

*"An investigation into the positive and negative
perceptions of e-learners in Afrox"*

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SYNOPSIS

Globalisation has taken root at all economic levels and has forced organisations to skill their employees in order for them to compete on unprecedented levels. Companies can no longer afford to see themselves in operation outside of the global village. Those that have not yet been absorbed into the global economy are moving faster than ever before towards the information age, focusing on people as the greatest competitive edge.

Survival in a global economy is not only dependent on how quickly an organisation is able to respond to the changing economic environment but also on the ability of the business to learn. The concepts of a network organisation and a learning organisation have redefined how suppliers, employees and customers interact and how learning in organisations takes place. Traditional learning processes are no longer adequate for meeting the demand for faster just-in-time learning.

The benefits of anytime, anywhere access to learning and information offered by the Internet and the World Wide Web are fundamentally changing the way many companies operate and interact. In the field of mass education the Internet is changing instruction, research, and administration. The prospects of e-learning have far-reaching implications for business organisations by virtue of the enabling technologies that are removing distance and fostering collaborative on-demand learning.

The business case for investing in e-learning is evident in the myriad new products, services, and providers that are entering the e-learning domain. Curriculum and content development through software learning environments, teleconferencing, and integrated learning delivery systems have a fundamental impact on the growth of the e-learning industry.

Companies are not the only entities affected by the new economy. Governments across the world have become increasingly involved at a macro-economic level in fostering skills development as a means of competing in the global arena. South Africa has approximately 5 million economically active citizens, compared to the UK with 15 million and the USA with 25

million. In response to the skills shortage, South Africa has proposed a Human Resources Development (HRD) strategy, entrenched in an outcomes-based learning methodology and enacted through various pieces of legislation, including the South African Qualifications Authority (SAQA) Act 61 of 1995.

The national HRD strategy, by virtue of this legislative element, has been cascaded to organisational level to ensure the requisite skills development across all sectors of the economy. Organisational training and development strategies are influenced by the national outcomes-based-learning methodology. The development of skilled individuals through interventions such as workplace skills programme and learnerships must conform to SAQA requirements in terms of unit standards, assessment, quality assurance, the National Qualification Framework, and registration as a training provider.

African Oxygen Limited (Afrox) is one such South African Company that must conform to such legislation in developing its employees. Afrox is in the business of gases, welding products and healthcare. The Company was established in 1927 and listed on the Johannesburg Stock Exchange (now referred to as JSE Securities Exchange) in 1964. It has a market capitalisation of over R5,5 billion and 343 million shares in issue. The group comprises of two focused listed companies: gases and welding, and healthcare.

Afrox is South Africa's 17th largest employer with over 16 000 employees in both lines of business. The company is part of the BOC group plc affording it the status of a global company. The BOC Group has operations in 50 countries on five continents and owns 55% of the shares of Afrox. Afrox can rely on its parent company to provide the latest in technology, research and development and other leading global business practices.

A historical feature in Afrox (and the BOC Group) has been the regional basis on which the company was organised and structured, with some employees operating in fairly remote sites. The geographical composition and proximity of the customers and markets, as well as transportation constraints has influenced the establishment of three regional centres from which to distribute product and service customers.

The challenge in Afrox is to refine how learning systems that involve the use of technology take place. All employees in Afrox have a competency profile on the e-learning systems of the organisation. However, in recent focus group sessions perceptions of e-learning have been found to vary among e-learners. The study is therefore concerned with investigating the

perceptions of e-learners in order to position the company to capitalise on the advantages that e-learning offers the business world.

A literature review of key aspects of e-learning systems will be presented relative to the learning systems within Afrox. An empirical exercise involving a telephonic survey is offered, based on a stratified sample of respondents in Afrox to determine their perceptions of key aspects of e-learning.



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TABLE OF CONTENTS

	PAGE
SYNOPSIS	i
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
TABLE OF FIGURES	xi
CHAPTER ONE	1
CONTEXTUALISATION OF THE RESEARCH	1
1.1 INTRODUCTION	1
1.2 CONTEXT OF THIS STUDY	1
1.2.1 Developing a culture of learning.....	3
1.2.2 Learning organisations and e-learning	3
1.2.3 Outcomes-based learning and e-learning	5
1.2.4 E-learning in Afrox.....	6
1.3 FORMULATION OF THE RESEARCH PROBLEM	6
1.3.1 Research problem.....	7
1.3.2 Research objectives	7
1.3.3 Research questions.....	7
1.3.4 Hypothesis.....	7
1.4. DEMARCATION OF THE STUDY	8
1.4.1 Scope of the study.....	8
1.4.2 Limitations of the study.....	8
1.5. RESEARCH METHODOLOGY	8
1.6 ETHICAL REQUIREMENTS	9
1.7 BENEFITS OF THE RESEARCH	9
1.8 CLARIFICATION OF KEY CONCEPTS	10
1.8.1 Perceptions	10
1.8.2 A learning organisation.....	10
1.8.3 Outcomes-based Learning	10
1.8.4 E-learning.....	11
1.8.5 Integrated management system and standards	11
1.9 CHAPTER OUTLINE	12
1.10 CONCLUSION	12
CHAPTER TWO	14

OUTCOMES-BASED LEARNING AND E-LEARNING IN AFROX	14
2.1 INTRODUCTION.....	14
2.2 OUTCOMES-BASED LEARNING IN AFROX	14
2.2.1 Knowledge system	15
2.2.2 Delivery system	15
2.2.3 Learning process.....	16
2.2.4 Management of learning.....	16
2.3 E-LEARNING IN AFROX.....	17
2.3.1 Scope of e-learning in Afrox	18
2.3.2 Requirements for the delivery of e-learning	19
2.4 TRACCESS LEARNING MANAGEMENT SYSTEM	19
2.4.1 Managing learner progress	19
2.4.2 Traccess user levels.....	20
2.5 INTEGRATED MANAGEMENT SYSTEMS AND STANDARDS.....	20
2.5.1 The IMSS framework.....	21
2.5.2 IMSS goals	21
2.5.3 Disadvantages of IMSS.....	22
2.5.4 OBL resources available on IMSS	22
2.6 MANAGING COMPETENCE IN AFROX.....	22
2.6.1 A competency steering committee	22
2.6.2 The development of line manager competence	24
2.7 CONCLUSION	25
CHAPTER THREE.....	26
KEY ASPECTS IN DESIGN, DELIVERY AND MAINTENANCE OF E-LEARNING.....	26
3.1 INTRODUCTION.....	26
3.2 TRANSITIONS IN DELIVERING EDUCATION AND TRAINING	26
3.2.1 Competitive advantage through learning.....	26
3.2.1.1 The ability to learn faster than competitors	26
3.2.1.2 An organisation-wide learning plan	27
3.2.1.3 Blended learning approach	28
3.2.1.4 Learning and work.....	29
3.2.2 Growth of e-learning as a medium of instruction.....	29
3.2.2.1 Perceptions of learning	29
3.2.2.2 Constructivist learning and instruction	30
3.2.2.3 Increase in technology-based learning	30

3.2.2.4 E-learning as an emergent pedagogy	32
3.3 KEY ELEMENTS OF E-LEARNING SYSTEMS	32
3.3.1 Program goals and objectives	34
3.3.1.1 Understanding the organisational needs.....	34
3.3.1.2 Advancing an on-line learning environment.....	36
3.3.1.3 Designing e-learning programmes	36
3.3.2 Development of e-learning courses.....	37
3.3.2.1 Principles of effective e-learning course development.....	38
3.3.2.2 Addressing different learning styles	39
3.3.2.3 Developing a balance between humans and technology.....	39
3.3.3 Delivery of e-learning programmes	39
3.3.3.1 Factors affecting acceptance of e-learning technology	40
3.3.3.2 Use of standardised e-learning technology.....	40
3.3.4 Equipment and infrastructure	41
3.3.4.1 Architecture and tools	42
3.3.4.2 Services and use of learning objects	43
3.3.4.3 Performance support systems	43
3.3.4.4 End-to-end e-learning solutions	44
3.3.5 Availability of technical support	44
3.3.5.1 Basic training in computer usage	45
3.3.5.2 Considerations in the selection of e-learning vendors	45
3.3.6 Availability of face-to-face support	46
3.3.6.1 Supporting the learning process	47
3.3.6.2 E-learning used to deliver self paced and distance learning.....	47
3.3.7 Instructional methodologies.....	48
3.3.7.1 Adopting a problem-based approach in e-learning	48
3.3.7.2 Empowerment of employees.....	49
3.3.8 Application of learning	49
3.3.8.1 Measurement and evaluation.....	49
3.3.8.2 Measuring training effectiveness.....	51
3.3.8.3 Building organisational capital.....	52
3.4 CRAFTING AN E-LEARNING STRATEGY	52
3.4.1 Strategic planning.....	53
3.4.2 Project management	53
3.4.3 Change management.....	53

3.5 CONCLUSION	55
CHAPTER FOUR.....	56
RESEARCH METHODOLOGY.....	56
4.1 INTRODUCTION.....	56
4.2 RESEARCH DESIGN.....	56
4.3 SAMPLING STRATEGY	56
4.3.1 Definition of the population.....	56
4.3.2 Sampling design.....	57
4.4 TYPE OF DATA TO BE OBTAINED	58
4.5 DATA COLLECTION METHOD	59
4.5.1 Measurement instrument.....	59
4.5.2 Screening enquiry and participation appeal	60
4.5.3 Administering the questionnaire	60
4.5.4 Logistics	63
4.6 DATA ANALYSIS METHOD.....	63
4.6.1 Data preparation.....	63
4.6.2 Descriptive statistical summary	66
4.7 CONCLUSION	66
CHAPTER FIVE.....	67
ANALYSIS AND INTERPRETATION OF EMPIRICAL DATA.....	67
5.1 INTRODUCTION.....	67
5.2 BIOGRAPHICAL DATA.....	67
5.3 DESCRIPTION OF THE STATISTICAL PROCESS.....	70
5.3.1 Construct validity.....	70
5.3.1.1 First order factor analysis.....	71
5.3.1.2 Second order factor analysis.....	74
5.3.2 Internal reliability measures.....	75
5.3.2.1 First order factor one.....	75
5.3.2.2 First order factors two, three and four	76
5.3.2.3 Second order factor.....	76
5.3.2.4 Interpretation of reliability and validity measures	77
5.4 HYPOTHESES TESTING	77
5.4.1 Testing approach.....	78
5.4.2 Selection of statistical tests	79

5.4.3	Using the t-test for independent samples	79
5.4.3.1	Statistical testing of factors	79
5.4.3.2	Interpretation of t-test results	80
5.4.4	ANOVA - one way for three or more samples	80
5.4.4.1	Statistical testing of factors	81
5.4.4.3	Interpretation of ANOVA test results	81
5.4.4.4	Post hoc test: Scheffe's S test	81
5.4.4.5	Interpretation of Scheffe's S test results	82
5.5	MEASURES OF ASSOCIATION	83
5.5.1	Relational hypothesis	83
5.5.2	Statistical testing using cross-tabulation	84
5.5.2.1	Face to face support from local staff: employment category	84
5.5.2.1.1.	Interpretation of scores: employment category	85
5.5.2.2	Face to face support from local staff: division employed	85
5.5.2.2.1.	Interpretation of scores: division employed	86
5.5.2.3	E-learning is time consuming: employment category	87
5.5.2.3.1.	Interpretation of scores: employment category	87
5.5.2.4	E-learning is time consuming: division employed	88
5.5.2.4.1.	Interpretation of scores: division employed	88
5.6	CONCLUSION	89
	CHAPTER SIX	90
	SUMMARY, FINDINGS AND RECOMMENDATIONS.....	90
6.1	INTRODUCTION.....	90
6.2	FINDINGS.....	90
6.2.1	Findings from the literature study	91
6.2.1.1	Growth of e-learning in the corporate environment.....	91
6.2.1.2	Key elements of e-learning systems	91
6.2.2	Findings from the empirical study.....	94
6.2.2.1	Biographical data	94
6.2.2.2	Use of available e-learning facilities.....	94
6.2.2.3	Perceptions of e-learning	94
6.3	RECOMMENDATIONS.....	96
6.3.1	Policy issues.....	96
6.3.2	Technology.....	96
6.4	FURTHER RESEARCH.....	97

