

## Chapter 5

### Empirical research

#### 5.1 Introduction

This chapter will be devoted to a discussion on the empirical research undertaken for this study. The first part of this chapter will, therefore, be used to provide the reader with an overview of and a background to the type of research embarked on here. This will be followed by the formulation of definitions for some of the aspects associated with a new research paradigm. Expanding on the said core aspects, a closer look will then be taken at the methodological-research component, followed by an interpretation of the results obtained.

#### 5.2 What is research?

*Our true lover of knowledge naturally strives for reality and will not rest content with each set of a particular which opinion takes from reality, but soars with undimmed and unwearied passion till he grasps the nature of each thing as it is...*  
(Plato, *Republic*, 490b, in Mouton and Marias, 1994: 3)

In our modern Information Age, evidence has been mounting steadily of the fact that, in order fully to serve the social and/or science orders in general, researchers need to consider information that goes beyond the kind of information generated by the academic disciplines.

Research proceeds by making choices (Stokes, 1997: 6), and even though the activities associated with research may be diverse, it should be noted that these activities always entail a succession of decisions and/or choices.

According to Stokes, research may require that some or all of the following activities be performed:

- Choice of problem area or particular line of inquiry
- The construction of theories and/or models
- Derivation of predictions, deductions or hypotheses
- Development of instruments or measures
- Design of experiments and the observation of data
- The use of analytic techniques
- Selection of follow-on inquiries

- The communication of results to other scientists.

Based on the foregoing list of activities, the concept “research” could be defined as “a collaborative activity by means of which a given phenomenon in reality is studied in an objective manner, with a view to establishing a valid understanding of that phenomenon” (Mouton, 1994: 156).

Brooks (1979: 14-18) concurs and adds that “...any research process can be thought of as a sequential, branched decision-making process. At each successive branch, there are many different alternatives for the next step”. It should be noted here that the difference between basic and applied research acts as the catalysis that governs the choices amongst the foregoing alternatives.

According to Bush (1944), basic research is performed without thought of practical ends, and the salient features of basic research is its contribution to “...general knowledge and an understanding of nature and its laws” (Stokes, 1990: 3). In essence, the principal aim of basic research is to promote and enhance knowledge (theory) without any given application in mind. In contrast with this, applied research focuses on meeting specific needs by gaining in-depth knowledge and understanding of the application in question. Denning (2002: 120) concurs and adds that “applied research is technological development that solves near-term problems”. These two models have different diffusion times from research results to practice – often, 20 to 50 years for basic research, and 2 to 3 years for applied research (Denning, 2002: 120).

According to some researchers, the effectiveness of basic and applied research is suspect, especially in the light of (among other reasons) the rapid advances made in Information Technologies and Communications (“ICT”, for short).

With the foregoing in mind, a new research paradigm, aimed at addressing research in Information Science, is called for. This new research paradigm will be taken under discussion next.

### **5.3 Stokes’ research paradigm**

Today, there is an alternative way in which to envisage research efforts that are more comprehensive and which offer a better viewpoint about and approach to

knowledge creation that is more robust and has a greater impact on society at large. In reaction to the basic/applied research dichotomy, Stokes developed a four-quadrant model, which can be used to classify all research efforts. According to Stokes, all research efforts should be examined in terms of the following two dimensions:

- Research inspired by considerations of use
- Research as a quest for fundamental understanding.

As indicated in figure 5.1, the upper-left quadrant captures the traditional paradigm of *basic research*. Stokes calls this quadrant the “Bohr's quadrant”, as it represents the early work of Niels Bohr on atomic structure.

Stokes named the lower-right quadrant “Edison's quadrant”. This quadrant embodies the traditional *applied-research* paradigm. In terms of this quadrant, researchers, such as Edison, will be more interested in making something work or in solving a practical problem, with the result that they will, in essence, be more focused on considerations of use.

The upper-right (and most significant) quadrant is called “Pasteur's quadrant”, as Louis Pasteur is often thought of as the father of microbiology. Few people have done more to alter our basic understanding of life processes. This type of research is what Stokes refers to as *use-inspired basic research*. Pasteur was devoted to solving problems, to finding solutions that would improve the lives of the people around him (Appelgate, 2004).

The lower-left quadrant, also known as the “sterile quadrant” (Reeves, 2000), represents research that neither seeks fundamental understanding nor considers use. This quadrant also represents the research conducted and published solely to advance the careers of academics confronted with the mandate to “publish or perish” (Reeves, 2000).

It would be safe to assume, then, that Stokes envisaged an interweaving of basic, applied and use-inspired basic research. According to this interwoven approach, research in each quadrant influences research in all the other quadrants.

	Inspired by considerations of use?		
	No	Yes	
Quest for fundamental understanding?	Yes	<p><b>Bohr's quadrant</b></p> <p><b>Pure basic research</b></p> <p>Research &amp; development to seek knowledge, without any concern for application</p>	<p><b>Pasteur's quadrant</b></p> <p><b>Use-inspired basic research</b></p> <p>Research &amp; development with a quest for understanding and considerations of use</p>
	No	<p><b>Sterile quadrant</b></p> <p>Research &amp; development for the sake of research, with no apparent goal of seeking knowledge or considerations of use</p>	<p><b>Edison's quadrant</b></p> <p><b>Pure applied research</b></p> <p>Research for the sake of research, with no apparent goal of furthering knowledge, but with considerations of use</p>

**Figure 5.1: Quadrant Model of Scientific Research (Stokes, 1997: 73)**

### 5.3.1 Where this study fits into Stokes' quadrants

The principal aim of this study is to gather, reflect and produce findings on user behaviour in the utilisation of Peer-to-Peer applications, with the result that the study leans towards the upper-right or second quadrant (use-inspired basic research). The research and development processes in this quadrant have as objective the quest for understanding, as well as considerations of use.

Next, a discussion on the research methodology employed in this study.

## 5.4 Research methodology

The focus in this section will fall on, firstly, the methodological orientation adopted and, secondly, on the choice of research design for this study.

It should, however, be noted here that researchers often confuse the concepts "research design" and "research methodology". The differences between these concepts can be summed up as in table 5.1 on the next page.

**Table 5.1: Differences between research design and research methodology**

<b>Research design</b>	<b>Research methodology</b>
Focuses on the end product: What kind of study is being planned and what results are being aimed at?	Focuses on the research process and on the kind of tools and procedures to be followed.
Point of departure: research problem or question.	Point of departure: specific tasks (data-collection or sampling) at hand.
Focuses on the logic of research: What kind of evidence is required adequately to address the research question?	Focuses on the individual (not linear) steps in the research process and the most “objective” (unbiased) procedures to be followed.

It becomes evident from the above table that research methods and techniques are task specific, and that the research task is defined by the research objective(s).

#### 5.4.1 Research objectives

According to Reeves (2000), there are six main types of research objectives:

- **Theoretical objectives:** researchers with these objectives in mind are focussed on explaining phenomena through the logical analysis and synthesis of theories, principles and the results of other forms of research, such as empirical studies.
- **Empirical objectives:** as the name suggests, this category of research objectives is focused on determining how things work by means of testing the related theories.
- **Interpretivist objectives:** interpretive research focuses on how things work inside the identified study field.
- **Postmodern objectives:** research with this type of objective focuses on the examination of assumptions.
- **Development objectives:** researchers with developmental objectives are focused on the dual objective of developing creative approaches, while at the same time constructing a body of design principles that could guide future development efforts.
- **Action objectives:** researchers with action objectives are focused on a particular program, product or method, usually in an applied setting, for the purpose of describing it, improving it or estimating its effectiveness

and worth.

Different studies employ different methods or techniques, because they have different objectives (Mouton, 1996: 38). According to Myers (2004), research methods can be classified in various ways, with one of the most common distinctions being made between that of qualitative and quantitative research methods.

