desk design critique session was held as a means to assist students. The design critique session served the purpose of cross-checking the prototype against the drawing of the fashion illustration and the technical drawings to ensure accurate know-how application (refer to codes PO-26:232 in Table 7.12). Deducing from code PO-26:233 in Table 7.12, design critique took the form of a reflective conversation between facilitator, student designer and user unfolding through questioning, probing, practical demonstration, reflection and feedback in an attempt to finalise the fashion illustration and technical drawings. Online tools re-emerged during the design critique session because some design teams created computer-aided technical drawings and used electronic platforms to engage in discussion. Two suppositions can be drawn from this finding. Firstly, technology has changed the scope regarding the manner in which design critiques are offered and, secondly, technical drawings may be moving away from manual forms to a preferred computer-aided design orientation.

Following the design critique session, design teams refined and finalised the fashion illustration and technical drawings. Thereafter, supported by online platforms, students (both designers and users) jointly engaged with a diverse range of knowledge and media techniques to apply colour and fabrications onto their fashion illustrations, although technical drawings took the
form of a solid black line drawing, as seen in Figure 7.9. These design-related activities were executed before moving onto the product stage.

![Figure 7.9: Fashion illustration and technical drawings of abstract final design solution. Photographed by author (22/9/2017)](image)

### 7.5.6 Product stage

As noted earlier, observation served the purpose of exploring and documenting design-related activities rather than the technology-related activities involved in making the product. For this reason, discussion about the product focuses on describing the linkages between incubated idea and materialised product. To do this, I include a product made by one design team (refer to Figure 7.10) and link discussion thereof to Figures 7.5, 7.6, 7.7 and 7.9.

The incubated idea of geometric shapes, first seen in Figure 7.5, manifested as the core concept of abstraction visualised in the areas circled in red in Figure 7.6 and then in Figure 7.9. In the product, marked with the white square outline in Figure 7.10, this idea and abstract concept manifested itself as a pocket detail. In the same way, during the concept stage this particular design team experimented with paper modelling representations and experimentation through fabric texturing (illustrated in Figure 7.7) which is evident in the product. The fabric-textured prototype manifested itself in the product as a hemline design detail comprising of stitched tucks in downward and upward directions, seen in the black square outline in Figure 7.10.
It is clear that this particular design team reflected on their thinking, design ideas and concepts in their design journal, which translated itself into a tangible product through the technology-related actions of pattern making and manufacture. For this reason, within the context of this study, as discussed in sub-sections 1.9.2 and 3.2.3.4, I would argue that for a design idea to materialise into a product, design and technological processes require different conceptual and procedural knowledge but that these two processes and knowledge types cannot be separated from each other. This view corresponds with the discussion presented in sub-sections 4.4.2 and 4.4.3, where scholars confirm the co-dependency of conceptual and procedural knowledge types (McCormick, 1997; 2006; Nonaka & Von Krogh, 2009; Polanyi, 2009). In the same way, the product essentially emerged as a result of an underlying HCD volition, which reflected itself in objective and subjective design process activities hence it is essential to discuss how these activities align with the design method paradigms.
7.5.7 Alignment of activities with design method paradigms

As discussed in section 7.5.2, the design criteria stage of the design process unfolded in an objective manner because of the systematic and logical manner in which the fuzziness of the design problem was framed. This way of framing the design problem corresponds with Simon’s (1982:55-58; 67-68; 71; 133) positivist, rational problem-solving design method paradigm, in which the problem space is analysed in a systematic, logical, rational and structured manner (refer to sub-section 4.5.2.1 for discussion of this point). In the same way, the information gathering, analysis and synthesis strategies employed by the students coincided with Dorst’s (1997:162) dual-mode model of design methods, in which he argues that objective framing and interpretation of a design problem is undertaken in the information stage and, as such, relies on rational problem-solving.

Similarly, as noted in sub-section 4.5.2.3, Dorst’s (1997) dual-mode model bridges the gap between positivist, rational problem-solving and constructivist, reflective practice. As noted in 4.5.2.2, Schön’s (1995) constructivist, reflective practice design method paradigm is less-structured and involves iteration, reflection-in-action and reflection-on-action. The discussions presented in sections 7.5.3, 7.5.4 and 7.5.5 show that the idea, concept and prototype stages unfolded in a less-structured manner through iteration, reflection-in-action, reflection-on-action, experimentation and refinement until the design solution was finalised. In addition, although not the case in all design teams, the activities undertaken within the idea, concept and prototype stages show that students were strategic in documenting and visualising their activities and reflecting on these in order to justify their subjective design and technology-related decisions, which set the course for further action and refinement. As such, the subjectivity associated with conceptual activities was supported by objective justification, thus coinciding with Dorst’s (1997) dual-mode model of design method.

Furthermore, given that multiple iterations and refinements were prominent in the prototype stage with the aim of ensuring that the design solution aligned with user needs, preferences and context of use before it was finalised (refer to sub-sections 7.5.5.2 and 7.5.5.3), I argue that these activities parallel the embodied stage. Dorst (1997:152; 163; 166; 169) claims that the freedom of choice, motivations and interpretations of designers are embodied in their design activities and processes. Based on these discussions, I argue that the underlying volition within HCD corresponds with Dorst’s dual-mode model of design method due to its manifestation in
design and technology-related activities that culminated in a manufactured product. However, some issues emerged during the main intervention.

7.6 EMERGENT ISSUES DURING THE MAIN INTERVENTION

7.6.1 Overview

This section reports on participant observation in order to describe issues that emerged during the main intervention. These issues fall into three categories: 1) designer non-existent, 2) punctuality and non-constructiveness, and 3) timetable and learning resource challenges. The first two categories pertain to students, while the third is a challenge inherent to DEP. These observations are important because they link to the findings presented in the first research theme, but also to the themes yet to be discussed, namely the effect of HCD and its underlying design principles within FD education and the participants’ experiences of a HCD approach to FD education.

7.6.2 Designer non-existent

In one student design team (known as design team 10 in this study), comprising of designer SRD10 and user SRU10, SRD10 (known as PD2 in the pilot study) was “non-engaging displaying the same situation in the first iteration cycle” (PO-26:174). This brought about tension within the design team, resulting in SRU10 executing the ATs predominantly on his/her own. As such, SRU10 was “more involved and engaging in design critiques than the designer” (PO-26:233) because SRD10 demonstrated a recurring pattern of absenteeism. Similarly, when SRD10 was present to engage in ATs, punctuality was also a problem.

7.6.3 Punctuality and non-constructiveness

Punctuality and attendance were an issue with SRD10 but also with some other participating design teams. As noted in sub-section 7.5.5, of the 11 design teams, only eight presented prototypes for user evaluation and facilitator design critique because three design teams fell behind in their ATs. Three main factors contributed to this. Firstly, those design teams who were not prepared did not plan effectively, which implies a lack of project and time management skill. Secondly, these design teams did not work constructively during formalised
studio contact sessions, which affected them during the prototype stage. This is confirmed in my observational field note, “design team did not begin with the prototype so was not ready for evaluation. Same pattern as in the first cycle – design team fell behind. Instead of working on the task at hand, this design team was still busy with the concept stage” (PO-26:168). Thirdly, throughout the teaching and learning intervention, these ill-prepared design teams did not attend, arrived late, or exited early from formal studio sessions.

In an attempt to counteract the situation of the non-existent designer (discussed in sub-section 7.6.2), poor punctuality, low attendance and non-constructive engagement with ATs, I recommend a three-member design team comprising of one student designer and two users, or vice-versa, as a refined teaching and learning intervention for future study. I recommend this for two reasons. Firstly, I found that the one three-member design team worked well together with no issues emerging during the intervention. Secondly, in a three-member design team, if the student designer displays poor attendance or non-constructive engagement with ATs, then one of the two users is in a position to take over the designer role. However, I do acknowledge that the effects of three-member design teams can only be evaluated through iteration of a third teaching and learning cycle in a further study. Similarly, in further studies, refined teaching and learning interventions may do well to consider timetabled sessions and learning resources, which presented challenges in this study.

7.6.4 Timetable and learning resources challenges

As noted in sub-section 7.2.2.7, design and technology-related activities were carried out in two separate studios. The technology studio comprised of discipline-specific, specialised industrial machinery but the design studio was not equipped with such learning resources. The separation of these two studios and non-inclusion of specialised machinery in the design studio hindered the experimental prototyping activities carried out during the concept stage (refer to discussion in sub-section 7.5.4.2) in two ways.

First, prototype experimentation is simultaneous undertaken with two-dimensional sketching because of the iteration between the two activities, but this was not possible in this situation because the design studio was not equipped with specialised machinery. As such, the separation of design and technology studios did not fully support instantaneous iterative design activity nor does it align with the acknowledged view that SB pedagogy requires a social and cultural
learning space that acts as both classroom and workshop (Brandt et al., 2013; Brocato, 2009; Crowther, 2013; Lawson & Dorst, 2009).

Second, time was wasted in the concept stage because students had to find alternative strategies, such as hand-sewing, to execute experimentation during formalised design contact sessions and only later used machinery during technology sessions or when a venue with the required equipment was available. My field notes during the formal design studio contact time, such as “experimenting with idea through hand sewing – no machine in class” (PO-26:140) and “had to pin these pleats down – no machine to sew in studio” (PO-26:140), support these interpretations. Furthermore, experimental fabric-texturing prototypes (an example is shown in Figure 7.7) were found in design journals upon submission of the HCD project.

Based on this, I recommend that future teaching and learning interventions be designed and implemented in such a way that the timetable and available learning resources allow for design and technology-related ATs to unfold in one studio, rather than two separate studios. I acknowledge that, pragmatically, this might not always be possible in which case I recommend that the design studio be equipped with technology-related resources such as specialised machinery and pattern tables. This concludes discussion of this research theme. The following section addresses the third research theme pertaining to the effects of HCD and its underlying design principles to FD education.

7.7 EFFECTS OF THE HCD APPROACH AND ITS UNDERLYING DESIGN PRINCIPLES TO FASHION DESIGN (FD) EDUCATION

7.7.1 Overview

This section addresses the research theme related to the perspectives of the participating facilitators and students regarding the effects of the HCD approach and its underlying design principles to FD education, based on implementation of the main study. As shown in Figure 7.2, this research theme is further divided into 12 categories corresponding with the 12 design principles for HCD. Most of these categories contain sub-categories (indicated with green shading in Figure 7.2). Discussion in the following sub-sections is structured to correspond with the HCD design principles, beginning with HCD1.
7.7.2  HCD1: Users as core source of inspiration

7.7.2.1  Traditional scope of fashion design (FD) education

Both F1 and F2 began by scoping out traditional FD pedagogy, arguing that FD\textsuperscript{80} students, in general, would typically receive a prescribed set of teaching and learning directives that present a design theme meant to evoke feelings and set the scene for a search for inspiration in order to determine what to design. This is evident in the statement that “... the traditional set where we would give a theme and we would provide a certain set of instructions and the [FD] students would follow it, get their inspiration from secondary sources” (F2-25:1). From these teaching and learning directives, FD students would “literally open up a fashion magazine, pick a garment\textsuperscript{81} or go onto the Internet and pick a design ... and adapt and take it from there” (F1-24:2). The implication here is that secondary visual inspiration is privileged as part of an inward-looking practice or what F2 refers to as “a set of design signatures from the [FD student] designers themselves” (F2-25:26). This previously acted as the input with which to drive the design process with little actual engagement with people. These findings parallel the scholarship presented in section 4.10 regarding traditional pedagogical strategies in FD education both locally and internationally (Cassidy, 2008; De Wet, 2016; 2017).

However, the applicability and relevance of traditional pedagogical strategies for professional fashion design praxis has been questioned. The reality is that professional fashion designers are beginning to question the relevance of what they design and why they design the way they do. This is drawn from F2s response outlined in Table 7.13.

<table>
<thead>
<tr>
<th>CODE</th>
<th>MEMO</th>
<th>RAW DATA QUOTATION</th>
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</thead>
<tbody>
<tr>
<td>F2-25:15</td>
<td>Referring to professional fashion designers</td>
<td>“Industry right now where designers are questioning, but why am I doing this?”</td>
</tr>
<tr>
<td>F2-25:16</td>
<td></td>
<td>“Am I designing a garment that is fashionable and will sell well?”</td>
</tr>
<tr>
<td>F2-25:27</td>
<td></td>
<td>“Am I designing a garment that will satisfy my end-user?”</td>
</tr>
</tbody>
</table>

\textsuperscript{80} As noted in sub-section 7.4.2, when using the term FD students, I mean to refer to the general FD student population, but when discussing the students who participated in this particular study, I use the term students.

\textsuperscript{81} In some instances, participant responses refer to the word garment. The word garment is the same as what I refer to as product in this study. In the context of fashion design praxis, a garment is the product.
Based on the raw data extracts presented in Table 7.13, I argue that traditional FD pedagogical strategies no longer suffice. Thus, FD students should be encouraged to think about their actions and the purposes for which they design. Implementation of HCD1 counteracted this situation by moving away from an inward-looking practice towards an externally-driven design purpose.

7.7.2.2 Shift from inward-looking practice to externally-driven design purpose

The facilitators concurred that HCD1 counteracted the traditional approach to FD pedagogy in that it “... really challenges the students” (F1-24:1) to think differently and compelled them to transform themselves from a culture of inward-looking practice or the “... star designer approach” (F2-25:17) to an alternative frame of reference, namely that of an externally-driven practice that places people at its core. As such, actual users (in this case, students in their roles as users) become the drivers and “... source of inspiration ...” (F2-25:139) for what to design as they are considered as gatekeepers of the knowledge and “... all the information that goes to drive this project and to drive the design decisions” (F2-25:5). These findings coincide with the view in the literature that people and their voices are the nucleus of design, and the source of inspiration and knowledge with which to drive the design process (Giacomin, 2014; IDEO, 2015; Keinonen, 2010; Sanders & Stappers, 2014; Steen, 2011; Still, 2007).

In so doing, HCD1 changes the scope of how FD students generally design, possibly due to its instrumentality in fashioning a sense of design purpose, thinking about what to design and the actions required to achieve an intended outcome as opposed to merely abiding by fashion trends. As such, with the application HCD1, students thought about fashion design praxis in greater depth, moving beyond personal gratification, hence changing the existing way in which they are educated to a preferred way. Codes F2-25:19 and F2-25:23, presented in Table 7.14, were obtained from F2 and provide evidence to support these interpretations.

Both F1 and F2 mentioned fashion trends, yet none of the student responses drew attention to these. Like F2 (see code F2-25:23 in Table 7.14), F1 drew attention to fashion trends regarding colour and fabrication, remarking that they “... are important to some degree but they are not the key driver of the entire process because the user determines what they want, even the colours” (F1-26:6). However, students’ responses indicate that the user as source of information is fundamental to a HCD approach to FD education as they believed that HCD1
was “... one of the most important [design] principles that runs through the entire process” (SRU11-14:2) because the user, as opposed to secondary visual inspiration, inspires and drives design ideas, concepts and solutions. Student designers stated that HCD1 gave them a sense of direction concerning the purpose of design solutions and streamlined the design process making it more manageable. To support this, statements obtained from student designers are reflected as codes SRD4-6:2, SRD7-9:2 and SRD4-6:1 in Table 7.14.

Table 7.14: Shift from inward-looking practice to externally-driven design purpose

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>F2-25:19</td>
<td>“It moved them away from that and had to make them really question why they are doing what they doing?”</td>
</tr>
<tr>
<td>F2-25:23</td>
<td>“... actually just forced them to really reflect on [the purpose of design] a little bit more and to start engaging with projects beyond just the level of trends”</td>
</tr>
<tr>
<td>SRD4-6:2</td>
<td>“... so I knew which direction to go with the design”</td>
</tr>
<tr>
<td>SRD7-9:2</td>
<td>“... should turn out to be very usable and functional ...”</td>
</tr>
<tr>
<td>SRD4-6:1</td>
<td>“... designing process is less complicated”</td>
</tr>
</tbody>
</table>

The facilitators concurred that HCD1 was influential in guiding and fostering a culture whereby students are educated in a manner to first develop a “… set of constraints …” (F1-24:3) or design criteria based on actual users’ needs rather than personal values, thus compelling them “to work within those constraints to develop a garment which is going to fit all those needs ...” (F2-24:4). Giving consideration to user needs shifted students’ perceptions from that of an inward-looking practice to one where they learn to become agents of change and design with empathy.

7.7.2.3 Affordances of design empathy

HCD1 evoked student designer feelings of becoming change agents who design with an empathic approach perhaps because they no longer saw themselves as the lone-genius in the process but rather became more aware of and took cognisance of user opinions and voices to drive design. This is evident in codes SRD9-11:1 and SRD3-5:2 in Table 7.15. Similarly, codes SRU4-17:1 and SRU2-15:1 in Table 7.15 show that student users believed that student designers empathised with them by positioning themselves in the reality of others. As such, student users valued being a source of inspiration with which to drive the design process. They believed that when a designer positions the user as the nucleus of design, then that designer shows empathy and consideration. These findings demonstrate a move away from a lone-
genius designer ethos to one that affords design empathy, thus reinforcing Norman’s (2011:112; 114) view that those designers who assume the role of experts and design from their perspective only, lack empathy with which to design with the people who ultimately use the product.

Table 7.15: Affordances of design empathy

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRD9-11:1</td>
<td>“... made me more considerate of the user needs”</td>
</tr>
<tr>
<td>SRD3-5:2</td>
<td>“... having a different opinion in a design is a good feeling”</td>
</tr>
<tr>
<td>SRU4-17:1</td>
<td>“... a closer look at understanding another person”</td>
</tr>
<tr>
<td>SRU2-15:1</td>
<td>“... that she cares about my needs”</td>
</tr>
<tr>
<td>SRU3-16:1</td>
<td>“It helped me to be aware that design is not just having ideas that are random in your head and implementing them but it’s [it is] using ideas and opinions from the person or the people you are designing with”</td>
</tr>
<tr>
<td>SRU7-21:2</td>
<td>“I was not the subject of study but rather the source of inspiration”</td>
</tr>
<tr>
<td>SRU2-15:2</td>
<td>“... as the user it allowed me to be more open”</td>
</tr>
</tbody>
</table>

Linked to this, in educating students to become future professional designers and agents of change, student users in general believed that HCD1 brought about a new sense of mindfulness in that they too became conscious of the importance of user needs along with the designer’s voice and contribution to the process. This was evident in one particular response: “... be aware of the user’s needs and to know that the designer’s input counts as much as your does” (SRU3-16:2). Furthermore, for student users, it created an awareness that design is about inclusivity and people’s opinion as opposed to merely being about the materialisation of an abstract idea; this can be seen in code SRU3-16:1 in Table 7.15.

This new sense of awareness and empathy shifted students’ design beliefs from a conventional educational model that aligns with a technology-driven design (TDD) mind-set to one that values inclusivity, belonging and freedom for both student designers and users to express their voices. Student users did not feel they were subjects of study (refer to code SRU7-21:2 in Table 7.15) but believed that HCD1 afforded them an opportunity to be open with their respective designers (refer to code SRU2-15:2 in Table 7.15). In the same way, student designers also commented that “users get to express their ideas across” (SRD2-4:1). This freedom to explicate ideas resulted in two-way communication and feedback between student designers and users. Based on these findings, it is evident that HCD1 was instrumental in transforming students and assisting them in learning to design with empathy and become what Fuad-Luke (2009:18) refers to as activists and agents of change, and what Icograda (2011:8-9), in their Design
Education Manifesto, call global designer citizens. Such transformative learning further resulted in design with users rather than for users.

### 7.7.3 HCD2: Design is with users and not for users

#### 7.7.3.1 A way forward for fashion design (FD) education

F2 drew attention to mainstream FD pedagogy, arguing that “traditionally we would always design for the user” (F2-25:29) but this “... could either take form in making up our own design decision, taking inspiration where we as designers feel we want to take inspiration from and creating a bit more off an artist collection” (F2-25:30). Although this response includes reference to ‘we’ and ‘our’, when probed about this, F2 clarified that this was a reference to FD students in general. Three suppositions are drawn from this particular view.

Firstly, to implement HCD within FD education, educators should familiarise themselves with theoretical constructs and terminology. F2 uses the word ‘user’, yet a design approach driven by inspiration and the orientation to ‘design for’ resonates with TDD, where people are referred to as ‘consumers’ rather than ‘users’. This assertion coincides with the theoretical view that, in a TDD paradigm, people are known as customers or consumers, but in HCD, people are known as users (Sanders & Stappers, 2014:26-27; 29-30). Secondly, under the banner of conventional FD education, FD students were educated to design for imagined people based on their personal assumptions without any face-to-face contact or empirical exploration and deep understanding of user needs. Thirdly, F2 draws attention to design of artistic collections that correspond with FD students’ personal design style as opposed to that of actual users. The people for whom such designs are created may not necessarily favour artistic collections. Then again, it is questionable from whose lens such artistic collections are judged taking into consideration the subjectivity associated with such a concept.

Despite the traditional scope, both facilitators concurred that HCD2 is beneficial and advantageous in bringing about a way forward for FD education (refer to codes F2-25:50 and F1-24:12 in Table 7.16). From a “business perspective” (F1-24:15), HCD2 supported education of students by stimulating a realistic scenario reminiscent of professional industry, and by educating them in a manner whereby they learn to become future professional designers who understand that they can no longer design clothing products with the expectation that people
will merely accept what they design (refer to codes F1-24:13 and F1-24:19 in Table 7.16). As such, HCD2 afforded students easier articulation into professional design because they might “... design knowing exactly who the market is you’re [you are] working together to come up with this range” (F1-24:17).

**Table 7.16: A way forward for fashion design (FD) education**

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2-25:50</td>
<td>“Absolutely, it is definitely very useful for them”</td>
</tr>
<tr>
<td>F1-24:12</td>
<td>“… it’s [it is] a novel new way of doing things which is going to become much bigger in the future”</td>
</tr>
<tr>
<td>F1-24:13</td>
<td>“… it really simulates how things should be in the world”</td>
</tr>
<tr>
<td>F1-24:19</td>
<td>“… we need to just switch our minds out of just designing whatever we want and … expecting people to like what we put out”</td>
</tr>
<tr>
<td>SRU1-12:4</td>
<td>“Because design is with users, I am able to express my interests, likes and dislikes without having to just accept what the designer has designed and made for me”</td>
</tr>
<tr>
<td>SRD9-11:3</td>
<td>“Positive as you see the user’s individuality and as not just a statistic or a person following a trend”</td>
</tr>
<tr>
<td>F1-24:136</td>
<td>“… with the second project [main study] they did,... the [design] principles where summarised basically so they knew exactly what to look at … compared to the … first phase of the study [the pilot study] where we had a wider range of … [design] principles [of HCD] to work with”</td>
</tr>
<tr>
<td>F2-25:53</td>
<td>“… did change their mind on the role that the user can play in the design process and the benefits that come with involving them as well …”</td>
</tr>
</tbody>
</table>

F1 (see code F1-24:17) emphasises design for a target market, which resonates with TDD, but empirical evidence in sub-section 5.4.2.2 indicates that Designer X applied a lead-user approach (an approach to HCD) to design with users who represent a target market. This corresponds with scholarship on HCD around lead-user participation in the design practice of technology forerunners such as Google, IBM and Apple (Elmansy, n.d; Friess, 2010; Muratovski, 2016), hence confirming that HCD2 can be applied to situations where design is for a target market. However, as F1 stated in code F1-24:19 in Table 7.16, implementation of HCD2 requires an educational mind-shift regarding underlying ethos. Likewise, student responses, expressed in codes SRU1-12:24 and SRD9-11:3 in Table 7.16, support the facilitator views in that the students claimed that HCD2 brought about an understanding that users are not a statistic in the larger population who merely follow fashion trends and passively accept what designers design.
Even though HCD2 was initially experienced as difficult in the pilot study, students overcame this difficulty in the main study because of the reduced number of design principles pertaining to HCD (refer to code F1-24:136 in Table 7.16), which offered a better, more focused approach to design. One student response confirmed that “the idea of designing with the user brings about a better approach ...” (SRU5-18:3). Within a narrowed set of design principles, F2 believed that HCD2 was mind-changing for students as they began to see the role of users and the affordances of incorporating user voice and participation the design process (as seen in code F2-25:53 in Table 7.16). Similarly, students agreed that HCD2 reshaped their mind-set: “user and designer became more open-minded” (SRU9-23:6). If such conviction is instilled at an educational level, future professional fashion designers might well continue to implement HCD2 and avoid design based on assumption.

7.7.3.2 Eliminates design assumption

With HCD2, students learnt to engage with actual users (albeit students role-playing as users) in order to explore and come to gain insight about users and understand their needs, goals and preferences in greater depth, without assuming that, as designers, they know what people need. Students favoured HCD2 because they believed that design praxis unfolded in a way that better aligns with actual user needs as compared with the lone-genius approach. The raw data extracted from students and presented in Table 7.17 corresponds with these interpretations.

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>SRU4-17:3</td>
<td>“Helps take a closer look on what the people want or would like rather than assuming”</td>
</tr>
<tr>
<td>SRD5-7:3</td>
<td>“This [design] principle is effective, due to the fact that when the users is [are] involved, there is accuracy and proper understanding in what the user wants”</td>
</tr>
</tbody>
</table>

It can be argued that traditional FD pedagogy does require FD students to engage with users and come to understand their needs through market research and statistical analysis. However, as F2 points out “... you cannot do that by having a one-hour discussion with them ... that’s [that is] just not possible” (F2-25:46). HCD2 aims for depth as opposed to a surface understanding of peoples’ needs which requires inclusivity and joint decision-making throughout the design process.
7.7.3.3 Inclusivity as opposed to designer-driven

For students, HCD2 brought about new insight with which to design through consensus, rather than engaging in a designer-driven approach to thinking about design praxis. In doing so, student designers and users combined their personal values and design ideas. This can be seen in codes SRU2-15:6 and SRU5-18:5 presented in Table 7.18.

Table 7.18: Inclusive rather than designer-driven design

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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</thead>
<tbody>
<tr>
<td>SRU2-15:6</td>
<td>“It showed me how two minds work better than one. We both have different tastes and values but working together made the design much better”</td>
</tr>
<tr>
<td>SRU5-18:5</td>
<td>“Working with users helped as more ideas came about”</td>
</tr>
<tr>
<td>SRU5-18:4</td>
<td>“... design with a [the] input from both the user and designer”</td>
</tr>
<tr>
<td>SRU3-16:5</td>
<td>“... the design process is a joint process”</td>
</tr>
<tr>
<td>SRD10-2:7</td>
<td>“... decisions throughout the process, were made with the user”</td>
</tr>
<tr>
<td>F2-25:51</td>
<td>“... some of them felt that the designer students is [are] going to be taking charge and making all the choices and it was only through exploring the process and going at it step by step that they started realising, but wait a minute, the user is also doing things in this case”</td>
</tr>
<tr>
<td>F2-25:54</td>
<td>“... actually have them, help to make decisions, more better decisions”</td>
</tr>
<tr>
<td>F2-25:55</td>
<td>“... which would have taken them a lot longer otherwise trying to figure it out on their own”</td>
</tr>
</tbody>
</table>

This new way to design combines collaboration and joint decision-making. In general, students, in the user and designer roles, confirmed that HCD2 brought about inclusivity by accommodating both voices and encouraging collaboration throughout the design process thus culminating in continuous joint decision-making. This is confirmed in student statements such as SRU5-18:4, SRU3-16:5 and SRD10-2:7 in Table 7.18. F2 corroborates the student responses, arguing that inclusivity, through collaboration and joint decision-making, occurs across the design process resulting in swifter, better decision-making, even though students may have not initially viewed it as such. To support this finding, refer to the facilitator responses coded F2-25:51, F2-25:54 and F2-25:55 in Table 7.18. These findings align with the Design Education Manifesto’s call for design education to incorporate inclusive design and collaboration with users (Icograda, 2011:9).

Surprisingly, SRD10 (see code SRD10-2:7 in Table 7.18) drew attention to joint decision-making albeit that collaboration, in this particular design team, did not unfold across all stages
of the design process. As SRU10 explicates, “... I feel like my partner and I only worked together well at the beginning of the HCD project but lost one another in the process” (SRU10-13:5). This can be attributed to the fact that SRD10 was absent and disengaged with the HCD process (refer to sub-section 7.6.2 for discussion of this point) in comparison to other student designers. Despite this, students and facilitators concurred that inclusive design through collaboration paved the way for mutual learning to unfold. Mutual learning is a design principle in its own right (HCD9) and will be returned to in sub-section 7.7.10.