6.5 EVALUATION OF THE RESEARCH..... 97
6.6 CONCLUSION 98
QUESTIONNAIRE 99
BIBLIOGRAPHY 104



TABLE OF FIGURES

	PAGE	
Table 1.1	Conventional learning and e-learning	4
Table 2.1	Modes of learning	16
Table 2.2	Global e-learning requirements in the BOC Group	18
Table 2.3	IMSS driven learning in Afrox	23
Table 2.4	Developing line managers in a learning organisation	25
Table 3.1	Key elements in the design, development and delivery of e-learning.	34
Table 3.2	Principles of effective e-learning	38
Table 3.3	E-learning technical requirements	42
Table 4.1	Sampling design	57
Table 4.2	Process flow of possible outcomes for telephone contacts	62
Table 5.1a	Age distribution of respondents	68
Table 5.1b	Graphical description of age distribution of respondents	68
Table 5.2a	Responses by employment category	68
Table 5.2b	Responses by division of employment	69
Table 5.3	Reasons for not accessing e-learning	69
Table 5.4	E-learning programmes accessed in the last 12 months	70
Table 5.5	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	71
Table 5.6	Kaiser-Meyer-Olkin Measure of Sampling Adequacy: first order factor	71
Table 5.7	Total variance explained: first order factor	72
Table 5.8	Rotated factor matrix: first order factor	72
Table 5.9	Factor transformation matrix: first order factor	73
Table 5.10	Kaiser-Meyer-Olkin Measure of Sampling Adequacy: second order factor	74
Table 5.11	Total variance explained: second order factor	74
Table 5.12	Cronbach's Alpha: first order factor	75
Table 5.13	Item statistics: first order factor	75
Table 5.14	Cronbach's Alpha: second order factor	76
Table 5.15	Item Statistics on the perceptions of e-learning: second order factor	76
Table 5.16	T-Test for equality of means: independent samples	80
Table 5.17	Summary table for one-way ANOVA: second order factor	81
Table 5.18	Scheffe's S test (multiple comparisons)	82
Table 5.19	Interpretation of Scheffe's S test: second order factor	82
Table 5.20	Section D & E - Second order factor * Division employed	82
Table 5.21	Cross-tabulation – Face-to-face support from local staff* Employment category	84
Table 5.22	Chi-square measures of association – Face-to-face support * Employment category	85
Table 5.23	Cross tabulation - Face-to-face support from local staff * Division employed	86
Table 5.24	Chi-square measures of association Face-to-face support* Division employed	86

Table 5.25	Cross-tabulation – E-learning is time consuming * Employment category	87
Table 5.26	Chi-square measures of association E-learning is time consuming* Employment category	88
Table 5.27	Cross-tabulation – E-learning is time consuming * Division employed	88
Table 5.28	Chi-square measures of association E-learning is time consuming* Division employed	89
Table 6.1	Key elements in the design, development and delivery of e-learning.	91



CHAPTER ONE

CONTEXTUALISATION OF THE RESEARCH

1.1 INTRODUCTION

This research study focuses on e-learning in African Oxygen Limited (Afrox). The application of e-learning in Afrox has grown significantly since 1995 when an electronic content management system was introduced in the company. The Company subsequently developed competency profiles for all employees with the requirement that staff become competent in defined learning programmes. These competency profiles are in place on the company learning management system and mandated target dates have been set for staff to achieve identified competence levels. Most of the learning programmes are delivered via e-learning. It is expected that of those training programmes that are still to be developed, a major portion will be delivered via the e-learning infrastructure.

In recent focus groups and in-depth interviews conducted with middle and senior managers however, it was discovered that while e-learning is viewed as a useful medium for pre-course assignments, there were differing opinions of its overall use as a medium for skills development. Until the latest development involving the formulation of competency profiles, less than one third of employees utilised the company's e-learning facilities.

A fundamental concern is therefore to improve the perceptions of e-learning as well as to increase the use of e-learning as a medium for skills development. In this chapter the background to the research problem is discussed and is followed by an overview of the objectives of the research as well as a discussion of the research method and benefits. A summary of the contents of the chapters of the research paper is also provided.

1.2 CONTEXT OF THIS STUDY

Organisations have a primary goal, which is to ensure their own success. Through strategic planning organisations set objectives and decide on comprehensive programme of action to achieve these objectives (Duncan, 2001:64). The strategic HR planning is concerned with getting everyone in the organisation from the top to the bottom to do those things which will enhance organisational effectiveness (Bowmaker-Falconer & Horwitz, 1994:15-20, McHugh, 1995:247), relating to sustained future growth (Grobler, 1993:14-18).

The shift towards a new age thinking of the learning organisation emphasises the need for fluid processes that adapt to the changing needs of the organisation and its members. The focus is on building networks of relationships, instead of categorising and splitting work into specific jobs and functions. Organisational charts, job descriptions and functional specialisation will have to fall away and the traditional approach to managing jobs through linear hierarchical methods are no longer acceptable.

These new practices of a learning organisation equate to a less stable environment and a redefinition of what people do in the workplace. Fluid structures will promote the flow of ideas, promote unity of purpose, and build trust rather than define functional roles, indicating a major pragmatic shift in the way we think about the organisation.

The way in which people talk about work is also beginning to change. Employees are now described as “performers” and training events as “self-directed learning activities”. There is a greater emphasis on team effort rather than on individual accomplishments. Social models of learning are replacing transfer models, and career management is beginning to reflect skills acquisition rather than life-long employment in one company (Torres, Preskill & Piontek 1996:21).

Gordon (1996:480) describes a learning organisation as having the ability to fundamentally revitalise itself, and manifest five key characteristics. First, there is continuous learning by individuals, and teams, and the organisation seeks out a competitive advantage. Inventories are prepared of capacity-building opportunities for individuals and groups and a system is created for sharing learning in day-to-day business operations.

Secondly, individuals have a shared vision and leaders inspire commitment from workers who contribute their ideas and are empowered to implement them. The entire organisation is involved and operates as a system, including the company’s strategies, information flow, work processes, performance goals, training and development systems, and reward and recognition schemes.

Executives are seen to value learning as a continuous process in which shared learning is encouraged, calculated risk taking and experimentation is promoted, and initiative and feedback are rewarded.

Finally, managers support decentralisation, the learning of decision making skills and employee empowerment in which cross-functional work teams perform tasks.

1.2.1 Developing a culture of learning

The question raised is how this culture of learning is manufactured and how individuals are made to adapt to this new organisational behaviour?

Research indicates that creating new structures and inventing new policies, strategies, rules, or regulations and procedures (Harrison, 1994:190) do not necessarily lead to a change in organisational behaviour. Rather, the path to developing a learning organisation lies in the development first of individuals within the organisation. Swieringa and Wierdsma (1992:2) advocate that one should attempt to change the behaviour of the individuals first, which ultimately would lead to a change of the rules by which people work together, since organisational members must create and adapt to an organisation and not vice versa. In short, a collective learning process should be embarked on in which everyone is involved.

Companies that can be described as learning organisations are distinctive by their ability to continuously adapt to new processes and to accommodate an ever-increasing number of diverse factors. New market demands placed on relationships in trade and interaction require organisations to trade in what is now termed a “global village”. Cognisance must be taken of technological advancements in the areas of electronic data interchange, the Internet business, mobile communications, and developments in microcomputer chips.

These advances in technology have given rise to an increasing use of e-business to replace physical processes with new processes that can be carried out over networks. This has meant that businesses are able to conduct their affairs more quickly and are forced to compete in offering minimal delays in customer service. The implications for employee response time in learning and performing have therefore taken on new dimensions

1.2.2 Learning organisations and e-learning

The move to e-business and e-learning is a business imperative with a direct impact on the return on investment of an organisation. E-learning is defined as using the Internet for instruction in most forms of education and training. The technology has implications for distance education and serves to enable virtual learning and communication across boundaries. These

enabling technologies are providing organisations with a competitive edge in training and developing employees to acquire skills and to respond to market decisions at a far greater speed.

The effect of e-learning technology makes learning a student-centred activity. However, the profit motive requires organisations to play an active role in managing this student-centred learning. Table 1.1 provides a comparison of conventional learning and e-learning:

Table 1.1 Conventional learning and e-learning

Conventional Learning	E-learning
Learners physically come to learning sites.	Learners participate at locations remote from the instructor.
Learners take classes at times predetermined by the institution.	Learner determines when to access instruction based on individual needs.
Single training vendor (company, college or university) provides all instructional and student services needed by learners.	Educational services are unbundled, with different providers developing course materials, delivering instruction, evaluating learners, awarding credentials, providing access to information, and offering various student services.
Learners is affiliated with one institution at a time	Learners are concurrently associated with multiple providers and modes of instruction.
The institution specifies learning objectives.	Learners shop for opportunities that fit their specific needs.
Relationship with learners is determined by the institution (time and place of instruction, sequences of courses, terms of admission).	Learners design their own programme with regard to content, length, structure, and so forth.
The institution in terms of credit hours earned defines programme completion.	Programme completion is defined by knowledge gained and skills mastered.

The method in which knowledge is passed on is a critical point for most organisations. Senge, Roberts, Ross, Smith & Kleiner (1996:376) argues that the learning methodology will determine how quickly an organisation is able to learn new ways of doing business and develop the necessary skills to respond to market changes. Duncan (2001:62) indicates that if people who

are lower in the organisation hierarchy are able to access information (previously denied them) they will be able to work more effectively. Gaining greater understanding of how people interact with each other in an organisation and how effectively they bring suppliers and partners together into the mix will enhance the performance of the organisation.

1.2.3 Outcomes-based learning and e-learning

Pereira (2001:9) points out that while South Africa has a major shortfall in managerial and technical skills, this situation is not unique, but is a global problem faced by most countries. The South African government has advocated the use of outcomes-based learning in the workplace as a means of correcting the imbalance. Organisations such as Afrox that operate in South Africa are required by legislation to adopt an outcomes-based learning approach. It is within the context of outcomes-based learning that South African companies need to identify methods that will enable faster acquisition of needed skills to compete in the global economy. E-learning is one way of disseminating information quickly and facilitating learning at a rapid speed by using a combination of collaborative technologies.

However, as technology changes the environment in which education and training takes place, an e-learning strategy needs to take into account the costs and the returns on investment associated with maintenance and support, especially with regard to the unbundling of learning services. E-learning systems could easily be outsourced to a number of vendors or developed internally. Partnering the provision of training and development will become more critical as organisations seek to better equip employees. In either case, e-learning is fast becoming a business imperative.

World trends indicate there is a shortage of managerial and technical skills to meet the demands of a global economy. In South African labour the market is skewed in the supply and demand of critical skills required particularly in the fields of sales, catering, information technology, construction and financial services. There is an over-supply of unskilled and semi-skilled labour and under-supply of highly developed managerial and technical skills. According to a report in the Finance Week (Pereira, 2001:9) PE Corporate Services are quoted as reporting that there is a backlog of 350 000 to 500 000 managerial and technical skilled people required in the South African Labour Market. It is also indicated that 25% of South African adults have primary schooling only, 16% have a Matric, while only 6% have any post-matric qualifications.

However, the problem is not unique to South Africa. Unfilled vacancies in IT skills in London stand at 20%, while the USA reports a backlog of 800 000 jobs, and Western Europe 600 000. Although South Africa spends 7% of GDP on education, the problem may be exacerbated by the fact that the number of people in general education is 98% in comparison to Germany, Italy, and Sweden that have between 10-30% of their people in general education (Pereira, 2001:9).

1.2.4 E-learning in Afrox

The use of technology in learning in Afrox is gaining momentum as information dissemination and traditional training becomes more expensive. The regional basis on which the company is organised and structured requires that employee competence is achieved quickly and efficiently to ensure consistency in best commercial practice. The geographical composition and proximity of customers and markets as well as transportation constraints make it imperative that both the information needs and the learning opportunities required for optimal employee performance are addressed timeously.

Employees in Afrox are given access to a learning content management system known as the “Integrated Management System and Standard” (IMSS). In conjunction with a learning management system known as Traccess employees are afforded a collaborative knowledge management and e-learning facility. One of the objectives of this system is to manage information as a seamless flow within the organisation for the purpose of training and development. Knowledge is supposed to be directed at the right people at the right time. The company philosophy (rather than the culture) is to make available the information employees require in order for them to function at optimal levels.

1.3 FORMULATION OF THE RESEARCH PROBLEM

Afrox has developed competency profiles for all employees across the organisation, with the requirement that staff achieve competency in defined learning areas. The competency profiles have been placed on the company learning management system and mandated target dates have been set to achieve competency levels. Most of these learning objectives are delivered via e-learning. Further training programmes planned will also have a major portion of their content delivered via e-learning infrastructure.

1.3.1 Research problem

Recent focus groups and in-depth interviews conducted with middle and senior managers in the development of a middle management training programme indicated that while e-learning is viewed as a useful medium for pre-course assignments, there were differing opinions of its overall use as a medium for skills development. Until the latest development involving the formulation of competency profiles, less than one third of employees utilised e-learning facilities.

The management question, which is also the research question of this report, is what should be done to increase the use of e-learning as a medium for skills development?

1.3.2 Research objectives

The primary objective of this study is to evaluate e-learners' positive and negative perceptions of the key aspects of e-learning in Afrox and to identify areas that need improvement.