#### 5.4.2 Differences between quantitative and qualitative research methodologies

According to Neuman (2000: 123), the differences between quantitative and qualitative research can be depicted as in table 5.2 below:

**Table 5.2: Differences between quantitative and qualitative research methodologies**

Quantitative research methodology	Qualitative research methodology
Tests hypothesis that the researcher begins with.	Captures and discovers meaning once the researcher becomes immersed in the data.
Concepts come in the form of distinct variables.	Concepts come in the form of themes, motifs, generalisations and taxonomies.
Measures are systematically created before data collection and are standardised.	Measures are created in an <i>ad hoc</i> manner and are often specific to the individual setting or researcher.
Data comes in the form of numbers from precise measurements.	Data comes in the form of words and images from documents, observations and transcripts.
Theory is largely causal and is deductive.	Theory can be causal or non-casual and is often inductive.
Procedures are standard and replication is assumed.	Research procedures are particular and replication is very rare.
Analysis proceeds by using statistics, tables or charts and by discussing how they relate to hypotheses.	Analysis proceeds by extracting themes of generalisations from evidence and by organising data to present a coherent, consistent picture.

The methodological orientation adopted for this research project is a quantitative orientation. The following section will be used for a more detailed discussion on the two approaches.

#### 5.4.3 A quantitative-research methodology

Quantitative research methods were originally developed in the natural sciences to study natural phenomena (Myers, 2004). It can, therefore, be said

that quantitative research is conducted on the basis of “hard science”. In essence, quantitative research is a descriptive research that involves the collection of numerical data to test prescribed hypotheses and/or questions concerning a relevant research question or hypothesis inside a study field. This collection of results is necessary to obtain measurable results to analyse and tabulate. This approach to research assigns only denotative meaning to results where no alternative assumptions can be made about the scenario.

Some benefits possibly to be derived from quantitative research are as follows (Babbie, 2002; Wimmer & Dominick, 1983):

- The use of numbers allows for greater precision in reporting results.
- Quantification makes for more explicit observations in the research.
- Quantitative research allows for the use of powerful methods of mathematical analysis, such as the Thurston scale for predicting probability.
- By applying the quantitative-research method, the aggregation and summarisation of the collected data are simplified.

The greatest drawback of a quantitative-research methodology pertains to the fact that responses and the people providing the responses are categorised into predetermined classes, thus negating the human element.

According to Neuman (2000: 33-36), the following techniques may be utilised as tools in a quantitative-research methodology:

- Experiments
- Surveys
- Content analyses
- Existing statistics.

The following section will be used for a discussion on the second category of research methods, as classified by Myers (2004).

#### 5.4.4 A qualitative-research methodology

Qualitative-research methods were developed in the social sciences in a bid to enable researchers to study natural and cultural phenomena (Myers, 2004). It would be safe to say, therefore, that a qualitative-research methodology is any type of research that produces findings and/or results not arrived at by any quantifiable or calculated means, thus focusing on the description, rather on the

observation of the identified problem statement.

Some benefits possibly to be derived from qualitative research may include the following (Key, 1997):

- Produces more in-depth, comprehensive information.
- The qualitative methodology allows researchers to view behaviour inside the social setting.
- It is more flexible and adaptable in formulation and implementation.

The fundamental disadvantage of a qualitative-research methodology is that it may focus too closely on the individual results, because of the smaller sample size. In addition, the more factual and statistical orientation of the quantitative-research methodology may be better suited to the reliability and validity of the study. According to Neuman (2000: 36-37), the following techniques may be utilised as tools in a qualitative-research methodology:

- Field research
- Historical-comparative research

The next section will be devoted to a closer look at the research design of this study.

## **5.5 Research design**

According to Mouton (2001: 55), a research design is a plan or a blueprint of how the researcher intends to conduct his/her research.

### **5.5.1 Rationale of this study**

Many users associate Peer-to-Peer computing with file-sharing, in particular with MP3 music files, whilst in reality, Peer-to-Peer computing consists of much more, such as instant messaging, group collaboration and distributed computing. An example closer to the Information Studies and library environments would, for instance, be the Peer-to-Peer data replication of a digital-library collection. In the social arena, Peer-to-Peer computing has wide-ranging ramifications for the Internet and its users.

According to Vale (2000), one of the most overlooked sectors of the influence Peer-to-Peer computing exerts over other areas is that of the indirect role it plays as a pusher of the development and adoption of hard technology. This



study is, therefore, aimed at identifying frequencies and patterns of user behaviour and utilisation when interacting with Peer-to-Peer systems available on the Internet. The literature review confirmed that P2P could be considered one of the most important emerging technologies in the Information Society. P2P can, in other words, be seen as the dominant model that future Internet adaptations will be built on, thus making it essential to know how many people are currently utilising these models and applications. By determining the volume and patterns of use, system administrators could profile Peer-to-Peer users in order better to manage, control and plan for the Information Technology (IT) infrastructure in their organisations.

### 5.5.2 The research problem

Understanding the usage patterns of individuals using Peer-to-Peer applications will help system administrators better to manage and control the expensive Information Technology (IT) infrastructures in their respective organisations.

As such, the research problem can be formulated as follows:

**To what extent are RAU Information Science students utilising P2P systems as part of their information infrastructure?**

The following sub-problems were identified in a bid to solve the above research problem:

- What kind of Information Technology (IT) Infrastructure is utilised when connecting to P2P file-sharing applications on the Internet?
- What are the utilisation patterns of the online student community when using P2P systems on the Internet?
- To what extent do ethics have an impact on the utilisation patterns of P2P systems?

It was decided to perform a quantitative study on the behaviour of individual students with regard to their utilisation of Peer-to-Peer file-sharing applications. In order to ensure that readers be fully informed, the research required that a literature survey (chapters 1 to 4) be undertaken to identify the latest research on Peer-to-Peer file-sharing, thereby setting the scene for an in-depth analysis of the results obtained from the empirical research.

## 5.6 Test sample, data collection and data

The participants in the study were sampled from the undergraduate student population of the Rand Afrikaans University in Johannesburg, South Africa. Students registered for first-, second- and third-year degree courses in the Information Science Department were utilised for the study. Participation in the study was voluntary.

The questionnaire was only made available in English. Although the University is a dual-medium institution, it was thought that the respondents would be able easily to manage an English-only questionnaire. Assistance was, however, available, in case students experienced language or translation difficulties.

In addition, the participants were all provided with both written and verbal instructions. These instructions included an obligation to answer all the questions in each section, and pointed out that there were no correct or incorrect answers, as well as an instruction to answer honestly and truthfully and to work as quickly and as accurately as possible.

A total of 377 students participated in the study. Despite clear instructions in this respect, however, not all the respondents answered all the questions in the questionnaire, which consisted of five sections. The research procedure involved first gaining permission from and making arrangements with the course lecturers of the aforementioned student sample. After distribution of the questionnaire during lectures, an explanation of the purpose of the study (that the researcher is doing a master's degree) was provided by the promoter and/or lecturer. Assistance was then given where necessary to facilitate the understanding and completion of the questionnaire in an unbiased manner. Once the questionnaires had been completed, they were handed back to the researcher.

The completed questionnaires were then submitted for statistical analysis at Statcon (the "Statistical Consultation Service"), a division of the RAU, where the SPSS (the "Statistical Package for Social Sciences") software, version 11.0, was used for the input, management and statistical analysis of the data collected. This was then put into spreadsheets, with statistical graphs for a visual representation of the results. The resulting frequencies and tables are available in Appendix B to provide the reader with a complete picture of the results obtained.

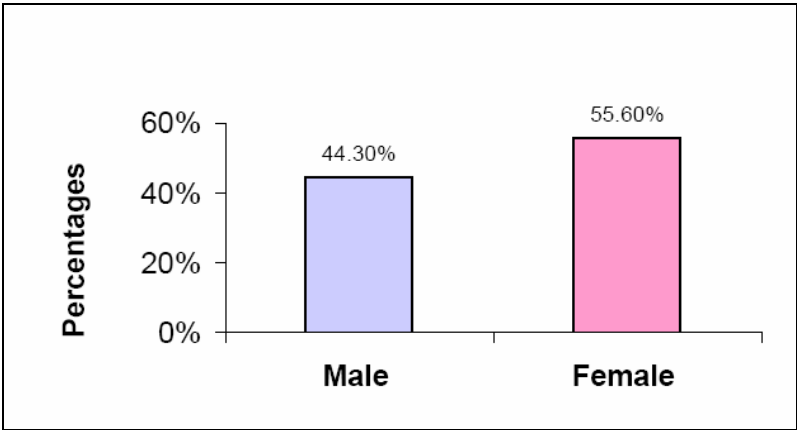
## 5.7 Analysis and interpretation of questionnaire results

The questionnaire consisted of five sections (see Appendix A), which will each be taken under discussion next.