7.7.4 HCD3: Integration of primary research and design

7.7.4.1 Research, design and technology integration in traditional fashion design (FD) education

F2 did not furnish any responses on this topic, but F1 commented that previous first-year teaching and learning strategies did not integrate design and technology-related activities (pattern-making and product manufacture). Rather, FD students were taught and practiced these as three separate components. Design activities unfolded from an inward-looking, personal perspective terminating with an abstract, two-dimensional fashion illustration with no attention given to the technology-related translation thereof into a human-proportioned pattern and manufactured, tangible product. Although this was the situation at first-year level, design and technology integration were combined at higher levels of study; however, as F1 argues, “... it’s [it is] too late at third-year level to start doing that” (F1-24:137). Two fundamental assertions are drawn from these findings. Firstly, conventional FD education at first-year level possibly promote surface learning as FD students merely engage with design and technology-related activities for the purpose of fulling assessment requirements without interrelating knowing-how and knowing-that for deep transfer of learning. Secondly, articulation and scaffolding from first-year to higher levels of study regarding design and technology-related components may have been lacking. The raw data extracts provided in Table 7.19 illustrate the perspective of F1. However, implementation of HCD3 counteracted this situation, as discussed in sub-section 7.7.4.4.

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82 Design as one component, pattern making as the second, and manufacture of the garment, or what I refer to as product, as the third component.
Regarding integration of research and design, F1 believes that, previously, FD students typically consider research as something with which they engage with but without particular purpose. As such, FD students viewed research and design as two separate entities, rather than the former informing the latter in practice. However, FD students “can’t [cannot] just look at research as a separate thing, do it, move on and then go onto design. But the two go together” (F1-24:139). The discussion in the sub-section that follows verifies the finding that mainstream teaching and learning fosters a culture of secondary visual research which raised contentious arguments about the typical dimensions of research within FD education.

7.7.4.2 Tensions and challenges associated with research in fashion design (FD) education

F2 was passionate in response to this point, contextualising secondary research strategies in professional fashion design practice and linking these to FD education. In the professional context, F2 (refer to codes F2-25:58, F2-25:62 and F2-25:68 in Table 7.20) contends that fashion designers typically employ secondary research strategies by collecting visual images of pre-existing design solutions as drivers of inspiration. This corresponds with the literature presented in sub-sections 4.3.1 and 4.5.4.1, where it was shown that secondary research strategies are used to gather information about trending fashion themes, past sketches and sources of inspiration as primary input with which to trigger the design process (Laamanen & Seitamaa-Hakkarainen, 2014; Lee & Jirousek, 2015; Seivewright, 2007). Although this is common practice amongst professional fashion designers, F2 found this problematic thus raising contentious questions in terms of design trustworthiness from multiple positions. Firstly, secondary visual research brings about a tension between design plagiarism and originality because if professional fashion designers are merely borrowing design concepts

Table 7.19: Research, design and technology integration in traditional fashion design (FD) education

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>F1-24:32</td>
<td>“... they’ve [they have] got the design subject they design whatever and then they’ve [they have] got patterns [making] and garments so on”</td>
</tr>
<tr>
<td>F1-24:36</td>
<td>“... last year our illustrations, they never made any of our garments”</td>
</tr>
<tr>
<td>F1-24:37</td>
<td>“And then for patterns, we simply made patterns, they end up being marked, hung on the rail and that’s [that is] it”</td>
</tr>
<tr>
<td>F1-24:40</td>
<td>“Well in the past I mean for instance with illustrations they’ll [they will] get a brief and then will simply do the illustrations depending on what they like or what inspires them”</td>
</tr>
</tbody>
</table>
from what already exists, then it raises the question as to the extent it can be considered novel work. Secondly, when local professional fashion designers merely adopt Western-dominated fashion trends, dichotomies emerge with respect to applicability of design to indigenous contexts. These interpretations are drawn from F2s comment in codes F2-25:58, F2-25:62 and F2-25:68 in Table 7.20.

Table 7.20: Tensions and challenges associated with research in fashion design (FD) education

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>F2-25:58</td>
<td>Professional context</td>
<td>“I have a very big problem with designers in general is this idea of getting inspiration from secondary sources because in what way does that actually distinguish us from being copy cats”</td>
</tr>
<tr>
<td>F2-25:62</td>
<td></td>
<td>“At what point does it... get to a point where we take ideas from other people and put them together in a little collage and call it our own design”</td>
</tr>
<tr>
<td>F2-25:68</td>
<td>Valentino - international fashion designer</td>
<td>“... what Valentino had on the runway last season. It is, because that is trend but is that what your customer wants at the end of the day? Is that what the South African consumer wants at the end of the day?”</td>
</tr>
<tr>
<td>F1-24:2</td>
<td></td>
<td>“literally open up a fashion magazine, pick a garment or go onto the Internet and pick a design ... and adapt and take it from there”</td>
</tr>
<tr>
<td>F2-25:71</td>
<td>Referring to FD students in general</td>
<td>“... the first thing that you would usually do, as a student, is to go and look for [design concepts] usually through the internet, through google images”</td>
</tr>
<tr>
<td>F2-25:77</td>
<td></td>
<td>“Some students do it quite well where they would integrate a lot of different elements into something original but the inspiration was drawn from that secondary source”</td>
</tr>
<tr>
<td>F2-25:78</td>
<td></td>
<td>“Other students, might even go and take the entire design detail as is, and put it on whatever they should be designing”</td>
</tr>
<tr>
<td>F2-25:82</td>
<td>We refers to FD students</td>
<td>“Where’s [where is] the originality and where’s [where is] the innovation and do we actually then learn anything from that...”</td>
</tr>
<tr>
<td>F2-25:83</td>
<td></td>
<td>“Do we then really learn by copying a certain design detail from someone else”</td>
</tr>
</tbody>
</table>

Linking the professional environment to the educational context, both facilitators agreed that mainstream FD education fosters a culture of secondary, visual-oriented research (refer to codes F1-24:2 and F2-25:71 in Table 7.20), which sees FD students typically “mimicking [pause] exactly what other designers are doing” (F2-25:81). The implication here is that FD students typically draw on secondary, visual-oriented research in order to design “what they like or what inspires them” (F1-24:40) from an inward-looking perspective, corresponding with the view that design students, in general, including those from FD, design for themselves (Hall & Logo, 2015; Newsbetter & McCracken, 2001). While secondary visual research is a common
strategy in FD education, as evident in the scholarship presented in section 4.10, in some cases, FD students successfully interpret pre-existing visual images to create their own meaning by engaging in re-design. However, in other cases, FD students do not interpret visuals with the purpose of re-design but rather with the purpose of copying design detail. This was made evident in codes F2-25:77 and F2-25:78, presented in Table 7.20.

This foregrounds two conflicts, or challenges: 1) the relevance of Western-dominated fashion trends in SA fashion design, and 2) the role of secondary, visual-oriented research strategies in FD education. F2 doubts design authenticity and innovation and, even more so, the learning process, if FD students merely rely on secondary visual images and copy design detail (see quotations F2-25:82 and F2-25:83 in Table 7.20). In my view, this is perplexing because if academic textual plagiarism is unacceptable then surely design plagiarism should not be accepted at an educational level. Then again, if teaching and learning opportunities are not created for FD students to move away from inspiration by secondary, visual data collection then they might continue this practice due to familiarity therewith. A HCD approach to FD education and implementation of HCD3 counteracts the conventional reliance on secondary visual research strategies due to the embeddedness of qualitative primary research in order to integrate design and technological practice.

**7.7.4.3 Value of engaging in qualitative primary research**

The facilitators concurred that implementing systematic and empirical primary research at a first-year level enhances student preparation for articulation into further levels of study. This is because, previously, conceptual knowledge about research was only introduced at a higher level of study. Responses from both F1 and F2 support this, including the view that “...right from first-year are able to take it right from the research to the final product” (F1-24:34) and “usually these [research] concepts are only introduced to them later during their course and bringing it in, in such a creative and practical environment really helped establish ... key things they need to know about research which I personally believe will aid them later in their studies” (F2-25:57).

Similarly, students believed that engaging with HCD3 opened their minds and brought about insight into and conceptual knowledge about research, shifting their preconceived notions of how research methods are executed and how they inform design practice. This is evident in
student statements, such as “by doing primary research, I was able to get qualitative information on the user and that formed a strong bases for our design” (SRD10-2:8) and “opens mind and teaches more on researching” (SRU4-17:4).

In doing so, qualitative primary research established the conditions for exploration and understanding with the aim of framing the design problem and establishing design criteria without the influence of personal bias. As one student commented, “we were able to discern her actual needs and context of use. The main design criteria are not just extracted from hypothesis” (SRD7-9:5). This finding aligns with scholarship that argues that within HCD, designers utilise open-ended, qualitative questions to empirically collect data from actual users in order to establish their needs and context (Sanders & Stappers, 2008:7).

Implementation of HCD3 mandated a move away from secondary visual research given that students were “… discouraged to use images, but to use primary sources which were the data collected from the user themselves” (F2-25:64). For this reason, primary research “forced them [students] to now have to actually think about original ideas and to use the information straight from the source to create a garment” (F2-25:65). Given that students were compelled to systematically and objectively analyse and synthesis rich, thick data to drive their thinking, justifications and design decisions, this approach also supported design authenticity. This is based on student responses such as, “the research also helped us justify some of our decisions, like colour, fabric, feel and so on” (SRD10-2:9). Moreover, from a facilitator perspective, the following comment was found:

... I think the synthesis process worked quite better because the data was so good instead of just taking from secondary sources and I think the fact that its primary info, primary sources, you do need to start synthesising that information in a certain way and I think that is, that is pretty much a pro in these kind of projects because we're [we are] teaching them how to do research at a first-year level and in a very creative way (F2-25:125).

Based on these responses, it is evident that primary, empirically-based, qualitative research is a strategy that could possibly overcome the tension between design plagiarism and authenticity. First-year students were able to engage in systematic application of empirical, qualitative research in order to drive their own design practice when afforded an opportunity to do so, rather than relying on secondary visual images as research strategy with which to trigger design. Clearly, students “never looked at images while they were designing” (F2-25:88). In
cases where students accessed online platforms, as evident in my participant observation field notes (as mentioned in sub-section 7.5.2.2), it was mainly for the purpose of effective communication as expressed in the following comment:

... some students began the conversation but realised in conversing with their user they realised that they seem to be talking past one another. The user [student] may not have the knowledge to explain the correct terminology what they were looking for. Or the [student] designer would have an idea and refer to the term and then the user would not understand what they were talking about. In such a case they would quickly go on google images and google the term and kind of explain the terminology (F2:25:89).

These findings reiterate the value of engaging in qualitative primary research strategies, which further promotes integration with design practice.

7.7.4.4 Affordances of integrating primary research and design

As noted in sub-section 7.7.4.1, conventional first-year FD education does not seek to integrate research, design and technology-related activities but, HCD3 counteracts this situation, leading to a deeper, more holistic approach to learning in that students came to interrelate the three components throughout the design and technological processes. This is corroborated by statements such as “... you actually, right from first-year are able to take it right from the research to the final product” (F1-24:34) and “I think it’s [it is] beneficial because they develop ... a more holistic understanding of the entire process of ... taking it from the idea to the finished product” (F1-24:39). As such, HCD3 is fundamental to a HCD approach in order to first identify user needs, goals and preferences and then pragmatically address these.

7.7.5 HCD4: Identify and address user needs, goals and preferences

7.7.5.1 Overcoming messiness of design criteria stage through social relationships

In terms of identifying user needs, limited negative effects emerged for student designers because it was confusing for them to elicit and sort through information given the fact that student users often expressed multiple needs, making the process time-consuming. This can be attributed to the fuzzy and mystifying nature of the design criteria stage as the required information is not readily available. Despite this, the majority of students (both designers
and users) showed versatility in successfully navigating this messy terrain and were able to identify a focused set of design criteria with respect to user needs, goals and preferences. They did this through building rapport, developing social relationships and building consensus in a non-judgemental way even in a situation where one design team had two users and one designer. Raw data from the students, in support of these observations, is presented in Table 7.21.

Table 7.21: Overcoming messiness in the design criteria stage through relationship building

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>SRD1-1:12</td>
<td>“Confusion usually takes place during the design process because the user is still clustering ideas on what she needs ...”</td>
</tr>
<tr>
<td>SRD5-7:6</td>
<td>“... time consuming due to the combing of needs”</td>
</tr>
<tr>
<td>SRD8-10:6</td>
<td>“The user was able to communicate with me her preferences without shying away from being judged or questioned”</td>
</tr>
<tr>
<td>SRU5-18:8</td>
<td>“All wants and needs were then either combined or one of the needs and wants from one user was not used and the other had to compromise”</td>
</tr>
</tbody>
</table>

Identification of user needs, goals and preferences paved the way for another overarching effect of HCD4, namely materialisation of a design outcome that corresponds with the initial design constraints and requirements.

7.7.5.2 Materialisation of intended design outcome

HCD4 was instrumental in ensuring that the intended designed outcome aligned with user needs, goals and preferences. F1 remarked that HCD4 was “beneficial” (F1-24:42) in bringing forward students’ critical justification. As a facilitator, he/she could not impose his/her personal values and inclinations, and student designers were able to justify why they could not digress from their user’s needs and preferences. This is evident in the comment, “in class when I made suggestions, let’s [let us] change this or take ... this particular direction ... they tell me no, the user wants this so we can’t [cannot] really deviate too much from it” (F1-24:43). Based on this finding, it seems that HCD4 allowed for student-directed, independent thinking and critical justification rather than positioning students as passive recipients of knowledge. This is in line with a constructivist, student-centered approach that fosters active learning as opposed to delivery and transfer of information (Brandt et al., 2013; Cennamo et al., 2011; Taylor, 2009).
To achieve the intended design outcome, active learning unfolded, with students independently exploring different ways to engage with design activities, including reflection-in-action by looking back on the initial design criteria to ensure that the design solution addressed the user’s needs, goals and preferences. Students argued that HCD4 afforded them an opportunity to “push the boundaries” (SRD4-6:8) and come up with design solutions that exceeded their own expectations. This is evident in the raw data presented in Table 7.22.

Table 7.22: Materialisation of intended design outcome

<table>
<thead>
<tr>
<th>CODE</th>
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</tr>
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<tbody>
<tr>
<td>SRU1-12:7</td>
<td>“It makes it easier to come up constraints and looking back on what’s [what is] actually expected of the product and the designer”</td>
</tr>
<tr>
<td>SRU4-17:6</td>
<td>“finding out all the motives, using all angles to get to the preferred outcome”</td>
</tr>
<tr>
<td>SRU6-20:5</td>
<td>“This helps in making sure that the user is satisfied”</td>
</tr>
<tr>
<td>SRD5-7:7</td>
<td>“The final goal become extraordinary better than expected”</td>
</tr>
</tbody>
</table>

As such, when presented with opportunities to do so, students appeared to be able to turn their intentions into well-formed design solutions that substantively addressed notions of user satisfaction and context of use.

7.7.6 HCD5: Context of use

7.7.6.1 Set design parameters

F1 and F2 concurred that HCD5 played “an extremely important part” (F2-25:95) in framing the design criteria stage of the fuzzy front-end design process. They believed that FD students “need to speak to the user in order to be able to clarify ... the context” (F1-24:47). This implies that HCD5 requires comprehensive understanding through engaged conversation. This finding corresponds with that of Sanders and Stappers (2008:7), who argue that the design criteria stage should see designers utilising open-ended, qualitative questions to establish the context of use. As such, HCD5 was a valuable “... means to refine your data to end the ideation\(^{83}\) phase, set up your criteria and move onwards” (F2-25:94). Likewise, student comments also suggest that

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\(^{83}\) Ideation refers to the idea stage in the design process, which was guided by application of the ideation tool designed specifically for the main teaching and learning intervention.
HCD5 was instrumental in setting design parameters and streamlining design concepts, as seen in statements such as, “knowing the context of use narrows down and clarifies the design” (SRD3-5:7) and “it helps in building a solid foundation for the design of the final product. As it puts a limitation of garment to design and make” (SRU6-20:7). These findings accord with scholarship that demonstrates that establishing the context of use serves as valuable input into and throughout the design process (Endsley & Jones, 2012; ISO, 2010; Marti & Bannon 2009; Still, 2007; Wilkinson & De Angeli, 2014).

In addition, HCD5 also inculcated deeper awareness on the part of students regarding design for appropriateness rather than design for attractiveness. This assertion is evident in student statements such as, “... garment would be worn so as to not just design something just because it would be appealing” (SRU6-20:7) and “I feel this [design] principle ensures the appropriateness of the garment, as the user needs it to be” (SRU11-14:11). Despite these positive effects, contradictions emerged between F1 and F2 concerning application of HCD5 in practice.

7.7.6.2 Application of HCD5 in practice

Although both F1 and F2 viewed HCD5 as a viable design principle, contradictory responses nonetheless emerged. There were also inconsistencies in F2’s comments: “I find very few students did actually [pause] use, they did not use the context of use appropriately as part of the ideation” (F2-25:104). Given the non-verbal pause and inconsistency within this statement, I probed for clarification and F2 responded, stating that “the majority did not” (F2-25:106) apply HCD5 in practice. In contrast, F1 believed that only a few students did not aptly apply HCD5: “I would say just a handful. It was not all the students for instance” (F1-24:53).

In these limited cases, two overarching factors contributed to inappropriate application of HCD5 in practice, namely: 1) iteration without maintaining focus on initial context, and 2) non-alignment of fabric choice to context. In the first case, although students initially identified the context of design usage, as design ideas and concepts progressed and were refined, the product ceased to reflect the context (refer to quotation code F1-24:49 in Table 7.23). Through iteration and refinement, students lost focus on and disregarded the initial context of design usage (as seen in code F1-24:51 in Table 7.23). The second contributing factor pertains to the disjuncture
between fabric choice and HCD5, because students selected fabrics that were inappropriate for the context (as made evident in code F1-24:54 in Table 7.23).

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<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>F1-24:49</td>
<td>“… you had students who identified a particular context right from the start but as the design evolves, then things do not really match up so the finished product doesn’t [does not] really fit into the context at the original starting point”</td>
</tr>
<tr>
<td>F1-24:51</td>
<td>“So they keep on re-iterating changing, what needs to be changed and so on but they forget the context, which is extremely the goal point”</td>
</tr>
<tr>
<td>F1-24:54</td>
<td>“A daywear garment and you end up choosing satin as final fabric then it’s [it is] not really the best choice for that particular context”</td>
</tr>
</tbody>
</table>

This concludes discussion of the findings pertaining to HCD5, and attention now shifts to reporting on translation of user needs into requirements.

7.7.7 HCD6: Translate user needs into requirements

7.7.7.1 Improved data synthesis and refinement

In conventional FD education, design requirements are generally issued to FD students: “usually those requirements are given to [FD] students in the brief ...” (F2-25:119), but with implementation of HCD6, students “… had the freedom to create their own requirements” (F2-25:120). This might have been possible as students first empirically engaged in qualitative primary research to identify user needs and then analysed and synthesised the data obtained by refining information and establishing design requirements (refer to coded data F2-25:117 and F2-25:118 in Table 7.24). While some students found HCD6 perplexing and difficult at first (refer to code SRU5-18:10 in Table 7.24), they managed to overcome these challenges (refer to codes SRD10-2:16, SRU1-12:9 and SRU1-12:10 in Table 7.24).

Students showed versatility in solving problems by synthesising rich, first-hand data leading to a higher level of synthesis than was perhaps evident in traditional FD projects that placed greater emphasis on voluminous secondary visual images that did not always serve a tangible

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84 Requirements pertaining to user-specific design criteria and constraints.
purpose (refer to codes F2-25:123, F2-25:121 and F2-25:122 in Table 7.24). The scholarship presented in section 4.10 confirms that commonly accepted pedagogies in FD education place significant emphasis on secondary visual images that evoke feelings and drive design ideas.

Table 7.24: Improved data synthesis and refinement

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>F2-25:117</td>
<td>“... they started disseminating the information into certain requirements that the user needs from their garments ...”</td>
</tr>
<tr>
<td>F2-25:118</td>
<td>“... synthesising the information really to set it into a list of 5, maybe 6 requirements of the user for that specific garment ...”</td>
</tr>
<tr>
<td>SRU5-18:10</td>
<td>“Combining the needs ... became difficult in the beginning but as we continued with the design process, more innovative [innovative] approaches came about”</td>
</tr>
<tr>
<td>SRD10-2:16</td>
<td>“By translating the user needs into requirements, as a designer this helped me tone down some of the ideas we were throwing around ...”</td>
</tr>
<tr>
<td>SRU1-12:9</td>
<td>“This process was tricky because there are so many needs and in the end some get left out because they aren’t [are not] really seen as requirements”</td>
</tr>
<tr>
<td>SRU1-12:10</td>
<td>“... and so in the end only a few are put into requirements for the design”</td>
</tr>
<tr>
<td>F2-25:123</td>
<td>“... the synthesis process worked quite better because the data was so good instead of just taking from secondary sources and I think the fact that it’s [it is] primary info, primary sources, you do need to start synthesising that information in a certain way ...”</td>
</tr>
<tr>
<td>F2-25:121</td>
<td>“I think in comparison to the traditional projects that sort of synthesising was not really always reflected in the visual diaries”</td>
</tr>
<tr>
<td>F2-25:122</td>
<td>“... visual diaries are pretty much filled of pretty little pictures that not all had a certain function”</td>
</tr>
</tbody>
</table>

However, in this situation, no secondary visual images were applied to practice. Rather, information-rich data was collected, promoting greater levels of synthesis and fostering deeper understanding of user needs, supported by conceptual understanding of user need models (refer to ATs 5 and 6 in Table 7.3) and the design and implementation of an ideation tool (refer to Figure 7.1 and ATs 7, 8 and 9 in Table 7.3). These theoretical models, especially the Functional, Expressive and Aesthetic (FEA) model provided a point of departure for student designers to elicit large amounts of data from their respective users regarding the different dimensions of their needs. This assertion is made evident by statements such as, “to really go and use existing theoretical models to show the students how we determine these things and I find that especially the FEA model, ... they really loved using it because suddenly it seemed to click with them” (F2-112) and “... when they started to use that model ... it just completely filtered into a lot of data that they could use” (F2-25:113). In addition to deeper conceptual knowledge about user needs, code SRU1-12:9 in Table 7.24, suggests that the ideation tool was in fact crucial in
differentiating between a need and a requirement, which was important for development of an intentional and realistic design outcome.

7.7.7.2 Intentional and realistic design outcomes

As a result of improved data synthesis, refinement and conceptual understanding, students argued that HCD6 supported materialisation of intentional and realistic design outcomes. One particular student user stated that, “this [design] principle lay [laid] out a check list that the user and designer can refer back to ...” (SRU11-14:12). Other students corroborated the view that effortless translation of needs into requirements was afforded by application of HDC6 as a strategy for design improvement and refinement (refer to codes SRU2-15:14, SRU3-16:11 and SRD3-5:8 in Table 7.25). As such, it is evident that HCD6 was central to driving pragmatic, functional and feasible design outcomes as students understood that abstract design ideas may or may not manifest in reality. Raw data codes SRU2-15:13, SRD10-2:17, SRD7-9:8 and SRU8-22:4, included in Table 7.25, support this view. In light of this, a HCD approach to FD education, particularly application of HCD6, shifts the scope of design practice from conceptual and predominately aesthetic-oriented ideas to intentional pragmatism and functionality, in which students strategically ensured that achievable design outcomes fell within the scope of their design and technology-related procedural knowledge.

Table 7.25: Intentional and realistic design outcomes

<table>
<thead>
<tr>
<th>CODE</th>
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</thead>
<tbody>
<tr>
<td>SRU2-15:14</td>
<td>“Then became easier to translate the needs”</td>
</tr>
<tr>
<td>SRU3-16:11</td>
<td>“... this [design] principle indicate that the design will reflect your requirements and there’s [there is] always a room for improvements and changes”</td>
</tr>
<tr>
<td>SRD3-5:8</td>
<td>“... allowing them to do some changes ...”</td>
</tr>
<tr>
<td>SRU2-15:13</td>
<td>“This [design] principle helped separate what was realistic and what was not”</td>
</tr>
<tr>
<td>SRD10-2:17</td>
<td>“... turn them into solid, practical things that could be achieved within our skills set and ideas”</td>
</tr>
<tr>
<td>SRD7-9:8</td>
<td>“... very functional ...”</td>
</tr>
<tr>
<td>SRU8-22:4</td>
<td>“Making changes to garment cause [because] something that looked good on paper didn’t [did not] look so good on the garment”</td>
</tr>
</tbody>
</table>

However, this was not the case amongst all the design teams, as some negative and contradictory responses emerged regarding the challenges of applying HDC6 in practice.
7.7.7.3 Challenges of applying HCD6 in practice

F1 was of the view that, given that the students were in first-year, some of them did not understand the underlying rationale for HCD6 and, as a result, did not efficiently apply it in practice. Instead, they merely saw this design principle as a means to fulfil the design and technological process ATs. This can be seen in codes F1-24:55 and F1-24:57 in Table 7.26. In contrast, F2 argued that students effectively applied HCD6 in practice because of their improved data synthesis and refinement (refer to codes F2-25:111 and F2-25:110 in Table 7.26).

Table 7.26: Challenges of applying HCD6 in practice

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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</thead>
<tbody>
<tr>
<td>F1-24:55</td>
<td>“I don’t [do not] think some of the groups really did that properly”</td>
</tr>
<tr>
<td>F1-24:57</td>
<td>“… simply we need to go through the process without really understanding why we need to do it”</td>
</tr>
<tr>
<td>F2-25:111</td>
<td>“… really worked quite well”</td>
</tr>
<tr>
<td>F2-25:110</td>
<td>“… actually did very well with”</td>
</tr>
</tbody>
</table>

In addition, contradictions also emerged within design team 10. SRD10 noted the positive effects of HCD6 (as seen in code SRD10-2:16 and SRD10-2:17 in Tables 7.24 and 7.25, respectively), but the corresponding student user disagreed, reasoning that the “designer could not translate user needs into design requirements” (SRU10-13:10). In this isolated instance, the student user expressed the opinion that he/she “... had to take over the designer’s job ...” (SRU10-13:11). This is attributed to the fact that SRD10 did not participate in the HCD process or teaching and learning intervention (refer to sub-section 7.6.2), in contrast to the majority of design teams who “... worked well together” (SRU6-20:8). This positive group dynamic further supported HCD7, where student users are positioned as partners and actively involved throughout the HCD process.

7.7.8 HCD7: Users as partners with active involvement

7.7.8.1 Participant attitudes and relationship skills

In comparison to the pilot study, the main study found that the majority of design teams demonstrated active participation of users (that is, students role-playing as users) throughout
the design process. As such, there were more equal partnerships, as expressed in one statement that, “she was involved in every aspect of this project and that meant we had a much more balanced degree of input than in the previous project (in which my partner barely participated)” (SRD7-9:25). In the same way, the majority of students, especially users, believed that HCD7 promoted development of relationship skills due to the fact that it afforded opportunity for collegial peer learning (refer to codes SRU2-15:15 and SRU9-13:14 in Table 7.27). This finding corresponds with scholars who claim that when users are actively involved in the design process, mutual learning between users and designers results (Sanders et al., 2010; Steen, 2011; Wilkinson & De Angeli, 2014).

However, a few student designers claimed that relationships and collegiality were absent, expressing the view that their respective users were domineering and, as designers, they were merely instructed regarding what to design (this is seen in codes SRD10-2:19 and SRD9-11:17, respectively, in Table 7.27). These negative effects emerged as a result of the fact that HCD7 removes the lone-genius designer ethos, and correspond with Wilkinson and De Angeli’s (2014:615) claim that user participation eliminates the need for designers to draw on their personal knowledge, skills and attitudes. Such interpretation is further grounded in a student designer’s affirmation that he/she “proved to be headstrong” (SRD5-7:11). In the same way, code SRD10-2:19 in Table 7.27 suggests user domination but the corresponding student user felt that the “[student] designer did not understand the working together as joint partners to come up with the design” (SRU10-13:13).