The following secondary objectives can be derived:

- i. to identify the key elements of sound e-learning practices; and
- ii. to determine the factors that will motivate employees to use e-learning.

1.3.3 Research questions

The investigative questions that the research seeks to explore include:

- i) What are the key aspects that constitute the provision of effective e-learning systems?
- ii) What perceptions do e-learners hold with regard to key aspects of e-learning in Afrox?
- iii) Are there regional differences in the perceived quality of e-learning programmes?

1.3.4 Hypothesis

The following hypotheses are presented for this study:

- I. The null hypothesis (H_0) is: There is no differences in managerial and non-managerial perceptions of e-learning.
- II. Alternative hypothesis (H_1): Non-managerial e-learners perceive e-learning as a more positive experience than do managerial e-learners.
- III. Alternative hypothesis (H_2): Northern regional staff have a more positive perception of key aspects of e-learning than do e-learners in the other regional offices.

1.4. DEMARCATION OF THE STUDY

1.4.1 Scope of the study

The research focuses on determining the factors that will provide Afrox with maximum return on an e-learning strategy. The benefits of such a strategy have implications for the business success of the organisation and its competitive edge.

Afrox comprises three Lines of Business (LOB), namely the Industrial and Special Products business, the Process Gas Solutions business, and the Healthcare business. Afrox has a staff complement of approximately 16 000 employees in the three Lines of Business and spread across three geographical regions that spans South Africa. This research report is confined to employees in the Industrial and Special Products Division, which consists of approximately 2 400 employees.

Attention is drawn to the relationship between a learning organisation, e-learning and outcomes-based learning. Organisations in South Africa are required by legislation to adopt an outcomes-based learning approach. Chapter Two of this study sketches the integration of e-learning and outcomes-based learning as applied in Afrox. The research therefore focuses primarily on e-learning as a method used by a learning organisation such as Afrox



1.4.2 Limitations of the study

The research study does not investigate the related concepts of knowledge management or the computer hardware and software specifications required for e-learning.

There is no previous research into the literacy levels in many manufacturing and agricultural industries, where it is assumed to be particularly low. Low literacy levels in many sectors of the economy may impede e-learning and other learning methods. This research will not investigate literacy levels in the organisation.

The research is not a comparison of different learning methods.

1.5. RESEARCH METHODOLOGY

A more detailed description of the research methodology is presented in Chapter Four.

The research method of this study is based on a descriptive design that incorporates a review of applicable literature, cases, projects, and media releases pertaining to e-learning. It includes a survey of the attitudes and perceptions of employees of the use of e-learning systems as a development tool. The research methodology will outline the quantitative data collection methods or proposed plan and report on what was done.

A structured questionnaire was designed which tested each of the research questions. The respondents were contacted telephonically to complete the questionnaire in order for rapport to be built with them and for unwillingness to complete the questionnaire to be overcome. The data was processed using the services of a statistician from the RAU Statskon Department. Care was taken to ensure the reliability and validity of the data.

1.6 ETHICAL REQUIREMENTS

The researcher assured the anonymity, confidentiality and privacy of all information obtained in this research. All necessary precautions were taken to abide by the rules, procedures and conditions for good ethical practice.



1.7 BENEFITS OF THE RESEARCH

The benefits of the research have far reaching implications for Afrox. These benefits for the management and employees include:

- Alignment of organisational development and individual development;
- Identification of elements that will create a climate of ongoing development utilising e-learning;
- Highlighting the platform for individuals to take greater ownership of their development as a process and in the context of organisational development;
- Highlighting factors that will make individual development a shared process that is more manageable;
- Provision of anchors to enable individuals to take a proactive role in managing their development; and
- Open sharing of information.

1.8 CLARIFICATION OF KEY CONCEPTS

1.8.1 Perceptions

In research, the use of concepts to understand and communicate information about objects and events is required. The concept of perception is borrowed from behavioural scientists. Ivancevich and Matteson (1996:121) describe perception as the “cognitive process by which an individual gives meaning to the environment”. In the case of e-learning, one could argue that rather than does the learning situation itself, it is the way in which e-learners see the learning situation that has much greater meaning for understanding behaviour.

1.8.2 A learning organisation

While a study of learning organisations is not the focal point of this research, reference is made to the impact that e-learning has on the development of a learning organisation.

A learning organisation can be described as an organisation that is:

- skilled at creating knowledge (Garvin, 1993:79),
- acquiring capabilities needed for future success (Calhoun & Leon, 1993:18),
- transferring knowledge that results in learning, adaptation, and change becoming part of a firms culture (Senge *et al*, 1996:14), and
- at modifying its behaviour to reflect new knowledge and insights.”

Learning within such an organisation is integrated with work activities and a common set of values, attitudes, and perceptions among organisational members (Torres *et al*, 1996:9). According to Harrison (1994:184) feedback and information about both processes and outcomes are crucial. The organisation operates as an organic learning system able to take in and comprehend complex information from the environment and to modify its behaviour on the basis of that information.

1.8.3 Outcomes-based Learning

Outcomes-based learning is a training approach where the emphasis is placed on job-related performance standards. It is competency based and has as its starting point the intended outputs as opposed to inputs (Erasmus & Van Dyk, 1999:4). The focus is on demonstrating the

knowledge, skills and ability to accomplish an output in the workplace. It is based rather on consistent learning than on intermittent panic learning sessions.

Being competent means having the skill (or ability) and knowledge necessary to perform a task or activity to a prescribed standard.

1.8.4 E-learning

E-learning is the computerisation of the educational process (Phillips, Phillips, Duresky, Gaudet, 2002:387) using both enabling and transforming technologies (Volkl and Castelein, 2002:66) that are aligned to actual business goals to ensure effective human capital development. It includes networking facilities such as virtual classrooms and the application of Internet, and channel enhancements such as Extranets, Intranets, and the World Wide Web to an organization's training processes and training delivery systems.

By adopting a strategic and transforming focus e-learning further assumes the integration of a variety of related technologies (data warehousing, data mining, artificial intelligence) to replace physical training and administration processes with new processes that can be accomplished over networks. The transformation of the learning environment into collaborative spaces that integrate with other value-enabling processes such as competence and content management lifts the performance of the individual in the business environment.

1.8.5 Integrated management system and standards

The Integrated Management System and Standards (IMSS) is a computer-based system that provides Afrox employees with access to up-to-date information and learning resources required to operate the business effectively. It combines the Integrated Management System, operating best practices and standards and all supporting documents into one system, that is a single source for Afrox corporate knowledge (Afrox Intranet, 2003).

This system integrates training and audit requirements with the reference information with the following objectives:

- To provide all Afrox operators with up-to-date access to the knowledge required to run their businesses safely and effectively;
- To provide an integrated standards, training and audit system; and

- To provide a system to aid the drive towards continuous improvement and operational excellence.

1.9 CHAPTER OUTLINE

The study consists of six chapters.

The first chapter deals with an orientation of the research, the formulation of the problem statement, and a motivation for the study.

In Chapter Two an overview is provided of Outcomes-based Learning as it applies to Afrox. This is followed by a review of e-learning practices in Afrox as a means of increasing the skill levels of the workforce.

In Chapter Three a literature review of e-learning practices is provided, with benchmarks for developing effective e-learning programmes. A presentation of the key elements of e-learning is outlined.

Chapter Four deals with the research methodology employed in the empirical study of the perceptions of e-learners in Afrox. It includes an overview of the sampling procedures, the design of a questionnaire, the data collection procedures, and procedure for processing the data.

Chapter Five concentrates on the results the empirical study and includes an analysis of the data and the interpretation of the results.

Chapter Six, the final chapter, focuses on the findings of the study and offers recommendations on the strategic value of e-learning as a medium for learning in Afrox.

1.10 CONCLUSION

This chapter has provided the context for the research as well as an outline of the research methodology. This chapter has also highlighted that traditional methods of learning alone are insufficient to address the skills backlog that is developing in organisations. In some respects it

can be argued that traditional methods of learning may even inhibit the development of a learning organisation. A new type of learning methodology is required to catapult companies such as Afrox and the South African economy in general, to a competitive position in the global arena.

It is suggested that organisations are constantly changing, are context bound, driven and are made up of people who experience change differently, have many cultures, include formal and informal communication channels and are politically charged. Afrox operates in both the local and the global economy and faces competitive challenges. As a result, if Afrox as a collective organisation is to thrive it will need to:

- increase its capacity to accelerate the development and innovation process;
- develop employees to anticipate and adapt more quickly to environmental effects;
- become more proficient at learning from competitors and collaborators;
- expedite the transfer of knowledge from one part of the organisation to another;
- learn more effectively from its mistakes;
- maximise the contributions of employees at all levels of the organisation;
- shorten the time required to implement strategic changes; and
- stimulate continuous improvement in all areas of the organisation.

E-learning as a subset of a broader solution offers many opportunities to address the challenges faced in a changing global environment. It offers a platform to equip employees across the different strata to learn the skills and characteristics associated with a learning organisation.

Chapter two outlines the context within which learning takes place in South Africa and within Afrox and other South African companies.

CHAPTER TWO

OUTCOMES-BASED LEARNING AND E-LEARNING IN AFROX

2.1 INTRODUCTION

Chapter Two deals with the strategic value of e-learning as a medium for outcomes-based learning (OBL) in Afrox. The outcomes-based learning methodology is prescribed in the Skills Development Act 97 of 1998 and in the National Qualifications Framework (Gerber, Nel & van Dyk, 2001: p468), and serves as a guideline for companies involved in implementing workplace-learning activities. The learning system in Afrox is based on the outcomes based learning methodology and comprises of a knowledge system, a delivery system, the learning process, and the management of learning.

The use of e-learning technology to advance OBL initiatives in Afrox is presented in this chapter. Specific reference is made to the Licence to Work programme initiated in Afrox, which requires that employees achieve requisite competencies in their jobs. The primary vehicles of e-learning used to achieve the Licence to Work objectives are the Traccess learning management system and the IMSS learning content management system.

In Chapter Three a literature review is presented of the key elements of e-learning. These key elements are used in the empirical study to investigate e-learners positive and negative perceptions of e-learning in Afrox.

2.2 OUTCOMES-BASED LEARNING IN AFROX

Human resource development is characterised by an ability attract, retain and mobilize a critical mass of human talent. The objective of an HRD plan is to enable employees to adapt to change quickly and to embrace organisational objectives (Hiltrop & Despres, 1995:201). Changes in South Africa ten years ago also brought with it change in employee development and management practices. The outcomes-based learning (OBL) methodology was initiated by the South African government and introduced in Afrox to support employees to achieve job competence, and to ensure that competent employees did their jobs to defined performance standards. The OBL methodology in Afrox supports the requirements of the Skills Development

Act, Skills Development Levies Act, South African Qualifications Authority Act, Employment Equity Act and the regulations of appropriate professional bodies.

OBL is a methodology used to design, assess and transfer learning. A salient feature is that OBL is a system of learning that puts the focus on the application of knowledge and skills, rather than passing exams. This is done by:

- defining the results that will indicate if a person is competent in a given area of his job;
- assessing against these required results to decide if the person is 'competent' or 'not yet competent'; and
- providing coaching, training or any other appropriate learning method, where the assessment results is 'not yet competent'.

OBL is applied as the system for ensuring that the required in-house competencies of Afrox are achieved.

The output of the Afrox OBL System is competent employees (Afrox Intranet, 2004). The learning philosophy encompasses a competency-based learning approach. It is made up of 4 components. These components are described under the following headings.

2.2.1 Knowledge system

The Knowledge System covers the entire way knowledge is developed and stored, and includes:

- policy and procedures for the storing of knowledge as defined by a Team of Experts,
- job descriptions / how the job has been performed;
- working environment, i.e. safety, health, education and quality;
- information content / subject matter content, e.g. filling liquid petroleum gas cylinders;
- best operating practice; and
- process / task / information to do the job;

The knowledge system is information that is "trapped" in manuals, CD ROM's, IMSS and the experience of subject matter experts.

2.2.2 Delivery system

The delivery of the knowledge to the learner encompasses a variety of methods that is used in the learning or training system. It includes small group collaboration learning to meet the needs of the organisation and the learners as well as delivery methods such as:

Table 2.1 Modes of learning

• Facilitation	• E Mail
• Classroom training / teaching	• Coaching
• Workbooks	• Demonstration
• Computer facilitated training systems	• On the job training
• Telephone	• Field visits
• Video conferencing	• Action learning
• E Learning	

Delivery of learning includes any method that transfers knowledge effectively to the learners and allows them to apply it successfully back on the job.

2.2.3 Learning process

The learning process is a deeply personal process whereby the learner acquires skills, insights and knowledge that result in changed behaviour and attitudes. In Afrox, actual learning is the responsibility of the learner, while the company must provide all the necessary support. Learning may be said to be effective only when the learner has provided evidence of competence. One of the most successful methods of learning is problem-solving learning whereby the learner becomes an individual and critical thinker.