### 5.7.1 Section 1: General information

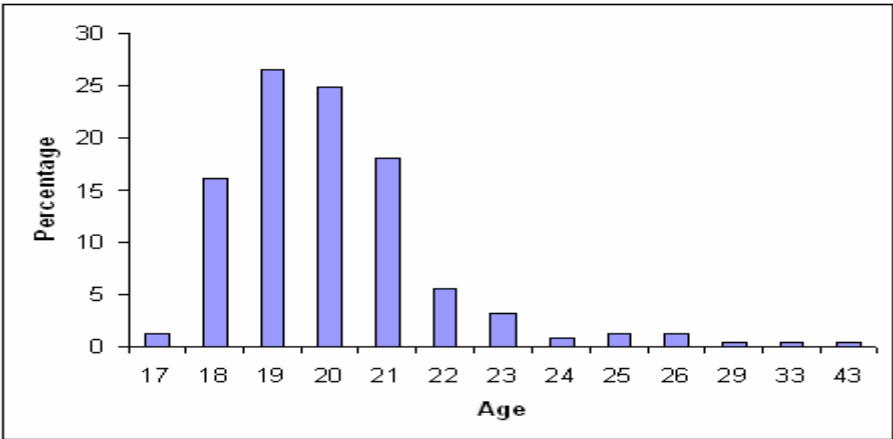
Section one of the questionnaire focused on the biographical information of the sample. Based on the definitions provided in chapter 3, section 3.2, the sample used in the study may be defined as a society and/or a community. As stated by Tillman (2000), a “community” is “a combination of place, content and people and the interactions and relationships between them”. All the respondents were registered students of the RAU (soon to be called the “University of Johannesburg”), and the sample consisted of 377 students.

The chart below depicts the gender composition of the sample:



**Chart 1: Gender composition**

It becomes evident from the above that 44.3% of the sample was male and 55.6% female. The age distribution was within the 17 to 43 age range, as indicated in chart 2 below:

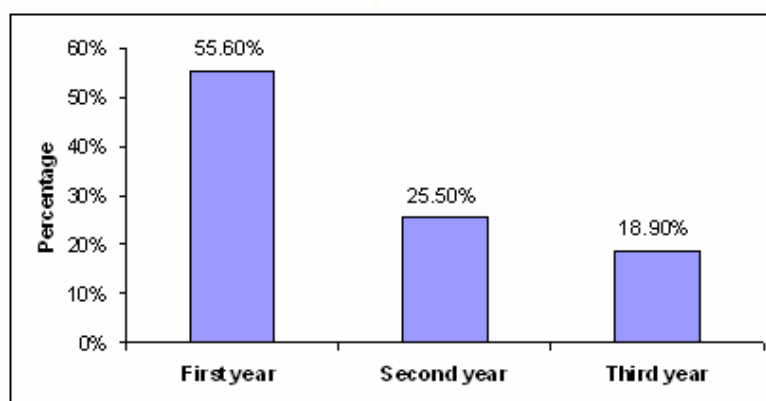


**Chart 2: Age distribution**

It should be noted that the mean age for the group was 20.09, with a standard deviation of 2.232 (n = 377). A number of deviations from the norm can also be seen. It is noted that a number of respondents fall outside the normal distribution, including the age range from 24 to 43. In addition, the normal distribution (bell-shaped distribution range) also represents the fact that most of the respondents are first- or second-year students.

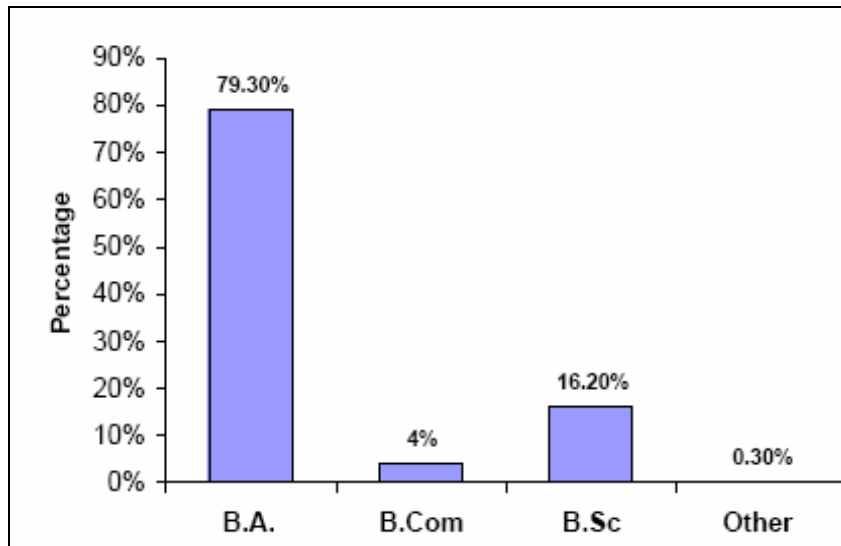
With regard to the ethnic demographics of the sample, again two groups were identified, namely white (40%) and other respondents (60%).

The majority of the sample (55.6%) were in their first year of study, while [the sum of second- (25.5%) and third-year students (18.9%)] 44.4% of the students reported that they were in their second and third years of study (see chart 3). The finding in chart 2 is, therefore, verified, underlining the fact that the core base of respondents fell within the age range of 17 to 23 years (being either a first- or a second-year student).



**Chart 3: Year of study**

With regard to degree registration, the sample was made up of BA (79.3%), BCom (4.0%), BSc (16.2%) and Other students (0.3%). The high ratio of BA students can be attributed to the fact that Information Science is a specific subject in the Faculty of Arts.

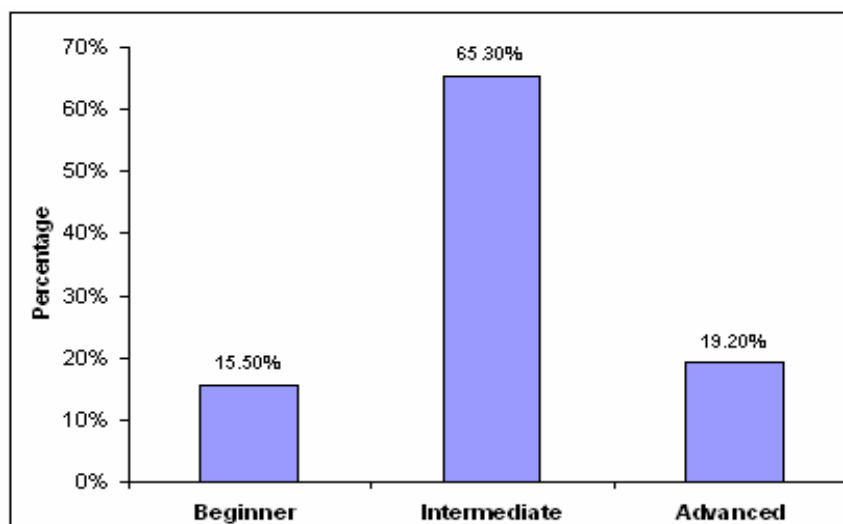


**Chart 4: Degree registration**

### 5.7.2 Section 2: Information and communication technology (ICT) hardware

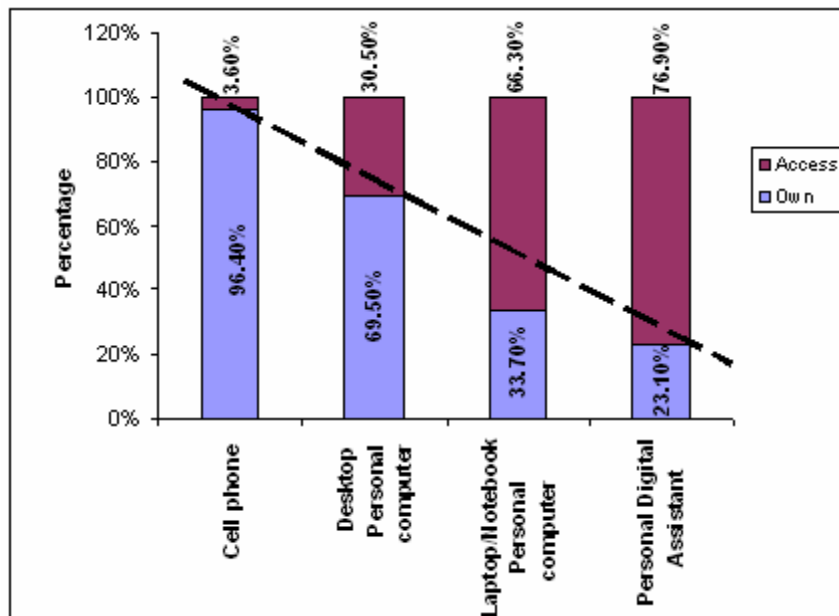
Section 2 of the questionnaire focused on the Information and Communication Technology (“ICT”, for short) hardware utilised by the respondents. As indicated in chapter 3, section 3.2.2, the ICT hardware utilised by the individuals will have a significant effect on the creation and/or composition of the society or community as a whole.