Table 7.27: Participant attitudes and relationship skills

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRU2-15:15</td>
<td>“The [design] principle made us work more together and created a stronger relationship”</td>
</tr>
<tr>
<td>SRU9-13:14</td>
<td>“learn to work together as partners”</td>
</tr>
<tr>
<td>SRD10-2:19</td>
<td>“This [design] principle sometimes caused clashes between myself and the user mainly because the active involvement of the user came across as overbearing”</td>
</tr>
<tr>
<td>SRD9-11:7</td>
<td>“Negative as user thought I must do exactly what they say without debating it ...”</td>
</tr>
<tr>
<td>F1-24:62</td>
<td>“... for them it’s [it is] understanding what they will actually go and do as [professional] designers”</td>
</tr>
<tr>
<td>F2-25:131</td>
<td>“... very important for students to learn how to work in a team”</td>
</tr>
<tr>
<td>F2-25:132</td>
<td>“... fact that the user becomes involved I do feel from student’s perspective it works extremely well”</td>
</tr>
</tbody>
</table>

Table 7.27 continues on next page
Regardless, the facilitators’ believed that involving actual users, even though the situation was role-played, was advantageous in creating a platform from which to gain insight into the real-world of professional fashion design, where a siloed approach no longer suffices and working co-operatively with people is expected (refer to codes F 1-24:62, F2-25:131 and F2-25:132 in Table 7.27 for evidence that supports this assertion). Likewise, students believed that HCD7 transmuted the ethos and commonly accepted premise of the lone-genius designer as the only person who engages in the design process into one where users are seen as actively involved partners (refer to code SRD2-4:12 in Table 7.27). F2 believes that HCD7 encourages students, in their respective user and designer roles, to design with empathy by placing themselves in the role of the other person (as seen in codes F2-25:128 and F2-25:130 in Table 7.27).

These positive effects were seemingly a result of students’ attitudes towards HCD7. One student user stated that HCD7 “made the project a lot more fun” (SRU6-20:11). Similarly, F1 notes that students, even in their user role, embraced the idea that users were considered partners with dynamic involvement in the design process: “more active, more excited like I’ve [I have] observed with the students” (F1-24:61). As such, facilitators welcomed implementation of HCD7 and were “very much in favour of it” (F2-25:127).

HCD7 was instrumental in shifting the scope of FD education, from an ethos encouraging inward-looking practice to one that promotes externally-driven practice, which, according to Muratovski (2016:xxx), places people and their needs at the core of design. When given an opportunity to do so, students embraced inclusion of users with enthusiasm as giving value to both design and technological processes.

7.7.8.2 Supporting design and technological processes

HCD7 brought forward the voices of students, in both designer and user roles, ultimately affording richness and creativity for idea incubation and concept development. Students agreed that they could co-operatively make refinements and solve problems early in the technological process, thus preventing unforeseen glitches in the product development stage. As such, design
and technological processes were less-complicated and students were able to achieve the project outcome and complete the required ATs more quickly.

Table 7.28: Supporting design and technological processes

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRD10-2:20</td>
<td>“... provides a richer design idea/concept”</td>
</tr>
<tr>
<td>SRU1-12:13</td>
<td>“... makes the creative process more fruitful because two minds are better than one”</td>
</tr>
<tr>
<td>SRU1-12:11</td>
<td>It was a good outcome because if there are any problems, they're [they are] seen early in the process of making and are changed quickly”</td>
</tr>
<tr>
<td>SRD11-3:9</td>
<td>“... it made the process easier”</td>
</tr>
<tr>
<td>SRU6-20:10</td>
<td>“... project quicker and easier”</td>
</tr>
</tbody>
</table>

To support these assertions regarding the effects of HCD7 in terms of adding value to the design and technological process, raw data extracts are provided in Table 7.28. These positive effects also contributed to a shared student workload.

7.7.8.3 Shared student workload

In my experience as a FD educator, FD students sometimes find it difficult to manage their workload. However, HCD7 overcame this situation due to the pedagogical strategy of working in design teams. The general consensus amongst students was that user participation, as a result of HCD7, decreased their workload. Students claimed that they drew on each other’s knowledge in order to share the design and technology ATs and achieve the project outcome. This finding is grounded in student responses such as, “we were both active and we shared tasks according to each other individuals capability” (SRD8-10:12) and “it helps in reducing the work” (SRU11-14:14). Likewise, from a facilitator point of view, HCD7 “... helps to assign tasks and make sure that everyone is doing equal amounts of work” (F2-25:133). In my view, the action plan that students developed as part of their personal ideation tool (refer to AT23 in Table 7.3) was instrumental in balancing the workload and ATs for both student users and designers. However, the facilitator responses regarding the role-playing of students as designers and users in an educational setting in comparison to a real-world context brought about debate.
Debate around real-world context (external users) and educational setting (internal users)

The facilitators debated the authenticity of application of HCD7 in a real-world context with external users. On the one hand, they believed that external users’ might not have an interest in fashion or in the design process (refer to codes F1-24:60 and F2-25:134 in Table 7.29). I agree that not all external users will have an interest in understanding how an abstract idea is translated into a tangible product. However, when it comes to an interest in fashion, I would argue that the theoretical constructs relating to the very nature of fashion require better understanding because, as noted in sub-section 1.3.1, several scholars concur that fashion only becomes such when it is accepted by a large majority of consumers (Aage & Belussi, 2008; Kawamura, 2005; Loschek, 2009; Welters & Lillethun, 2011). This means that not all designed clothing products become fashion but all human beings need wearable products to serve the fundamental need for protecting the body, hence there is interest in clothing to protect the body, if not in fashionable wearables.

On the other hand, as seen in code F2-25:134 in Table 7.29, F2 believed that external users might not have the discipline-specific knowledge or skill to effectively contribute to the design process, but contradicted himself/herself when reflecting on a conversation held with a student who applied HCD7 outside the educational setting to design a clothing product by involving an external user early in the design process. This contradiction is evident in the statement put forward by F2:

I spoke to one of the [participating] students in this study and we just began the main study, ... and she told me that over the holidays, she had her cousin approach her to design a dress for her, and the first thing, ... that she turned and said, okay but what do you want? What should I design for you? ... the student told me, that at that point, ... she realised what the impact of the HCD project has taught her. And she used the same type of questions that she had used with the user in the project to draw the right information from her cousin, to learn what the cousin actually wants because her cousin herself didn’t [did not] even know what she wanted. But by asking the right questions and drawing out the right information, she had then designed a garment that satisfied her cousin’s needs (F2-25:300).

External users are people who are not students and do not form part of the educational context but are non-designers from external environments.
As such, I disagree with the dichotomy regarding application or authenticity of HCD7 in real-world contexts with external users, and align myself with scholars who argue that non-designers are experts with tacit knowledge because they are the real users of products (Sanders et al., 2010; Steen, 2011; Wilkinson & De Angeli, 2014). Furthermore, the views of F1 and F2 contradict the empirical findings found in professional fashion design (reported on in subsection 5.4.2.3) which showed that Designer X co-designed with an actual user even though the user was a non-designer with no domain-specific knowledge or skills.

Table 7.29: Debate around real-world context (with external users) and educational settings (with internal users)

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1-24:60</td>
<td>“In the real-world, I’m [I am] not sure how that would work out if you’ve [you have] got someone who doesn’t [does not] have that much of an interest in fashion, if they will be more active ...”</td>
</tr>
<tr>
<td>F2-25:134</td>
<td>“If we had the situation with the user’s outside of the university, I think that might need a bit of thinking ... because not all users are interested in the design process, not all users may have the skills or the knowledge to be able to contribute effectively towards the design process”</td>
</tr>
<tr>
<td>F2-25:142</td>
<td>“I think it’s [it is] worth considering that if we have users from an external environment we will have to set up a project in such a way that allows for that”</td>
</tr>
</tbody>
</table>

In conclusion, F2 reports that if external people (non-designers as users) are integrated into the educational setting, then teaching and learning ATs should be re-conceptualised (refer to code F2-25:142 in Table 7.29). However, F2 supported this by drawing on an isolated instance in which one student (in a designer role) was not particularly interested in actively engaging the student user as a partner. Whether the involvement of users stems from a role-played educational or real-world setting, application of HCD7 is central to a HCD approach. Therefore, FD students should develop the conceptual and procedural knowledge and skills required to engage in HCD when they enter the professional world. This is particularly important given Sanders and Stappers’s (2008:5) claim that participatory design practice considers users as co-operative partners with assigned roles for participating in the design process through collaboration.
7.7.9 HCD8: Collaboration

7.7.9.1 Affordances for quality design solutions

HCD8 was seen as enhancing the quality of design concepts and technological products: “in terms of the concept and also from a construction point of view” (F1-24:67), the design solution was a “much better product” (F1-24:68). This may be attributed to the “bringing together [of] multiple ideas” (SRU5-18:12) in the idea stage of the design process which led to the generation of multiple two-dimensional sketches of possible design solutions with greater emphasis placed on student designers justifying their choices. This is further evident in the student designer response, “... had to show reasons as to why certain things might not work” (SRD5-7:12). As such, different views of the same situation and multiple design ideas made students aware that they need to justify what they do and why they do what they do, but also that their first idea may not necessarily lead to quality design. The need to justify subjective design decisions and consider alternative design possibilities also corresponds with the literature (Kuhn, 2001; Shreeve, 2015) and with DM5, presented in Table 6.12. In addition, it corresponds with a response from a student user who said that it “helps to make one product of many opinions which opens the mind” (SRU4-17:9). This was due to the collective nature of the project ATs.

7.7.9.2 Collective responsibility in project activity tasks (ATs)

As in the case of HCD7 (discussed in sub-section 7.7.8.3), the notion of sharing the design and technological process workload resurfaced as an effect of HCD8. Students stated that this design principle was “positive in terms of sharing the load and working with others” (SRU9-23:17). Similarly, F2 confirmed that students (both designers and users) “worked together, they split up the tasks from the very beginning” (F2-25:159). These positive effects resulted from strategic project planning (as part of the ideation tool - refer to AT23 in Table 7.3) as students “made a plan, how they are going to split up these tasks and they stuck to it” (F2-25:160).

Despite this, a limited number of students disagreed, arguing that their respective designer or user did not constructively contribute to collective workload due to absenteeism. This can be seen in the response of one student designer, who stated that “I feel like as the designer, I did all the work and made some decisions without the user because she was absent” (SRD4-6:14).
Likewise, a student user stated that “there was no collaboration between designer and user as designer did not pitch up at all times - user forced to work alone” (SRU10-13:14). These findings with respect to absenteeism validate my observations discussed in sub-sections 7.6.2 and 7.6.3 but, as recommended in sub-section 7.6.3, a possible way to counteract this situation is through a refined teaching and learning intervention that involves a three-member design role-play team. Regardless, the collective nature of the project ATs linked to social constructivist learning.

7.7.9.3 Affordance of social constructivist learning

Both facilitators agreed that HCD8 created an important educational opportunity and F2 specifically differentiated collaboration from group work by remarking that collaboration relies on individual capabilities regarding procedural and conceptual knowledge, whereas the latter merely requires that people work in groups (refer to codes F2-25:148, F2-25:149 and F2-25:150 in Table 7.30). HCD8 brought about social constructivist learning as recurring responses from facilitators and students alike confirmed that students drew on each other’s strengths and weaknesses in order to apply discipline-specific know-how and achieve the learning outcomes. Moreover, from a student perspective, HCD8 enriched communication skill. This can be seen in statements such as those presented in codes SRD2-4:18, SRU7-21:12, F1-24:69 and SRU1-12:14 in Table 7.30. These findings align with the literature on SB pedagogy, which suggests that students should engage in collaborative interaction with peers as a means to support socially-engaged learning (Cennamo et al., 2011; Lawson & Dorst, 2009, Shreeve, 2015; Tovey, 2015).

In comparison with the pilot study, the main study saw students taking ownership of their own learning in that they selected team members based on the person’s strengths and weaknesses so as to balance the knowledge required to achieve the project outcomes. F2 said that it was “... interesting that in the second iteration, they specifically chose members not based on whether they friends or not but what that person can add to this project” (F2-25:154). The implication here is that collaboration is valuable in bringing forward complementary knowledge and skills along with exposure to those who hold such required knowledge, as was noted in a comment that students “need to get someone who is strong in that but not so strong in the things that I am good at” (F2-25:155).
Despite this, the affordances of HCD8 for social constructivist learning did not materialise in two of the design teams, who were more concerned with completing the teaching and learning ATs than with engaging in a social learning process and gaining new knowledge. This was evident in the facilitator comment that, “I think there were two groups, I saw they weren’t [were not] really talking much about the work, they were more just kind of, let’s [let us] get this project done working together doing that. I don’t [do not] think there was much focus and engagement on gaining new knowledge ...” (F2-25:182). Nonetheless, for the majority of students, HCD8 afforded opportunities for social constructivist learning (see code F2-25:158 in Table 7.30). This is also confirmed in the student comment, “I enjoyed the experience” (SRU2-15:17). HCD8 and social constructivist learning were found to offer a way forward for FD education.

7.7.9.4 *HCD8 as preferred method for fashion design (FD) education*

The facilitators concurred that HCD8 was an “incredible” (F1-24:74) and valuable strategy for familiarising and exposing students to the notion of collaboration rather than expecting them to collaborate without giving them the tools and the know-how to do so. For this reason, the facilitators agreed that HCD8 and, more generally, a HCD approach to FD education is a way forward and, could also extend itself into cross-discipline projects. To validate these findings, raw data quotations are included in Table 7.31.
Table 7.31: HCD8 as preferred method for fashion design (FD) education

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1-24:73</td>
<td>“… from what I’ve [I have] seen this year it’s [it is] definitely what we need to start doing”</td>
</tr>
<tr>
<td>F2-25:165</td>
<td>“… this is a great way to introduce this concept to them without throwing them in the deep end”</td>
</tr>
<tr>
<td>F2-25:163</td>
<td>“I can even see the HCD project going across different disciplines”</td>
</tr>
</tbody>
</table>

One facilitator responded to HCD8 from a pedagogical stance, in terms of studio space and timetable structure, but discussion around this is presented in sub-section 7.8.4.

7.7.10 HCD9: Knowledge generation and mutual learning

7.7.10.1 Affordance of a social constructivist way of acquiring knowledge

The facilitators considered HCD9 to be a by-product of HCD8 due to the fact that both involve exchange of conceptual and procedural knowledge between students (as seen in codes F2-25:168 and F2-25:169 in Table 7.32). The general consensus amongst students was that they acquired new conceptual and procedural knowledge through social collectiveness. In terms of conceptual knowledge, student designers concurred that they gained new insights and deeper understanding about actual users (or, at least, students in user roles) as the user held knowledge that drove the design solutions (refer to codes SRD10-2:27, SRD6-8:10, SRD7-9:13 and SRD10-13:15 in Table 7.32 as examples). In the same light, student users placed importance on designers acquiring conceptual knowledge about them but also acknowledged that, like the designers, they do not possess all the requisite knowledge (refer to codes SRU1-12:27 in Table 7.32). Likewise, F1 confirmed the need to acquire conceptual knowledge about users, as seen in statements such as F1-24:88 and F1-24:89 in Table 7.32. These findings concur with scholars who argue that users should assume collaborative roles in the design process and engage in mutual learning with designers because they are knowledge generators who contribute to knowledge production (Sanders et al., 2010; Steen, 2011; Still, 2007; Wilkinson & De Angeli, 2014). Deeper conceptual understanding informed what to design and was transformed into design and technology-related procedural know-how through peer-led learning that culminated in a more valuable design and technological process. To support these interpretations, quotations coded SRD7-19:16 and SRD4-6:15 are included in Table 7.32.
Four core assertions can be drawn from this. Firstly, knowing-that knowledge is not only acquired about users and about design through explicated words, but know-how knowledge is acquired through social learning processes and, once discovered, is held as true knowledge. Taking into consideration the tacit dimension of knowledge corresponds with Polanyi’s (2009:6) argument that “all knowledge is discovered and, once discovered, is held to be true”. Secondly, as discussed in sub-section 4.4.3, knowing-that and knowing-how knowledge cannot be separated from one another (McCormick, 1997; 2006; Nonaka & Von Krogh, 2009; Polanyi, 2009). Thirdly, although FD facilitators might have experience and discipline-specific knowledge, FD students can also acquire knowledge through peer-led learning. Fourthly, socially-engaged peer and mutual learning is a possible strategy for supporting underperforming FD students, given that implementation of HCD9 could involve implementation of a buddy system. F2 expresses the view that “students might use a buddy exactly for that reason is that they realise that they have a lack of knowledge or skill or something in a certain area so let me get a buddy that knows a lot about this” (F2-25:172), thus contributing to positive learning experiences.
7.7.10.2 Socially-engaged learning experiences

Implementation of HCD9 evoked learning not only for students but also for facilitators. F1 responded with the statement of “mutual impact I would say from two sides” (F1-24:82) and “from my side it was a learning experience” (F1-24:83). Thus, when it comes to alternative teaching and learning strategies such as a HCD approach to FD education, facilitators may not necessarily be the lone-genius regarding knowledge production, but can also learn from students. In this way, learning becomes a fluid and continuous social and engaged process. One student designer commented that “you get to do and experience things that you have never done before” (SRD2-4:19), which suggests that learning about design, and learning to design, is not a static process but can evolve into new learning experiences allowing individuals to become agents of change who understand and acknowledge that when entering the professional world, as designers, they do not hold all knowledge.

From another perspective, such learning experiences translate into socially-engaged rapport building as students developed social skills by learning how to deal with personality traits of users in an empathic manner in eliciting information. This was seen in facilitator data, for example, “without compromising their comfort” (F2-25:178) and “helps to work with a bit of a difficult user you can learn how to deal with difficult people” (F2-25:177). Student responses also supported this: “helped build a bond which made it easier to work” (SRD9-11:9). The implication here is that HCD9 brought about learning about design as well as learning how to design. Such learning experiences also included learning about user evaluation, feedback and refinement.

7.7.11 HCD10: User evaluation, feedback and refinement

7.7.11.1 Prototype evaluation, feedback and refinement in traditional fashion design (FD) education

F2 spoke passionately about traditional pedagogical strategies applied in FD education, arguing that they did not accommodate instantaneous, iterative looping between abstract two-dimensional design solutions, prototype evaluation, feedback and refinement. Traditionally, abstract, two-dimensional design solutions were finalised as colour illustrations and submitted for assessment purposes without converting them first into a three-dimensional form through
prototype making, evaluation and refinement and iterative looping between these before finalising the design solution. This resulted in a lack of integration between design and technological processes, as was discussed in sub-section 7.7.4.1. This is in contrast to HCD, in which prototypes are made and evaluated in order to minimise risk, guide improvement and develop multiple solutions before the design is finalised (ISO, 2010; Maguire, 2001).

It can be argued that, in traditional FD education, experimental prototyping unfolds as part of design conceptualisation (as seen in Figure 7.7) or that prototypes are actually made and evaluated in terms of aspects such as fit and silhouette. However, a complete, three-dimensional, human-sized, proportioned prototype of a two-dimensional design solution is non-existent in traditional forms of pedagogy. As a result, in traditional FD teaching and learning, numerous problems emerged when two-dimensional, abstract designs were converted into patterns and products due to the disjuncture between design and technology-related activity. Firstly, the product did not resemble the abstract, two-dimensional design illustration nor did it actually materialise into reality. Secondly, without prototyping, design decisions such as fabric selection were made as part of the technological process rather than the design process. To support these assertions, raw data extracts are included in Table 7.33. The implication of this is that, in traditional FD education, prototypes of design solutions were not made, evaluated or refined in order to enhance aspects such as functionality, usability and materialisation of abstract design detail before the two-dimensional design solution was finalised. A second implication is a lack of iteration in the design process prior to manufacturing the product (the technological processes).

Table 7.33: Prototype evaluation, feedback and refinement in traditional fashion design (FD) education

<table>
<thead>
<tr>
<th>CODE</th>
<th>MEMO</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>F2-25:184</td>
<td>We refers to FD students</td>
<td>“... traditional projects focus on design, finishing a design, illustrating, presenting that design and only once it is finished do we start with the prototyping and the garment and pattern stage of it”</td>
</tr>
<tr>
<td>F2-25:205</td>
<td></td>
<td>“Not even sketched, painted, finished, presented on a board handed in for evaluation. It’s [it is] done, it’s [it is] finished”</td>
</tr>
<tr>
<td>F2-25:207</td>
<td></td>
<td>“… with no experimentation without checking if it’s [it is] going to be able to work at all and that to me is a scary”</td>
</tr>
<tr>
<td>F2-25:214</td>
<td>End-product in raw data is the same as product</td>
<td>“You end up with an end-product but when you take that product and you compare it with the design board, there are, there are sometimes big differences”</td>
</tr>
</tbody>
</table>

Table 7.33 continues on next page
Different areas refer to design, pattern making and manufacture.

“Sometimes even entire different fabrics that were chosen at the end of the day, so they do lack that cohesion between these different areas.”

The above findings contrast with what actually happens in professional fashion design practice when a HCD approach is applied. The discussion in sub-section 4.3.4.2 shows three-dimensional prototype evaluation, refinement and iteration of design solutions as necessary before finalisation of designs (Black & Torlei, 2013; Han et al., 2016). The absence of prototype evaluation, feedback and refinement in traditional FD education also contrasts with scholarship on SB pedagogy regarding the use of prototyping to demonstrate design (Brandt et al., 2013:331-332), and learning-by-doing as noted sub-section 4.9.3.10. Implementation of HCD10 changes the scope of conventional FD pedagogy.

7.7.11.2 Impact of pedagogical strategies

Three pedagogical strategies, namely 1) design critique, 2) the structure of the project brief, and 3) learning-by-doing, contributed to the positive effects of HCD10. AT31, in Table 7.3, illustrates that design critique was formally structured with both F1 and F2 jointly critiquing three-dimensional prototypes and providing feedback. The students believed that formal design critiques were valuable in supporting refinement for better alignment with user needs. AT30 (refer to Table 7.3) created opportunities for student-user prototype evaluation, which both students and facilitators agreed was important to generate valuable feedback. These findings are evident in codes SRD2-4:21 and F2-25:199, in Table 7.34.

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>SRD2-4:21</td>
<td>“This was important especially during our prototypes, we got to evaluate and also get feedback from lecturers ...”</td>
</tr>
<tr>
<td>F2-25:199</td>
<td>“… they’ve [they have] got some great feedback”</td>
</tr>
<tr>
<td>F2-25:216</td>
<td>“I feel that in the HCD project, because ... it was ... an integrated project first of all ... so time was also allocated but there was almost a meshing between the pattern [making] and prototyping stages and the design”</td>
</tr>
<tr>
<td>F2-25:217</td>
<td>“they would have one week just doing prototyping then return back ... for design then going back to patterns [making] and that I feel worked so well because you do, then you keep working at it”</td>
</tr>
</tbody>
</table>
Regarding the structure of the project brief, the ATs undertaken in week five (refer to Table 7.3) involved formal time being allocated for students to engage in prototype-evaluation before executing refinement through an iterative process and, thereafter, finalising two-dimensional design solutions by applying a diverse range of knowledge. This project brief structure was valuable in ensuring integration between design and technology-related activities (refer to codes F2-25:216 and F2-25:217 in Table 7.34). In this way, implementation of HCD10 stood in contrast to conventional teaching and learning strategy in which two-dimensional design solutions are finalised before prototyping (as noted in the sub-section 7.7.11.1). In so doing, HCD culminates in simultaneous learning-by-doing through iteration between design and technology-related activities. This corresponds with the constructivist, experimental learning theories put forward by Dewey (1916), Kolb (2015) and Schön (1987), as discussed in sub-section 4.9.3.10.

7.7.11.3 Inclusive evaluation

The majority of students and facilitators alike confirmed that prototype evaluation unfolded through an inclusive and collaborative process between designers and users. This aligns with scholarship that argues that users should actually evaluate prototypes (Gulliksen et al., 2003; ISO, 2010). From a facilitator perspective, user inclusion in prototype evaluation was fundamental, as users are seen to drive design as it is they who are best able to determine the extent to which their needs, preferences and context of use have been adequately addressed. With implementation of HCD10, on the one hand, student users were confident in expressing their concerns but, on the other hand, a limited number of responses focused on the disadvantages of user inclusion in prototype evaluation, namely that user needs are not static and can change if they are unsatisfied with the design solution. The above discussion is supported by the raw data quotations included in Table 7.35.

User inclusion is important to avoid designers evaluating a prototype based on their own perceptions. When a designer evaluates a prototype based on their own sensitivities, they might not know whether the design solution actually satisfies user needs: “you as the designer is responsible for making sure that prototype at the end of the day does satisfy user needs and preferences and all the requirements” (F2-25:193). This highlights the value of actual user prototype evaluation as discussed in the following sub-section.
Table 7.35: Inclusive evaluation

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>SRU7-21:14</td>
<td>“Both my partner and I worked on this. It wasn’t [was not] one-side”</td>
</tr>
<tr>
<td>F2-24:91</td>
<td>“I would say the evaluation was more both the designer and the user, not the user exclusively”</td>
</tr>
<tr>
<td>F2-25:192</td>
<td>“But your user in this case now becomes the driver of that”</td>
</tr>
<tr>
<td>F2-25:197</td>
<td>“... it is important that the user evaluates the work”</td>
</tr>
<tr>
<td>F2-25:200</td>
<td>“… the user was not afraid to say, no, this is not going to work, we need to start over again”</td>
</tr>
<tr>
<td>F2-25:195</td>
<td>“But that user can also change their minds and realise that, oh we started with this, no this is not what I wanted”</td>
</tr>
<tr>
<td>SRD3-5:14</td>
<td>“Bad, the user begins to have second thoughts about the design”</td>
</tr>
</tbody>
</table>

7.7.11.4 Value of actual user prototype evaluation and strategic methods for evaluation

The consensus amongst students is that user evaluation was valuable as it set the stage for actual user (albeit students role-playing as users) feedback and multiple refinement cycles before the design solution was finalised and product manufacture began. In doing so, it assisted students in identifying aspects where abstract ideas could not materialise in reality whilst at the same time eradicating any delusions about the design solution. These findings parallel theoretical perspectives on multiple prototyping and user evaluation as a critical source of information with which to guide improvement and development of further solutions before designs are finalised (ISO, 2010; Maguire, 2001).

Students concurred that HCD10 paved the way for quality design solutions that satisfied user needs: “it helped with the quality of the garment” (SRD10-2:29) and “make to better meet my user needs” (SRD7-9:19). Likewise, F2 remarked that HCD10 was instrumental in order “just to make sure that the product at the end of the day is what satisfies the user” (F2-25:234). Interestingly, a recurring pattern emerged in which students applied strategic methods to implement HCD10 by reverting to data captured during the design criteria stage (the first stage of the fuzzy front-end design process model) as a framework with which to evaluate prototypes and ensure that the design solution actually aligned with user needs, requirements and context of use. Both facilitators suggested that approximately 50% of students strategically applied such a framework to implement HCD10: “I would say about 50” (F1-24:96) and “around half of the groups did that” (F2-25:293). On the other hand, as F1 points out, some

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86 Data captured in design journals and ideation tool.
students did not thoroughly engage with HCD10 nor did they apply a framework but, merely evaluated prototypes in terms of their aesthetic properties, as can be seen in codes F1-24:90 and F1-24:98 in Table 7.36.

Despite this, in general, students acknowledged that user evaluation and refinement expanded their thinking and foregrounded deeper understanding of the fact that the design process is not static but involves continuous refinement as abstract ideas may or may not translate into reality. To demonstrate these arguments, raw data extracts are included in Table 7.36

Table 7.36: Value of actual user prototype evaluations and strategic methods for evaluation

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRD5-7:14</td>
<td>“After the prototype was done, user had to give feedback regarding fit, comfort and other elements. This leads to changes”</td>
</tr>
<tr>
<td>SRU3-16:7</td>
<td>“The user feedback, evaluation and refinement always have an impact on the design process. It gives you time to fix up your mistakes”</td>
</tr>
<tr>
<td>SRU1-12:19</td>
<td>“It helps a lot because it identifies errors and misconceptions about the design. It helps adjust”</td>
</tr>
<tr>
<td>SRU11-14:19</td>
<td>“Feedback from the user is important. It ensures that the design aligns with the designers requirements”</td>
</tr>
<tr>
<td>F2-25:292</td>
<td>“... they even came back to the ideation tool at the end where they went back and put a little checklist”</td>
</tr>
<tr>
<td>F2-25:294</td>
<td>“... where they went back to the ideation tool to double check whether they have really satisfied the user’s needs and all those things they put together”</td>
</tr>
<tr>
<td>F1-24:97</td>
<td>“... other students did look at it, ... whether that fits the criteria”</td>
</tr>
<tr>
<td>F1-24:90</td>
<td>“I would say the students really did not [pause] do it well”</td>
</tr>
<tr>
<td>F1-24:98</td>
<td>“Others didn’t [did not] even go there, it was just looking if the design is pretty or not”</td>
</tr>
<tr>
<td>SRD2-4:22</td>
<td>“… to expand thinking”</td>
</tr>
<tr>
<td>SRU9-23:22</td>
<td>“... you understand that it’s [is] a process that may continuously change until you reach the final design”</td>
</tr>
</tbody>
</table>

The above findings show objective strategies for implementing HCD10 as design unfolds through continuous refinement as part of an iterative process.