2.2.4 Management of learning

The management of learning covers what is done for the learner in the organisation to ensure that learning takes place. This includes:

- The infrastructure that is put in place to support the learning process;
- The learning process; and
- Learning resources.

Management of learning also includes developing both the capacity and infrastructure to ensure that the learning process is sustainable. Tracking progress of learning is a vital component of the OBL process. The management of learning ensures that the knowledge system, learning system, and delivery system function so that learners, once they have the required competence, can perform the job to the right standard.

2.3 E-LEARNING IN AFROX

Afrox is part of the BOC group plc affording it the status of a global company. The BOC Group has operations in 50 countries on five continents and owns 55% of the shares of Afrox. Afrox relies on its parent company to provide the latest in technology, research and development and other leading global business practices.

In the field of e-learning, there has been a gradual emergence of multi-media material within the BOC Group over the years. Most of this material that is passed down to Afrox is ad hoc packages in circulation, largely on CD, and in a variety of standards and formats. Learning portals with a limited number of training programmes have also emerged across the group. Recently, a BOC Web-Centric project was launched on a limited scale to provide for the delivery of all BOC applications via a web browser driven mainly by a cost-down strategy.

Afrox, however, does not have a technical or corporate strategy for delivering e-learning. The result is that the e-learning solutions introduced have not been part of a co-ordinated e-learning strategy. In most instances local solutions have been developed based on work-around solutions

The situation is exacerbated by a conflict between IM strategy and delivery of existing e-learning material, in that e-learning design, network bandwidth, specific hardware availability and Web-Centric restrictions all need to be considered. In the absence of any BOC standards, applications have been developed in a variety of ways. Adherence to e-learning application guidelines needs to be reinforced and current material in circulation should be revisited and redevelopment considered.

The gradual increase in the use of web-delivered training material in BOC has increased network traffic. This may in future become an inhibiting factor, as there is a requirement to upgrade links that are approaching maximum utilisation. The current network has not been sized for high bandwidth required for facilities such as streamed video. At a cost, the use of latest compression technologies in the design of e-learning programmes may help alleviate this increased network demand.

Notwithstanding the risk of network jams caused by widespread communication using video clips still exists. Specific operating practices and usage around e-learning can help reduce the burden on the network. Furthermore, while the most common form of e-learning delivery within BOC has been via CD, CD players are not globally available on BOC desktops and practice varies around the world (Harvey, 2002:2).

2.3.1 Scope of e-learning in Afrox

Afrox is part of the BOC Group of companies. The growth of e-learning programmes in the BOC Group, both at a local and a global level, is increasing. E-Learning programmes are being developed for all levels of employees, with application in the technical and behavioural areas of competence. For reference purposes, the e-learning material in the applications outlined below contains text, pictures, sound and video. These features may be critical in some applications, while in others they would serve to enhance the learning experience.

Table 2.2 Global e-learning requirements in the BOC Group

Material Type	Application	Audience
Management Development Training Material	Ashridge on-line	Middle management
	Cardean University	Middle and Senior Managers
	e-change, changefirst	Managers and employees
Safety and Operational Training	Management Responsibility for SHEQ	Senior Management
	Eagle Eye 3	Contractors working on any BOC site
	IMSS	Any BOC employee
IT Product Training	NetG eLearning	Any BOC employee
General Communications	BOC World	Managers and customers

(Harvey D. 2002. The challenge of delivering e-learning in the BOC technical environment. BOC internal correspondence:3)

Most of these programmes are available to employees in Afrox.

2.3.2 Requirements for the delivery of e-learning

Hardware remains the biggest requirement in the BOC Group for effective delivery of e-learning. In many geographies hardware lacks the multimedia capability, while in other geographies such as Afrox only a limited number of employees have access to computers. Network capacity and technology will have to be increased to accommodate the growing number of e-learning programmes, while the adherence to application development standards will be critical.

Despite the ad-hoc approach to e-learning in Afrox, all training is tracked, using the Traccess learning management system. At the same time, of all the e-learning in progress in Afrox, the most widely used applications are in IMSS.

2.4 TRACCESS LEARNING MANAGEMENT SYSTEM

One of the components of the OBL system is managing learner records in order to measure progress against the objectives defined in OBL systems. The Traccess system is used for this purpose.

2.4.1 Managing learner progress

Traccess is a software tool that enables the management of learning against job-relevant learning material. It can be described as a learning management system (LMS). It serves as a repository of employee learning profiles and houses the results of the progress of individuals learning.

Irrespective of the method of learning, Traccess is used to keep records of the level of competence of learners. This includes learning in IMSS, management and leadership development, sales training, computer-based training, and customer services training. Traccess is used to:

- hold the identified competency requirements of each learner;
- link the learner to the BOC IMSS computer-based system that holds information and training material, where this is appropriate;
- hold knowledge assessment questions for various competencies, where this is appropriate, enabling on-line tests to be taken by the learner as and when they feel ready for assessment;
- log test results against the appropriate competency in the learners profile; and

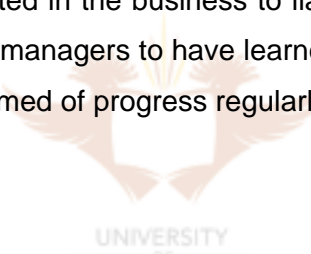
- produce management reports and graphs that show the progress of learner groups against the required outcomes so that the competence of staff can be measured.

2.4.2 Traccess user levels

There are three levels of use on the Traccess system. Level 1 users are mainly learners who are given access to view and print learning packages, view personal training records, receive messages, take tests, find skills folders and send notes to individuals in their learning group.

Level 2 users include supervisors of the learners who can perform all Level 1 functions as well as review progress and create reports for learners in their learning group. Level 3 is reserved for the training system administrator who is able to plan training, update information, manage records, develop tests, provide assistance to users and do troubleshooting. Level 3 users can perform all Level 1 and 2 functions as well.

A Traccess supervisor is appointed in the business to liaise closely with assessors, training and development specialist, and line managers to have learners' records updated. Teams of experts and line managers are kept informed of progress regularly through management reports.



2.5 INTEGRATED MANAGEMENT SYSTEMS AND STANDARDS

The Integrated Management Systems and Standards (IMSS) is a BOC software tool that provides structured capability for capturing company knowledge, documenting it in standards, and disseminating the information throughout BOC. As a knowledge warehouse IMSS serves as a repository for storing job and work-process standards. Using IMSS, information is made available in a way that enables computer literate employees to acquire all necessary competencies. IMSS also provides a feedback mechanism that ensures continuous improvement.

IMSS linked with the Traccess learning management system is the basis for an e-learning, self-paced, competency training system. Learners are evaluated on their knowledge of the standards, and the audit tool in the system provides a mechanism for evaluating actual practice against the same standards to ensure adequate implementation of the standards. Each chapter within the system has a learning and assessment guide.

2.5.1 The IMSS framework

The principles governing the IMSS framework are documented on the BOC intranet under IMS 18. From a training perspective, not all learning can be done on IMSS. Appropriate models for delivery of learning must be identified in conjunction with the teams of subject matter experts.

- The standards in IMSS contain the amalgamated requirements of both internal and internationally recognised external management systems such as ISO 9000, ISRS/NOSA, ISO 14000 and MHRP.
- Business process standards and procedures make up the major component of IMSS. They reflect the relationship between the customer, the operations and those internal processes that support both.
- IMSS also contains reference information such as data, explanations of the industry's processes and equipment, computer programme, specifications, regulations and links to external information sources such as Web sites.
- IMSS is the ultimate and central store for all Afrox knowledge content. It is accepted that there will be priorities for the preparation and storage of content.
- Where widespread national processes exist, these are given preference versus local departmental processes.
- IMSS is populated with a high-level chapter structure.. Should the content reside elsewhere, reference is made of the location under the relevant chapter heading.

It is accepted that IMSS is not the only knowledge delivery tool. Its use could be determined by the target audience. Employees who are not PC literate struggle to reach competence while those without access to a PC battle as well.

2.5.2 IMSS goals

- A principal goal of IMSS is to support quality and continuous improvement initiatives within BOC, including Best Operating Practices (BOP). IMSS ensures that this essential operational and corporate information is disseminated and retained within the organisation.
- IMSS supports the operational implementation of BOP by providing training resources in the form of an on-line system for delivering and monitoring the progress of employees' training.
- IMSS supports the continuous improvement process by providing benchmarks against which operational and business processes can be audited.

- IMSS linked with the TRACESS training management system is the basis for a computer-based, self-paced, competency training system. The material in IMSS can be delivered on-line, on CD-ROM or in paper formats.
- The total range of competencies required to define a given business process - the Competency Analysis Profile – will be promulgated globally through IMSS so that it is common throughout BOC.

2.5.3 Disadvantages of IMSS

The principle of IMSS is information all in one place. This does not recognise that for job functions within Afrox not all of the IMSS information would be relevant. The knowledge is conflated so that it is difficult to separate out what is needed by an operator, supervisor or manager. Operational employees in Afrox may not be literate enough to work with the on-line system or mature enough to study alone. Afrox has thus devised workbooks based on the IMSS material, which can be used in workshop learning.

IMSS does not provide learning support as there is not enough linking of information, or explanation of the 'what' and 'why' of the job. The chapters may contain material that is irrelevant to the job, and as there is only one learning and assessment guide per chapter, learners may never be able to achieve competence in that chapter. Competence defined by the learning and assessment guides may not be in line with the Unit Standards defined by the Gas Industry process (Barker, 1999:18).

2.5.4 OBL resources available on IMSS

As IMSS does not yet have all the information required by staff, and as other material is required for learning purposes, Afrox develops its own learning resources. However, these are done in the IMSS format so that they can be added to the system as and when necessary. The implementation of OBL in Afrox began in September 1997.

2.6 MANAGING COMPETENCE IN AFROX

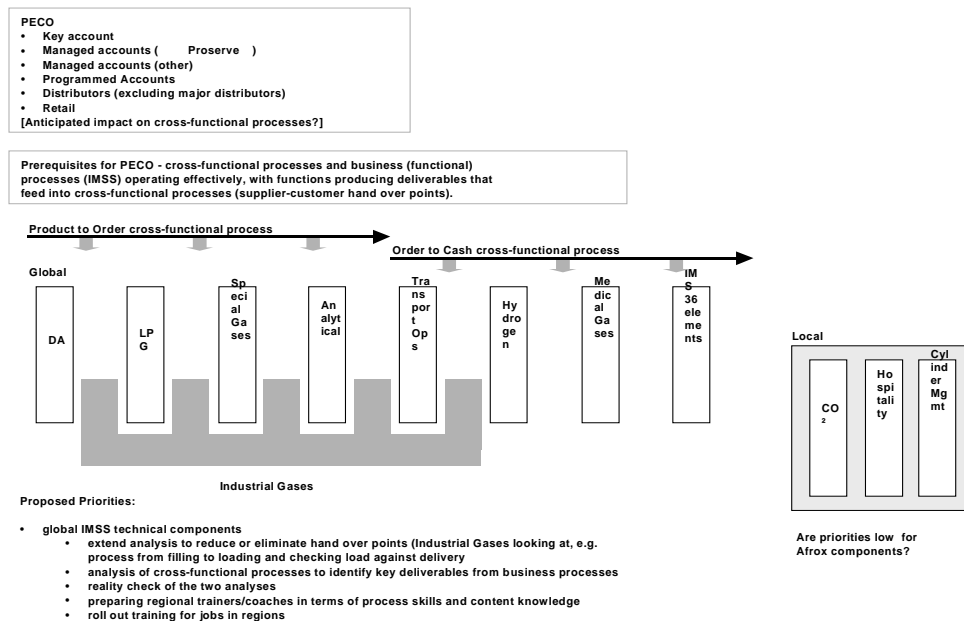
2.6.1 A competency steering committee

Ulrich (1998:125) and McLagan (1996:60) state that a competency model is a decision tool that describes the capabilities for performing a specific job. Competency based models have become

an important concept in the strategic management of human resources, and provide a framework for HR processes such as selection, appraisal, development and promotion. A competency model offers a common language across work disciplines to describe job requirements against which employees must produce specific outputs. Competencies are the underlying personal characteristics, which are expressed in observable behaviours and actions (McLagan, 1997:45)

Afrox manages competence requirements across the organisation through a competence steering committee that is represented by senior managers. The committee adopted a programme called licence to work, and refers to the requirement to certify staff as competent in their job. The licence to work programme makes use of the OBL methodology to determine required competencies and to manage the implementation thereof. Competence is viewed as a requirement for job ownership (to meet safety, quality and efficiency standards (Buitendach, Hart & Graham, 2001:10). The primary objective is to ensure that the business imperatives of safety and the process objectives in terms of customer service, efficient supply chain management and product development are achieved. This is depicted in below:

Table 2.3 IMSS driven learning in Afrox



The rationale of the Licence to work programme is that competent employees are able to work productively and to contribute to a productive working site, which adds value to customer

interaction and builds lasting customer relationships. The following activities are required to deliver an effective 'licence to work' system:

- Produce a job profile;
- Define what the person has to know and do in the role;
- Identify the learning intervention required and the learning/knowledge resources/ systems;
- Identify the learning delivery systems required;
- Implement an assessment system to evaluate the competence;
- Implement a learning management system to record the outcome of the assessments and schedule new learning intervention; and
- Ensure a sustaining model to for the continuing delivery, assessment and recording of learning intervention, and review the relevance of the learning on an ongoing basis (Buitendach, Hart & Graham, 2001:12).