As indicated in chart 5 below, 65.3% of the respondents rated themselves as intermediate computer users. A further analysis of chart 5 also indicated that there was a normal-curve distribution of the various levels of computer literacy. The low ratio of advanced users may be attributed to the fact that the majority of the students were only starting out on their formal tertiary education.



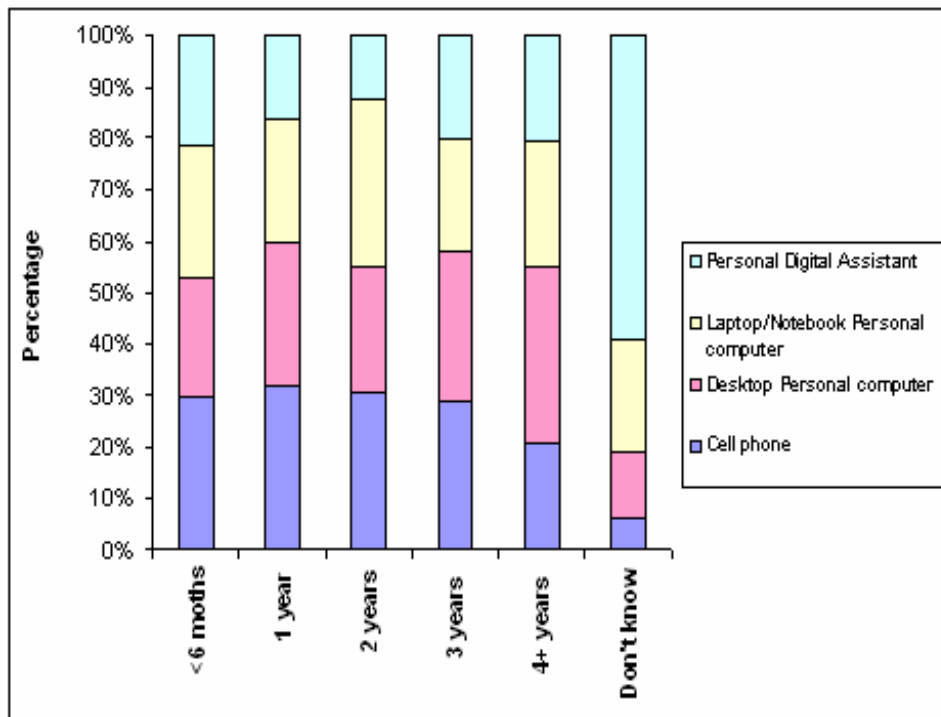
**Chart 5: Ratings in terms of computer usage**

After having determined the level of skill and knowledge in the use of computers, the focus shifted to ICT hardware owned or accessed by the respondents. This was deemed necessary to ensure that the impact of the ICT hardware on the society or community could be measured. The first and most obvious observation in chart 6 below was that the ownership of ICT hardware declined as the level of technological advancement of the ICT hardware increased. The greater majority (96.4%) of the respondents own what can be considered in this case to be the most basic form of ICT, namely a cellular phone, whilst only 23.1% own a Personal Digital Assistant (“PDA”, for short). This observation may, therefore, change over time as more and more cellular phones incorporate the basic applications and functions of PDA. In addition, 69.5% of the respondents own a desktop personal computer, whilst 30.5% of the respondents have access to one.



**Chart 6: ICT hardware owned or accessed**

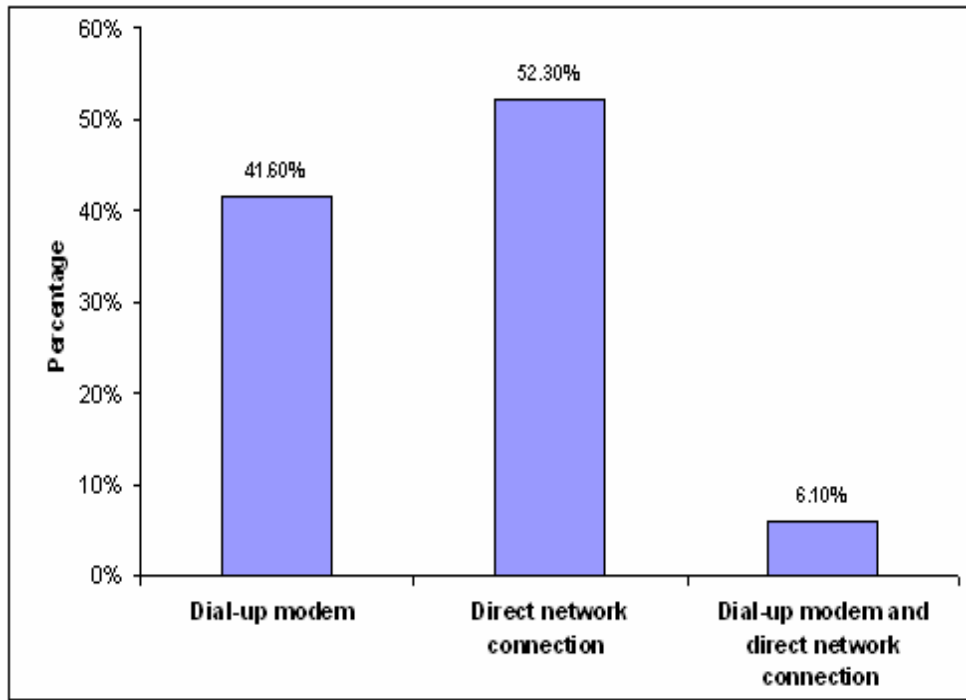
Even though the relative age of the ICT hardware varies, it can be deduced from chart 7 that the majority of the hardware was less than two years old.



**Chart 7: Relative age of ICT hardware**

Although it was necessary to determine the levels of computer literacy and ICT hardware owned and/or accessed, these applications would seem useless in the modern-day context if not connected to each other in a specific way. As was indicated in chapter 2, section 2.3.1, the Internet can be seen as the network connecting all the various ICT hardware and software applications.

According to the results, the respondents connect to the Internet, either via a dial-up connection (41.6%), a direct network connection (52.3%) or a combination of dial-up and direct network connection (6.1%).