7.7.12 HCD11: The process is iterative

7.7.12.1 Affordances of a dual-mode model of design method

Students’ responses demonstrated significant levels of objective thinking and justification, rather than merely undertaking design and technology-related activity. This corresponds with
Simon’s (1982) positivist, rational problem-solving paradigm of design method described in sub-section 4.5.2.1. However, the student responses also show that the design process unfolded in a non-static and less-structured way as problem and solution co-evolved through multiple, iterative loops between the first (design criteria) and the fourth (prototype) stages of the design process (refer to codes SRD2-4:23 and SRD10-2:33 in Table 7.37).

Table 7.37: Affordances of a dual-mode design process

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>SRD2-4:23</td>
<td>“We had to do a lot of this, because every time we settled on something, we thought of something else”</td>
</tr>
<tr>
<td>SRD10-2:33</td>
<td>“By going back and forth on the design process, some problems was [were] fixed and some avoided and justification were generated”</td>
</tr>
<tr>
<td>F2-25:222</td>
<td>“... with the way this project was structured, and perhaps it is also because it was integrated”</td>
</tr>
<tr>
<td>SRU9-23:25</td>
<td>“You get a better outcome as a result. The outcome is better than expected”</td>
</tr>
<tr>
<td>SRD7-9:22</td>
<td>“... tweaking elements to better meet my users needs”</td>
</tr>
</tbody>
</table>

However, such backward and forward looping did not unfold once the prototype stage was complete. Rather, iterations began in the very first stage of the process, as confirmed by one student who said “this happened a lot with needs and requirements as they changed quite a lot” (SRU1-12:22). Regardless of the stage in which iteration occurred, some students drew attention to repetitive design activities due to design experimentation and non-materialisation of abstract ideas into reality, hence further demonstrating the non-static nature of the design process. This finding is found in student responses such as, “a lot of steps were repeated and different techniques were tried out ...” (SRD4-6:17) and “having to go back to the drawing board and see where we messed up ...” (SRU8-22:12).

Application of HCD11 accorded with Schön’s (1995) constructivist, reflective practice school of thought in that students reflected in and on practice; in this way, the design process was less-structured. I say reflection-in-action because students reflected while they engaged with activities associated with each individual stage of the design process. In the same way, I say reflection-on-action because once the prototype was done, students reflected on the outcome of their practice and engaged in backward and forward loops before engaging with the product stage (manufacture of the product). Such reflection in and on action in a less-structured manner aligns with Schön’s (1995) constructivist, reflective practice paradigm for design method described in sub-section 4.5.2.2. As such, I argue that implementation of HCD11 represents...
Dorst’s (1997) dual-mode model of design method (discussed in sub-section 4.5.2.3), in which the constructivist, reflective practice school of thought is the dominant paradigm in the conceptualisation stage. This allows for bridging the gap with the objectivity of the positivist, rational problem-solving paradigm of design method through justification, as seen in code SRD10-2:33 in Table 7.37.

In support of a dominant, constructivist, reflective practice school of thought, facilitators drew attention to two aspects, namely: 1) holistic integration of design and technology-related activities, and 2) the iterative nature of the process. Regarding holistic integration, F2 expressed the view that the manner in which the HCD teaching and learning intervention was structured brought together design and technological processes (as confirmed in the response coded F2-25:222 in Table 7.37), which was previously absent at first-year, undergraduate level. To counteract this situation, the facilitators recommended such holistic integration across all teaching and learning interventions in FD education.

Regarding the iterative nature of the process, F2 argued that “the iteration is a very important part of it, it is a natural way of how we design things” (F2-25:235) and “we do go back, we realise, oh this is not going to work, and we have to go back to the design stage all over again” (F2-25:187). F2 explained the ‘we’ as a reference to the lens of professional fashion designers because, as noted in sub-section 7.7.12.2, he/she said that in an educational context, iteration does not typically take place. As such, when it comes to an iterative design process, I argue that there is a disjuncture between what happens in professional and educational contexts. Hence, HCD11 created a platform for students to work with iterative design, thus imitating the natural way of designing in the professional world.

Iteration is fundamental to an educational context, as F2 points out: “you need to go back to step one and it still gives them enough time to make the necessary changes to all the parts of the project so that it works well together at the very end” (F2-25:225). Students confirmed that implementation of HCD11 paved the way for better quality design outcomes that correspond with real, as opposed to imagined, user needs (refer to codes SRU9-23:25 and SRD7-9:22 in Table 7.37). Given that iteration manifested throughout the design process, I assert that such a design process aligns with Dorst’s (1997) dual-mode model of design method since students seemingly embodied their intentions and engaged in iteration until such time that their design solution actually addressed the user needs (this is seen in code SRD7-9:22 in Table 7.37). As
such, the facilitators believed that HCD11 offered a competitive advantage within FD education.

7.7.12.2 \textit{HCD11 as competitive educational advantage}

Drawing on their professional experience, the facilitators compared and contrasted the scope of conventional FD education with the alternative HCD approach. Adhering to fashion trends and dimensions of beauty and good taste were identified as the underlying ethos of mainstream FD education, whereas these were absent in a HCD approach. This finding is shown in the response that “fashion education is about trends and preferences, and aesthetics and how things look like but not human-centered, definitely not” (F1-24:107). The facilitators believed that the previous generally-accepted practice of FD students was to conceptualise a two-dimensional design, as the sum total of the design process, without materialising this design in the form of a three-dimensional prototype, or evaluating it before finalising the design solution through iterations and refinement, and only then moving on to the product development stage. As such, an iterative design process emerged as absent in traditional FD education, as confirmed by F2 who said that “... it usually does not take place” (F2-25:219) even though it may be argued that the process is iterative. F2 pointed out that in the event that iteration does occur, “it usually just becomes, if you do go back to step one, it comes a crisis mode” (F2-25:219). This may be attributed to the absence of problem-solution co-evolution as part of design-related activity, given that problem-solving may have predominately occurred during technology-related activities, that is, when manufacturing the product. However, when problem-solving occurs during the product manufacturing stage, it results in wasted time due to the disjuncture between abstraction and realistic outcome. This meant that FD students would have to start with design activities again. To validate these observations, raw data extracts are included in Table 7.38 with codes F1-24:103 and F2-25:221.

The HCD approach, and implementation of HCD11, placed students in a strategic position of competitive advantage over those from other HEIs were such an alternative approach is non-existent. This is because a HCD approach to FD education, specifically HCD11, exposes students to the messiness of the design process as it unfolds in real-world contexts, thus better equipping them with knowledge with which to enter the professional domain. Moreover, a HCD approach creates a platform for students to design in an inclusive manner and with actual users (in this case, a role-played situation) rather than for themselves or for imagined
consumers (as evident in codes F1-24:102 and F1-24:106 in Table 7.38), which requires multidisciplinary skills and perspectives as discussed in the following sub-section.

Table 7.38: HCD11 as competitive educational advantage

<table>
<thead>
<tr>
<th>CODE</th>
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<tbody>
<tr>
<td>F1-24:103</td>
<td>“... design it and that’s [that is] it”</td>
</tr>
<tr>
<td>F2-25:221</td>
<td>“They have to make up for that lost time and they need to go back to the beginning and sometimes make an entirely different product at the end of the day”</td>
</tr>
<tr>
<td>F1-24:102</td>
<td>“... already at first-year level I can see they’ve [they have] got skills which other institutions are not going to give them”</td>
</tr>
<tr>
<td>F1-24:106</td>
<td>“... our students, because of bringing the user into the entire process, it gives them a, I would say they would be more marketable once they leave university because they will be better skilled in understanding how things works in the real-world and actually working with the end-users and people who are actually going to buy a product in order to drive the design process”</td>
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7.7.13 HCD12: The design team includes multidisciplinary skills and perspectives

Multidisciplinary skills and perspectives can include those from, for example, marketing, production teams and other design disciplines. In this context, HCD12 pertained to design know-how such as, drawing and sketching and technology-related know-how such as pattern and prototype making and product manufacturing. Traditionally, FD students draw on their personal perspectives and design and technology-related knowledge in order to fulfil project requirements with little consideration given to, for example, what actually happens in the real-world of fashion design or the social and cultural views of people. As F1 points out, by introducing HCD12 into an educational context, students were “not too set in doing things in their own little world. They become more aware of all the different things on the outside” (F1-24:111) but also of the value of “bringing different suggestions and perspectives into it” (F1-24:240).

Likewise, students displayed deeper knowing-that by obtaining the perspectives of their respective team members: “getting opinions from other people doesn’t [does not] mean you don’t [do not] know or you are not sure of what you want but gives you more knowledge and more suggestions” (SRU3-16:21). Knowing-that was transferred to knowing-how through tactical utilisation of each other’s skills to complete the design project: “we combined our knowledge and skills for the project” (SRD8-10:24) and “one’s weakness is another’s strength...”
helps a lot when doing this assignment" (SRD6:8:13). Although students did not specify the skill-sets they referred to, F2 was of the view “that happened throughout the design process” (F2:25:240) which suggests that this occurred during both design and technology-related activities. As such, as in the case of HCD9 (discussed in sub-section 7.7.10.1), the facilitators confirmed that HCD12 was instrumental in promoting a learning culture through a buddy system.

From a facilitator perspective, prior to implementation of a HCD approach to FD education, first-year FD students who underperformed in technology-related modules were not particularly concerned with their grades as their abstract design solutions did not materialise into pattern-making nor did pattern-making manifest itself in a tangible, manufactured product. Previously, pattern-making, product manufacture and design were seen as three isolated modules within the first-year FD curriculum with little integration thereof (as noted in sub-section 7.7.4.1). This is evident in the fact that F1 stated that “I mean, for instance, in the past you would find [FD] students who are weak with patterns, they wouldn’t [would not] bother too much because they don’t [do not] need to construct a garment which they designed in illustrations” (F 1:24:113).

However, implementation of HCD12 changed this situation as design and technology-related activities were integrated, thus requiring a multidisciplinary skill-set as both components came together in the design and manufacture of a tangible, wearable product. For this reason, implementation of HCD12 changed students’ orientation in that those who previously underperformed in technology-related aspects began to self-direct their own learning rather than merely concentrating on design activities such as sketching and illustrating. This is evident in statements such as, “you find students who are not so good with patterns right now putting more effort because they want to actually bring that idea which they illustrated beautifully to life” (F1:24:114) and “... we’ve [we have] got creative students who like sketching, illustrating and so on. So ... from an education perspective ... you are able to develop the skills more because they want to see that idea come to life” (F1:24:117). This concludes discussion of the research theme pertaining to the effects of the underlying design principles for HCD within FD education. Attention now turns to the research theme involving facilitator and student experiences.

87 Assignment refers to the project.
7.8 PARTICIPANT EXPERIENCES OF A HCD APPROACH TO FASHION DESIGN (FD) EDUCATION

7.8.1 Overview

This research theme describes the holistic personal experiences of students and facilitators regarding implementation of a HCD approach to FD education. As depicted in Figure 7.2, three categories emerged within this theme, namely: 1) social learning experiences, 2) HCD as preferred approach to FD education, and 3) HCD pedagogical strategies.

7.8.2 HCD as social learning experience

In general, students and facilitators alike expressed positive learning experiences regarding the HCD approach to FD education. Students expressed the view that they enjoyed the social learning experience created by a HCD approach. From the students’ perspective, HCD represented an insightful way to design through collaboration with actual users albeit students role-played as users. As such, a HCD approach transformed student learning experiences and preconceived ideas about themselves; they transitioned from learning to become a lone-genius designer to learn to become agents for collaborative and empathic design. This represents a change to the existing way that FD students in general are educated and introduces a preferred way of inclusive design education. Similarly, both facilitators were enthusiastic about adopting such an alternative approach to FD education and reported positive learning experiences. In particular, F1 expressed a sense of pride in what the students achieved as a result of the HCD approach to FD education. To support these assertions, codes SRU2-15:21, SRD7-9:24, SRU11-14:30, F1-24:140, F2-25:301 and F2-25:303 are presented in Table 7.39.

Nonetheless, a few student designers communicated both ambivalent and negative experiences. For one, the HCD “... experience was fun and stressful at the same time” (SRD8-10:25). Another student designer mentions that “some parts of the process are helpful and needed but some are not good. It was a new and good experience. It [was] good because you get to make your client happy” (SRD3-5:19). Based on this, it can be argued that, in this case, the experience was positive because the designer’s efforts resulted in user satisfaction. On the other hand, a limited number of student designer remarks demonstrate a subjective, lone-genius mind-set (refer to codes SRD6-8:15 and SRD5-7:20 in Table 7.39). Despite these ambivalent
or negative findings, the consensus amongst participants was that HCD is a preferred approach to FD education.

Table 7.39: HCD as social learning experience

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>SRU2-15:21</td>
<td>“It was a very good experience for me especially since I’ve [I have] always thought I work better alone. The project showed me how much I can do with a partner, working together”</td>
</tr>
<tr>
<td>SRD7-9:24</td>
<td>“I much preferred this experience to the previous one largely because I had a much more involved partner. I was compelled to step more outside my box than in the previous project”</td>
</tr>
<tr>
<td>SRU11-14:30</td>
<td>“Human-centered design is a very insightful way to approach design. By placing the user at the core it made it hard for the design to deviate ... it is a very empathetic way of dealing with design”</td>
</tr>
<tr>
<td>F1-24:140</td>
<td>“... my experience was pretty positive, I mean, I enjoyed the entire year. We’ve [we have] had some exciting projects, a few good laughs, with the students and so on. It was really positive because I mean you see these guys come in at first-year ... at the end of the semester you see something developing, skills coming out, and it really makes me proud, as an educator ...”</td>
</tr>
<tr>
<td>F2-25:301</td>
<td>“I am very happy about the project. I was, I feel so grateful that I was part of it”</td>
</tr>
<tr>
<td>F2-25:303</td>
<td>“... when you approached me to do this study, I was very excited to explore a different approach to it”</td>
</tr>
<tr>
<td>SRD6-8:15</td>
<td>“I felt me as the designer, my creative juices wasn’t [was not] generated. Felt I had to be the logical one that would make this skirt work”</td>
</tr>
<tr>
<td>SRD5-7:20</td>
<td>“Personally, I wouldn’t [would not] use this approach due to the fact that when it comes to designing, I prefer to work alone ...”</td>
</tr>
</tbody>
</table>

7.8.3 HCD as preferred approach to fashion design (FD) education

Students called for more opportunities to engage in HCD because they felt it educated them to become future professional fashion designers who can differentiate between ‘design for’ and 'design with'. Moreover, HCD equipped them with the tools necessary for managing deadlines and people, but also with knowledge about user needs, goals and preferences as drivers of design and the know-how to integrate conceptual knowledge into collaborative design practice. To support this, student response codes SRD11-3:15, SRD2-4:30 and SRU5-19:13 are presented in Table 7.40.
Table 7.40: HCD as preferred approach to fashion design (FD) education

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRD11-3:15</td>
<td>“It was a great experience. It taught us to design with the user instead of designing for the user. It trains designers to consider user needs when designing”</td>
</tr>
<tr>
<td>SRD2-4:30</td>
<td>“From my experience, this should be done more often. It has many benefits and also it teaches us as fashion designers how to collaborate with each other for the future, how to handle deadline and users, goals, preferences, wants and needs”</td>
</tr>
<tr>
<td>SRU5-19:13</td>
<td>“... The human centered design approach helps the user and designer to know what to do even in complication [a complicated] process. Human centered design approach is needed and important in fashion [FD] education – it is like avoiding problems and solving problems at the same time with this approach. To me it was helpful and can’t [cannot wait] to finish me degree and use this approach to [with] my users”</td>
</tr>
</tbody>
</table>

From the facilitators’ viewpoint, both drew on their professional industry and educational experiences and argued that a HCD approach is definitely a way forward for FD education because it challenges conventional educational models in various ways. Firstly, F2 points out the conventional FD education models do not adequately prepare FD students to enter the professional fashion industry. Rather, FD students were taught skills and know-how to design and make artistic, magnificent products with limited learning about, experience of or opportunities to engage in, design in a collaborative way with actual people. Secondly, traditionally, FD students were taught to focus on aesthetic values without actually reasoning about the purpose of the designed product, whereas, in the real-world, as F2 points out, user satisfaction is more important. Raw data extracts obtained from F2 are included below to illustrate this point.

Doing all the traditional projects as a student and then teaching them as a facilitator and there are these questions that start popping up. Like why do we create clothing, where does it, you know, who do we do it for? I worked in the industry and from experience I realised that we don’t [do not] design for trends in real life. We design a product that needs to sell well and in order for it to sell well it needs to satisfy the user ... (F2-25:302).

... The human-centered design approach, to me feels like another step forward into the right direction and I feel it’s [it is] so important that students, we definitely, don’t [do not] necessarily prepare them for the industry but then we prepare them with the skills in order to deal with what they will have to deal with in the industry. And unfortunately the traditional model is very artsy, it’s [it is] very creative and it’s [it is] lots of drawing and painting and creating fabulous things but we don’t [do not] really teach them how it’s [it is] going to work in industry (F2-25:303).
You are going to work in a team that is just a matter of fact, you are going to work using different skills from different people and you need to acknowledge that. You need to now learn how to give control over certain design decisions to the people working with you and ultimately you need to think why you’re [you are] making this? It’s [it is] for the user, so why are we not giving them that experience? Why are we not teaching them how to deal with users ... (F2-25:304).

Thirdly, F1 drew attention to conventional FD curriculum that foreground a siloed mind-set and non-integration of research, design and technology-related components at a first-year level of study, albeit that such integration occurs at exit-level. However, even with such integration at exit-level, a HCD approach is absent which causes a problem when FD students enter the professional world in that they may continue to practice an inward-looking and lone-genius praxis. Another concern raised was that such exit-level integration of primary research, design and technology was too late for scaffolding such learning. This is supported by raw data extracts obtained from F1.

I’d [I would] say it challenges everything about the conventional model [laughing]. Everything becomes one integrated ... module. You need to walk away from doing things separately in little silos and so on and actually bring in all the different aspects of the curriculum. With your human-centered because you take it right from your [primary] research to your designs to the patterns [making] and the garments [product] and so on (F1-24:143).

It does with your conventional ways but it’s [it is] too late at third-year level to start doing that. Because I think that’s [that is] where they really start to integrate the different aspects of the work but from what I’ve [I have] observed even at third-year level they don’t [do not] have that ... human-centered design approach. So it means ... with the current ways of doing things graduates still walk out and they just continue with the way things are being done in the industry where the designer is the guru basically (F1-24:144).

Based on this, a HCD approach to FD education changes the existing educational scope and offers an alternative, inclusive design approach as preferred way of educating future fashion designers and equipping them with knowledge to enter the professional world and deal with actual users. Furthermore, in a HCD approach to FD education, first-year students were far more advanced, in terms of ability, than those not exposed to such an educational design strategy, as argued in the quotation below.
... to see how they develop with the second project and I was like wow, these guys are really getting where they were supposed to be and that’s [that is] something which I haven’t [have not] really seen in the past from first-year level that they produce that kind of work that they do (F1-24:140).

As such, when students graduate they might be in a strategic position to change their design approach from inward-looking practice and design for themselves or for imagined users, to one externally-driven through HCD in which users are at the core of design. This aligns with Muratovski’s (2016:xxx) call to transform design education in general (refer to sub-section 1.8.2): he argues that an “inward-looking practice” ultimately manifests in personal self-expression to design for oneself or for people, whereas an “externally-driven process” places people and their needs at the core of design. However, the facilitator responses also demonstrate that some pedagogical strategies challenged the HCD approach to FD education.

### 7.8.4 HCD pedagogical strategies

The facilitators concurred that the conventional separation of the design and technology studios, and the structure of the department’s timetable, was not conducive to design and technological process integration. This is due to the holistic integration of and relationship between these two processes.

Isolating the two studios does not accommodate immediate design experimentation through learning-by-doing, given the unavailability of discipline-specific machinery in the design studio. This also results in time wastage. As a way forward, the facilitators agreed that design and technology-related activities should occur in one studio, which means that the timetable structure and learning environment should change. This can be seen in the facilitator comments coded F1-24:75, F1-24:77, F2-25:275, F1-24:76, F2-25:276 and F1-24:81 presented in Table 7.41. These raw data extracts corroborate the observational findings discussed in sub-section 7.6.4.

#### Table 7.41: HCD pedagogical strategies

<table>
<thead>
<tr>
<th>CODE</th>
<th>RAW DATA QUOTATION</th>
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<tbody>
<tr>
<td>F1-24:75</td>
<td>“I mean the time table is prepared based on the traditional ways of having a separate class for design, a separate class for patterns [making] and another one for garments [product]”</td>
</tr>
</tbody>
</table>

Table 7.41 continues on next page
“I mean when you’re [you are] busy with your patterns [making] and mock ups and then you realise this design is not working you need to go back to the design room for that…”

“… wanted to experiment with a few of their design ideas but where incapable of doing so because there wasn’t [was not] a sewing room open for them to experiment so obviously they lost a bit of time because of that”

“… what we need in an ideal world is to have one shared venue for all 3 units or 3 parts of the fashion curriculum”

“… ideally it would be that we would all work in one studio where you can have access to all the equipment you require to do whatever it is that you need to do at that point because not everyone works the same”

“So you need to change the system so that it’s [it is] more supportive of what we’re [we are] doing basically”

“... there was actually time allocated for them to come back to the design point to work on it again, finalise the design and only then did they start with the illustration and the TDs and I think that worked extremely effectively”

Still on the point of the timetable but with reference to the project duration, the main study was conducted over a period of seven-weeks for both the design and technology-related ATs. The facilitators were of the view that seven-weeks was excessive: “... I think we gave them too much time” (F1-24:72). F2 recommended that a HCD project of this nature should extend over approximately “... 6 [six] weeks [as the] ultimate goal for such an entire project” (F2-25:88).

As noted in sub-section 7.2.2.8, design and technology activities were framed within a non-linear block model that was purposefully engineered for undertaking the main study. This block model was seen as an effective planning strategy for FD education, given that the holistic, non-linear nature of such a strategy afforded students an opportunity to constructively engage in prototype evaluation, multiple refinements, and iteration before finalising their two-dimensional sketches and completing the fashion illustration. This is confirmed in the statements coded F2-25:290 and F2-25:291 in Table 7.41. This block model ultimately was in conflict with conventional ways of engaging in projects where two-dimensional design solutions are finalised and only then do the technology-related activities of pattern-making and manufacture commence, as was discussed in sub-section 7.7.11.1.
This concludes discussion of the findings that emerged from data collection and analysis, hence completing the second purpose of the present chapter. Against the backdrop of these findings, relationships are now drawn between the research themes and the main findings therein.

7.9  RELATIONSHIP BETWEEN RESEARCH THEMES AND FINDINGS

In this section, I draw on discussion of the empirical findings presented in sections 7.5, 7.6, 7.7 and 7.8 that introduced four main research themes (depicted in Figure 7.2). This is done in order to elucidate the main findings that emerged from each of the four research themes. Figure 7.11 shows the possible relationships between the four main research themes and their respective findings. In Table 7.42, I present the main findings as emergent from the research themes. For the purpose of clarity, I code the main findings such that they parallel the research themes. For example, MF1-RT1 is the first main finding emerging from the first research theme.

Table 7.42: Main findings aligned with research themes

<table>
<thead>
<tr>
<th>CODE</th>
<th>MAIN FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF1-RT1</td>
<td>The majority of students, in their respective designer and user roles, collaboratively and objectively framed the design problem through qualitative primary research strategies, in the form of conversation, and systematic methods of data capturing, analysis and synthesis in order to drive design</td>
</tr>
<tr>
<td>MF2-RT1</td>
<td>The constructivist, reflective practice paradigm came into play in the idea, concept and prototype stages that unfolded in a less-structured manner through collaborative designer and user engagement as well as experimentation, systematic prototype evaluation, iteration, reflection-in-action, reflection-on-action, and refinement</td>
</tr>
<tr>
<td>MF3-RT1</td>
<td>The volition underpinning a HCD approach and its underlying design principles merge objectively with subjective, less-structured, constructivist, reflective activities to embody user needs, preferences and context of use, rather than inward-looking, lone-genius design practice</td>
</tr>
</tbody>
</table>

Table 7.42 continues on next page
### RESEARCH THEME 2 (RT2): EMERGENT ISSUES DURING THE MAIN INTERVENTION

| MF1-RT2 | One student designer was predominantly absent and non-participative during the intervention |
| MF2-RT2 | Attendance, punctuality and non-constructive engagement with ATs emerged in the case of a few students |
| MF3-RT2 | Timetable structure and learning resources were not conducive to instantaneous prototype experimentation and two-dimensional sketching during the concept stage design-related activities, nor did these support an iterative design process due to separation of the design and technology studios |

### RESEARCH THEME 3 (RT3): EFFECTS OF THE HCD APPROACH AND ITS UNDERLYING DESIGN PRINCIPLES TO FASHION DESIGN (FD) EDUCATION

| MF1-RT3 | The effects of a HCD approach and its underlying design principles is a novel, alternative educational model for educating FD students to design in a collaborative, inclusive way |
| MF2-RT3 | HCD counteracts the ethos of traditional FD pedagogy of inward-looking, lone-genius praxis and secondary visual research as the driver of design |
| MF3-RT3 | The HCD approach to FD education, is a preferred means of bridging the gap between educational and real-world contexts |
| MF4-RT3 | HCD challenges and transforms traditional dimensions of research in FD education and the non-integration of research, design and technological processes, instead promoting qualitative-based primary data collection and a higher level of data analysis, synthesis and refinement in order to inform design and holistic integration of technological processes |
| MF5-RT3 | HCD raises the possibility of scaffolded learning about research and can inform design praxis from first-year |
| MF6-RT3 | HCD changed students’ mind-set about fashion design praxis providing new insight into an alternative, externally-driven design praxis, thus encouraging students to become agents of change and to design with empathy with actual users, through collaboration and inclusivity |
| MF7-RT3 | HCD gives rise to quality, intentional and realistic design outcomes by eliminating designer assumption |
| MF8-RT3 | Bridges the gap between objectivity and subjectivity in the design process |
| MF9-RT3 | Two-dimensional design solutions cannot be finalised without systematic prototype evaluation on the part of actual users, as well as iteration and refinement between design and technological processes before manufacture of the product |
| MF10-RT3 | Supports fourth industrial revolution skills of problem-solving, communication, multi-disciplinarity, social skills and collaboration |
| MF11-RT3 | Promotes a constructivist, student-centered approach to socially-engaged learning and knowledge acquisition |

Table 7.42 continues on next page
**RESEARCH THEME 4 (RT4): PARTICIPANT EXPERIENCES OF A HCD APPROACH TO FASHION DESIGN (FD) EDUCATION**

| MF1-RT4 | The majority of participants enjoyed the HCD approach, expressing positive learning experiences and positioning HCD a preferred approach to FD education |
| MF2-RT4 | Limited negative experiences emerged, foregrounding a subjective, lone-genius mind-set |
| MF3-RT4 | The timetable structure and learning resources in studios resulted in negative facilitator experiences |

Drawing from Table 7.42, I apply the same codes to ensure legibility in Figure 7.11, where I present possible relationships between the main findings. MF1-RT1, MF2-RT1 and MF3-RT1 in Table 7.42 imply that a dual-mode model of design method appear to have bridged the gap between the positivist, rational problem-solving and less-structured, constructivist, reflective practice paradigms to embody user needs, preferences and context of use while students engaged with the design principles of HCD in executing the assigned ATs. However, as depicted in Figure 7.11, a potential negative relationship exists between MF1-RT1, MF2-RT1 and MF3-RT1 with that of MF1-RT2 and MF2-RT2 as disabling factors for student engagement with activities in the HCD fuzzy front-end design process. Similarly, MF2-RT1 promotes experimentation, evaluation, iteration, reflection-in-action, reflection-on-action and refinement, but there seems to be a possible negative relationship (refer to Figure 7.11) with the disabling factor of timetable structure and learning resources, in MF3-RT2.