Afrox expects staff to perform their functions at the appropriate competence levels for which they are recruited and paid. Employees are required to achieve competence within a reasonable time frame. Time frames should not be extended beyond three months unless circumstances warrant otherwise. The emphasis for learning is now a shared responsibility between the learner and the line manager by virtue of the defined time frame within which competence should be achieved.

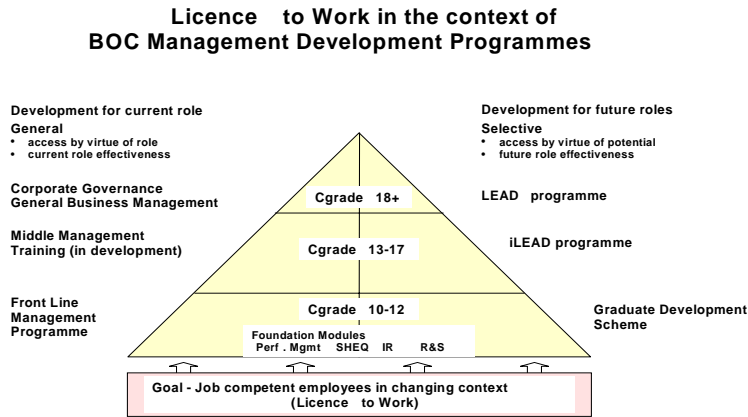
The learning process needs to take into account the gap between the language level of IMSS materials and the language level of many operators. Realistic support is required to make the resource material accessible to the learners. The provision of four additional staff to act in a coaching and mentoring role will help. The roles of these coaches/trainers and line managers need to be clarified, and coaching and assessment integrated with the performance management process (see note above on changed behaviour on the job as an element of job competence). The line manager is accountable for the performance of his/her reports (Buitendach, Hart & Graham, 2001:13).

2.6.2 The development of line manager competence

Afrox ascribes to a model in which the line manager plays a critical role in acting as a sponsor in implementing business strategic objectives, The readiness of the line manager to continue learning and the willingness to accept change are vital factors for success of the organisation. Line managers play a key role in encouraging their staff to master competencies required to be performed effectively and efficiently for strategic goals to be achieved.

The ongoing development of line managers in terms of licence to work are therefore vital and are depicted in the following diagram:

Table 2.4 Developing line managers in a learning organisation



Line managers therefore play a vital role in developing a culture of learning and performance in the organisation.



2.7 CONCLUSION

In Chapter Two an overview was provided of OBL and the use of e-learning systems to implement required learning. While e-learning is not the only mode of learning used in Afrox, it is the most predominant form of learning, particularly for imparting theoretical technical skills required in jobs. The implementation of OBL using e-learning methods is gaining momentum as a means of increasing the skills levels of the workforce. This chapter also highlighted the role and ability of the managers as an important feature in providing employees with the support to acquire technical and other skills to ensure a high performing organisation. E-learning offers a quick and efficient methods to achieve job competence.

In Chapter three a literature review of e-learning practices is provided. Reference is made to industry best practice and benchmarks for developing effective e-learning programmes.

CHAPTER THREE

KEY ASPECTS IN DESIGN, DELIVERY AND MAINTENANCE OF E-LEARNING

3.1 INTRODUCTION

Chapter two focused on the use of e-learning in OBL. Chapter three is a literature review of the key elements that constitutes effective e-learning.

Chapter three commences with a discussion of the shift that is taking place in the modes of delivery of training and development, and the emergence of e-learning as the dominant pedagogy in the 21st century. This is followed by a presentation of the four phases involved in when making available e-learning, namely the design, the development, the delivery, and the maintenance of e-learning programmes. Each of these phases requires that key factors be addressed in an effort to ensure the effective implementation of e-learning in the workplace. These key factors are evident in the delivery of e-learning programmes.

The key factors of e-learning identified in this chapter are also used in the empirical study to test the perceptions of e-learners in Afrox. Chapter four deals with the design of the questionnaire for the purpose of investigating learners' positive and negative perceptions of e-learning in Afrox.

3.2 TRANSITIONS IN DELIVERING EDUCATION AND TRAINING

3.2.1 Competitive advantage through learning

3.2.1.1 The ability to learn faster than competitors

Senge *et al* (1996:14) points out that the only sustainable source of competitive advantage is the organisation's ability to learn faster than its competition. E-learning offers organisations an opportunity to deliver learning quickly to a wider audience. However, how fast an organisation learns to adapt to a new process is only half the exercise. An organisation's ability to learn how to learn will determine its survival and prosperity.

Organisations are embracing e-learning to the extent that the competitiveness of a company is closely aligned to concepts such as just-in-time learning. The increasing speed of change and the obsolescence of knowledge make it clear that the learning process is more important than the content of what is being learnt. An organisation with a culture that is flexible enough to embrace change, devolve powers of authority, and become more generative in learning is able to facilitate the rapid changes that are taking place.

The attraction of e-learning is the access it provides anywhere, anytime. Managers and employees are afforded the functionality and support in areas such as learning, information support and coaching, knowledge management, interaction and collaboration, and guidance and tracking (Rossett, 2002:8). When e-learning is ingrained into the work culture of an organisation there is an opportunity for expanding the value proposition of an organisation. This requires that learning be seen as part of the productive activities of individuals.

3.2.1.2 An organisation-wide learning plan

The field of human resources development (HRD) is not one that is static, but rather it is dynamic. As the pace of change increases, McLagan (1996:1) states that HRD employees play a crucial role in shaping the organisation. According to McLagan (1997:42) the new world of work that is evolving has a number of characteristics that is:

- less secretive and more flexible as information and communication technology improves,
- more customer centred with many potential providers of products and services,
- global in design, production and marketing,
- value aware as organisations streamline for simplicity, and
- defined by an interdependent working relationship as markets expand.

HRD has a key role to play in assisting the business to develop and communicate a company wide learning plan, opportunities are created for employees to use various learning technologies to enhance performance levels. Training programmes provide the framework for setting performance-measurement criteria and incentives that will support ongoing learning and innovation. Used appropriately, learning resources can be focused to achieve objectives across the organisation.

The advantage of global connectivity enables companies to develop and implement training and education for learners who are geographically dispersed. A company-wide learning plan, using a distributed learning approach, ensures that disparate training efforts are brought into focus and that funds are re-allocated to where it is needed most. However, change management experts would argue that the active sponsorship of the Chief Executive Officer is required to ensure that the right blend of learning for the right audience is implemented to meet the desired business goals.

3.2.1.3 Blended learning approach

Research (Masie, 2002:59) indicates that the success of a learning programme depends on the right blend of learning for a given audience, for a given set of business goals. A "blended learning" approach involves creating a portfolio of training interventions by combining different methods of training and technologies to improve outcomes and to involve learners in taking more responsibility for their own development. Two or more of the following approaches can be combined to deliver a blended solution to training: simulations; group sessions; coaching; structured courses; on-the-job training; and e-learning.

A balance of on-line learning and classroom-based learning allows for the best of each approach to be adopted with maximum value for both the learner and the organisation (Hall, 2002:241). E-learning has the potential for reaching a wider audience, but there are unique advantages to meeting face to face with peers in a classroom and having an instructor lead participants through the content while answering questions. Maximum benefit can be derived from a blended learning approach for both managerial and non-managerial employees (Hoyle, 2002:48).

Blended learning programmes require the different internal organisational functions to help in the design at different points. The Executive leadership is required for developing broad business objectives, while the different divisions such as sales and finance could identify skill gaps. The training department works with the information technology experts and subject matter experts in designing and delivering specific courses. An interdepartmental approach ensures that there are well-defined interfaces between the relevant groups to enable clear communication once the programmes are rolled out and that learning is tied back to the business strategies.

3.2.1.4 Learning and work

E-learning has been instrumental in adding to the convergence of learning and work and the shift in the responsibility for learning, away from the HR department to the individual and to the line managers (Rossett, 2002:7). As the speed of change increases the way in which individuals are acquiring skills, how they perceive their jobs and the way in which organisations expect employees to add value to the business are all under review.

At an employer level, training and development is aimed at bridging the gap between the strategic and the operational objectives (Ulrich, 1998:130). At an individual level e-learning is contextualised and convenient. Learning is viewed as one factor among many others in the life of an individual. Ivancevich & Mattesson, (2000:23) argue that this evolving psychological contract between individuals and organisations has implications for the quality of work life; the motivation of individuals to develop a portfolio of marketable skills, and organisational investment in skills that will determine its differentiating competence.

3.2.2 Growth of e-learning as a medium of instruction

3.2.2.1 Perceptions of learning

A question raised in the training and development fraternity is whether e-learning is more effective than previous learning methods, and whether the cost of implementing e-learning is worthwhile. Forshay and Bergeron (2002:365) point out that while e-learning is an excellent means of distributing information, placing the same traditional classroom-based content on an e-learning portal is no guarantee of learning. In a study of modes of learning, it was found that the perception of accountability and contribution from traditional face-to-face learners is higher than that of technologically mediated learners (Phillips, Phillips, Duresky, and Gaudet, 2002:389).

Zoraini Wati Abas (2003) demonstrates further the influence of perception on the learning process in a study on learning practices. In this study respondents indicated that the only way one could benefit from lecturers was to attend both the lectures and tutorial sessions. According to the study students took down notes or copied down explanations that were written on the blackboard or from diagrams that were projected from overheads, slide projectors or video players. However, the recent merger between learning and information is altering this perception at an organisational level. The corporate world is using technology to enable lecturers to reach geographically disparate employees and to get out key messages.

According to Salas, Cannon-Bowers and Kozlowski, as well as Tannenbaum and Yukl (in Hook and Bunce, 2001:439) the central question in organisational training research is shifting away from research designed to confirm that a particular type of training works, to research that determines why, when, and for whom a training programme is effective. What is needed is not just the presentation of information but structured managed content that is specifically designed to elicit performance, enable practice and provide feedback.

3.2.2.2 Constructivist learning and instruction

The self-directed nature of e-learning lends itself to the concepts advanced in the constructivist approach to learning. E-learning tends to be modelled on behaviourism, with the view that learners are empty vessels waiting to be filled (Morphew, 2000:13). As opposed to this view, the constructivist approach argues that both the learner and the teacher bring prior knowledge to the learning process to co-construct new meaning and knowledge over time through their interaction with the environment. New knowledge is therefore built onto older knowledge.

The practical implication for planning learning programmes in the information age is that the experience of the learner must be taken into account when a curriculum is designed and delivered. The degree of growth of the learner should be evaluated in terms of meaning construction and based on an assessment of the extent to which the curriculum taught and the curriculum learnt match (Morphew, 2000:13). The combination of instructional formats and technologies should therefore be based on human capability.

3.2.2.3 Increase in technology-based learning

The increase in the development of technologically powered systems is eliminating the need for manual labour and re-defining the way in which industries approach work. New demands are placed on employees to possess computer skills in order to perform job-related activities. The need for skills in information communication technology that is driven by global expansion, telecommuting, and a lack of time to spend in traditional classrooms have contributed to the growth of e-learning as a serious player in the delivery of training and development.

While a distinction can be drawn between the communication of information and the delivery of high quality instruction (Forshay and Bergeron, 2002:366), a deciding factor in the adoption of e-learning technology is the capital-intensive nature of traditional learning practices (Salopek,

2002:43). Taking people out of their normal jobs for any length of time is not cost-effective. Financial commitments are easier to justify where there are tangible results from employing a particular form of learning. Business is concerned with using education to advance competence to make a profit, while the schooling system is concerned with developing productive civilians.

Gaytan, and Slate (2003:186-206) point out that irrespective of motives, societal institutions such as business colleges are affected by technological change and, in turn, are fostering change in institutional missions and structure. Following an exhaustive review of the literature, these authors argue that a new technology-based learning environment is developing as a result of

- the decrease in state and local financial support;
- an increase in the cost of educational expenses, such as space, staffing, and transport;
- the increase in local and global competition;
- the change in student expectations and background; and
- the necessity for students and communities to engage in continuous life-long learning.