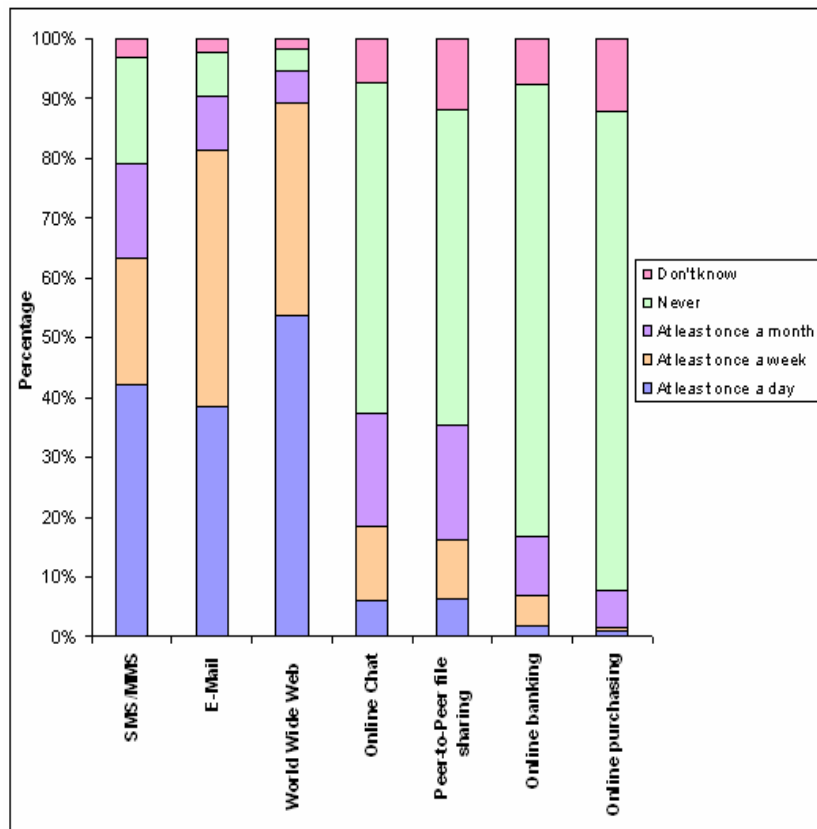
**Chart 8: Connection to the Internet**

Future frequencies and means of connecting to the Internet may also be influenced by the wireless connection. Various programs and/or initiatives are currently available on the market.

### 5.7.3 Section 3: Information technology (IT) utilisation

While connected to the Internet, the respondents could perform various tasks, for example, SMS/MMS, e-mail, WWW, online chat, Peer-to-Peer file-sharing, online banking or online purchasing. The respondents were asked to indicate the frequency of use during the past six months of each of the aforementioned applications (as indicated in chart 9).





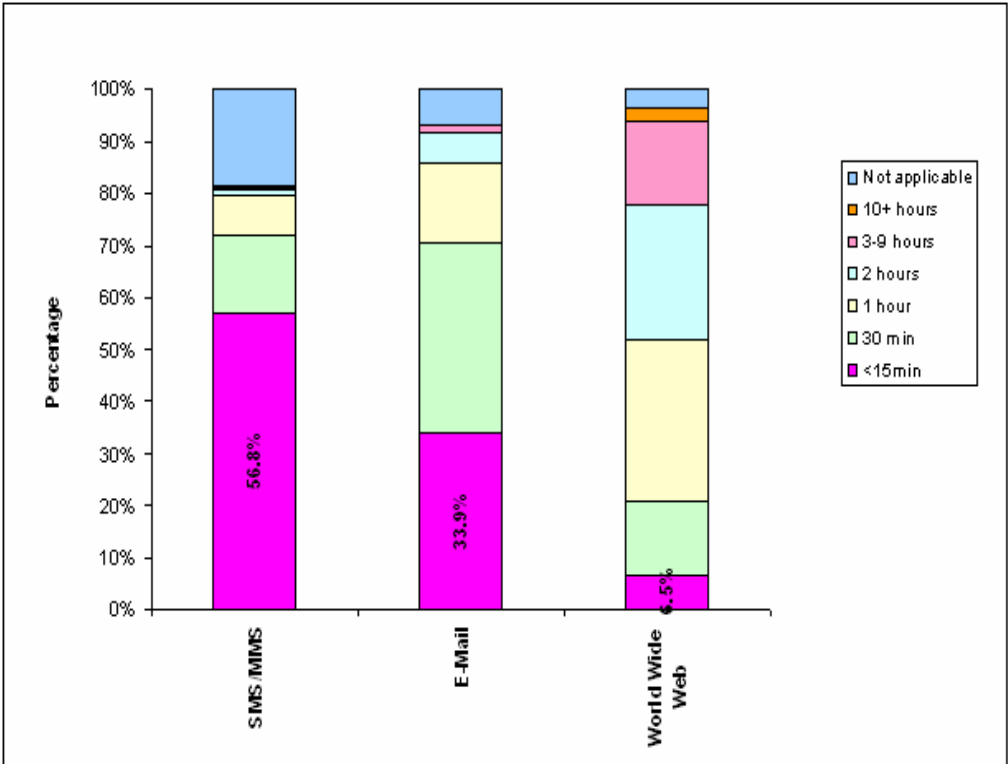
**Chart 9: Frequency of use of each application**

A graphic analysis of chart 9 produced interesting results. The frequency of use of SMS/MMS, e-mail and WWW was very high. The respondents indicated that these three applications were utilised at least once a day. This frequency of use is especially significant, and confirms the notion that modern-day communication channels are, fundamentally, built around these applications, specifically around the SMS/MMS and e-mail applications.

In addition, a large number of respondents indicated that they never used online chat (55.1%), Peer-to-Peer file-sharing (52.5%), online banking (75.8) or online purchasing (80.1%). The results obtained from the questionnaire indicated that 53.9% of the respondents accessed the WWW at least once a day, that 42.8% accessed their e-mail at least once a week and that 19.3% downloaded and/or uploaded files via a Peer-to-Peer file-sharing application.

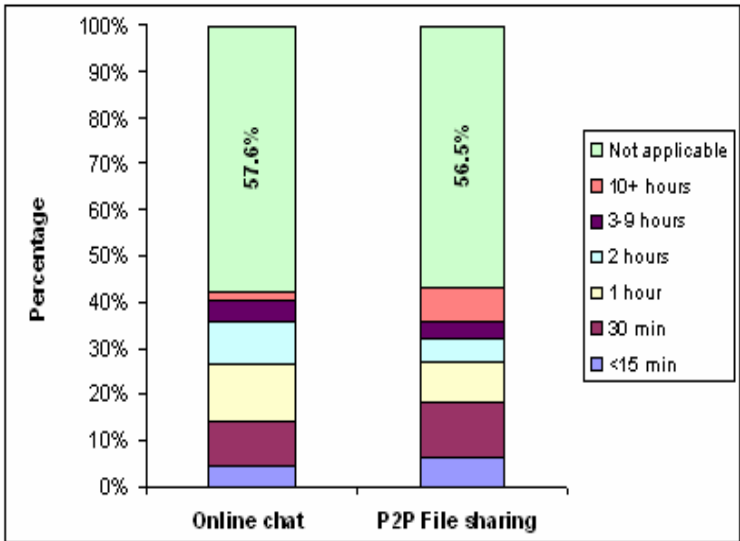
As indicated by the results obtained in chart 9a, the greater part (56.8%) of the respondents spent 15 minutes or less sending SMS/MMS via the Internet. This observation substantiated the fact that this ICT application plays a fundamental part in modern-day Digital Society. Even though e-mail can also be seen as one of the fundamental communications tools in the modern Digital Society, 33.9% of the respondents indicated that they spend 15 minutes or less at a

time to send e-mails via the Internet. A possible explanation for this low usage rate (as obtained from chart 3) could be the fact that 55.6% of the respondents are in their first year of study and have only had limited exposure to an ICT-rich environment. This argument would also explain the even lower WWW usage.



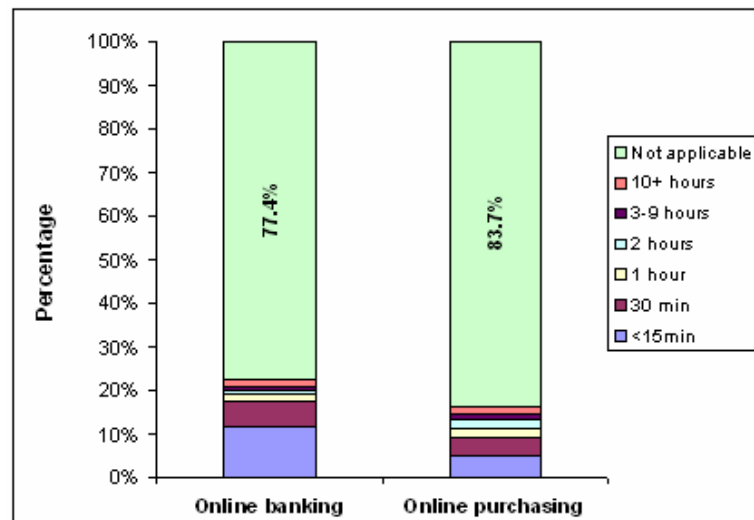
**Chart 9a: Duration of a single session of SMS/MMS, e-mail and WWW**

In contrast with chart 9a, chart 9b indicated that more than half of the respondents did not use the Internet for online-chat (55.1%) and/or P2P file-sharing (52.5%) purposes. The results for those that do are spread out from less than 15 minutes to 10+ hours.