Furthermore, as seen in Figure 7.11, likely relationships are also drawn between MF1-RT1, MF2-RT1 and MF3-RT1, with the positive effects found in MF1-RT3, MF2-RT3, MF3-RT3, MF4-RT3, MF5-RT3, MF6-RT3, MF7-RT3, MF8-RT3, MF9-RT3, MF10-RT3, MF11-RT3 and MF12-RT3. Implementing the design principles of HCD and collaborative engagement in ATs within the HCD fuzzy front-end design process perhaps paved the way for these positive effects, which could potentially have led to the positive experiences of socially-engaged learning and HCD as a preferred approach to FD education (MF1-RT4). On the contrary, the negative effects identified in MF13-RT3 might have resulted from the disabling factors in MF1-RT2 and MF2-RT2. If all students were punctual, attended the sessions regularly, and implemented the design principles of HCD in order to constructively engage with the design...
and technology-related ATs within studio sessions, the limited negative effect found in MF13-RT3 may not have emerged and may not have led to the negative experience identified in MF2-RT4. Similarly, it appears the disabling factor of timetable structure and learning resources in studios (MF3-RT2) perhaps contributed to the negative experience outlined in MF3-RT4. If design and technological processes unfolded in the same studio, perhaps this particular negative experience might not have emerged.

![Figure 7.11: Relationships between main findings and research themes](image)

This concludes discussion of the possible relationships between the main findings and research themes and paves the way for refinement of the design principles and identification of a final set of design principles for FD education as the theoretical contribution of this inquiry.

### 7.10 FINAL DESIGN PRINCIPLES FOR FASHION DESIGN (FD) EDUCATION

This section addresses the third purpose of this chapter, namely proposition of a final set of design principles for HCD, fashion design praxis, framed within the four modes of volition (V), design knowledge (DK), design methodology (DM) and product (P), and DEP that, together, constitute a HCD approach to FD education. To achieve this, I refer to sub-section...
6.10.2, which presented a re-named and re-coded set of design principles (as refined from the pilot study) for HCD, fashion design praxis and DEP and presented in Tables 6.11, 6.12 and 6.13, respectively. This refined set of design principles was used for design and implementation of the main study. Based on the findings of the main study, as presented in this chapter, I further refine the design principles by consolidating or eliminating them as explained in Table 7.43, which also provides justification as to why these design principles were further refined.

Table 7.43: Refinement of design principles

<table>
<thead>
<tr>
<th>CONSOLIDATE OR ELIMINATE</th>
<th>JUSTIFICATION</th>
<th>AFTER MAIN STUDY</th>
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<tbody>
<tr>
<td><strong>Consolidate:</strong> HCD2 HCD7 HCD8</td>
<td>The discussion presented in sub-sections 7.7.3, 7.7.8 and 7.7.9 shows that design unfolded with the actual user and not for an imagined user (HCD2), through inclusive partnership (HCD7) and collaboration between students in their designer and user roles (HCD8)</td>
<td>Final design principle categorised as a general design principle, and re-named and re-coded as HCD8 (see Table 7.44)</td>
</tr>
<tr>
<td><strong>Eliminate:</strong> HCD9</td>
<td>Knowledge generation and mutual learning emerged as a by-product of collaboration (refer to sub-section 7.7.10.1). Similarly, recurring patterns found in sub-sections 7.7.13, 7.7.8.3, 7.7.9.3 and 7.7.10.1 emphasise the effects of a socially constructive method of engaging with ATs and acquiring knowledge. As such, this design principle is embedded in a HCD approach and does not constitute a design principle in its own right</td>
<td></td>
</tr>
<tr>
<td><strong>Consolidate:</strong> V1 V2</td>
<td>Both design principles refer to a change in volition. The findings foreground an alternative volition with a change in approach, mind-set and thinking about praxis. Students learnt to become agents of change by moving from inward-looking practice and a lone-genius ethos, to one that involves design with empathy, inclusivity and collaboration with users (refer to sub-sections 7.7.2.2, 7.7.2.3, 7.7.3.1, 7.7.3.3, 7.7.8.1, 7.8.2)</td>
<td>Final design principle categorised as a general design principle and re-named and re-coded as FDP8V (see Table 7.44)</td>
</tr>
<tr>
<td>Consolidate:</td>
<td>DM1</td>
<td>The findings presented in sub-sections 7.5.2.1, 7.5.2.3, 7.5.2.4, 7.7.4.3 and 7.7.6 emphasise that establishing the design context formed part of framing the design problem and was executed in activities associated with the design criteria stage of the design process. Framing the context, as part of the design problem, allowed for development of a set of user-specific design criteria and constraints as input with which to drive design.</td>
</tr>
<tr>
<td>Consolidate:</td>
<td>DM7</td>
<td>The fuzzy front-end design process model was applied throughout the teaching and learning intervention as an alternative model for design (refer to SLO6 in Table 7.2). This design process model comprises of a sequence of activities, as evident in discussion of the research theme pertaining to activities in the HCD fuzzy front-end design process (refer to section 7.5 for this discussion)</td>
</tr>
<tr>
<td>Consolidate:</td>
<td>DEP2</td>
<td>Given the nature of the role-play situation, with students working in design teams. Data showed that such pedagogy was grounded in a constructivist, student-centered approach involving peer collaboration, dialogue and feedback, thus fostering socially-engaged learning experiences (refer, for example, to sub-sections 7.5.5.1, 7.7.9.3, 7.7.10.1, 7.7.10.2 7.7.11.2, 7.7.11.4, 7.8.2). Similarly, facilitators guided student learning through design critique sessions as opposed to transmitting knowledge (refer, for example, to sub-sections 7.5.4.3, 7.5.5.1, 7.7.11.2)</td>
</tr>
<tr>
<td>Consolidate:</td>
<td>DEP13</td>
<td>DEP14</td>
</tr>
</tbody>
</table>

Based on Table 7.43, Table 7.44 presents a final set of re-named and re-coded design principles comprising of nine HCD, 16 fashion design praxis, and 16 DEP that, together, constitute a
HCD approach to FD education. In Table 7.44, these design principles are categorised as either specific or general. Specific design principles are identified for two reasons. Firstly, these principles align with specific SLOs or ATs (presented in Tables 7.2 and 7.3, respectively). Secondly, the findings from the main study paved the way for such specification, hence they are categorised as specific design principles. In contrast, the general design principles were implemented throughout the teaching and learning intervention, given the underlying emphasis on a HCD approach to FD education.

Table 7.44: Final design principles for a HCD approach to fashion design (FD) education

<table>
<thead>
<tr>
<th>CODE</th>
<th>SPECIFIC DESIGN PRINCIPLES</th>
</tr>
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<tbody>
<tr>
<td>HCD</td>
<td></td>
</tr>
<tr>
<td>HCD1</td>
<td>Users as core and source of inspiration – focus is on the user as nucleus of design and source of inspiration, not as subject of study</td>
</tr>
<tr>
<td>HCD2</td>
<td>Integration of primary research and design - designers assume a dual role of researchers and designers meaning that design is grounded in primary rather than secondary research</td>
</tr>
<tr>
<td>HCD3</td>
<td>Identify and address user needs, goals and preferences – first, establish users’ needs, goals and preferences through socially-engaged dialogue as input into the design process before seeking to address those needs, goals and preferences</td>
</tr>
<tr>
<td>HCD4</td>
<td>Context of use - design should take into account the context or situation in which the user will use the product</td>
</tr>
<tr>
<td>HCD5</td>
<td>Translate user needs into requirements - users’ needs should be translated into a set of design requirements (design criteria and constraints)</td>
</tr>
<tr>
<td>HCD6</td>
<td>User evaluation, feedback and refinement - users should evaluate prototypes and provide feedback as a critical source of information. Designers should evaluate designs with users and improve them based on the feedback obtained</td>
</tr>
<tr>
<td>HCD7</td>
<td>The process is iterative - iteration or repeated steps occur throughout the design and development process until the desired outcome is achieved</td>
</tr>
<tr>
<td>FASHION DESIGN PRAXIS</td>
<td></td>
</tr>
<tr>
<td>FDP1DK</td>
<td>Fashion designers require conceptual knowledge about rules, design theories and design process models</td>
</tr>
<tr>
<td>FDP2DM</td>
<td>Design problems are ill-defined, wicked and bound by context, with no set design criteria</td>
</tr>
<tr>
<td>FDP3DM</td>
<td>The conceptual stages of the design process align with a constructivist, reflective practice paradigm</td>
</tr>
<tr>
<td>FDP4DM</td>
<td>The positivist, rational problem-solving paradigm is more appropriate to the information stage of the design process</td>
</tr>
<tr>
<td>FDP5DM</td>
<td>The fuzzy front-end design process model, comprising of a sequence of activities that unfold in some logical manner through analysis, synthesis and evaluation, is an applicable alternative model for moving away from inspiration as the first stage of the design process</td>
</tr>
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<thead>
<tr>
<th>FDP6DM</th>
<th>The design criteria stage frames the design problem via open-ended, qualitative strategies aimed at establishing a set of design criteria and constraints as input for design action</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDP7P</td>
<td>Designed clothing products include physical characteristics or design elements such as lines, shapes (silhouette), textures (fabric) and colours</td>
</tr>
</tbody>
</table>

### DEP

<table>
<thead>
<tr>
<th>DEP1</th>
<th>Conceptual knowledge about HCD, qualitative primary research strategies and design process models are first known and understood, and then integrated and applied using know-how procedural knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP2</td>
<td>The timetable should be structured in a six-week, non-linear block that integrates design and technology-related activities. During these six weeks, both formal and non-formal sessions should be scheduled in order to foster student self-directed learning and freedom to work both inside and outside the boundaries of studio sessions</td>
</tr>
<tr>
<td>DEP3</td>
<td>The project is an assessment method that consists of both formative and summative assessment, with design and technology-related activities constituting assessment tasks</td>
</tr>
<tr>
<td>DEP4</td>
<td>Activity tasks should include representational methods and prototype development</td>
</tr>
<tr>
<td>DEP5</td>
<td>Pedagogical strategies should include formal and informal design critique sessions</td>
</tr>
<tr>
<td>DEP6</td>
<td>Pedagogical strategies should support an iterative design process and provide opportunities for multiple iterations and refinement before design solutions are finalised</td>
</tr>
<tr>
<td>DEP7</td>
<td>Pedagogical strategies should include opportunities for experimentation, reflection and learning-on-the-go</td>
</tr>
</tbody>
</table>

### GENERAL DESIGN PRINCIPLES

#### HCD

<table>
<thead>
<tr>
<th>HCD8</th>
<th>Collaboration between users and designers – users are active and continuously involved partners in the design process and design should unfold with users, not for users</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD9</td>
<td>The design team includes multidisciplinary skills and perspectives – designers work in design teams and engage in collaborative decision-making and implementation</td>
</tr>
</tbody>
</table>

### FASHION DESIGN PRAXIS

<table>
<thead>
<tr>
<th>FDP8V</th>
<th>The volition to design from an inward-looking practice should be changed in order to move to a preferred situation of alternative ways of thinking about and approaching design practice from a HCD perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDP9V</td>
<td>Eradicate misguided volition embodiment about HCD approaches in practice</td>
</tr>
<tr>
<td>FDP10DK</td>
<td>Fashion designers require know-how knowledge in order to practice</td>
</tr>
<tr>
<td>FDP11DK</td>
<td>There is a co-dependency between conceptual and procedural knowledge: know-that is first known and understood before being applied to know-how</td>
</tr>
<tr>
<td>FDP12DK</td>
<td>The tacit within design practice should be made explicit in some way</td>
</tr>
<tr>
<td>FDP13DM</td>
<td>Design tasks involve both objectivity and subjectivity with objective justification and analysis used to support subjectivity</td>
</tr>
<tr>
<td>FDP14DM</td>
<td>Objective and subjective volition are embodied in design activities</td>
</tr>
</tbody>
</table>

Table 7.44 continues on next page
Designers work in teams

The materialisation of products is a result of one’s volition, way of thinking, agency and intention

Design education should shift from conventional educational models that foster inward looking-practice to those that foster collaboration and design with users

Pedagogy should be grounded in a constructivist, student-centered approach that fosters engaged, active learning on the part of students, through increased peer collaboration, dialogue and feedback, in which educators assume the role of facilitators that guide learning experiences rather than transmitting knowledge

Opportunities should be created for students to transform themselves by learning to become agents of change

Teaching and learning should be grounded in studio-based pedagogy and project-based learning

Role-playing is an effective pedagogical strategy to imitate professional design practice

Learning spaces should be equipped with discipline-specific, specialised resources

Students should receive a written project brief outlining a simulated wicked design problem, a time frame for completion, and design constraints

Students should work in groups to execute design projects

Activity tasks should include an audit trail to record and justify all design activities

These design principles are important given the underlying nature of teaching and learning in FD and the need to link theory to educational practice in order to educate student to become agents of change and learn to become future proponents of HCD. The design principles for fashion design praxis are necessary because students are educated to enter this particular field and it is imperative for FD education to consider the four identified modes in teaching and learning. Finally, FD education forms part of design education, as such, design principles regarding DEP are fundamental to link theory to educational practice. These design principles address the third and final purpose of the present chapter and constitute the theoretical contribution of this inquiry.

In addition, as a contribution to FD educational practice, the main teaching and learning intervention was refined (refer to Addendum P) for adaption and evaluation in the module as future research. Three fundamental improvements were made to refine the teaching and learning intervention. Firstly, as presented in DEP2 (refer to Table 7.44) that emerged from the findings presented in sub-section 7.8.4, the timeframe for the refined intervention is structured
around a six-week, non-linear block. Secondly, to mitigate the disabling factor of non-participation of students, lack of punctuality, poor attendance and non-constructive engagement with ATs (refer to section 7.9) the refined intervention is structured to include a three-member design team. Thirdly, in an attempt to overcome the disabling factor presented in section 7.9 regarding timetabling and learning resources, the refined intervention is designed to accommodate execution of design and technology-related ATs in one studio. The present chapter concludes with reflection on the manner in which the three-folded purpose of this chapter was achieved.

7.11 CONCLUSION

Chapter 7 addressed Phases 4 and 5 of the current research, discussing the main intervention carried out, with a three-fold purpose. Firstly, the chapter sought to contextualise the design and implementation of the main study. Secondly, it aimed to ascertain the effects of the HCD approach and its underlying design principles to FD education by making reference to the empirical findings gathered. Thirdly, the chapter put forward a final set of design principles with respect to HCD, fashion design praxis and DEP, as a theoretical contribution of this inquiry. In addition, the main teaching and learning intervention is refined for adaptation in the module, as a contribution to FD education practice and future research (refer to Addendum P).

With regard to the first purpose, the discussion in section 7.2 framed the design and implementation of the main study by contextualising the module scope, participating students, DEP strategies and ATs. Following this, the UO, SLOs and ATs were aligned with the refined set of design principles in section 7.3. To achieve the second purpose, I drew on the data collection and analysis that emerged from participant observation, student questionnaires and face-to-face facilitator interviews. Artefacts, in the form of self-created photographs, were used to support interpretations. The findings were first mapped in section 7.4, as including four main research themes, namely: 1) activities in the HCD fuzzy front-end design process, 2) emergent issues during the main intervention, 3) the effects of the HCD approach and its underlying design principles to FD education, and 4) participant experiences of a HCD approach to FD education. These themes are depicted in Figure 7.2. In section 7.5, I drew on participant observation and artefacts to present findings pertaining to students’ design-related activities in the different stages of the fuzzy front-end design process. Discussion then shifted, in section 7.6, to deliberate on issues that emerged during the main intervention, regarding non-
participation of students, lack of punctuality, and challenges around the timetable and learning resources. Following this, section 7.7 presented student and facilitator responses regarding the effects of the HCD approach and its underlying 12 design principles to FD education. Section 7.8 presented consideration of participants’ holistic experiences regarding a HCD approach to FD education. Drawing from the discussion of empirical findings, section 7.9 teased out the main findings that correspond with each of the four research themes and proposed relationships between these research themes and findings.

Finally, in section 7.10, I referred back to the design principles regarding HCD, fashion design praxis and DEP that were used to design the main study, and began a process of refining these in order to propose a final set of design principles for FD education grounded in HCD. These final design principles constitute one of the theoretical contributions of this study, which is further deliberated upon in Chapter 8. In terms of contribution to FD educational practice, the teaching and learning intervention was also refined (Addendum P) for adaption and evaluation in the module, as future research, which is also further discussed in Chapter 8. In Chapter 8, I conclude this study by reflecting on the undertaking of this research. Moreover, in Chapter 8, I also deliberate on the inter-relations between the design principles, describe the limitations of this study, propose further study and locate the contribution of the present study.
CHAPTER 8

CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

In addressing Phases 4 and 5 of the present research (that is, the main study), Chapter 7 described the design and implementation of a second teaching and learning intervention. In addition, Chapter 7 presented the empirical findings regarding the effects of the HCD approach and its underlying design principles to fashion design (FD) education, and proposed a final set design principles for HCD, fashion design praxis and design education pedagogy (DEP) as a theoretical contribution for use in future interventions. Chapter 8 also serves a three-fold purpose. The first purpose is to provide a synopsis of the preceding chapters that have laid out this study, as well as their alignment with the respective research phases. The second purpose of the present chapter is to describe the limitations of the study and scope out recommendations for future study. Finally, the chapter concludes with deliberation on the contributions of this work.

8.2 SYNOPSIS OF CHAPTERS

8.2.1 Introduction and background (Chapter 1)

8.2.1.1 Working premise

As noted in section 1.2, design is both a noun and a verb and it has multiple meanings. However, I proposed a working definition of design as the co-evolution of problem and solution, and as a deliberate way of thinking and acting directed by volition that manifests itself in the manner in which human beings execute actions and activities. I extend this meaning to include the discipline of fashion design, the focus of this study. In section 1.3, I described fashion as a noun and fashion design as a verb that involves practice, process and product. In section 1.4, I argued that the discipline of fashion design lacks sufficient research and well-formulated theoretical frameworks, and borrow from Love’s (2000) meta-theoretical taxonomy of design theory, from the philosophy of design, as a point of departure.
Thereafter, in sub-section 1.5.1, I argued that the study of design process is an area of inquiry known as design methodology. I positioned fashion design to align with Dorst’s (1997) dual-mode model for design method. This is because, on the one hand, it involves solving problems in a relatively positivist way but, on the other hand, the design process is less-structured aligning it within a constructivist, reflective practice paradigm. In sub-section 1.5.2, I proposed a working definition for fashion design, purposefully using the word ‘fashion design praxis’ to holistically capture the way one thinks about and approaches fashion design, the underlying volition, the knowledge and the actions undertaken in the design process that culminate in development of a product. I use the word ‘practice’ to refer to the know-how application of fashion design praxis. Praxis, as opposed to practice, raises the potential to incorporate new theories and new ways of engaging with design thus making it possible to transform the current situation into a preferred one, and aligning with the paradigm shifts currently occurring in design praxis.

8.2.1.2 Paradigm shift in design praxis

Section 1.6 shows that design praxis is generally practiced within a technology-driven design (TDD) paradigm, which is characterised by market-driven considerations and which places emphasis on the designer as lone-genius who designs for imagined consumers based on inward-looking practice. However, the general design landscape is shifting towards HCD and environmentally-sustainable design, which take into account externally-driven processes and place people and planet at the core of design. HCD is a mind-set, a world-view, a way of thinking and an approach to design praxis that is increasingly prominent in design discourse and research. However, as shown in section 1.7, HCD remains non-prominent in professional fashion design praxis. I argue this situation ought to change to make the discipline more relevant and align with current design discourses.

8.2.1.3 Framing fashion design (FD) pedagogy and the need for change

Aligning with the shifts in general design praxis, in section 1.8, I reasoned that educational values and ideologies are changing, across design education, from a stylistic inward-looking practice to an externally-driven process. However, in section 1.10, it was seen that FD pedagogy remains grounded in a TDD paradigm in which students draw inspiration from secondary visual research to become lone-genius or star designers who design for themselves.
or for imagined consumers based on their own subjective feelings, imagination and need for self-expression, resulting in what I term an inward-looking practice. Conventional teaching and learning within FD education is outdated and may no longer suffice, considering that the design landscape is changing and that the notion of the lone-genius designer has out-lived itself. Scholarship, both in SA and internationally, suggests that FD education is shifting in order to align with environmentally-sustainable praxis.

8.2.1.3 Framing the research problem within a South African higher education context

In section 1.11, I argued that transformation of FD education is possible through shifts in mindset and introduction of pedagogical methodologies that ensure that students learn to become design activists and agents of change who design with the needs of people and planet in mind. I call for change in conventional ideologies and pedagogies within FD education, through a HCD approach. HCD can be used as a research strategy or as a design approach. However, I opt to position this study within a HCD approach to FD education, and argue that such an approach is important given the shifts in design praxis. HCD is thus a platform for students to learn values and ideologies that will enable them to engage in HCD and become agents of change. I argue that HCD can add value to pedagogical activities and design knowledge but that FD education in SA HE from a HCD perspective is an under developed area of research, lacking academic rigour and scientific investigation. However, HCD is particularly relevant given the national and international shift towards HCD and, even more so, the call for inclusive and collaborative design in education.

As discussed in section 1.11, the challenge facing FD education in SA HE is that it continues to be dominated by a TDD paradigm and conventional educational models are grounded in traditional ideologies and pedagogies that continue to foster inward-looking culture. Without scientific inquiry and rigour, it becomes unclear how FD students in SA can be educated in a manner that allows for and incorporates the user as an inclusive collaborator in design process activities. The extent to which such an approach might add value and contribute to pedagogical activities within FD education in SA has not been scientifically explored as yet.
8.2.1.4 Framing the aim, research question and objectives

To address the research problem, this study aimed to explore and establish underlying design principles for HCD, and its effects to FD education in SA HE (refer to section 1.12). However, as noted in section 1.12, effects in this study refer not to cause and effect relations, but to participant views and experiences regarding the design principles of HCD. To achieve the overarching aim, in section 1.13, I formulated the main research question involving the pedagogical strategies and underlying design principles of HCD and its effects to FD education in SA HE. Moreover, objectives were formulated that parallel the various research phases, as was shown in Table 1.1.

8.2.1.5 Personal assumptions and rationale

In section 1.14, I clarified my bias as a Senior lecturer in the Department of Fashion Design at a SA urban HEI with 22 years of experience in FD education. My personal rationale for this study was presented as: to add empirically-based scientific value to the current scope and intent of FD education in HE in SA, and to contribute to the faculty’s niche research areas and the institution’s drive for research-led teaching and learning. To align with my personal assumptions and rationale, in section 1.15, I presented a conceptual framework (refer to Figure 1.2) that guided the research. Having clarified my personal assumptions and rationale, the subsection that follow provides a synopsis of the research design that guided this research.

8.2.1.6 Synopsis of research design

To guide this research, in section 1.16, I provided a synopsis of the research design, as seen through the lens of DBR. Section 1.16 also outlined the primary and secondary units of analysis, the methods employed to identify participants and collect and analyse data as per the various research phases (refer to Table 1.3, for a data collection and analysis matrix). That section also outlined the methods used to ensure trustworthiness within the study. Chapter 1 concluded with a chapter outline.
8.2.2 Research design (Chapter 2)

In section 2.2, it was noted that this study was undertaken through the lens of DBR, which was selected due to the nature of the inquiry, namely that it is grounded in defining design principles with which to guide iterative cycles of teaching and learning interventions. I identified the goals of DBR as aligning with the respective research phases in the study, as was shown in sub-section 2.2.4 and in Figure 2.1. Embedded within DBR, I made use of an interpretive paradigm, social constructivism and a qualitative research approach and justified the appropriateness of these for this investigation (refer to sections 2.3 and 2.4 respectively). Also within DBR, as explained in section 2.5, the primary unit of analysis was identified as FD education, although a secondary unit of analysis centred on professional fashion design praxis.

Turning to research methodology, I explained what methods were used, why they were selected and how they were applied in this study. As mentioned in section 2.7, purposive sampling guided the selection of participants based on specific criteria. Participants for the secondary unit of analysis comprised of two professional, Johannesburg-based fashion designers and one user. For the primary unit of analysis, the participants included myself as participant observer, a cohort of first-year FD students registered for a Bachelor of Arts (BA) FD programme, and two FD facilitators.

Regarding data collection, as discussed in section 2.8, this study employed multiple data collection methods to elicit both theoretical (for Phases 1A, 1B, 1C and 1D) and empirical information (for Phases 1E, 2, 3, 4 and 5). Sub-section 2.8.5 showed the methods used to record, transfer and preserve the safety and security of data. To analyse the empirical data, a constant comparative method of analysis was deployed in order to code raw data and generate categories and research themes. This occurred through deployment of two coding cycles (refer to section 2.9). To ensure trustworthiness and ethical research practice, in sections 2.10 and 2.11, respectively, I outlined several methods and application thereof, as aligning with my meta-physical beliefs and the implications of this research (see section 2.12).
8.2.3 Theoretical perspectives on philosophy of design and human-centered design (Chapter 3)

Chapter 3 addressed Phases 1A and 1B of the research aimed at establishing a personal philosophy of fashion design praxis and review scholarship in order to define tentative design principles for HCD for application in a pilot teaching and learning intervention. To attain this purpose, in section 3.2, I discussed Love’s (2000) meta-theoretical taxonomy of design theory and Mitcham’s (1994) framework regarding the four modes of manifestation of technology. As shown in sub-section 3.2.2 (and visualised in Figure 3.1), Love frames the meta-theoretical taxonomy of design theory within the core levels of: 1) direct perceptions of reality, 2) objects, 3) design process, and 4) philosophical matters. In sub-section 3.2.3 (and illustrated in Figure 3.2), Mitcham’s framework was shown to involve four modes of manifestation of technology: 1) volition, 2) knowledge, 3) activity, and 4) object. Against this background, I selected the modes of: 1) volition, 2) design knowledge, 3) design methodology and 4) product as overarching theoretical elements with which to propose my philosophical framework for fashion design praxis, which was presented in section 3.3 and illustrated in Figure 3.3.

Drawing from this philosophical framework for fashion design praxis, I positioned HCD as the underlying volition underpinning Phase 1B, which sought to review scholarship pertaining to the underlying design ethos of TDD and HCD, juxtaposing these two paradigms (refer to section 3.4). Discussion then moved on to the background for HCD, in section 3.5, and clarification of terminology as well as differences regarding user-centered design (UCD) and HCD. By reviewing scholarship pertaining to HCD principles (refer to section 3.6.1), in section 3.6.2, I was able to present a tentative set of 24 design principles for HCD with which to engineer a pilot intervention.

8.2.4 Theoretical perspectives: Fashion design praxis and design education (Chapter 4)

Chapter 4 addressed Phases 1C and 1D of the research. For Phase 1C, I drew on the four modes of volition, design knowledge, design methodology and product (the elements from my proposed philosophy for fashion design praxis) in order to review literature and define a tentative set of design principles for fashion design praxis. In section 4.2, I explored the notion of volition framing it within becoming an agent of change through design-with-intent and motivation and intention manifesting in action. This streamlined to professional fashion design
praxis, where volition was argued to manifest in inward-looking practice, design for consumers, or in HCD approaches (refer to section 4.3). Section 4.4 explored the construct of knowledge and knowledge types, the relevance of which for design, in general, and fashion design, specifically, was shown. Design methodology was addressed in section 4.5, which provided a historical overview and three paradigms for design method, namely Simon’s (1982) positivist, rational problem-solving paradigm, Schön’s (1995) constructivist, reflective practice paradigm, and Dorst’s (1997) dual-mode model. Moreover, discussion included consideration of design processes models applied within fashion design praxis, and the fuzzy front-end design process model put forward by proponents of HCD. In section 4.6, product as a fourth mode in my proposed philosophy of fashion design praxis was discussed. Herein, attention was given to the physical characteristics of products as well as the intentional manifestation of one’s volition, thinking, agency and deliberate action as reflected in products. This chapter culminated in identification of 34 tentative design principles for fashion design praxis, presented in section 4.7, with which to guide the pilot study.