The use of technology in education and training has the potential to provide a consistent set of foundation skills that apply the same teaching and learning principles of classroom-based education including the provision for student-to-student interaction (Purcell-Robertson and Purcell, 2000:16). The integration of related technologies (data warehousing, data mining, artificial intelligence) has resulted in the replacement of physical training and administration processes with new processes that can be accomplished over networks. The integration of technology into the learning environment has the potential to create a learner-centered environment that is technology-based and allows for greater student control and responsibility of the learning process.

In this particular instance the role of the teacher changes from knowledge provider to facilitator of learning. The focus of education also shifts from teaching outcomes to learning outcomes. The success of this transition to a technology-based learning environment requires the support of a well-organised strategic planning process, based on the needs of stakeholders (Gaytan, and Slate, 2003:186-205).

3.2.2.4 E-learning as an emergent pedagogy

The use of technology in learning provides alternatives to classroom training that includes performance support systems, simulations, and knowledge management (Aldrich, 2001:15). The continual upgrading of computer-based instructional design and other technology has influenced the development of sophisticated courseware, implementation and management systems. Salopek (2002:74) points out that the key to a quality e-learning experience is to include those winning aspects of classroom learning such as information sharing, hands-on exercises, and an ability to get feedback.

Raybould (2002:339) who supports this view points out that the design of newer software systems is being carried out from a performance-centred approach to enable added value. Positive elements particular to e-learning are being incorporated into the classroom and exposing learners to technology and the just-in-time nature of e-learning. As a result, learners' expectations for any learning experience are changing.

There is a growing acknowledgement that the tolerance for long classes has diminished. Attempts are being made to investigate the extent to which e-learning represents an emergent pedagogy that will be employed, not only by corporations, but also by educational institutions, government agencies and major transportation carriers around the world. Special attention and thought are given to the relationship of e-learning to diverse cultures, particularly as some cultures bring with them centuries of tradition.

Learning opportunities are regarded as value adding when information is located and disseminated efficiently, allowing learners to decide what part of it is necessary to assist them to do their work. The self-directed characteristic of e-learning enables individuals to take a needs analysis and encourages them to assert their right to choose appropriate learning. The element of choice differentiates e-learning from classroom training. In particular e-learning has made training a part of everyone's job by combining work and learning more efficiently.

3.3 KEY ELEMENTS OF E-LEARNING SYSTEMS

Research (Schrum, 2000:95–101; Meyer-Peyton, 2000:82-86; Colbrunn and Van Tiem, 2002:86-90; Hall, 2002:237-247; Morphew, 2000:13-15; Nisar, 2002:253-60; Northrup, 2002:135-137; and Wiley, 2002:16) indicates that there are key elements that constitute the design,

development, delivery and maintenance of successfully distributed e-learning programmes. These include:

- **Clearly defined program goals and objectives**

This element reflects the pedagogical decisions about the fundamentals of an on-line course. Typically the learning programme should have clearly defined goals, objectives, and performance standards for success.

- **Course content**

This element suggests that there should be sufficient depth of information in the e-learning course.

- **A delivery platform**

This element refers to the organisational issues defining the administration of the course. The delivery platforms should support the course content and methodology, facilitate easy learning, allow convenient access, and be user friendly.

- **Equipment and infrastructure**

Under this element equipment and infrastructure should be reliable and robust with a budget for future upgrades.

- **The availability of technical support**

The availability of technical support when problems occur is important to ensure that learners stay enrolled on the course.

- **The availability of face to face support**

It is necessary to have available instructors who are dedicated to the concept of distributed learning and who are versed in distributed learning pedagogy. It is also important to have available local personnel who can assist with on site facilitating and support.

- **Instructional methodology**

Instructional methodologies should facilitate easy learning and incorporate a variety of techniques, enabling simplicity of e-learning programmes, and empowering employees.

- **Application of the learning**

This element suggests that programmes should be constantly monitored and evaluated for effectiveness. The evidence of effectiveness can be gauged from the ease and practicality of applying the e-learning back on the job, and the perception of the extent to which it enhances productivity.

The literature suggested that these key elements should be carefully considered during the design, development, delivery and maintenance phases of making available an e-learning offering in an organisation. The phases of the learning process and the key elements of e-learning described above can be depicted in the following matrix:

Table 3.1 Key elements in the design, development and delivery of e-learning.

Elements & Components	Design	Development	Delivery	Maintenance
Clearly defined program goals and objectives	X		X	
Course content		X	X	
Delivery platform			X	
Equipment and infrastructure	X	X	X	X
The availability of technical support			X	
The availability of face to face support			X	
Instructional methodology		X	X	
Application of the learning			X	X

The eight key elements that influence the effectiveness of an e-learning offering are discussed below.

3.3.1 Program goals and objectives

The need for clearly defined program goals and objectives is the first of the key elements of effective e-learning. The decision to make available e-learning programmes in organisations requires careful consideration of aspects related to the organisational needs and the environment within which e-learning will take place. E-learning programme goals and objectives should take into account the pedagogical decisions about the fundamentals of an on-line course. A high degree of attention should be paid to designing an environment conducive to e-learning.

3.3.1.1 Understanding the organisational needs

Strategically deployed e-learning has the capacity to enable the alignment of the entire organisation in terms of new strategies, acquisitions, competencies, and products. However, the drivers of corporate e-learning in one organisation may not be the same in another. It is

therefore vital that business carries out a thorough analysis to understand the training needs of the organisation before making an investment in e-learning systems.

Aldrich (2001:4) argues that companies that invest in e-learning should consider both productivity issues and competitiveness issues. E-learning can be utilised to

- carry out training for high turnover positions to improve customer services and retention of employees;
- introduce learning management systems for automation of training administration and self-service learning;
- track skills and manage organisational competence;
- manage self-paced end-user courses as an option for technologically advanced workforces; and
- introduce learning portals as a central point from which to access learning sources.

One of the major drivers of e-learning is the ability to reach employees who are in remote areas. However, not all learning conforms to an e-learning format or can be appropriately delivered via e-learning. The investment in e-learning is often inhibited by poor integration and interoperability problems between the various technical elements of systems; product limitations; inadequate support services; and vendors' financial instability (Goodridge, 2002a:65).

In organisations that have a global presence the availability of learning resources and knowledge database are required twenty four hours a day and seven days a week (Hall, 2001:172). While there are many product options available to businesses, e-learning is no longer just about immediate cost savings but about increasing worker productivity, driving operational efficiencies, and streamlining corporate training (Goodridge, 2002b:81). The localisation of language and cultural difference need to be taken into account when establishing a global presence, together with consideration of the availability of IT support or vendors of e-learning technology.

The impact of time to market has also become a major driver for implementing e-learning in organisations. The ability to reach employees who must participate in the roll-out of product launches can be carried out cost-effectively and maximise return on investment. Training can be

targeted at specific groups of employees with specific needs for product information and on-line instruction (Hall, 2001:172-3).

3.3.1.2 Advancing an on-line learning environment

The design phase in making available e-learning programmes also has a direct impact on the development, delivery, and maintenance phases as described above. The first step in advancing an online learning environment is to address the learning culture in the organisation. Building a learning culture requires the elimination of perceptions that learning and work are different and that learning takes place only in the classroom. These perceptions imply that work is productive and learning is not, and that learning and training are one and the same thing. Strategies that help forge a learning culture involve collaboration from across the organisation as opposed to only from within the training department. Line managers should be made accountable for learning and integrate learning directly into work.

The quality of the design of learning products and the certification of learning also influence the growth of a learning culture. When assessment of learning programmes becomes valid predictors of job performance there will be greater buy-in, with closer links to pay for performance and targeting of training opportunities (Rosenberg, 2002:199) in areas where the business is weak. Lowering the delivery and access costs enables e-learners to get to e-learning resources easily and promotes the use of e-learning programmes. Strategies to help learners embrace e-learning are vital to ensure a culture of learning.

The power and affordability of portable computers and wireless networking can be exploited even further to develop a culture of e-learning. Varvel, Virgil & Thurston (2002:487-502) point out that there is a growing trend toward the development of computer labs to support the use of technology in learning. The use of technology in learning provides a viable alternative for just-in-time professional development and for life-long learning, and is especially effective with well-motivated learners. This however, also implies that the design of on-line courses may not work equally well with less motivated learners.

3.3.1.3 Designing e-learning programmes

Traditional courses or training programmes should not be simply placed on an educational network without due consideration of the learner. Colbrunn and Van Tiem (2002:90) argue that in most cases courses that focus on content and information are appropriate for e-learning as

they do not require experiential learning that more closely resembles job situations. When designing on-line programmes consideration should be given to the type of course content, the job fidelity, the level of interaction required, the delivery structure, and the frequency of the learning. Schrum (2000:93) adds that based on the nature of the required e-learning programme the design should capitalise on the advancements in e-learning technology that make provision for learners to have increased communication and interaction not only with the instructor but also with other learners.

Schrum (2000:95–101) goes on to explain that as a guidelines the design of an on-line educational environment poses three major challenges, namely:

- a consideration of pedagogical decisions about the fundamentals of an on-line course;
- the organisational issues that will define how the course will be administered such as whether the course will be a blended learning solution or a web only course, the prerequisite skills expected, the synchronicity of interactions, and
- the institutional issues such as recognition for the training department and support for innovative practices, the student's ability to use credits obtained from on-line courses toward postgraduate or graduate programme, and a course evaluation component.

The design of the on-line course should include a component involving counselling the student about the choice of on-line learning. Research suggests that the non-completion of courses involving the use of technology in learning is higher than that for face-to-face classes (Schrum, 2000:101). Students should be made aware that independent on-line courses provide a greater degree of freedom to schedule work, but at the same time they also require more self-discipline.

3.3.2 Development of e-learning courses

The development of e-learning programmes, the second of the key elements of effective e-learning, should take into account the depth of the content and the use of appropriate instructional methods to enable the assimilation of the material. In particular it should accommodate different learning styles. Programme development is of significant importance in ensuring that pre-determined goals and outcomes are achievable.

3.3.2.1 Principles of effective e-learning course development

The depth of the content of e-learning programmes is influenced by the use of key principles of development. Clark (2002a) identifies six principles of effective e-learning course development that is supported by earlier researches. The six principles are the:

Table 3.2 Principles of effective e-learning

• Multimedia principle	• Contiguity principle
• Modality principle	• Redundancy principle
• Coherence principle	• Personalisation principle

The multimedia principle advocates the use of graphics with words to improve learning. Motion graphics includes animation and video while still graphics includes line drawings, charts, graphs and photographs. Graphics that are not congruent with the instructional message but that are used for entertainment or dramatic effects may depress learning.

The contiguity principle involves placing text near graphics to improve learning. It is argued that text and graphics should not be placed at the top or bottom of each other. Research has indicated that text placed separate from visuals tends to contribute to poorer learning (Clark, 2002a). In a similar vein, the modality principle suggests that explaining graphics with audio improves learning. The use of broadband or CD ROM could be used to satisfy the modality principle. The slowness of the internet does not always make it feasible due to the slowness of the connection.

The redundancy principle involves the presentation of information in different formats that include graphics with audio and redundant text. It is suggested that the use of audio to read the text should be avoided as learning is depressed when the graphic is explained by the combination of the two media mentioned. Similarly, the coherence principle relates to the use of visuals, text or sounds only if they contribute to the understanding of the materials to be learnt. Superfluous or extraneous media tends to do more harm than good and depresses learning.

The personalisation principle suggests that it is best to write it in conversational mode using first and second language rather than language in the third person. Learners will become engaged with the content if conversational language is used.

3.3.2.2 Addressing different learning styles

While depth of content is an important consideration, equally important is how different learners approach the learning material. It is acknowledged that there are different learning styles among learners (Zoraini Wati Abas, 2003). The impact of learning styles on the learning process should be considered depending on the sophistication employed in the development phase. E-learning often involves access to learning delivered anytime and anywhere through a wide range of e-learning solutions. These solutions include e-learning discussion groups, live virtual classes, video and audio, web chat, simulations, and on-line mentoring. Implementing an effective on-line communication strategy can assist in accommodating learning styles. E-learning therefore has the capacity to be presented in a multi-media-rich format that can match the needs of learners with different learning styles. (Zoraini Wati Abas, 2003).

3.3.2.3 Developing a balance between humans and technology

The need for consuming and processing information is increasing and as a consequence, creating new ethical dilemmas for the developers of e-applications. E-learning programmes are essentially computerising aspects that were once the sole domain of human activity. The preparation and countdown to the Y2K event highlighted the growth and impact of the electronic digital age.