**Chart 9b: Duration of a single session of online chatting and P2P file-sharing**

In chart 9c, the results obtained from the questionnaire indicated that 75.8% of the respondents did not utilise the Internet for online-banking or online-purchasing purposes (80.1%).



**Chart 9c: Duration of a single session of online banking and online purchasing**

#### 5.7.4 Section 4: Peer-to-Peer file-sharing

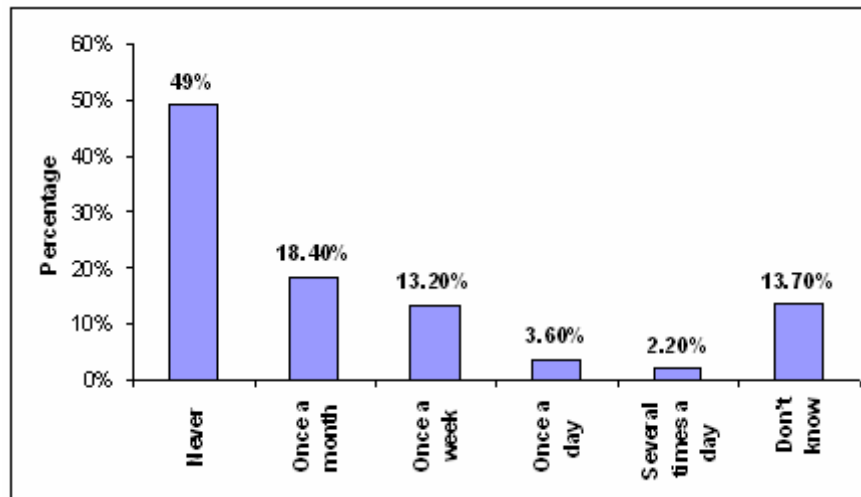
In chapter 4, section 4.2, it was pointed out that Peer-to-Peer file-sharing is not a novel concept. According to Barkai (2002: 39), the historical foundation on which the modern-day P2P applications are built can be divided into the following three components:

- Direct exchange
- Distributed processing
- Online collaboration.

The traditional definition of “file-sharing” is that “two or more different users can access (read and/or modify) the same file, typically the same single instance of a file”. This is a capability that a typical shared distributed file system supports. As was noted in chapter 4, section 4.5, active sharing is the cornerstone of a useful Peer-to-Peer experience. In order for users to benefit from the collaboration, all of them need to share appropriate files in accordance with the end-user licensing agreement. Following, a discussion on the section of the questionnaire that focused on the use of Peer-to-Peer file-sharing application.

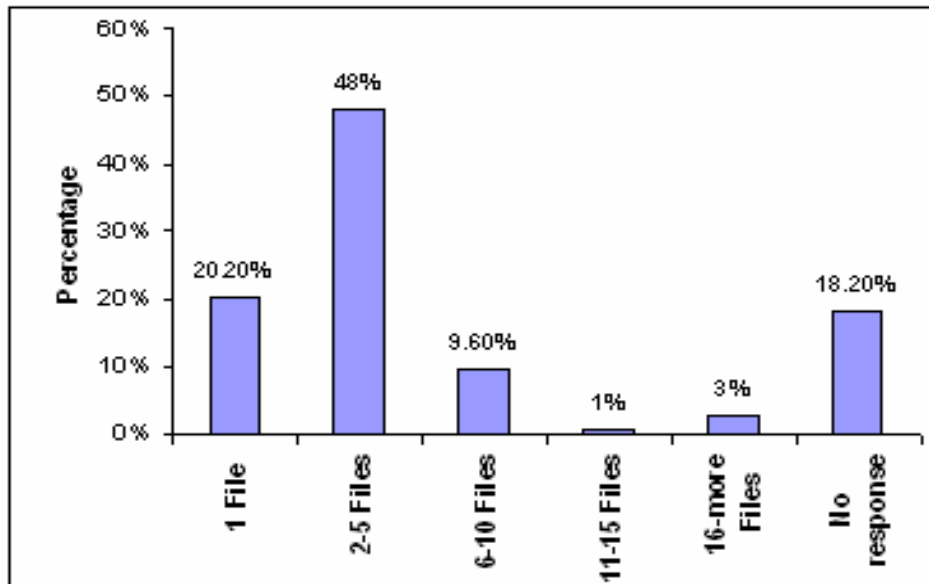
As indicated in chart 10, a mere 3.6% of the respondents indicated that they used a Peer-to-Peer file-sharing application once a day.

The most obvious observation is the fact that less than half (49%) of the respondents had not used P2P during the past six months. This figure drops to 18.4% that have used a P2P application at least once a month during the same six-month period. Even though only 5.8% of the respondents utilised a P2P application at least once a day, this could still have a significant effect on the available network bandwidth. Chart 10 must be seen in unison with the following charts.



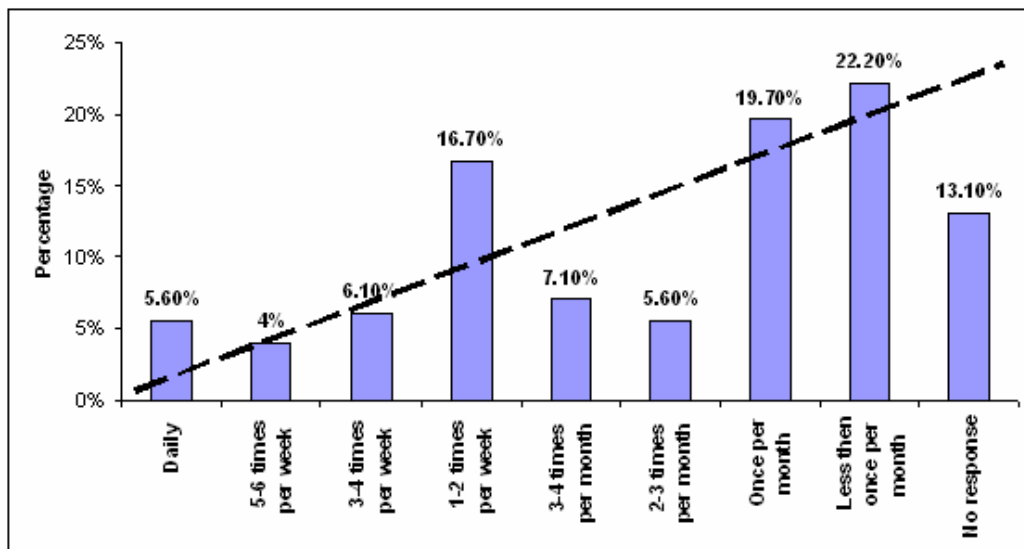
**Chart 10: Use of Peer-to-Peer file-sharing application**

When downloading Peer-to-Peer files, 48% of the respondents indicated that they downloaded 2 to 5 files per session, as became evident from chart 11. This high level of download, however, declined as the volumes of files increased; for example, 9.6% of the respondents indicated that they downloaded 6 to 10 files, 1% of the respondents indicated that they downloaded 11 to 15 files. A possible contributing factor might be slow network-response times. The last category of the chart showed a slight increase in the number of respondents, indicating that they downloaded 16 or more files in a single session. This 3% of the respondents may be seen as the more advanced Peer-to-Peer file-sharing users.