Regarding Phase 1D, deliberation focused on the overall scope of design education and pedagogy, with a view to defining tentative design principles for DEP that could inform design of the pilot study. In section 4.8, I reviewed scholarship regarding movements within design education and, in section 4.9, gave attention to DEP and the characteristics of studio-based (SB) pedagogy. In section 4.10, I discussed typical pedagogical strategies used within FD education. Based on this, in section 4.11, I presented 32 tentative design principles for DEP that informed design of a pilot study.

8.2.5 Professional fashion design praxis: Design process and alignment with design principles of human-centered design (Chapter 5)

Chapter 5 addressed Phase 1E of the study, and achieved the two-fold purpose of exploring and describing the design process activities of two Johannesburg-based professional fashion designers and aligning these activities with the tentative design principles for HCD. This was done in order to find commonalities between theory and praxis. Based on analysis of the raw data obtained, the empirical findings were categorised into three research themes: 1) design context and volition manifestation in practice, 2) design process, and 3) role of users in design process and alignment with design principles of HCD.
Within the first research theme, a first category pertained to the design context, particularly the customer profile of each fashion designer and their intention to pursue a lifestyle design approach (refer to sub-section 5.2.1). In a second category, discussed in sub-section 5.2.2, it was observed that the volition of the designers manifested in a view of the designer as expert, as well as notions of ‘design for’ and ‘design with’. Within the second research theme, described in section 5.3, the first category pertained to the manner in which each fashion designer approaches the design process in terms of the design method paradigms. The design process includes categories pertaining to the activities associated with the initial, conceptualisation, experimental and prototypes stages as well as refinement and evaluation. In section 5.4, the third research theme, pertaining to the role of users in the design process and alignment of the designer’s practice with the tentative design principles for HCD, was discussed. While one of the professional fashion designers displayed alignment with 19 of the 24 tentative design principles for HCD, no new design principles emerged from the data collected from the professional fashion designers.

**8.2.6 Pilot study: Design, implementation and summary of findings (Chapter 6)**

Chapter 6 addressed Phases 2 and 3, in the form of a pilot study. The chapter had a three-fold purpose: 1) to describe the pilot teaching and learning intervention, as grounded in a HCD approach to FD education, 2) to present a summary of the findings obtained, and 3) to execute a retrospective analysis in order to refine the design principles for HCD, fashion design praxis and DEP, with which to design the main study.

In section 6.2, I gave an overview of the module and programme for which the pilot study was designed and implemented, as well as the strategies employed in order to design the pilot teaching and learning intervention. To prepare students prior to implementation of the pilot study, as discussed in section 6.3, I explained the supporting module and the unit outcomes (UOs) thereof, as well as the learning environment, conceptual knowledge content and applied pedagogical strategies. In section 6.4, I discussed the design and implementation of the pilot study, including the UO addressed and the specific learning outcomes (SLOs). Also in section 6.4, strategies for a DEP grounded in SB pedagogy were described. These involved: 1) role-playing as a strategy to simulate practice, 2) the use of a project structured around a brief, 3) assessment instruments, 4) activity tasks (ATs), and 5) the constructive learning space and
timetable. In section 6.5, I aligned the UOs, SLOs and ATs with the tentative design principles for HCD, fashion design praxis and DEP.

Thereafter, I moved on to the second purpose of Chapter 6. In section 6.6, I mapped out a structure in which to summarise the findings obtained. This structure was framed around three main research themes: 1) design process activities, 2) facilitator perspectives on the HCD approach to FD education, and 3) student perspectives on the effects of the HCD approach and its underlying tentative design principles to FD education. These main research themes included various categorises, which are depicted in Figure 6.1. The first research theme reported on data obtained from participant observations, supported by self-created photographs, regarding the design process activities executed by the participating students (refer to section 6.7). The second research theme, reported on in section 6.8, drew on data obtained from the participating facilitators regarding their perspectives on a holistic, HCD approach to FD education. Finally, section 6.9 discussed the third research theme, which emerged from analysis of student data and concerned their perspectives on the effects of the HCD approach and its 24 tentative design principles, as implemented in the pilot study.

The third purpose of Chapter 6 was then achieved in section 6.10 through retrospective analysis regarding two dimensions: 1) refinement of the tentative design principles, and 2) refinement of the pedagogical strategies employed. The tentative design principles were consolidated or eliminated, giving rise to a refined set of re-named and re-coded design principles, including 12 HCD (presented in Table 6.11), 19 fashion design praxis (seen in Table 6.12) and 19 DEP (crafted in Table 6.13). The pedagogical strategy also required improvement and strategies to do so were presented in Table 6.14. These refined design principles and improved pedagogical strategies informed design and implementation of the main study.

8.2.7 Main study: Design, implementation and discussion of findings (Chapter 7)

Chapter 7 addressed Phases 4 and 5 of the research, and also sought to achieve a three-fold purpose. Firstly, the chapter sought to describe the design and implementation of the main study. Secondly, it aimed to ascertain the effects of the HCD approach and its underlying design principles to FD education with reference to the empirical findings obtained. Thirdly, the chapter put forward final design principles for HCD, fashion design praxis and DEP, as a
theoretical contribution, along with a refined teaching and learning intervention for adaptation in the module, as a contribution to FD education practice and future research.

Regarding the first purpose, in section 7.2, I discussed the design and implementation of the main study by explaining the module and programme scope. In the same section, I explained the strategies for DEP, which was framed by SB pedagogy. In Table 7.1, I explained the manner in which improved pedagogical strategies emerged from the pilot study and were refined for the main study. An ideation tool (Figure 7.1), designed for implementation in the main study, was also introduced. Still in section 7.2, strategies for DEP were highlighted, including: 1) role-playing as a strategy to simulate practice, 2) the project (as intervention) which included UO and SLOs, 3) assessment instruments and ATs, and 4) the constructive learning environment and timetable. In section 7.3, I aligned the UO, SLOs and ATs with the refined design principles.

Regarding the second purpose, I drew on analysis of data emerging from participant observation, student questionnaires and facilitator face-to-face interviews to present empirical findings. Artefacts, in the form of self-created photographs, were used to support this discussion. The findings were first mapped out in section 7.4, as including four main research themes: 1) activities in the HCD fuzzy front-end design process, 2) emergent issues during main intervention, 3) the effects of the HCD approach and its underling design principles to FD education, and 4) participant experiences of a HCD approach to FD education. These main research themes comprised of categories (some with sub-categories) as was depicted in Figure 7.2.

In section 7.5, the first research theme drew on participant observation and artefacts to present findings related to student design activities within the different stages of the fuzzy front-end design process. In section 7.6, I drew on participant observation to identify emergent issues during the main teaching and learning intervention, including non-existent designer, lack of punctuality, non-constructiveness and timetable and learning resources. The third research theme, presented in section 7.7, involved student and facilitator responses regarding the effects of the HCD approach and its underlying design principles to FD education. Finally, the fourth research theme, discussed in section 7.8, describes participants’ holistic experiences regarding the HCD approach to FD education. Based on these findings, in section 7.9, I drew out the main findings and proposed relationships between the four research themes and main findings.
Thereafter, in section 7.10, I addressed the third purpose of Chapter 7, by referring back to the design principles for HCD, fashion design praxis and DEP that were used to design the main study, refining them and putting forward a final set of design principles (refer to Table 7.44) for FD education to consider in order to be grounded in a HCD approach. Although this study focuses on FD education, the design principles for HCD and DEP could be extended to any design discipline. In the same light, as noted in sub-sections 1.16.1 and 2.2.1, the context-specific nature of DBR necessitated the focus of this study on fashion design and the education thereof. However, the design principles of fashion design praxis, presented in Table 7.44, may also extend to other design disciplines, or where products are somewhat different to clothing, as the outcome of design and technological processes in fashion design. As seen in Table 7.44, these final design principles include nine HCD, 16 fashion design praxis, organised around the four modes of volition (V), design knowledge (DK), design methodology (DM) and product (P), and 16 DEP principles. In the subsequent section, possible inter-relations between these design principles, as outlined in Table 7.44, are presented.

### 8.3 DESIGN PRINCIPLE INTER-RELATIONS

The design principles of HCD represent a theory, mind-set, volition, way of thinking and approach that has the potential to change fashion design praxis making it more relevant to transforming situations and discourse. This gives way to possible inter-relations between HCD and fashion design praxis as shown in Figure 8.1 (see arrow 3). Possible inter-relations can also be drawn between the design principles of HCD and DEP (see arrow 1 in Figure 8.1) as transformation of fashion design praxis may be made possible through FD education because this is the platform where students learn to become agents of change as future professional fashion designers. As such, arrow 2 in Figure 8.1 indicates possible inter-relations between the design principles of DEP and fashion design praxis. If opportunities are created for FD students to be educated and trained within a HCD approach then, when they become professional designers, they may well align themselves with this changing praxis. After all, it is at the level of education that FD students acquire the values, ideologies and knowledge that inform their future practice as fashion designers.
If DEP strategies are not designed to accommodate conceptual knowledge about the design principles of HCD, the underlying design ethos, thinking, approach and volition (see arrow 1), then students might not have the know-how to support co-dependency with procedural knowledge. Moreover, without conceptual and procedural knowledge co-dependency, FD students might not be in a position to change from an inward-looking practice to one that grounds fashion design praxis in HCD (see arrow 2). The possibility exists that without the inter-relationship of HCD and DEP (see arrow 1), upon entering the professional world, FD students may well continue to deploy mainstream fashion design praxis without eradicating the misguided perceptions of HCD. As such, possible holistic inter-relations exist between the three main categories of HCD, DEP and fashion design praxis.

Clear roles for designers and users within HCD may assist in rooting out such erroneous perceptions in fashion design praxis. Drawing from the HCD perspectives discussed in sections 3.5 and 3.6, Figure 8.1 show that designers assume the role of researcher, co-designer, co-creator and collaborator within HCD (see arrow 5). These designer roles merge with those of users who assume the roles of knowledge generators, and participants in design and development, which gives way to becoming co-designers, co-creators, collaborators and evaluators of design solutions. DEP strategies should be designed in a way that accommodates the merging of these designer and user roles, as shown using arrow 4 in Figure 8.1. Similarly,
when FD students enter the professional world, they might adopt a HCD approach and work with actual users hence merging their role as designers with that of users to engage in fashion design praxis (see arrow 6 in Figure 8.1). Although possible inter-relations exist between the design principles as well as designer and user roles, in retrospect, this study has some limitations, but also paves the way for future study.

8.4 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE STUDY

8.4.1 Limitations of the study

This section addresses the second purpose of the current chapter. The following limitations are identified, based on reflection upon the findings that emerged from the pilot study:

- As was seen in sub-section 6.4.2, the pilot study was designed to extend over a four-week block of formal contact sessions. However, participant observation (refer to sub-section 6.7.4) found that this timeframe was insufficient. Similarly, in sub-section 6.8.2, it was found that facilitator responses also identified insufficient time for the project. Also, the ATs presented in Table 6.3 did not include making of a product. In retrospect, the project timeframe should have been longer to accommodate product development, so that students could engage with all five stages of the fuzzy front-end design process model.

- As was discussed in sub-section 2.8.3.3 and section 6.6, to collect data from facilitators, I used electronic, self-administered, semi-structured, open-ended questionnaires aimed at ascertaining the holistic main effects of the HCD approach to FD education. Firstly, although I found this data informative, the responses obtained from one particular facilitator were too broad and yielded irrelevant data in some instances. Secondly, the purpose and scope of the semi-structured, open-ended questionnaire was wide-ranging and should have aimed at ascertaining the main effects of the HCD approach and its underlying 24 design principles. Thirdly, this data collection method was not suitable because it did not allow for probing for clarification.

- The pilot study was flawed, in that there were too many tentative design principles for HCD, fashion design praxis and DEP. As such, it was challenging for students to implement 24 design principles of HCD in practice. On reflection, the design principles should have been consolidated from the onset.
Concerning the first limitation, I counteracted this situation in the main study by extending the period to seven-weeks (refer to sub-section 7.2.2.8). With regard to the second limitation, as stated in sub-section 2.8.4.4, I amended the data collection method for facilitators as well as the purpose thereof in the main study.

Nonetheless, the following limitations are drawn from reflection upon the findings emerging from the main study:

- As discussed in sub-section 7.2.2.2, and depicted in Figure 7.1, an ideation tool was specifically designed for implementation in the main study. On review, this should have been designed and implemented in the pilot study to allow for refinement in the main study. Beyond that, the term ‘ideation tool’ is perhaps inappropriate; it should perhaps be called a generative tool given its focus on the productive dimensions of: 1) generating primary information, design criteria and constraints, 2) brainstorming incubated design ideas, and 3) developing an action plan.

- As was seen to emerge in sub-sections 7.6.4 and 7.8.4, and in the relationships drawn out in section 7.9 (and in Figure 7.11), timetable and learning resources were an emergent issue and disabling factor, given that design and technology-related activities took place in two separate studios. This hindered instantaneous prototype experimentation during the concept stage and, more so, prevented iteration between design and technological processes. As such, separation of the design and technology studios did not support instantaneous iterative design, which resulted in wasted time during the concept stage.

- As discussed in sections 7.6 and 7.9 (and depicted in Figure 7.11), one designer was non-existent. Punctuality, absenteeism and non-constructive engagement with ATs amongst some students was also an emergent issue and disabling factor in the main study. In retrospect, as mentioned in section 7.6, three-member rather than two-member design teams may have counteracted this problem. The refined teaching and learning intervention proposed for future study into improving educational practice is designed to accommodate three-member design teams (refer to Addendum P).

With reference to the second limitation in the main study, design and technology-related activities ideally should have occurred in one studio. However, this situation was beyond my
control and was due to the manner in which the FD department structures the timetable in order to accommodate six levels of undergraduate study. Despite these limitations, this study presents valuable opportunities for future study.

8.4.2 Recommendations for future study

Given that discourse on fashion design and FD education are underdeveloped areas of research, in this section, I recommend future study in both professional and educational contexts.

As noted in sub-sections 1.16.1 and 2.2.1, I acknowledge that this study may be applicable to disciplines such as architecture and industrial design, but the context-specific nature of DBR necessitated that this study be located in FD education. As such, it is recommended that this study be replicated in disciplines such as architecture and industrial design.

Sub-section 7.2.2.2 described the design and implementation of an ideation tool or, more preferably, a generative tool. This was not the intention of this research but became necessary in order to guide design-related activity and generate an action plan. As such, it is recommended that this generative tool may well be investigated, evaluated and refined as a possible future study within FD education.

The findings presented in sub-section 7.7.8.4 demonstrate the dualism between real-world contexts (with external users) and a role-played, simulated educational setting (with internal users, or students). One facilitator argued that if external users were included in the educational setting, the teaching and learning intervention would require re-conceptualisation. This finding paves the way for future study. The final design principles for HCD presented in Table 7.44 could be used to design teaching and learning iteration cycles for implementation with external people serving the role of users in order to ascertain if such a study might yield the same results as were seen in the case of a role-playing strategy. A similar study may also be conducted in disciplines such as architecture and industrial design.

The final design principles for HCD, fashion design praxis and DEP (presented in Tables 7.44 and 8.1) could be refined through further iteration cycles. In addition, in section 7.10, as a contribution to FD education, the main teaching and learning intervention is refined to include three improvements. This refined teaching and learning intervention is presented as Addendum
P. Nonetheless, further study is recommended regarding: 1) refinement of the design principles through further iteration, and 2) implementation and evaluation of the refined teaching and learning intervention. In the same light, a similar study may also be conducted in disciplines such as architecture and industrial design, wherein the design principles of fashion design praxis can be amended to relate to the respective discipline-specific products.

In addition to the above-mentioned recommended studies, the responses obtained from one facilitator highlighted a disjuncture between design quality and quantity with respect to design-related activities (refer to section 6.8.4). This raises a question regarding whether a well-developed, quality design solution is a result of an engaged design process that includes objective, well-documented, rich information, analysis and justification that foreground internal thought processes and support subjectivity or whether quantifiable, stimulating imagery constitute quality design. In light of this, future study is recommended aimed at investigating student design process activities to ascertain whether a well-developed design solution is a result of visual inspiration or objective, qualitative, rich information, documentation, analysis and justification. Moreover, future study could investigate student design process activities through the theoretical lens of the dual-mode model of design method.

Also emerging from the pilot study, the responses obtained from one facilitator show a disjuncture between design activities and technological manufacturing operations (refer to section 6.8.4). This implies that quality design may be measured in terms of technological, manufacturing and industrial operations, rather than, for example, design thinking, justification, conceptualisation, feasibility, functionality or user satisfaction. In an educational setting, the same facilitator points out that technological process work content regarding industrial manufacturing operations are important because these differentiate between assessment results. That is to say, in an educational context, the more sophisticated technological manufacturing operations are, the higher student assessment results might be. However, this may or may not result in quality design. FD education needs to consider whether design activities associated with developing design criteria, generating ideas, conceptualising design solutions, evaluating prototypes and iteration should be the core of design, or if manufacturing operations are central. Furthermore, teaching, learning and assessment strategies within a vocational programme should differ from those of a BA programme, given the different scope and purposes of these qualifications. However, the recommendation from one facilitator is that technological and industrial aspects should be assessed in the same way.
as they are in a vocational programme. These findings paved the way for various recommended studies below:

- Investigation into the extent to which FD education considers design-related activities or technology-related manufacturing operations as the core of design.
- Comparative study to investigate co-dependency of knowledge types, teaching, learning and assessment strategies in vocational programmes and BA programmes.
- A blended approach to investigate student learning styles, the types of knowledge taught and learned combining a HCD approach with traditional FD education.
- Investigation into the dimensions of design quality.
- Exploration into whether quality design is evaluated in terms of its intended use, feasibility, desirability, functionality and user satisfaction, or in terms of quantifiable, technological manufacturing operations.

Moreover, the four modes of volition, design knowledge, design methodology and product in my proposed framework for a philosophy of fashion design praxis (presented in section 3.3), could be researched as individual units of analysis in order to introduce new perspectives on praxis. This paves the way for various future studies:

- Investigation into the volition of fashion designers and how this influences praxis.
- Exploration of the extent to which current fashion design knowledge no longer suffices in a changing design landscape: with alternative volitional factors emerging, new forms of conceptual and procedural knowledge and understanding may need to inform praxis thus creating the possibility for broadening the scope of research both for and about fashion design praxis.
- Alternative volition and new forms of design knowledge have the potential to change designer choices, justification, cognition, and design processes, which may require investigation.
- Investigation into the fourth mode, product, may offer the potential to question the ontological nature of products, and the relationship between designer, intention and product.
To strengthen scholarship around these four modes, the above-mentioned research studies could be undertaken within both professional fashion design praxis and in educational contexts. Similarly, the studies proposed above have the potential to strengthen scholarship on teaching and learning in FD education. This study contributes to scholarship of teaching and learning in FD education in SA HE but also to professional fashion design praxis, as will be highlighted in the section that follows.

8.5 CONTRIBUTION OF THIS STUDY

Theoretically, this study contributes principally to scholarship on design education, particularly with regard to the design principles for HCD, fashion design praxis and DEP (presented in Table 7.44), which outline the elements of a new approach to FD education in HE in SA, one that adopts a HCD approach. Similarly, the design principles for HCD and DEP can contribute to the broader design education discipline. Similarly, the design principles of fashion design praxis, presented in Table 7.44, may be adapted for application in other design disciplines where products are somewhat different to those of fashion. A HCD approach brings about knowledge of alternative teaching and learning pedagogies that involve active collaboration between users and designers. This is ground-breaking, research-led teaching as there does not appear to be similar doctoral study undertaken in FD education in HE either in SA or internationally. Moreover, research-led teaching embedded in HCD in FD education in a HE context has never been scientifically explored through iteration cycles. As such, this study deepens the traditional, practicum-based stance within FD education and supports research-led teaching and learning.

From a pragmatic perspective, the refined teaching and learning intervention (in Addendum P) could be adapted and evaluated in future research, and is a contribution to FD educational practice. As a secondary contribution, this study contributes to HCD praxis so that FD students can learn to become agents of change in their careers as future fashion designers, thus transforming an existing design situation into a preferred one by incorporating users as collaborative design partners. In doing so, when students enter the real-world, they may be better equipped with the knowledge, skills and tools required to engage in professional HCD, which will be particularly important given the advent of the fourth industrial revolution.
8.6 CONCLUSION

This chapter had a four-fold purpose. In section 8.2, I provided a synopsis of the preceding chapters and aligned these with the research phases. The second purpose was achieved in section 8.3, in which I drew on the final design principles presented in Table 7.44 to draw possible inter-relations between these principles. The third purpose was achieved in section 8.4, in which I outlined the limitations of this study and recommended future studies. Section 8.5 addressed the final purpose, outlining the theoretical and pragmatic contributions of this study.

In conclusion, and on a personal note, this research study broadened my knowledge about the discipline of fashion design and foregrounded alternative forms of thinking about and approaching praxis. Moreover, as a FD educator, I believe that this research has improved my educational practice by grounding me in an ideological position from which I seek to educate FD students such that they learn to become agents of change, and to design with people in an inclusive and collaborative manner.


ADDENDUM A: INTERVIEW LINE OF INQUIRY WITH PROFESSIONAL FASHION DESIGNERS

1. What is your approach to a design process?
2. Tell me about your design process activities.
3. At which stages in your design process do you make rational selections and decisions?
4. At which stages in your design process do you use creativity?
5. At which stages in your design process do you use reflection?
6. Who can be regarded as users of your designed products?
7. Should users’ have any voice or play any role in designers’ design processes or intentions?
8. In what way do users’ play any role in your design intentions (objectives) and process?
9. To what extent do you agree/disagree with the following statement: ‘My users’ are actively engaged in my design processes’? Please motivate your answer.
10. Should users’ needs be taken into account in a designer’s design processes?
11. If users’ are involved in your design process, do you gain any new knowledge and learn from them? If so, can you please elaborate on this?
12. What are the advantages and disadvantages of user involvement in the design processes and intentions?
13. Should users’ needs and preferences play any role in the evaluation of design solutions?
ADDENDUM B: FACILITATOR QUESTIONNAIRE FOR THE PILOT STUDY

What in your view, were the main effects (impact or outcomes) of the human-centered design approach to fashion design education?

Any further comments or recommendations about the human-centered design approach to fashion design education to refine the teaching and learning intervention.

THANK YOU FOR YOUR PARTICIPATION
<table>
<thead>
<tr>
<th>CODE</th>
<th>DESIGN PRINCIPLE</th>
<th>QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1</td>
<td>Users as core and source of inspiration</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
</tr>
<tr>
<td>HCD2</td>
<td>Design is with users and not for users</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
</tr>
<tr>
<td>HCD3</td>
<td>Integration of primary research and design</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
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<tr>
<td>HCD4</td>
<td>Identify and address user needs, goals and preferences</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
</tr>
<tr>
<td>HCD5</td>
<td>Context of use</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
</tr>
<tr>
<td>HCD6</td>
<td>Translate user needs into requirements</td>
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<td>------</td>
<td>----------------------------------------</td>
<td></td>
</tr>
<tr>
<td>HCD7</td>
<td>Users as joint partners with active user involvement</td>
<td></td>
</tr>
<tr>
<td>HCD8</td>
<td>Collaboration</td>
<td></td>
</tr>
</tbody>
</table>

What in your view, were the **main effects** (impact or outcomes) of the implementation of this principle?
<table>
<thead>
<tr>
<th>HCD9</th>
<th>Knowledge generation and mutual learning</th>
<th>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD10</td>
<td>User evaluation, feedback and refinement</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
</tr>
<tr>
<td>HCD11</td>
<td>The process is iterative</td>
<td>What in your view, were the <strong>main effects</strong> (impact or outcomes) of the implementation of this principle?</td>
</tr>
<tr>
<td>HCD12</td>
<td>The design team includes multidisciplinary skills and perspectives</td>
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</tbody>
</table>

What in your view, were the **main effects** (impact or outcomes) of the implementation of this principle?

Describe your own experience in respect of the implementation of a human-centered design approach to fashion design education.

THANK YOU FOR YOUR PARTICIPATION
1. What in your view, were the main effects (impact or outcomes) of users as the core and source of inspiration in the design process?

2. What in your view, were the main effects (impact or outcomes) of design taking place with users and not for users?

3. What in your view, were the main effects (impact or outcomes) of integrating primary research and design?

4. What in your view, were the main effects (impact or outcomes) of identifying and addressing user needs, goals and preferences?

5. What in your view, were the main effects (impact or outcomes) of context of use as a design principle?

6. What in your view, were the main effects (impact or outcomes) of designers translating user needs into requirements?

7. What in your view, were the main effects (impact or outcomes) of users’ serving as joint partners with active user involvement in the design process?

8. What in your view, were the main effects (impact or outcomes) of designers and users collaborating in the design process?

9. What in your view, were the main effects (impact or outcomes) of knowledge generation and mutual learning in HCD?

10. What in your view, were the main effects (impact or outcomes) of user evaluation, feedback and refinement?

11. What in your view, were the main effects (impact or outcomes) of an iterative design process?

12. What in your view, were the main effects (impact or outcomes) of the design team including multidisciplinary skills and perspectives?

13. Tell me about your own experience in respect of the implementation of a human-centered design approach in fashion design education?
ADDENDUM E: EXAMPLE OF OBSERVATIONAL SCHEDULE FOR THE MAIN STUDY

DATE: (week one in practice)

<table>
<thead>
<tr>
<th>LEARNING ACTIVITIES OBSERVED</th>
<th>MEMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Designers assumed role of researcher and placed the user at the core of design and the source of inspiration</td>
<td></td>
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<tr>
<td>• Designers engaged user in qualitative dialogue, probing them to collect primary information about user needs, goals, preference and context of design usage</td>
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<tr>
<td>• Design journal – collection and documentation of primary information about user’s needs, goals and preference and context of use. Was the ideation tool used?</td>
<td></td>
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<tr>
<td>• Framing of the design problem through systematic categorisation of primary data into user needs, goals and preferences and context</td>
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<tr>
<td>• Design teams established and documented a set of user-specific design criteria and constraints in design journal</td>
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<tr>
<td>GROUP</td>
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<td>GROUP</td>
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<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>
HCD2 Neg: Do not get to agree on everything
HCD2 Neg: Collaboration
HCD2 Pos: Better quality design
HCD2 Pos: Better quality design and approach
HCD2 Pos: Cannot understand user needs swiftly
HCD2 Pos: Collaboration
HCD2 Pos: Collaboration leading to effective balance
HCD2 Pos: Collaboration relationship building
HCD2 Pos: Design with
HCD2 Pos: Designer makes it more realistic
HCD2 Pos: Designer voice included
HCD2 Pos: Directed towards user
HCD2 Pos: For business
HCD2 Pos: Input from both
HCD2 Pos: Joint ideas into consideration
HCD2 Pos: Joint process
HCD2 Pos: Less complicated
HCD2 Pos: Mind-shift
HCD2 Pos: Mutual learning
HCD2 Pos: Mutual satisfaction
HCD2 Pos: Mutual understanding and consensus
HCD2 Pos: New way for future
HCD2 Pos: Overcame challenges
HCD2 Pos: Realistic
HCD2 Pos: Shared activities
HCD2 Pos: Understand rather than assume
HCD2 Pos: Understand user - user not a statistic
HCD2 Pos: Understanding
HCD2 Pos: User decision making
HCD2 Pos: User inclusion
HCD2 Pos: User not a subject - not accepting what designer does
HCD2 Pos: User satisfaction
HCD2 Pos: User voice
HCD2 Pos: Values of user
HCD2 Traditional design practice
HCD2 Traditional education
ADDENDUM G: EXAMPLE OF MAIN STUDY SECOND CODING CYCLE FOR HCD2

HU: MAIN STUDY ANALYSIS
File: [E:PHD/DATA ANALYSIS/MAIN STUDY/MAIN STUDY ANALYSIS.hpr7]
Edited by: Super
Date/Time: 2018-04-05 20:44:30

Codes: [HCD2 Pos: Joint ideas into consideration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

both of our ideas

P 2: SRD10.pdf - 2:6 [] (@642-@190) (Super)
Codes: [HCD2 Pos: User inclusion - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

This made the user feel included in the process

P 2: SRD10.pdf - 2:7 [] (@641-@182) (Super)
Codes: [HCD2 Pos: User decision making - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

decision throughout the process were made with the user.