At the speed at which the digital age is advancing, the consequence for humanity are dire if there is no consideration of substance first and process second. Technology that is being designed to think, feel and act like humans should be pursued responsibly. Until now the use of technology and its existence has been to serve the aims of humanity (Albrecht and Gunn, 2002:379).

3.3.3 Delivery of e-learning programmes

The third key element makes reference to the effective delivery of e-learning programmes. Effective delivery needs to take into consideration the organisational issues defining the administration of e-learning courses. The delivery platforms should support the course content and methodology; facilitate easy learning; allow for convenient access; and be user friendly.

3.3.3.1 Factors affecting acceptance of e-learning technology

The use of e-learning can serve as an important competitive advantage for an organisation, especially where there is greater collaboration between people throughout the organisation to share their data; information; knowledge; and expertise (Jones and Laffey, 2002:251). These authors point out that over and above those change management aspects for conditioning the receptiveness of the environment the factors that influence people to either adopt or reject e-learning technology can be categorised in terms of three groups:

- infrastructure made up of an adequate supply of hardware and software to enable people to share knowledge using appropriate technology;
- infrastructure issues that comprise the definition of formal rules governing the interaction between people using the systems; and
- infoculture that defines the background knowledge and assumptions that govern the social relations surrounding work group processes. These values, motives, attitudes and experiences reflect an organisation's culture.

On the basis of empirical studies (Jones and Laffey, 2002:255) it was found that the main reasons why individuals use or embrace collaborative learning technology are the perceived relative advantage to themselves, their departments or the organisation. Introducing collaborative technologies provided benefits that other existing tools could not.

3.3.3.2 Use of standardised e-learning technology

The introduction and management of a set of standards that define processes and systems is vital in the industrialised world, as they guarantee that products from multiple vendors can integrate and continue to work together over time (Clark, 2002b:104). Standards enable interoperability, re-usability and scalability that are the basis for designing and producing business solutions. Literature suggests that the development of e-learning standards and guidelines have an effect on the investment decision in e-learning (Oakes, 2002:68; Dobbs, 2002:361), bearing in mind the continual advancements in technology.

The leading learning technology standards were initiated in early 2000, as part of the ADL (advanced distributed learning) initiative commissioned by the US Department of Defence. Later, in collaboration with the White House Office of Technology and USA Department of Labor, it commissioned the creation of the Shareable Content Object Reference Model — better known as SCORM. The SCORM standard provides a standard for shareable, reusable content objects

that can be used on TCP/IP networks in various training conditions, without the limitations of proprietary vendor or system implementations.

SCORM is a set of specifications that describe

- how to create web-based content that can be delivered and tracked by various SCORM-compliant learning management systems, and
- what a SCORM-compliant learning management system must do to deliver and track SCORM-compliant learning content properly.

SCORM is based on the new XML protocol, and is built upon specifications developed by various industry initiatives such as the AICC (Aviation Industry CBT Committee), IMS (Instructional Management System), Global Learning Consortium, and the LTSC (Learning Technology Standards Committee) (Oakes, 2002:69).

Clark (2002b:112) points out that companies that need to invest in e-learning should first identify their specific e-learning needs and then match specifications to their requirements. It is advisable to approach certified providers of e-learning programmes who comply with SCORM standards and who will have the capacity to make available effective solutions.



3.3.4 Equipment and infrastructure

The fourth key element of e-learning refers to the nature and scope of the equipment and infrastructure required in the delivery of e-learning. Equipment and infrastructure should be reliable, robust and complete to ensure smooth delivery. In addition, a budget for future upgrades is also necessary.

Hall (2002:246) points out that there are a number of components required in developing a successful e-learning initiative. These are described in the following table.

Table 3.3 E-learning technical requirements

Architecture and tools	Services	Content	End-to-end solutions
Learning management system	Custom course development	Learning portals	A mix of products and services from the first three columns
Authoring tools	System integrators	On-line degree programmes	
Synchronous e-learning tools	Large scale course conversion	On-line course publishers	
Collaboration tools			
Content management system			
Simulation tools			
Digital video and audio tools			
Testing and assessment tools			

3.3.4.1 Architecture and tools

The more notable aspects being addressed in e-learning are those referring to the Learning Management System (LMS) and the Learning Content Management systems (LCMS). A learning management system is a software programme that automates the administration of training events (Hall, 2002:240) by registering learners, tracking progress, recording data and providing appropriate reports to management for both classroom and on line learning settings.

Sparta (2002:34) argues that making provision for the diverse training needs of all professional fields of an organisation is where the demand for training intersects. Owing to the increase in e-learning as a tool for delivering training, training executives face difficult decisions in terms of the type of e-learning system to buy; the content of learning; which employees should use e-learning for training; and what systems can integrate with the e-learning. Sparta also points out that a LMS should be part of a continuum of other large-scale information systems and serve as a single point of presence. It needs to be a portal for any training done by any employee at any location.

3.3.4.2 Services and use of learning objects

The concept of learning objects represents the basis of the instructional technology of e-learning. It is a combination of the concept of learning and the paradigm of object-orientation widely used in computer science (Oakes and Rengarajan, 2002:103). Two important concepts from traditional object-orientation apply:

- a traditional object in the computer science world is self-describing. In other words, it contains all of the information about itself so that it can be located at any time and its capabilities can be “read” by whoever wishes to use the object.
- a single object can be used in multiple places, which obviates the need to duplicate the capabilities of the object in every place.

A learning object can be characterised as a self-describing, self-contained small chunk of learning (Wiley, 2002:116) that accomplishes a specific learning objective. Learning objectives can therefore increase the speed and efficiency of course development. Organisations can use learning objects as just-in-time learning in the form of electronic performance support. The ability to call up snippets of information quickly at the moment of need is an important component of learning objects. Each object has meta-data that describes the content, as well as the ability to search and retrieve learning objects



Learning objects also have the characteristic of being reusable and being shared across courses. Instructors who teach multiple courses on the same subject, can use the learning objects across those courses. Learning objects created by the same author can be used to assemble a course and ensure that the learning experience is consistent. This enables an organisation to take advantage of the power of reusable learning objects, without compromising the quality of the learning experience (Oakes and Rengarajan, 2002:104).

3.3.4.3 Performance support systems

The number and types of things that people have to learn, experience, use or reference are increasing to the extent that learners are more busy learning about how to do it than actually performing the job. E-learning arrangements coupled with performance centred interfaces (Raybould, 2002:339) have unlimited potential to transform the professional lives of employees through the use of high-quality on-line content. Performance support systems can be described as electronic systems that provide integrated information; advice; learning experiences; and

tools to help someone perform a task with minimum support from other learners (Northrup, 2002:135).

The benefits of performance support are enhanced productivity, reduced training costs, increased worker autonomy, and increased quality as a result of uniform work practices (Northrup, 2002:135). The integration of adequate performance support systems into e-learning programme ensures that e-learning does not become more of a burden to users rather than serve the reason for which it was created. The integration of all of the elements required for successful job performance enables learners to quickly gain the knowledge and integrating experience for competent performance (Gery, 2002:26; Greenberg and Dickelman, 2002:302). The objective of a performance support system is to minimise the need for formal instruction.

In designing e-learning programmes, the role of training and development specialists and e-learning vendors is to stimulate learning and performance in organisations by understanding the new learning environment; advocating a complementary culture and communication process; and determining the best methods to reach it (Harris, 2002:26). Performance development is therefore a process of integrating task structuring support, knowledge, data, tools and communication support (Gery, 2002:30) to generate immediate work performance. The goal of e-learning designers is to focus on core competencies in delivering value to organisations. This implies helping people learn how to use their technologies directly, as well as to be recognised as a leader in education and training.

3.3.4.4 End-to-end e-learning solutions

According to industry analyst's customers of e-learning technology express a need for complete, practical and integrated end-to-end e-learning solutions. Integrated systems supplied by a single vendor enable companies to gain better control over their systems (Goodridge, 2002a:65) as well as to process a single payment for the services. Indications are that a need exists for turnkey systems that require a minimum of support with easy to install set-up procedures (Forshay and Bergeron, 2002:370).

3.3.5 Availability of technical support

This key element of e-learning refers to the availability of technical support when problems occur. The availability of technical support is deemed to be important to ensure that learners

stay enrolled on the course. The objective is to increase the rate of completion of e-learning courses initiated.

3.3.5.1 Basic training in computer usage

It is acknowledged that the availability of technical support for e-learners is vital. However, even more importantly is the ability to equip users with sufficient technical skills to use e-learning equipment. The use of information and communications technology (ICT) is pre-requisite for success of e-learning (Koh, 2003) and requires basic training in ICT usage before computer-based training and e-learning is made available to learners. ICT training includes training in the basic Microsoft administrative programmes. Depending on the nature of the e-learning, other ICT could include training on enterprise resourcing program (ERP) applications such as SAP, and internal manufacturing software to suit the demands of the business core functions.

However, there are constraints to implementing technology-based learning, including time off for learning, target audience buy-in, sufficient ICT training budget, hidden costs associated with loss of time and energy in retraining people, and learners spending too much time looking for answers among themselves. E-learning should therefore be seen as a facet of a broader training in scale. Various methods of learning such as classroom or personal training, computer-based training, and e-learning via the virtual classroom are available to employers. The need for trainers to guide and support learners is a critical component of the learning process. Where there are insufficient ICT skills, a blended learning environment may be a more appropriate delivery option (Koh, 2003).

3.3.5.2 Considerations in the selection of e-learning vendors

E-learning vendors are critical to supplying the necessary technical support to enable the success of an e-learning offering. The considerations applied to the selection and use of technology in the design phase of e-learning programmes is critical to the phases that follow in providing e-learning opportunities in any organisation. The e-learning market is characterised by six types of vendors (Aldrich, 2001:6) who provide one or more of the following services:

- learning management systems for delivery and management of the learning;
- virtual classroom tools to provide infrastructure for multiple learners;
- off-the-shelf learning content to reduce costs;
- self-paced authoring tools for building in-house programmes;
- custom-content-creation capability; and

- assessment to evaluate skill levels.

Aldrich (2001:6) points out that the e-learning industry appears to be in an early high-growth stage but is also extremely fragmented. The largest e-learning vendor holds less than a 5% share of the market share (Harris, 2002:27). The major players in the market include Accenture's Indeliq, an e-learning venture formerly with Andersen Consulting Enterprise, software giant SAP, Oracle, tech giant Sun Microsystems acquisition of Isopia and McGraw-Hill's Lifetime Learning unit.

According to Aldrich (2001:24) the market is moving toward a demand for a full-service system solution. This implies that specialist off-the-shelf content providers are no longer a dominant force as a result of the high costs of delivery platforms and the differences that exist among technology and content offerings. The need in the market is for suppliers to provide a full service solution as well as manage the maintenance and servicing of content streams with granular learning objects. Purchasers of e-learning systems appear to prefer simple selection procedures and options as opposed to detailed technical specifications.

Until recently, most e-learning vendors appear to have an offering in only one or two of the six categories of e-learning provision (Aldrich, 2001:25). Mergers and acquisitions among e-learning companies have demonstrated that the primary motivator for most acquisitions was the need for technology. Acquirers tend to be e-learning companies occupying a particular niche and seeking to grow their expertise in allied areas such as instructor-led training, software, hardware, or publishing. Market share, distributors, or other assets tend to be secondary reasons for acquisitions (Aldrich, 2001:25).

3.3.6 Availability of face-to-face support

It is necessary to have available instructors who are dedicated to the concept of distributed learning and who are versed in distributed learning pedagogy. It is also important to have available local personnel who can assist with on site facilitating and support.

3.3.6.1 Supporting the learning process

It is critical that training and development personnel who are well versed in distributed learning develop strategies to help learners embrace e-learning. Such strategies are vital to increasing the use of e-learning as medium for ensuring that learners achieve defined competence levels. Hoyle, (2003:49) suggests that there are three factors that promote a culture of using e-learning:

- motivation to learn;
- underpinning knowledge;
- skills born of practice.

E-learning programmes that define the know-why; know-what; and the know-how acknowledge that learning is not a passive process. People need to be engaged on a journey of discovery, to find out for themselves what they need at a time appropriate to them. The process of discovery and reinforcement needs to be inherently motivational, interactive, engaging and games-based if possible. Users of e-learning should be able to control the experience, with individuals selecting or being directed to content that is specific to their needs and experience (Hoyle, 2003:49). Once learning has taken place it should be followed by practical application. Interaction with other learners provides learners with the confidence to integrate what they know into what they do.

3.3.6.2 E-learning used to deliver self paced and distance learning

On-site local support for e-learning should be readily available to ensure the success of an e-learning offering. It may also be argued however, that the availability of technology including broadband Internet services and learning materials that are media-rich have the potential of making learning more exciting than that provided by a lecturer face-to-face. According to Zoraini Wati Abas (2003) a growing trend appears to be the need to study in an electronic manner.