**Chart 11: Number of files downloaded in a single session**

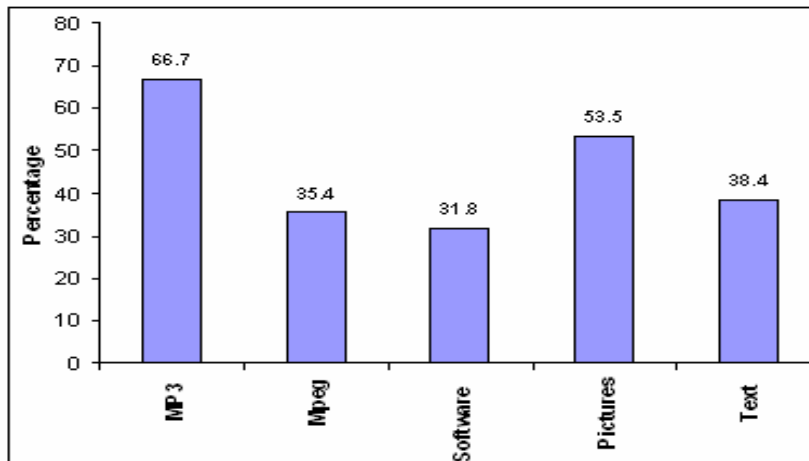
A basic trend was manifested in chart 12 below, namely that the percentage of downloads increases as the timeframe increases. This trend starts with 5.6% of the downloads occurring once a day on the left. An increase in the percentages of downloads ensues until a peak of 22.2% is reached on the right. In terms of this trend, a distinct observation indicates that 16.7% of the downloads occurred once or twice a week.



**Chart 12: Frequency of downloads**

Most people associate Peer-to-Peer file-sharing with the downloading of MP3 music files. This statement was supported by the results obtained from chart 13. According to the results obtained, 66.7% of the respondents downloaded MP3 music files. An interesting observation, though, was that only

35.4% of the respondents indicated that they download movie files. The percentage of Mpeg downloads may be attributed to the relative larger sizes (up to 700MB) of these files. As indicated in chart 6, 69.5% of the respondents own a desktop personal computer, which will explain the 31.8% of the downloads being software.

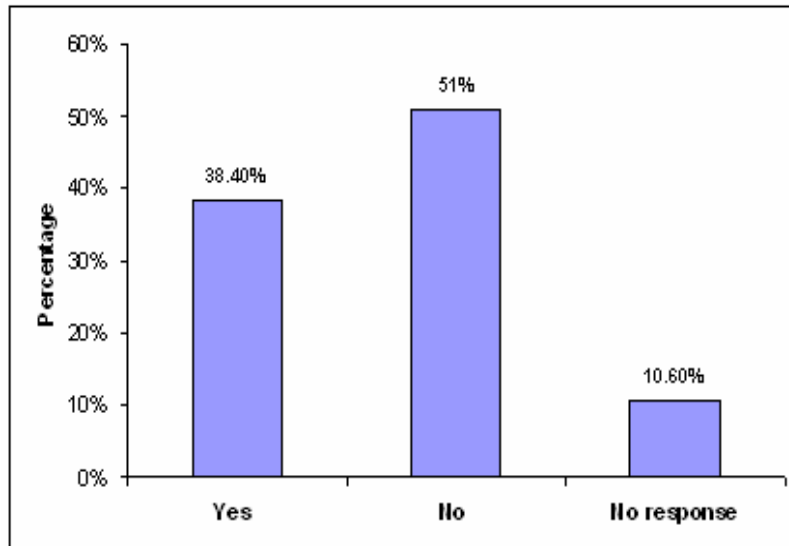


**Chart 13: Type of content downloaded**

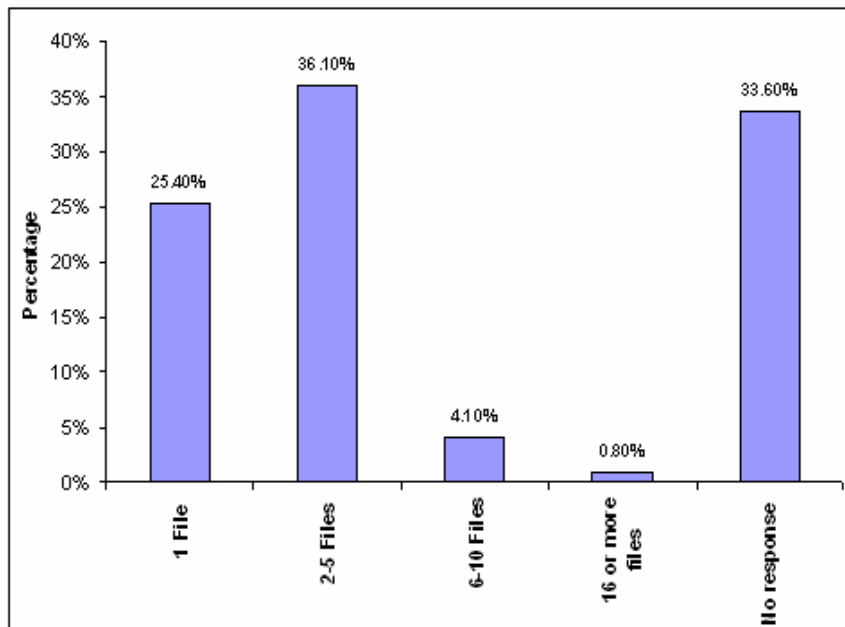
According to Dornfest and Brickley (2001: 229), just as in any other social system, there are always those who take from the system without giving anything back in return. These individuals (51.0%) among the respondents in this study can be classified as “freeloaders” (as was discussed in chapter 4, section 4.5), as they never share any files on the Peer-to-Peer file-sharing application (see chart 14 on the next page).

It should also be noted, however, that, for the remainder of the respondents, those that do share files online (chart 15) –

- 25.4% upload 1 file
- 36.1% upload 2 to 5 files
- 4.1% upload 6 to 10 files
- 0.8% upload 16 or more files in a single session.