P 3: SRD11.pdf - 3:2 [] (@642-@86) (Super)
Codes: [HCD2 Pos: Understanding - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos

Positive as it had to understand what exactly the user wants.

P 4: SRD2.pdf - 4:5 [] (@351-@74) (Super)
Codes: [HCD2 Pos: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

collaborate with each other
P 4: SRD2.pdf - 4:6 [] (@553-@219) (Super)
Codes: [HCD2 Pos: Mutual Learning - Family: HCD2: LEARNING AND ACTIVITIES]
No memos

learn from each other as well.

P 5: SRD3.pdf - 5:3 [] (@642-@101) (Super)
Codes: [HCD2 Pos: Mutual Learning - Family: HCD2: LEARNING AND ACTIVITIES]
No memos
The good part is that you don't have to apply all your design skills.

P 5: SRD3.pdf - 5:4 [] (@642-@83) (Super)
Codes: [HCD2 Neg: Do not get to agree on everything - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos
The bad part is you don't get to agree with the users in everything.

P 6: SRD4.pdf - 6:3 [] (@638-@194) (Super)
Codes: [HCD2 Pos: Less complicated - Family: HCD2: LEARNING AND ACTIVITIES]
No memos
this principle made (as said above) working with the user less complicated be

P 6: SRD4.pdf - 6:5 [] (@640-@136) (Super)
Codes: [HCD2 Pos: Designer voice included - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos
The user was straightforward but also allowed my to make an input on what would work.

P 7: SRD5.pdf - 7:3 [] (@644-@92) (Super)
Codes: [HCD2 Pos: Understanding - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos
This principle is effective due to the fact that when the users are involved, there is 'accuracy and proper understanding in what the users want.'
P 8: SRD6.pdf - 8:2 [] (@640-@113) (Super)
Codes: [HCD2 Pos: Directed towards user - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

P 8: SRD6.pdf - 8:3 [] (@604-@94) (Super)
Codes: [HCD2 Pos: Designer makes it more realistic - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

P 9: SRD7.pdf - 9:3 [] (@639-@78) (Super)
Codes: [HCD2 Pos: Collaboration leading to effective balance - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

P 9: SRD7.pdf - 9:4 [] (@636-@72) (Super)
Codes: [HCD2 Pos: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

P 10: SRD8.pdf - 10:3 [] (@643-@143) (Super)
Codes: [HCD2 Pos: Joint ideas into consideration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

P 10: SRD8.pdf - 10:4 [] (@644-@165) (Super)
Codes: [HCD2 Pos: Mutual satisfaction - Family: HCD2: QUALITY DESIGN AND SATISFACTION]
No memos
Satisfies both the user and the designer.

P 11: SRD9.pdf - 11:3 [] (@640-@76) (Super)
Codes: [HCD2 Pos: Understand user - user not a statistic - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

Because design is with users I am able to express my interests, likes and dislikes without having to just accept what the designer has designed and made "for me!"

P 12: SRU1.pdf - 12:4 [] (@644-@81) (Super)
Codes: [HCD2 Pos: User not a subject - not accepting what designer does - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

P 13: SRU10.pdf - 13:2 [] (@641-@76) (Super)
Codes: [HCD2 Pos: Shared activities - Family: HCD2: LEARNING AND ACTIVITIES]
No memos

The work was shared amongst groups of two people in a group

P 13: SRU10.pdf - 13:3 [] (@456-@105) (Super)
Codes: [HCD2 Pos: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

The designer and user works together

Codes: [HCD2 Pos: Understanding - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos

develop a project/design using information given by the user of design

P 13: SRU10.pdf - 13:5 [] (@644-@80) (Super)
Codes: [HCD2 Neg: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos
As a group, I feel like my partner and I only worked together well at the beginning of the HCD project but lost one another in the process.

P 14: SRU11.pdf - 14:4 (@636-@88) (Super)
Codes: [HCD2 Pos: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]

No memos

I feel when the designer designs with the user and designer work cohesively in the design to take place. I feel when the designer designs with the user.

P 14: SRU11.pdf - 14:5 (@533-@77) (Super)
Codes: [HCD2 Pos: Design with - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]

No memos

This further ensures the user stays at the core of the process.

P 14: SRU11.pdf - 14:6 (@638-@69) (Super)
Codes: [HCD2 Pos: Design with - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]

No memos

It showed me how two minds work better than one.

P 15: SRU2.pdf - 15:5 (@644-@238) (Super)
Codes: [HCD2 Pos: Joint ideas into consideration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]

No memos

It showed me how two minds work better than one. We both have different values and then together made the design much better and

P 15: SRU2.pdf - 15:6 (@644-@85) (Super)
Codes: [HCD2 Pos: Joint ideas into consideration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]

No memos

P 15: SRU2.pdf - 15:7 (@363-@135) (Super)
Codes: [HCD2 Pos: Better quality design - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]

No memos
P 16: SRU3.pdf - 16:4 [b*i*yner, *r' + des.g, ar-’d rr...] (@217-@165) (Super)
Codes: [HCD2 Pos: Understanding - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos

Designers don’t design and make what they users want. They understand the user's needs and be with them at every step they take.

P 16: SRU3.pdf - 16:5 [:Fe- a*esi3n Proceba 'ts q lor..] (@167-@137) (Super)
Codes: [HCD2 Pos: Joint process - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

The design process is a joint process.

P 17: SRU4.pdf - 17:3 [] (@636-@175) (Super)
Codes: [HCD2 Pos: Understand rather than assume - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos

Helps take a closer look on what the people want or would like rather than assuming.

P 18: SRU5.pdf - 18:3 [] (@642-@135) (Super)
Codes: [HCD2 Pos: Better quality design and approach - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

The idea of designing with the user brings about more specific design options that are not a better approach to what exactly must be design with input from both the user and designer.

P 18: SRU5.pdf - 18:4 [] (@642-@189) (Super)
Codes: [HCD2 Pos: Input from both - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos
must be design with a input from both the user and designer

P 18: SRU5.pdf - 18:5 [@642-@165] (Super)
Codes: [HCD2 Pos: Joint ideas into consideration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

Working with 3 users helped as more ideas came about.

P 20: SRU6.pdf - 20:2 [@640-@96] (Super)
Codes: [HCD2 Pos: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

with this the designer and user work together to design and

P 21: SRU7.pdf - 21:3 [@637-@80] (Super)
Codes: [HCD2 Pos: Collaboration - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

The design of the scut was created by both I and my partner. It worked well. It was a positive effect because

Codes: [HCD2 Pos: Mutual understanding and consensus - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos

what we both diacuss liked, we stated and what we both liked, we agreed.

Codes: [HCD2 Pos: Mutual satisfaction - Family: HCD2: QUALITY DESIGN AND SATISFACTION]
No memos

Making on designing an item that would be suitable for the user and cater to their needs but not

Codes: [HCD2 Pos: Designer voice included - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

the designer also has a say in the design and production

**P 23: SRU9.pdf - 23:5 [\( \text{@634-@110} \) (Super)**
Codes: [HCD2 Pos: Collaboration relationship building - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

and the team works closely with the designer to get what they want.

**P 23: SRU9.pdf - 23:6 [\( \text{@638-@186} \) (Super)**
Codes: [HCD2 Pos: Design with - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

users and designers become more open-minded

**P 24: M - F 1.docx - 24:12 [it’s a novel new way of doing ..] (50:50) (Super)**
Codes: [HCD2 Pos: New way for future - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

it’s a novel new way of doing things which is going to become much bigger in the future

**P 24: M - F 1.docx - 24:13 [it really simulates how things..] (50:50) (Super)**
Codes: [HCD2 Pos: Realistic - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

it really simulates how things should be in the world

**P 24: M - F 1.docx - 24:14 [So not just designing for peop..] (50:50) (Super)**
Codes: [HCD2 Pos: Mind-shift - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

So not just designing for people and expecting them to like whatever you put out

**P 24: M - F 1.docx - 24:15 [business perspective] (50:50) (Super)**
Codes: [HCD2 Pos: For business - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

business perspective

**P 24: M - F 1.docx - 24:16 [make things much more easier f..] (50:50) (Super)**
Codes: [HCD2 Pos: For business - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

make things much more easier for designers and so on

P 24: M - F 1.docx - 24:17 [If you design knowing exactly ..] (50:50) (Super)
Codes: [HCD2 Pos: For business - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

If you design knowing exactly who the market is you’re working together to come up with this range

P 24: M - F 1.docx - 24:18 [I think it will definitely be ..] (50:50) (Super)
Codes: [HCD2 Pos: New way for future - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

I think it will definitely be the way of the future

P 24: M - F 1.docx - 24:19 [we need to just switch our min..] (50:50) (Super)
Codes: [HCD2 Pos: Mind-shift - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

we need to just switch our minds out of just designing whatever we want and um, expecting people to like what we put out

P 24: M - F 1.docx - 24:23 [it is, it is, a lot more] (58:58) (Super)
Codes: [HCD2 Pos: Overcame challenges - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
Memos: [Second iteration HCD fewer more effective]

it is, it is, a lot more

P 24: M - F 1.docx - 24:136 [Uhh, with the second project t..] (54:54) (Super)
Codes: [HCD2 Pos: Overcame challenges - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
No memos

Uhh, with the second project they did. Uhh, because, uhh, the principles where summarised basically so they knew exactly what to look at. Uhh, compared to the, uhh, first phase of the study where we had a wider range of, umm [pause], of, of principles to work with.

P 25: M - F2.docx - 25:29 [So traditionally we would alwa..] (50:50) (Super)
Codes: [HCD2 Traditional education - Family: HCD2: WAY FORWARD FOR FD EDUCATION]
Memos: [we refers to fashion design students in general]

So traditionally we would always design for the user

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this could either take form in making up our own design decision, taking inspiration where we as designers feel we want to take inspiration from and creating a bit more off an artist collection

from another perspective, it could also be when we do custom wear, in the industry we could use the preferences from the user, we can ask them a few questions and then design a couple of rough sketches for them and then they get to decide which one they want and we will produce that for them

the human-centered design differs in that, as it zooms in on this user-centered approach

where the user doesn’t just come and make decisions they are consistently involved in the design process

Every decision goes by them

They are involved in fabric selection, not just choosing from what the designer depicts as appropriate for the design but what they want
DESIGNER-DRIVEN]
No memos

bringing them into the design process itself and consistently being a part of the decisions that are being made

P 25: M - F2.docx - 25:37 [making suggestions on their ow..] (50:50) (Super)
Codes: [HCD2 Pos: User voice - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

making suggestions on their own

P 25: M - F2.docx - 25:38 [The great thing about this is ..] (50:50) (Super)
Codes: [HCD2 Pos: Mutual Learning - Family: HCD2: LEARNING AND ACTIVITIES]
No memos

The great thing about this is they also tend to learn a bit more and the designers learn a bit more about them

P 25: M - F2.docx - 25:39 [There’s almost this mutual lea..] (50:50) (Super)
Codes: [HCD2 Pos: Mutual Learning - Family: HCD2: LEARNING AND ACTIVITIES]
No memos

There’s almost this mutual learning that starts to take place

P 25: M - F2.docx - 25:40 [I think is really good] (50:50) (Super)
Codes: [HCD2 Pos: Mutual Learning - Family: HCD2: LEARNING AND ACTIVITIES]
No memos

I think is really good

P 25: M - F2.docx - 25:41 [sometimes it’s always difficul..] (50:50) (Super)
Codes: [HCD2 Pos: Understanding - Family: HCD2: ELIMINATES DESIGN ASSUMPTION]
No memos

sometimes it’s always difficult to draw out from the user what it is that actually need from the project and it’s going beyond just this thing of what colour do you like, what fabrics do you like

P 25: M - F2.docx - 25:42 [really go and to sit with the ..] (50:50) (Super)
Codes: [HCD2 Pos: Values of user - Family: HCD2: INCLUSIVITY AS OPPOSED TO DESIGNER-DRIVEN]
No memos

really go and to sit with the user and try and figure out what value this garment needs to form as part of their lives

P 25: M - F2.docx - 25:43 [What is the best or do they ne..] (50:50) (Super)
What is the best or do they need pockets

**P 25: M - F2.docx - 25:44 [Do they need some form of func..] (50:50) (Super)**

Do they need some form of functional designs

**P 25: M - F2.docx - 25:45 [be completely satisfied] (50:50) (Super)**

**P 25: M - F2.docx - 25:46 [you cannot do that by having a..] (50:50) (Super)**

**P 25: M - F2.docx - 25:47 [The only way you can do that i..] (50:50) (Super)**

**P 25: M - F2.docx - 25:48 [it's starting to go into a wro..] (50:50) (Super)**

**P 25: M - F2.docx - 25:49 [human-centered design that is ..] (50:50) (Super)**

human-centered design that is how it differs during the design process
Absolutely, it was definitely very useful for them

some of them felt that the designer students is going to be taking charge and making all the choices and it was only through exploring the process and going at it step by step that they started realising, but wait a minute, the user is also doing things in this case

share the tasks completely

I think it did change their mind on the role that the user can play in the design process and the benefits that come with involving them as well

actually have them help to make decisions, more better decisions

which would have taken them a lot longer otherwise trying to figure it out on their own
ADDENDUM H: PEER INVESTIGATOR REPORT FOR THE MAIN STUDY

REVIEW OF HARVEY CHAPTER 8 “Discussions of findings...”

REVIEWER: Prof Allan Munro

TO WHOM IT MAY CONCERN

Thank you for affording me the opportunity to review Chapter 8 of the thesis being developed by Neshane Harvey, which contains the discussions of the findings. To do this I

1. Read the chapter to ascertain the thrust of the argument
2. Worked through the 2 Facilitators’ interview transcripts
3. Worked through the Personal Observation documents
4. Engaged with the responses of the students both in the Designer Group and the “User” Group
5. Interrogates the Analysis coding
6. Checked to see whether any of the quotes used as evidence were taken out of context, were accurately reported (and reported on) and were applicable to the argument being made.

In essence, the task was to triangulate the evidence presented with the argument being constructed in the chapter.

FINDING: In my professional opinion Ms Harvey has done a solid analysis of such a triangulation process, has been fair in the application of the evidence and has been reliable with the process of interpretation, given the particular challenges of the project.

Sincerely

Allan Munro

Note: Originally structured as Chapter 8, the discussion of findings pertaining to the main study subsequently consolidated into Chapter 7 as presented in the final thesis.
ETHICS CLEARANCE

Dear N Harvey,

Ethical Clearance Number: 2017.007

A human-centered design approach to fashion education

Ethical clearance for this study is granted subject to the following conditions:

- If there are major revisions to the research proposal based on recommendations from the Faculty Higher Degrees Committee, a new application for ethical clearance must be submitted.
- If the research question changes significantly so as to alter the nature of the study, it remains the duty of the student to submit a new application.
- It remains the student’s responsibility to ensure that all ethical forms and documents related to the research are kept in a safe and secure facility and are available on demand.
- Please quote the reference number above in all future communications and documents.

The Faculty of Education Research Ethics Committee has decided to

☑ Grant ethical clearance for the proposed research.

☐ Provisionally grant ethical clearance for the proposed research

☐ Recommend revision and resubmission of the ethical clearance documents

Sincerely,

Prof Geoffrey Lautenbach
Chair: FACULTY OF EDUCATION RESEARCH ETHICS COMMITTEE
7 March 2017
### 3. FACILITATION OF LEARNING PROGRAMME

#### 3.1 Module information and purpose

<table>
<thead>
<tr>
<th>TERMS OF PRESENTATION</th>
<th>FASHION DESIGN AND TECHNOLOGY 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Semester module</td>
</tr>
<tr>
<td>CREDITS</td>
<td></td>
</tr>
<tr>
<td>ASSESSMENT</td>
<td></td>
</tr>
<tr>
<td>PURPOSE</td>
<td>The purpose of this module is to understand, review, interpret and explore the fundamental concepts of design and conversion processes</td>
</tr>
<tr>
<td>OUTCOMES</td>
<td>• Understand and apply the fundamental concepts of fashion design</td>
</tr>
<tr>
<td></td>
<td>• Review, interpret and apply the relevant design principles</td>
</tr>
<tr>
<td></td>
<td>• Evaluate the use of design principles and identify required design and conversion processes</td>
</tr>
<tr>
<td></td>
<td>• Explore and apply a variety of visual and textual communication methods</td>
</tr>
<tr>
<td></td>
<td>• Understand and apply basic knowledge of technological practices</td>
</tr>
</tbody>
</table>
Learning unit: Human-centered design

Purpose
The purpose of this unit is to demonstrate a conceptual understanding of human-centered design and the principles thereof.

<table>
<thead>
<tr>
<th>Unit outcomes</th>
<th>Unit assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of this unit you will be able to:</td>
<td>You are competent if:</td>
</tr>
<tr>
<td>1. Explain the constructs of human-centered design</td>
<td>1.1 The constructs of human-centered design is defined correctly,</td>
</tr>
<tr>
<td></td>
<td>1.2 Understand the difference between design for and design with</td>
</tr>
<tr>
<td>2. Understand the principles of human-centered design</td>
<td>2.1 the various principles of human-centered design is understood,</td>
</tr>
<tr>
<td></td>
<td>2.2 Understand the users/designers roles in the design process</td>
</tr>
<tr>
<td>3. Plan a human-centered design approach</td>
<td>3.1 the human-centered design is planned</td>
</tr>
</tbody>
</table>
Learning unit: Basic research

<table>
<thead>
<tr>
<th>Unit outcomes</th>
<th>Unit assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of this unit you will be able to:</td>
<td>You are competent if:</td>
</tr>
<tr>
<td>1. Understand the concept of research</td>
<td>1.1 The basic concepts of research and data gathering are understood.</td>
</tr>
<tr>
<td>2. Understand data gathering information</td>
<td>2.1 The basic techniques of how to sort information is understood and applied to a research activity</td>
</tr>
<tr>
<td>3. Understand and apply basic skills in data analysis</td>
<td>3.1 The basic skills of data analysis is understood and applied to research activity.</td>
</tr>
</tbody>
</table>
### ADDENDUM M: PILOT STUDY TEACHING AND LEARNING INTERVENTION PROJECT BRIEF

#### DEPARTMENT OF FASHION DESIGN

<table>
<thead>
<tr>
<th>MODULE</th>
<th>FASHION DESIGN AND TECHNOLOGY 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODULE CODE</td>
<td>THREE – HUMAN-CENTERED DESIGN (HCD) PROJECT</td>
</tr>
<tr>
<td>UNIT</td>
<td>THREE – HUMAN-CENTERED DESIGN (HCD) PROJECT</td>
</tr>
<tr>
<td>UNIT OUTCOME</td>
<td>Integrate and apply conceptual knowledge in respect of the design principles of HCD as the underlying design approach and volition into practice to design and prototype a solution</td>
</tr>
<tr>
<td>PROJECT-SPECIFIC DESIGN CONSTRAINTS</td>
<td>• Wearable dress (the product) • Experimentation with silhouettes</td>
</tr>
<tr>
<td>ASSESSMENT INSTRUMENTS</td>
<td>• Design journal • Two-dimensional fashion illustration of the final design solution • Flow diagram • Three-dimensional prototype</td>
</tr>
<tr>
<td>DURATION OF UNIT</td>
<td>4 WEEKS</td>
</tr>
<tr>
<td>VENUE</td>
<td>Studio 1: Design studio Studio 2: Technology studio</td>
</tr>
<tr>
<td>DUE DATE</td>
<td></td>
</tr>
</tbody>
</table>

By the end of this learning unit, you should be able to achieve the following specific learning outcomes:

<table>
<thead>
<tr>
<th>SPECIFIC LEARNING OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The design problem: Establish a set of design criteria and requirements through in-depth understanding of user needs, goals, tasks, preferences and contexts of use in order to design and prototype a solution in response to a problem</td>
</tr>
<tr>
<td>Integrate conceptual knowledge about the fuzzy front-end design process model for application in design and technological process activities</td>
</tr>
<tr>
<td>Using multi-disciplinary skills and perspectives, design and prototype a solution through collaboration and partnership with the user to address their needs, goals, tasks and preferences and contexts of use</td>
</tr>
<tr>
<td>Learn to become agents of change to design with intent and empathy with actual users through collaboration and partnership</td>
</tr>
</tbody>
</table>
Generate a flow diagram illustrating designer and user involvement, tasks, functions and design and technological process activities for all stages of the fuzzy front-end design process model.

Compile a design journal to record and justify all design and technological process activities in an attempt to visualise and communicate internal thought processes.

Apply a diverse range of design-related skills to demonstrate illustration techniques and drawing ability.

Apply technology-related skills to develop a working pattern and construct a prototype.

**DESIGN PRINCIPLES OF HCD**

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESIGN PRINCIPLE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1</td>
<td>Users as core – users are not the subjects of study but rather the nucleus of design.</td>
</tr>
<tr>
<td>HCD2</td>
<td>Design is with users and not for users.</td>
</tr>
<tr>
<td>HCD3</td>
<td>Users as sources of inspiration – designers will have to accommodate actual, as opposed to imagined, users’ needs as the source of information and inspiration for design.</td>
</tr>
<tr>
<td>HCD4</td>
<td>Integration of research and design – designers should assume the dual role of researcher and designer in order to integrate research and design.</td>
</tr>
<tr>
<td>HCD5</td>
<td>Identify user needs, goals, tasks and preferences – first, establish users’ needs, goals, tasks and preferences as input into the design process.</td>
</tr>
<tr>
<td>HCD6</td>
<td>Context of use – design should take into account the context or situation in which the product will be used.</td>
</tr>
<tr>
<td>HCD7</td>
<td>Understand users – an in-depth understanding of users’ needs, goals, tasks, preferences and context of use is required as input and throughout the design process.</td>
</tr>
<tr>
<td>HCD8</td>
<td>Translate user needs into requirements – establish user needs and translate these into a set of design requirements.</td>
</tr>
<tr>
<td>HCD9</td>
<td>Address user needs – as the ultimate aim, design should address users’ needs, preferences and desires.</td>
</tr>
<tr>
<td>HCD10</td>
<td>Users as partners – users are seen as partners in the design process and design should take place with users and not for users.</td>
</tr>
<tr>
<td>HCD11</td>
<td>Active user involvement in design process – users should be directly involved and actively participate early and continually in the design and development process.</td>
</tr>
<tr>
<td>HCD12</td>
<td>Users as participants in data collection.</td>
</tr>
<tr>
<td>HCD13</td>
<td>Primary research – design should be grounded in primary as opposed to secondary research.</td>
</tr>
<tr>
<td>HCD14</td>
<td>Qualitative tools – designers should apply qualitative data collection methods rather than relying on quantitative data collected by researchers and about users.</td>
</tr>
<tr>
<td>HCD15</td>
<td>Collaboration – users and designers should collaborate with each other.</td>
</tr>
<tr>
<td>HCD16</td>
<td>Knowledge generation – users are a source of knowledge and should contribute knowledge as input in the design process.</td>
</tr>
<tr>
<td>HCD17</td>
<td>Mutual learning takes place between designers, users and all stakeholders.</td>
</tr>
<tr>
<td>HCD18</td>
<td>Aware of involvement – as active participants in design and development, users should be made aware of their involvement from the onset.</td>
</tr>
</tbody>
</table>
Users should have a clear understanding of their functions and tasks in the project.

User evaluation – users should evaluate a prototype of the product.

User feedback and refinement – feedback is a critical source of information hence prototypes of designs should be evaluated with users and improvements should be based on this feedback.

The process is iterative – iterations or repeated steps occur throughout design and development until the desired outcome is achieved.

Design addresses the whole user experience – focus is on the user’s main concern to be addressed, who has the experience, the object experienced, how the experience takes place and whether this occurs before, during or after interacting with the object.

The design team includes multidisciplinary skills and perspectives – work in design teams for collaborative decision-making and implementation.

**To engage with the project activity tasks you should:**

- Work in a design team of two where one takes the role of the designer and the other the user.
- Apply the fuzzy-front end design process model.
- All design and technology activities should be done through joint partnership and collaboration between designer and user.
- Refrain from using secondary visual images from, for example, internet sources, fashion magazines etc.
- Record all design and technology activities in a design journal.
## PROJECT PLAN AND ACTIVITY TASKS

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>COMPONENT</th>
<th>DAY</th>
<th>ACTIVITY TASK (AT)</th>
</tr>
</thead>
</table>
| 1    |      | Design    | 1   | **Design criteria stage activities:**  
|      |      |           |     | • Select a team member of their choice to form a design team with one student role-playing the designer and the other the user. Decide on who assumes the role of the designer and the other the user  
|      |      |           |     | • Designer assume the role of researcher and place the respective user as the source of inspiration and nucleus of design to trigger the design criteria stage – do not take inspiration from visual images  
|      |      |           |     | • Designer qualitatively engage the user in dialogue to gain an in-depth understanding about:  
|      |      |           |     |   • user needs,  
|      |      |           |     |   • user goals,  
|      |      |           |     |   • user tasks,  
|      |      |           |     |   • user preferences and  
|      |      |           |     |   • context of use  
|      |      |           |     | • Design teams record and make explicit collected data by way of, for example field notes and flow diagrams in a design journal  
|      |      |           |     | • Design teams objectively frame the design problem in the design journal by organising and categorising primary data to establish a set of user-specific design criteria and constraints (requirements) that best addresses the users’ needs, goals, tasks, preferences and the context of use |
| 2    |      |           | 2   | **Idea stage activities:**  
|      |      |           |     | • Design teams collaboratively and jointly work together to integrate the primary research with design by brainstorming several possible incubated design ideas  
|      |      |           |     | • Design teams jointly generate an ideation tool, in the design journal, to visualise, communicate and justify rough incubated ideas  
<p>|      |      |           |     | • As part of the ideation tool, design teams generate an action plan by objectively framing and making explicit how users’ needs, goals, and preferences and context of use will be addressed |</p>
<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>COMPONENT</th>
<th>DAY</th>
<th>ACTIVITY TASK (AT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Design</td>
<td>2 (cont.)</td>
<td>Specify on the ideation tool which team member would be responsible for design and technology-related activities</td>
</tr>
</tbody>
</table>
| 2    |      | Design    | 1   | **Concept stage activities:**  
  - Work with the user to translate user’s needs and design constraints into requirements  
  - Designer engage the user in further dialogue (if necessary)  
  - Designer collaborate with the user to generate multiple experimental abstract design ideas, reflect, iterate and conceptualise several rough sketches – record in the design journal  
  - Support the abstract sketches with tentative colouroations and fabrications along with justifications for choices and design ideas  
  - From these abstract roughly drawn sketches and experimental ideas, design teams reflect on and jointly select one abstract sketch as a possible design solution |
|      |      | Technology | 2   | **Prototype stage activities:**  
  - Design teams apply technology-related knowledge to make the working pattern of the design solution |
|      |      | Technology | 3   | **Prototype stage activities:**  
  - Design teams apply technology-related knowledge to make the tangible prototype of the design solution |
| 3    |      | Technology | 1   | **Critique session (formative feedback):**  
  - Design teams reflect and iterate the design process with continuous backward and forward movements between technology-related and design activities  
  - Design teams engage with the facilitator for prototype critique and feedback  
  - Users’ evaluate the prototype and provide designers with feedback  
  - Record evaluations and feedback in design journal |
|      |      | Technology | 2   |  
  - Design teams reflect on what you did, what worked, what did not work and how to fix the problems – record in design journal  
  - Execute multiple and rapid refinements and iterative actions to refine the preliminary working pattern and prototype – record in design journal |
<table>
<thead>
<tr>
<th>WEEK</th>
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<th>COMPONENT</th>
<th>DAY</th>
<th>ACTIVITY TASK (AT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>Design and Technology</td>
<td>3</td>
<td>- Design teams reflect in and on action, execute multiple and rapid refinements and iterative actions between design criteria, idea, concept, preliminary working patterns and prototype – record in design journal</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Design and Technology</td>
<td>1</td>
<td>- Design teams reflect in and on action, execute multiple and rapid refinements and iterative actions between design criteria, idea, concept, preliminary working patterns and prototype – record in design journal</td>
</tr>
</tbody>
</table>
|      |      | Design                    | 2   | - Develop a flow diagram highlighting and illustrating:                                                                                    
|      |      |                           |     |   - the designer and user involvement and tasks                                                                                                      
|      |      |                           |     |   - design process activities and justifications as per each stage of the fuzzy-front end design process model                                   |
|      |      |                           |     |   - Finalise the two-dimensional design solution through the practical application of drawing skills, media and fabrication techniques to illustrate, in colour, a fashion illustration (figure to include body areas) |
|      |      |                           | 3   | - Draw, in a black pen and with the application of correct equipment and line techniques, technical drawings of both the front and back view of the design |
|      |      |                           |     | - Compile the fashion illustration, technical drawings, fabric swatches and trims on one A3 size board                                                                                   |
|      |      |                           |     | - Finalise, complete and submit all design and technology-related assessment instruments                                             |
3. FACILITATION OF LEARNING PROGRAMME

3.1 Module information and purpose

<table>
<thead>
<tr>
<th>TERMS OF PRESENTATION</th>
<th>FASHION DESIGN AND TECHNOLOGY 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Semester module</td>
</tr>
<tr>
<td>CREDITS</td>
<td></td>
</tr>
<tr>
<td>ASSESSMENT</td>
<td>[Continuous assessment (100)]</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>The purpose of this module is to enable students to apply acquired fundamental knowledge and practice to fashion design and product development</td>
</tr>
</tbody>
</table>

OUTCOMES

- Understand the fundamental theoretical constructs of social, economic and environmental concepts
- Investigate and experiment with a variety of two and three dimensional practices that may be used to develop innovative design solutions
- Evaluate two and three dimensional practices that add value and innovation to the development of design solutions
- Experiment with technological practices that can be applied to develop design solutions for social, economic or environmental intentions
### MODULE
FASHION DESIGN AND TECHNOLOGY 1B

### MODULE CODE
ONE – HUMAN-CENTERED DESIGN (HCD) PROJECT

### UNIT OUTCOME
Integrate and apply conceptual knowledge in respect of the design principles of HCD as the underlying design approach and volition in praxis to design, prototype and manufacture a wearable product

### PROJECT-SPECIFIC DESIGN CONSTRAINTS
- Wearable skirt (the product)
- Experimentation with design detail, for example pleats, gathers, pin tucks, fastening methods etc.
- Natural fibre fabrics

### ASSESSMENT INSTRUMENTS
- Design journal
- Two-dimensional fashion illustration along with technical drawings of the final design solution
- Three-dimensional prototype
- Product and patterns

### DURATION OF UNIT
7 WEEKS

### VENUE
Studio 1: Design studio
Studio 2: Technology studio

### DUE DATE
Design: 60%
Technology: 40%

### MODULE COMPONENTS INVOLVED IN THIS PROJECT
- DESIGN
- PATTERN TECHNOLOGY
- GARMENT TECHNOLOGY

By the end of this learning unit, you should be able to achieve the following specific learning outcomes:

### SPECIFIC LEARNING OUTCOMES
- Develop a conceptual understanding of the design principles of HCD
- Develop a conceptual understanding of user needs
- Differentiate between user needs, goals and preferences
- Develop deeper conceptual understanding about the activities associated with each stage of the fuzzy front-end design process model
- Frame the design problem by establishing user-specific design criteria and constraints through in-depth understanding of user needs, goals, preferences and contexts of use and then design, prototype and manufacture a product in response to the problem
Integrate conceptual knowledge of the design principles of HCD, user needs and the fuzzy front-end design process model for application in design and technology-related activities

Incorporate multi-disciplinary skills and perspectives in order to design, prototype and make a product as a solution, through collaboration and partnership with the user to address their needs, goals, preferences and contexts of use

Learn to become agents of change in order to design-with-intent and empathy for actual users through collaboration and partnership

Develop an ideation tool to visually and explicitly (put into words) communicate the following:
- Users’ needs, goals and preferences
- Context of use
- Design criteria and constraints
- Brainstorming ideas (written)
- Action plan to translate ideas and define user/designer project learning tasks

Conceptualise and justify a series of design sketches to visually reflect the ideation tool

Compile a design journal to record and justify all design and technological process activities in an attempt to visualise and communicate internal thought processes

Apply a diverse range of design-related knowledge to demonstrate illustrative techniques and drawing ability

Apply technology-related knowledge to develop a pattern, make a prototype and product

**DESIGN PRINCIPLES OF HCD**

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESIGN PRINCIPLE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD1</td>
<td>Users as core and source of inspiration – focus is on the user as the nucleus for design and source of inspiration but not the subject of study</td>
</tr>
<tr>
<td>HCD2</td>
<td>Design is with users and not for users - design is no longer for people but rather with people</td>
</tr>
<tr>
<td>HCD3</td>
<td>Integration of primary research and design - designers assume a dual role of researcher and designer, meaning that design grounds itself in primary as opposed to secondary research</td>
</tr>
<tr>
<td>HCD4</td>
<td>Identify and address user needs, goals and preferences - first, establish users’ needs, goals and preferences through engaged dialogue as input into the design process before addressing these needs, goals and preferences</td>
</tr>
<tr>
<td>HCD5</td>
<td>Context of use - design should take into account the context or situation in which the user uses the product</td>
</tr>
<tr>
<td>HCD6</td>
<td>Translate user needs into requirements - translate users’ needs into a set of design requirements (design criteria and constraints)</td>
</tr>
<tr>
<td>HCD7</td>
<td>Users as partners with active involvement - users are seen as partners in the design process and design should take place with users rather than for users. Users should be directly involved and actively participate early and continually in the design process</td>
</tr>
<tr>
<td>HCD8</td>
<td>Collaboration - users and designers should collaborate with each other</td>
</tr>
<tr>
<td>HCD9</td>
<td>Knowledge generation and mutual learning - users are a source of knowledge and should contribute knowledge as input into the design process. Mutual learning takes place between all stakeholders</td>
</tr>
<tr>
<td>HCD10</td>
<td>User evaluation, feedback and refinement - users should evaluate prototypes and provide feedback as a critical source of information. Designers should</td>
</tr>
</tbody>
</table>
evaluate designs with users and improve designs based on the feedback obtained

<table>
<thead>
<tr>
<th>HCD11</th>
<th>The process is iterative - iteration or repeated steps should occur throughout the design and development process until the desired outcome is achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCD12</td>
<td>The design team includes multidisciplinary skills and perspectives - work in design teams for collaborative decision-making and implementation</td>
</tr>
</tbody>
</table>

**To engage with the project activity tasks you should:**

- Work in a design team of two where one takes the role of the designer and the other the user
- Apply the fuzzy-front end design process model
- All design and technology activities should be done through joint partnership and collaboration between designer and user
- Refrain from using secondary visual images from, for example, internet sources, fashion magazines etc.
- Record all design and technology activities in a design journal
## PROJECT PLAN AND ACTIVITY TASK

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>COMPONENT</th>
<th>DAY</th>
<th>ACTIVITY TASK (AT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Design</td>
<td>1</td>
<td>Conceptual knowledge session:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Receive learning material</td>
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<tr>
<td></td>
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<td></td>
<td>• Discussion around the pilot study findings and refinement of design</td>
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<td>principles of HCD</td>
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<td></td>
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<td></td>
<td>• Develop conceptual knowledge about the refined set of design</td>
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<tr>
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<td>principles of HCD (included in project brief)</td>
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<td></td>
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<td></td>
<td></td>
<td>• Discussion around the refined design principles of HCD</td>
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<td>• Develop conceptual understanding around the different aspects of</td>
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<td>user needs (refer to the learning material)</td>
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<td>• Recognise and differentiate between fundamental user needs and</td>
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<td>dimensions attached to each user need (refer to learning material)</td>
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<td></td>
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<td>• Differentiate between user needs, goals and preference (refer to the</td>
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<td></td>
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<td>ideation tool)</td>
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<td>• Link theory to practice - contextualise the ideation tool as per:</td>
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<td>• user needs, goals, preferences and context of use</td>
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<td>• the attributes of design criteria and constraints</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• how to brainstorm ideas</td>
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<td></td>
<td>• the features of the action plan</td>
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<td></td>
<td></td>
<td>• Differentiate between a need, a goal and a preference</td>
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<td></td>
<td></td>
<td>• Develop conceptual understanding about the fuzzy-front end design</td>
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<td></td>
<td>process model</td>
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<td></td>
<td>• Develop conceptual understanding about the activities in the fuzzy-</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>front end design process model</td>
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<td></td>
<td>• Differentiate between idea and concept stage activities</td>
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<td></td>
<td>• Practical application of tools and techniques such as post-it</td>
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<td>stickers, highlighters and coloured post cards to demonstrate data</td>
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<td></td>
<td></td>
<td>categorisation and idea generation</td>
</tr>
<tr>
<td>WEEK</td>
<td>DATE</td>
<td>COMPONENT</td>
<td>DAY</td>
<td>ACTIVITY TASK (AT)</td>
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</tbody>
</table>
| 1    |      | Design    | 2   | **Design criteria stage activities:**  
|      |      |           |     | • Select your design team member (based on your selection) with one student role-playing the designer and the other the user. Decide on who assumes the role of the designer and the user  
|      |      |           |     | • Designer assume the role of researcher and place their respective user as the source of inspiration and nucleus of design to trigger the design criteria stage - do not take inspiration from visual images  
|      |      |           |     | • Designers take on the researcher role and engage the user in conversation with probing strategies to collect primary information (you can use the user needs models and the ideation tool as a guide) about:  
|      |      |           |     |   • the user needs  
|      |      |           |     |   • the user goals  
|      |      |           |     |   • the user preferences  
|      |      |           |     |   • context of use  
|      |      |           |     | • Design teams record all primary information with field notes in the design journal – use the ideation tool as a guideline to record the information  
|      |      |           |     | • Use any method you prefer to frame the design problem by objectively and systematically categorising the information collected into:  
|      |      |           |     |   • user needs  
|      |      |           |     |   • user goals  
|      |      |           |     |   • user preferences  
|      |      |           |     |   • context of use  
<p>|      |      |           |     | • From the collected information and categorisation, develop a tentative set of user-specific design criteria and constraints based on the user needs, goals, preferences and context of use – record in design journal |</p>
<table>
<thead>
<tr>
<th>WEEK</th>
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<th>DAY</th>
<th>ACTIVITY TASK (AT)</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>Design</td>
<td>1</td>
<td><strong>Idea stage activities:</strong>&lt;br&gt;• Design teams narrow down and finalise a set of user-specific design criteria and constraints – record in design journal&lt;br&gt;• Reflect on the information captured in the design journal and collaboratively integrate primary research and design activities to design a skirt with the user. The design of the skirt must include the project-specific and user-specific design constraints and criteria&lt;br&gt;• Design teams brainstorm several possible incubated design ideas and capture this in for example words, post-it-stickers, post cards, roughly drawn ideas etc, in the design journal (idea stage)&lt;br&gt;• In the design journal, develop a plan of action illustrating:&lt;br&gt;  • the designer and user roles and tasks to execute the HCD project - refer to ideation tool for structure&lt;br&gt;  • what is required to translate design ideas into solutions&lt;br&gt;• In the design journal, design teams develop a personal ideation tool summarising the following information:&lt;br&gt;  • users’ needs, goals and preferences&lt;br&gt;  • context of use&lt;br&gt;  • design criteria and constraints&lt;br&gt;  • brainstormed incubated ideas (written)&lt;br&gt;  • action plan to translate ideas and define user/designer project tasks</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>2</td>
<td><strong>Concept stage activities:</strong>&lt;br&gt;• Design teams reflect on, go back to the design criteria, requirements and the brainstormed ideas. Designers engage users in further dialogue if necessary&lt;br&gt;• Design teams jointly and collaboratively translate the brainstormed incubated ideas into two-dimensional possible design solutions by:&lt;br&gt;  • experimenting with design detail&lt;br&gt;  • conceptualise a series of rough sketches (minimum of 20 rough sketches)&lt;br&gt;  • support your rough sketches with tentative colorations and fabrications and justify your selection&lt;br&gt;• Capture these activities in design journals</td>
</tr>
<tr>
<td>WEEK</td>
<td>DATE</td>
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<td>DAY</td>
<td>ACTIVITY TASK (AT)</td>
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</tbody>
</table>
| 3    |      | Design          | 1   | • Continue with concept stage activities  
|      |      |                 |     | • By the end of the studio time, design teams jointly select one abstract sketch as a possible design solution  |
|      |      |                 | 2   | **Prototype stage activities:**  
|      |      | Technology      |     | Design teams engage with the prototype stage and apply technology-related knowledge to translate the two-dimensional abstract sketch to develop a preliminary working pattern  |
|      |      |                 | 3   | **Self-directed learning:**  
|      |      |                 |     | • Complete the working pattern  
|      |      |                 |     | • Cut the working pattern in calico  |
| 4    |      | Technology      | 1   | **Formative feedback and design critique:**  
|      |      |                 |     | • Present prototype for user evaluation and feedback  
|      |      |                 |     | • Design team to present prototype for facilitators’ formal critique and feedback  
|      |      |                 |     | • Record all feedback in design journals  
|      |      |                 |     | • Work iteratively between the design criteria, idea, concept and prototype stages - reflect on what you did, what worked, what did not work and how to fix the problems  
|      |      |                 |     | • Execute multiple refinements to finalise the two-dimensional sketch, preliminary working pattern and prototype until the design solution addresses user satisfaction  
|      |      |                 |     | • Record all refinements in design journals  |
| 5    |      | Design and Technology | 1   | • Carry on with the iterative design process with multiple refinements  
|      |      |                 |     | • After refinements, finalise the two-dimensional abstract sketch  
|      |      |                 |     | • Apply a diverse range of knowledge to sketch out an artistic fashion illustration (in pencil) and draw hard edged pencil back and front technical drawings  |
|      |      |                 | 2   | |


<table>
<thead>
<tr>
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<th>DAY</th>
<th>ACTIVITY TASK (AT)</th>
</tr>
</thead>
</table>
| 5    |      | Design    | 3   | **Formative feedback and design critique:**  
  • At the beginning of the lesson, submit pencil drawing of the fashion illustration and technical drawings for critique and formative feedback to check drawing accuracy and alignment between pencil drawn illustration, technical drawings and prototype (bring prototype along)  
  • After feedback, apply a diverse range of medium and fabric rendering techniques to illustrate the final design solution as a fashion illustration and outline the pencil drawn technical drawings in black pen. Apply the correct equipment and line techniques to complete technical drawings of both the front and back views  
  • Complete the illustration on an A3 size  
  • Label technical drawing with design terminology and technical specifications  
  • Technical drawings, labelling, fabric swatches and trims must be included on the same A3 page as the illustration |
| 6    |      | Technology| 1   | **Product stage activities:**  
  Integrate and apply technology-related knowledge to manufacture the wearable product so that the design solution addresses the user needs, goals, preferences and context of use |
|      |      | Design    | 2   | **Formative feedback and design critique:**  
  Submit fashion illustration for design critique and facilitator feedback to check medium and fabrication application techniques |
|      |      | Technology| 3   | **Product stage activities:**  
  Integrate and apply technology-related knowledge to manufacture the wearable product so that the design solution addresses the user needs, goals, preferences and context of use |
|      |      | Technology| 1   | Integrate and apply technology-related knowledge to manufacture the wearable product so that the design solution addresses the user needs, goals, preferences and context of use |
|      |      | Design    | 2   | Plan and synthesise design journals and engage with overall presentation, planning and synthesising of the fashion illustration and technical drawings onto one A3 size board |
| 7    |      | Technology| 3   | • Integrate and apply technology-related knowledge to manufacture the wearable product so that the design solution addresses the user needs, goals, preferences and context of use  
  • Submit all assessment instruments of the project for summative assessment |
## Specific Learning Outcomes

<table>
<thead>
<tr>
<th>DEVELOP A CONCEPTUAL UNDERSTANDING OF THE DESIGN PRINCIPLES OF HCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFFERENTIATE BETWEEN USER NEEDS, GOALS AND PREFERENCES</td>
</tr>
<tr>
<td>DEVELOP DEEPER CONCEPTUAL UNDERSTANDING ABOUT THE ACTIVITIES ASSOCIATED WITH EACH STAGE OF THE FUZZY FRONT-END DESIGN PROCESS MODEL</td>
</tr>
<tr>
<td>FRAME THE DESIGN PROBLEM BY ESTABLISHING USER-SPECIFIC DESIGN CRITERIA AND CONSTRAINTS THROUGH IN-DEPTH UNDERSTANDING OF USER NEEDS, GOALS, PREFERENCES AND CONTEXTS OF USE AND THEN DESIGN, PROTOTYPE AND MANUFACTURE A PRODUCT IN RESPONSE TO THE PROBLEM</td>
</tr>
<tr>
<td>INTEGRATE CONCEPTUAL KNOWLEDGE OF THE DESIGN PRINCIPLES OF HCD, USER NEEDS AND THE FUZZY FRONT-END DESIGN PROCESS MODEL FOR APPLICATION IN DESIGN AND TECHNOLOGY-RELATED ACTIVITIES</td>
</tr>
<tr>
<td>INCORPORATE MULTIDISCIPLINARY SKILLS AND PERSPECTIVES IN ORDER TO DESIGN, PROTOTYPE AND MAKE A PRODUCT AS A SOLUTION, THROUGH COLLABORATION AND PARTNERSHIP WITH THE USER TO ADDRESS THEIR NEEDS, GOALS, PREFERENCES AND CONTEXTS OF USE</td>
</tr>
</tbody>
</table>

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### Module Code

**FASHION DESIGN AND TECHNOLOGY 1B**

### Unit Code

**ONE – HUMAN-CENTERED DESIGN (HCD) PROJECT**

### Unit Outcome

Integrate and apply conceptual knowledge in respect of the design principles of HCD as the underlying design approach and volition in praxis to design, prototype and manufacture a wearable product.

### Project-Specific Design Constraints

- Wearable product (can be any product category)
- Experimentation with design detail, for example pleats, gathers, pin tucks, fastening methods etc.
- Natural fibre fabrics

### Assessment Instruments

- Design journal
- Two-dimensional fashion illustration along with technical drawings of the final design solution
- Three-dimensional prototype
- Product and patterns

### Duration of Unit

**6 WEEKS**

### Venue

**Studio 1: Design and Technology studio**

### Due Date

**Design: 60%**  
**Technology: 40%**

### Module Components Involved in This Project

<table>
<thead>
<tr>
<th>DESIGN</th>
<th>PATTERN TECHNOLOGY</th>
<th>GARMENT TECHNOLOGY</th>
</tr>
</thead>
</table>

By the end of this learning unit, you should be able to achieve the following specific learning outcomes:
Learn to become agents of change in order to design-with-intent and empathy for actual users through collaboration and partnership.

Develop a generative tool to visually and explicitly (put into words) communicate the following:
- Users’ needs, goals and preferences
- Context of use
- Design criteria and constraints
- Brainstorming ideas (written)
- Action plan to translate ideas and define user/designer project learning tasks

Conceptualise and justify a series of design sketches to visually reflect the ideation tool.

Compile a design journal to record and justify all design and technological process activities in an attempt to visualise and communicate internal thought processes.

Apply a diverse range of design-related knowledge to demonstrate illustrative techniques and drawing ability.

Apply technology-related knowledge to develop a pattern, make a prototype and product.

### DESIGN PRINCIPLES OF HCD

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<tr>
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<td>HCD2</td>
<td>Integration of primary research and design - designers assume a dual role of researchers and designers meaning that design is grounded in primary rather than secondary research</td>
</tr>
<tr>
<td>HCD3</td>
<td>Identify and address user needs, goals and preferences – first, establish users’ needs, goals and preferences through socially-engaged dialogue as input into the design process before seeking to address those needs, goals and preferences</td>
</tr>
<tr>
<td>HCD4</td>
<td>Context of use - design should take into account the context or situation in which the user will use the product</td>
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<tr>
<td>HCD5</td>
<td>Translate user needs into requirements - users’ needs should be translated into a set of design requirements (design criteria and constraints)</td>
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<tr>
<td>HCD6</td>
<td>User evaluation, feedback and refinement - users should evaluate prototypes and provide feedback as a critical source of information. Designers should evaluate designs with users and improve them based on the feedback obtained</td>
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<tr>
<td>HCD7</td>
<td>The process is iterative - iteration or repeated steps occur throughout the design and development process until the desired outcome is achieved</td>
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<tr>
<td>HCD8</td>
<td>Collaboration between users and designers – users are active and continuously involved partners in the design process and design should unfold with users, not for users</td>
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<tr>
<td>HCD9</td>
<td>The design team includes multidisciplinary skills and perspectives – designers work in design teams and engage in collaborative decision-making and implementation</td>
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To engage with the project activity tasks you should:

- Work in a design team of three where one takes the role of the designer and the other two members, the role of users
- Apply the fuzzy-front end design process model
- All design and technology activities should be done through joint partnership and collaboration between designer and user
- Refrain from using secondary visual images from, for example, internet sources, fashion magazines etc.
- Record all design and technology activities in a design journal
# PROJECT PLAN AND ACTIVITY TASK

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| 1    |      | Design    | 1   | **Conceptual knowledge session:**  
  - Receive learning material  
  - Develop conceptual knowledge about the design principles of HCD (included in project brief)  
  - Discussion around the design principles of HCD  
  - Develop conceptual understanding around the different aspects of user needs (refer to the learning material)  
  - Recognise and differentiate between fundamental user needs and dimensions attached to each user need (refer to learning material)  
  - Differentiate between user needs, goals and preference (refer to the generative tool)  
  - Link theory to practice - contextualise the generative tool as per:  
    - user needs, goals, preferences and context of use  
    - the attributes of design criteria and constraints  
    - how to brainstorm ideas  
    - the features of the action plan  
  - Differentiate between a need, a goal and a preference  
  - Develop conceptual understanding about the fuzzy-front end design process model  
  - Develop conceptual understanding about the activities in the fuzzy-front end design process model  
  - Differentiate between idea and concept stage activities  
  - Practical application of tools and techniques such as post-it stickers, highlighters and coloured post cards to demonstrate data categorisation and idea generation |
Design criteria stage activities:
- Select your three-member design team (based on your selection) with one student role-playing the designer and the other two as users. Decide on who assumes the role of the designer and two users’
- Designer assume the role of researcher and place respective users’ as the source of inspiration and nucleus of design to trigger the design criteria stage - do not take inspiration from visual images
- Designers take on the researcher role and engage users’ in conversation, with probing strategies, to collect primary information (you can use the user needs models and the generative tool as a guide) about:
  - users’ needs
  - users’ goals
  - users’ preferences
  - context of use
- Design teams record all primary information with field notes in the design journal – use the generative tool as a guideline to record the information
- Use any method you prefer to frame the design problem by objectively and systematically categorising the information collected into:
  - users’ needs
  - users’ goals
  - users’ preferences
  - context of use
- From the collected information and categorisation, develop a tentative set of user-specific design criteria and constraints based on user needs, goals, preferences and context of use – record in design journal
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| 1    |      | Design    | 3   | Idea stage activities:  
|      |      |           |     | • Design teams narrow down and finalise a set of user-specific design criteria and constraints – record in design journal  
|      |      |           |     | • Reflect on the information captured in the design journal and collaboratively integrate primary research and design activities to design a product with users. The design of the product must include the project-specific and user-specific design constraints and criteria  
|      |      |           |     | • Design teams brainstorm several possible incubated design ideas and capture this in for example words, post-it-stickers, post cards, roughly drawn ideas etc, in the design journal (idea stage)  
|      |      |           |     | • In the design journal, develop a plan of action illustrating:  
|      |      |           |     |   • the designer and users’ roles and tasks to execute the HCD project - refer to generative tool for structure  
|      |      |           |     |   • what is required to translate design ideas into solutions  
|      |      |           |     | • In the design journal, design teams develop a personal generative tool summarising the following information:  
|      |      |           |     |   • users’ needs, goals and preferences  
|      |      |           |     |   • context of use  
|      |      |           |     |   • design criteria and constraints  
|      |      |           |     |   • brainstormed incubated ideas (written)  
<p>|      |      |           |     |   • action plan to translate ideas and define users’/designer project tasks |</p>
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|      |      | Design    | 1   | **Concept stage activities:**  
|      |      |           |     | - Design teams reflect on, go back to the design criteria, requirements and brainstormed ideas. Designers engage users’ in further dialogue if necessary  
|      |      |           |     | - Design teams jointly and collaboratively translate the brainstormed incubated ideas into two-dimensional possible design solutions by:  
|      |      |           |     |   - experimenting with design detail  
| 2    |      |           |     |   - conceptualise a series of rough sketches (minimum of 20 rough sketches)  
|      |      |           |     |   - support your rough sketches with tentative colorations and fabrications and justify your selection  
|      |      |           |     | - Capture these activities in design journals  
|      |      |           | 2   | **Continue with concept stage activities**  
|      |      |           |     | **By the end of the studio time, design teams jointly select one abstract sketch as a possible design solution**  
|      |      | Technology| 3   | **Prototype stage activities:**  
|      |      |           |     | Design teams engage with the prototype stage and apply technology-related knowledge to translate the two-dimensional abstract sketch to develop a preliminary working pattern  
|      |      | Technology| 1   | **Prototype stage activities:**  
|      |      |           |     | Design teams engage with the prototype stage and apply technology-related knowledge to translate the two-dimensional abstract sketch to develop a preliminary working pattern  
| 3    |      |           | 2   | **Self-directed learning:**  
|      |      |           |     | - Complete the working pattern  
|      |      |           |     | - Cut the working pattern in calico  
|      |      |           | 3   | Integrate and apply technology-related knowledge and specialised industrial machinery to manufacture a three-dimensional prototype  
|      |      | Technology| 1   | Integrate and apply technology-related knowledge and specialised industrial machinery to manufacture a three-dimensional prototype  

1 Integrate and apply technology-related knowledge and specialised industrial machinery to manufacture a three-dimensional prototype
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| 4    |      | Design and Technology         | 2   | **Formative feedback and design critique:**  
|      |      |                               |     | • Present prototype for user’s evaluation and feedback  
|      |      |                               |     | • Design teams to present prototypes for facilitators’ formal critique and feedback  
|      |      |                               |     | • Record all feedback in design journals  
|      |      |                               |     | • Work iteratively between the design criteria, idea, concept and prototype stages - reflect on what you did, what worked, what did not work and how to fix the problems  
|      |      |                               |     | • Execute multiple refinements to finalise the two-dimensional sketch, preliminary working pattern and prototype until the design solution addresses users’ satisfaction  
|      |      |                               |     | • Record all refinements in design journals  
|      |      |                               | 3   | **Self-directed learning:**  
|      |      |                               |     | • Carry on with the iterative design process with multiple refinements  
|      |      |                               |     | • After refinements, finalise the two-dimensional sketch  
|      |      |                               |     | • Apply a diverse range of knowledge to sketch out an artistic fashion illustration (in pencil) and draw hard edged pencil back and front technical drawings  
| 5    |      | Design                        | 1   | **Formative feedback and design critique:**  
|      |      |                               |     | • At the beginning of the lesson, submit pencil drawing of the fashion illustration and technical drawings for critique and formative feedback to check drawing accuracy and alignment between pencil drawn illustration, technical drawings and prototype (bring prototype along)  
|      |      |                               |     | • After feedback, apply a diverse range of medium and fabric rendering techniques to illustrate the final design solution as a fashion illustration and outline the pencil drawn technical drawings in black pen. Apply the correct equipment and line techniques to complete technical drawings of both the front and back views of the design.  
|      |      |                               |     | • Complete the illustration on an A3 size board  
|      |      |                               |     | • Label all relevant detail onto the technical drawings with the correct terminology  
|      |      |                               |     | • Technical drawings, labelling, fabric swatches and trims must be included on the same A3 board as the illustration  

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| 5    |      | Technology| 2   | **Product stage activities:**  
Integrate and apply technology-related knowledge to manufacture the wearable product so that the design solution addresses the user needs, goals, preferences and context of use |
|      |      | Technology| 3   |                      |
| 6    |      | Technology| 1   | **Product stage activities:**  
Integrate and apply technology-related knowledge to manufacture the wearable product so that the design solution addresses the user needs, goals, preferences and context of use |
|      |      | Technology| 2   |                      |
|      |      | Design    | 3   | **Formative feedback and design critique:**  
- Submit fashion illustration for design critique and facilitator feedback to check medium and fabrication application techniques  
- Plan and synthesise design journals and engage with overall presentation, planning and synthesising of the fashion illustration and technical drawings onto one A3 size board  
- Submit all assessment instruments of the project for summative assessment |