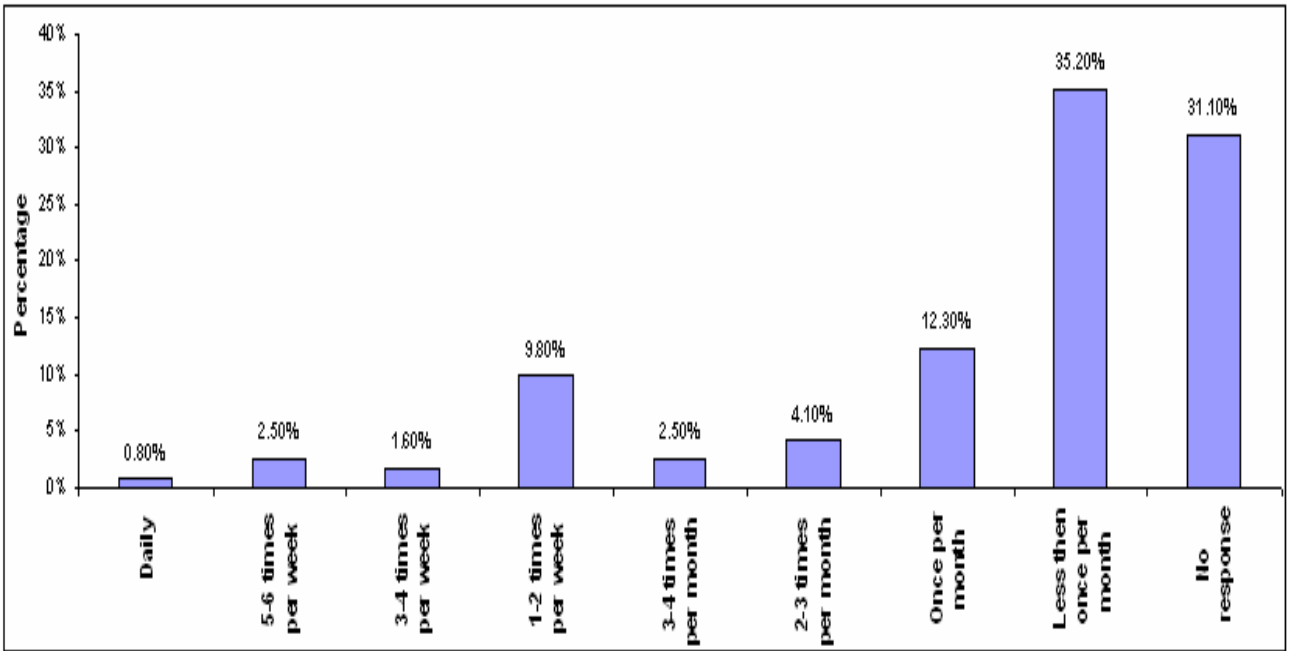


**Chart 14: Sharing of files on the Peer-to-Peer file-sharing application**



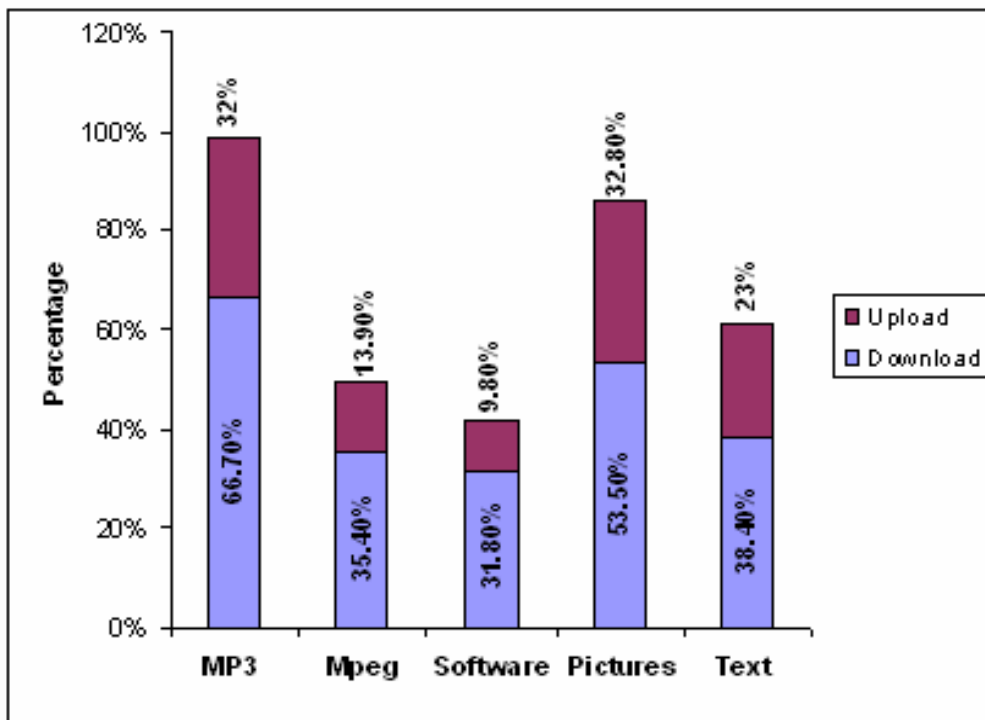
**Chart 15: Number of files uploaded in a single session**

No significant trend could be identified in chart 16. According to the results obtained, 35.2% of the aforementioned uploads occurred less than once a month. A total of 33.6% of the respondents upload files at least once a month.



**Chart 16: Frequency of uploads**

In contrast with the most popular content downloaded (MP3 music), the most popular content uploaded consisted of pictures (32.8%) in various formats (see chart 17 below).

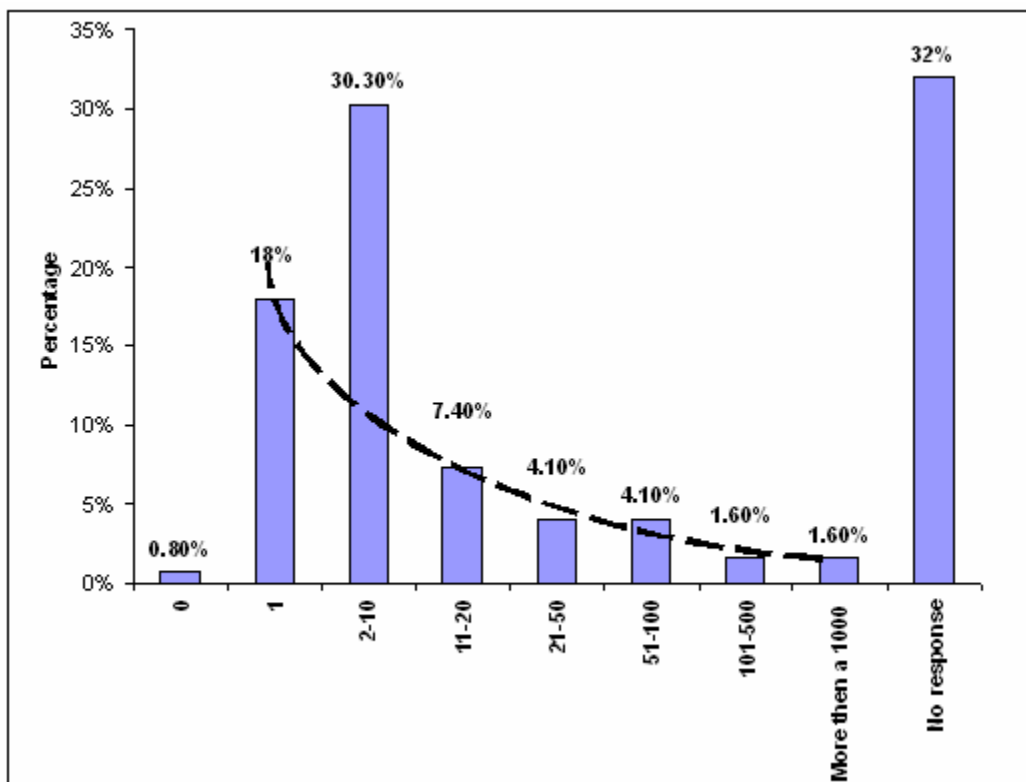


**Chart 17: Type of content uploaded**

Although the number of “freeloaders” identified in the study was relatively high, 30.3% of the respondents indicated that the maximum number of files they shared at any given point in time varied between 2 and 10 files (see chart 18).



The number of files shared on a Peer-to-Peer file-sharing application at any given point in time decreases as the volume of files increases (as indicated by the line drawn in the chart). A large portion (18%) of the respondents indicated that they share only 1 file at any given point in time. It is interesting to note, then, that 1.6% of the respondents indicated that they share more than 1 000 files at any given point in time. Given the fact that the average movie file is 700MB and the average MP3 file is 3MB, this one individual could slow down the average network to a painful pace if P2P users were to use this PC as the download service.



**Chart 18: Number of files shared at any given point in time**

#### 5.7.5 Section 5: Social aspects of Peer-to-Peer file-sharing

As was discussed in chapter 4, section 4.5, the recent Napster court case and ongoing efforts of the Recording Industry Association of America (“RIAA”, for short) to stop illegal file-sharing have individuals and organisations placing new emphasis on the ethical use of Information and Communication Technology (ICT) hardware.

“Ethics” can be defined as “a set of laws or morals that defines the sense of right and wrong for a community”. In terms of the P2P computing paradigm, ethics can, therefore, be seen as a double-edged sword, that is, the ethical use of P2P technology by the end-consumer and by the developer.

In section 5 of the questionnaire, some social and ethical questions were posed to the respondents. With regard to the question "...P2P file-sharing infringes on the original creator's copyright...", 69.9% of the respondents echoed the sentiment that P2P file-sharing does infringe on the originator's copyright. This corresponds with 74.4% of the respondents, who indicated that the statement: "...it is ethical to download copyrighted material" was false.

In addition, 78.7% of the students agreed that sharing/downloading material could threaten the very existence of an industry, such as the music industry. Although 87.4% of the respondents concurred that it was important carefully to read the entire installation agreement before downloading the Peer-to-Peer file-sharing application/program, only 73.2% of them indicated that some installation agreements make provision/allow for the processing power of your computer to be harnessed by other users on the Internet.

Only 61.7% of the respondents agreed that Peer-to-Peer file-sharing application may present a threat to their PC and/or computer network. In addition, a total of 65.8% of the students indicated that the Internet played a very important part in their lives.

## **5.8 Summary**

This chapter was devoted to analysing the basic concepts and methods forming the foundations of the research community. Expanding on this was a discussion on the frequencies and results of the questionnaire.

The next chapter will be used for discussions on the conclusions reached in this study and for a discussion on future research possibilities in this study field.