According to the above author, student perceptions are that the school is no longer the only means through which to obtain a secondary education. In cases where teachers are not effective in the classroom, students may show a preference to choose an alternative method to study a topic. The success in the examinations serves as a measure of academic performance rather than the attendance of classes. Similar studies (Keller & Cernerud, 2002:55-68) also suggest that technology-based learning offers opportunities for learners to access materials in a just-in-time fashion and to be in control of the pace of learning.

Berge & Smith, (2000:41) point out that technologically mature organisations have embraced e-learning as a means of developing geographically dispersed employees in a cost-effective manner. The objective in both education and business organisations is focussed on creating an atmosphere, relationships and processes that will achieve organisational goals. Distance education involving technology and two-way communication offers learners an ability to download course outlines from the Internet, click on links to articles or papers found on the Internet, and take self-evaluations normally administered face-to-face in the classroom. In addition, students are able to research a problem and to discuss their findings in discussion groups set up for this purpose (Zoraini Wati Abas, 2003).

3.3.7 Instructional methodologies

This element refers to the extent to which instructional methodologies facilitate easy learning and incorporate a variety of techniques. The objective is to enable simplicity of e-learning programmes and empowering of employees.

3.3.7.1 Adopting a problem-based approach in e-learning

The implementation approach to e-learning adopted by an organisation correlates roughly to the organisations experience with e-learning (Hall, 2002:237). Organisations that have some experience in implementing e-learning programmes should develop a business case based on a problem-focused approach where content is customised and offers problem-based skills practice. Research carried out by Doig and Werner (2000:173-179) at the College of Human Medicine at Michigan State University demonstrated that a curriculum that blended traditional discipline-oriented, lecture-based instruction with small-group, problem-based learning (PBL) provided the basis for active learning through laboratories, homework exercises, or Internet searches and reports.

However, the study also found that a relatively structured format for PBL has some disadvantages. Although the learning is organised primarily by system with thoughtful consideration for the student's growing body of knowledge, student emphasis on the subject matter objectives diminishes the primacy of the learning topics and discourages discovery learning. The centrality of multiple-choice tests further contributes to a dilution of the potential effect of case-based learning.

In organisations that have extensive experience and a history of using e-learning facilities there maybe a business case to build an enterprise wide e-learning solution, particularly if learning is problem-centred and simulation-based (Hall, 2002:238). Although the focus of this level is collaboration through virtual group work spaces, the challenge faced by developers of learning programmes is to create a balance between students' involvement in discovery learning and their mastery of the standard subject material related content (Doig and Werner, 2000:175). E learning should form an integral part of the organisations business strategy.

3.3.7.2 Empowerment of employees

The use of wireless and Web access allows employees to learn collaboratively, outside the traditional boundaries of a classroom. E-learning empowers the individual employee to teach themselves new things and also to teach others based on the experiences that they have about what works. This kind of learning is beyond formal classroom and e-learning courses, but it represents a blurring of the line between learning and knowledge management.

The ever-growing flow of business information and sharing of ideas has led organisations to implement systems such as call centre web portals. The portal integrates learning technology with customer contact, knowledge management and performance-management systems. The benefit of such a portal is that it will track various indicators and trigger the system to either provide e-learning modules that target specific problems or proactively determine the reasons for exceptional performance. By integrating learning, performance, management and knowledge-management technologies companies can proliferate the best minds in the organisation and manage human capital in a more holistic way (Anon, 2003).

3.3.8 Application of learning

The extent to which programmes are constantly monitored and evaluated for effectiveness; the ease and practicality of applying the e-learning back on the job; and the perception of the degree to which the learning enhances productivity is also discussed.

3.3.8.1 Measurement and evaluation

The need to continuously assess markets offerings and to identify e-learning programmes that meet company needs is vital to sustaining a dynamic e-learning system. Research (Nattestad, Attstrom, Matteos, Ramseier, Canegallo, Eaton, Feeney & Goffin, 2002:127-138) indicates that

there is a common view that the training of competent professionals across the economic and social spectrum will need to take advantage of up-to-date digital technologies and learning practices. Although Internet-based instructional technologies can be classified in three types, namely electronic communication, electronic postings and course web-sites, they are not mutually exclusive and can be integrated into a larger e-based framework (Nguyen and Kira, 2000:23).

The achievement of customised e-learning facilities may involve:

- designing customised e-learning curriculum measures that are aligned to the specific training philosophies and resources of organisations;
- providing re-useable digital instructional modules that can be incorporated or downloaded into specific parts of a curriculum;
- an e-consortium to provide for peer reviews and that will offer guidance in the design and delivery of teaching modules;
- the centralisation of human and physical resources at learning centres to enable the consistent delivery of instructional modules irrespective of the learning environments; and
- the assessment and provision of e-learning training to students with respect to the use of computers and related digital technologies and educational software programmes (Nattestad *et al* 2002:130).

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The objective of customised e-learning facilities ultimately is to create a virtual learning centre that will allow for both summative and formative evaluations of teaching material as well as the learning process. Summative evaluations serve to justify the implementation of an instructional technology in terms of:

- effective e-teaching and learning processes and related media that enable the student to gain a deep understanding of the subject content, to analyse and synthesis facts and information and to develop creative thinking and communication skills;
- the effectiveness of the delivery mode in attaining educational goals as opposed to traditional modes; and
- the extent to which the merits of the mode vary with the characteristics of students, subject matter experts, teaching methods and training equipment (Nguyen and Kira, 2000:23).

Formative evaluations involve the investigation of feedback on those factors that affect the teaching and learning process. Formative evaluations should be considered at the pre-course stage, during the course, and at the post course stage to determine efficiency levels in terms of content, audience, and design issues. Nattestad *et al* (2002:133) point out that the following aspects should be measured and evaluated as part of the learning process:

- students' behaviour in terms of attitude or willingness to learn independently; self regulation verses hands on and close supervision; and
- effectiveness, retention and the transfer of e-learned material into the practical situation.

The efficacy of e-learning based on summative and formative evaluations suggested that both the effectiveness of this teaching mode and student needs have to be taken into account in the design of appropriate e-learning programmes. These evaluations could include the following elements:

- planning;
- programming and technical development;
- learning behaviours; and
- learning outcomes of both the programme and the process (Nattestad et al 2002:134).

3.3.8.2 Measuring training effectiveness

A further distinction maybe drawn between training evaluation to determine the achievement of learning outcomes by trainees versus training effectiveness. Salas, Cannon-Bowers and Kozlowski as well as Tannenbaum and Yukl (in Hook and Bunce, 2001:440) point out that such a distinction would aid in explaining why training did or did not achieve the desired outcomes. While training evaluations are primarily a management tool, training effectiveness looks at influences such as individual differences, and training-related and organisational factors.

Training evaluations can prove to be more complex in the case of blended solutions. Hoyle (2003:28) points out that in most countries the biggest chunk of the training expenditure in companies is on one-day courses. Most learning programmes are offered on the basis of blended learning of prior knowledge, work practice, change management, HR interventions and organisational culture. To some extent this can be described as a managed process where learners are not necessarily aware that they're being taught, but have access to a range of

support tools to help improve performance (Hoyle, 2003:28). However, the benefits of one-day programmes are difficult to quantify.

3.3.8.3 Building organisational capital

Learning can be used to support ongoing improvements in human performance and to foster innovation. Devi (2003) argues that e-learning has been proven and accepted in both Europe and the United States as a flexible and cost-effective way to train employees and also to build the knowledge capital of an organisation. As a strategic tool, e-learning serves as a means of continuous development for employees who need to upgrade their knowledge and skills to remain focused and engaged (Anon, 2003).

The benefit of integrating e-learning into the existing business systems enables organisations to compete successfully (Kearns & Miller, 1997; Kearns, 2000). A key element of success in the global economy is the ability to access up-to-date skills and competencies just-in-time. At the same time, the costs associated with off-site learning such as travel; lodging; and lost work-time are also reduced (Devi, 2003).



3.4 CRAFTING AN E-LEARNING STRATEGY

The identification of a strategic need for e-learning in organisations also implies a need to plan for and allocate resources to ensure the requisite benefits are derived. While adding e-learning piecemeal to the existing training structure maybe attractive, training excellence is usually achieved more effectively by creating enterprise wide e-learning strategies. According to Pennington, Boase, Watson (1995:5), a situational analysis of both the internal and external environment are critical to an understanding of the current skill levels versus the skills requirements. The ultimate objective is to improve the quality of the strategic decisions by ensuring an appropriate match between the human resources practices, resources and the companies plans, Using the principles of strategic planning, project management, and change management in implementing e-learning (Berge & Smith, 2000:42) best practice organisations tend to first develop a clear purposeful vision of learning, knowledge, performance, and how current technology can activate this vision.

3.4.1 Strategic planning

The literature review of the key aspects of e-learning presented in this Chapter offers an opportunity to plan for the successful implementation of an e-learning offering. “Strategic planning is the process of setting organisational objectives and deciding on comprehensive programs of action to achieve these objectives” (Cascio, 1991:221).

Strategic planning facilitates a process for identifying the conditions or constraints that could enable or inhibit the process of reaching a critical business objective. According to Maynard & Mehrtens (1996:163-9) success in the new millennium will be characterised by a number of features that revolve around the corporate role, how we define and measure corporate wealth, the corporate structure, the corporate community, the issues defining environmental orientation relative to the organisation, technology development and our leadership culture. The most critical conditions for implementing e-learning are based on human and financial resources (Berge & Smith, 2000:46) but also how well an organisation plans for developing knowledge and skills for a future economy. Strategic planning models create linkages for users and implementers to plan for the implementation of e-learning as a strategic business objective and to facilitate a speedy adoption by users.



3.4.2 Project management

An e-learning project, as with most other projects, functions as a vehicle for realising tangible benefits in corporate environments. Project management therefore offers a set of disciplined principles and acts as a conduit for managing the implementation of e-learning. One of the principles of project management is that it has a beginning and an end with defined stages that involve techniques that employ a feasibility study, risk analysis, scope identification, work breakdown structures, resource allocation and scheduling. Project management therefore functions as a conduit for tactical implementation of strategy and for managing the change.

3.4.3 Change management

HRD has an instrumental role to play in initiating and assisting with the change management processes involved in the roll-out of e-learning. The literature (Defillippi & Arthur, 1994:310; McLagan, 1996:63) indicates that most organisations are moving toward a boundary-less new

world of work in which employers will require more off employees with fewer job descriptions in place. E-learning will constitute an important element of the new world of work.

The implementation of e-learning should be seen as a long term strategic change in a organisation. The use of change management principles provides the context for making strategic decisions and setting up projects. One of the critical principles in change management is the diffusion of information through certain channels over time and among members of a particular group. Proper consideration should be given to conditions and constraints of the organisation based on the true needs for e-learning. Utilising the principles of change management and project management, strategic goals can be implemented with a greater degree of success (Berge & Smith, 2000:49).

An assessment of organisational readiness is an important consideration in preparation to launch e-learning (Colbrunn and Van Tiem, 2002:86; Rosenberg, 2002:208). A systematic change strategy is required for the due consideration of the organisation's culture, identification of sponsors and change agents, the creation of value-based communications and a review of the technological sufficiency and compatibility is vital for successful implementation (Raman, 2003). The organisational capacity to embrace the new form of learning is dependent on learner access to computers and the skills of the learners to use computers, the impact that the new technology will have on individual jobs and the impact on the organisation as a whole. Change management assists in ensuring the people and the organisation are committed and capable of executing the business plan.

The motivation of people in terms of their support or resistance to the change as well as their competence levels is important to successful implementation. Equally important is the amount of resources needed to implement and sustain the change (Rosenberg, 2002:209). Post course training follow-up is needed to ensure that the learning outcomes are sustainable. Technology including discussion forums, learning communities or performance support tools can be used to reinforce of what people have learnt. (Hoyle, 2003:28)

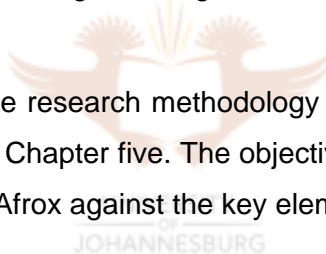
3.5 CONCLUSION

This chapter has provided a study of the best practices governing e-learning. The eight key elements that constitute effectiveness in the design, development, delivery and maintenance of successfully distributed e-learning programmes were discussed.

The benefits of implementing a sound e-learning strategy are far reaching. One of the tenets of e-learning is that it bridges work and learning. A particularly beneficial aspect of e-learning for organisations is the extent to which it addresses the development needs of employees who are geographically dispersed but must deliver products and services consistently.

E-learning should be adopted as part of a broader training strategy and where appropriate, offered as part of a blended learning solution. This chapter also pointed out that the business case for investing in e-learning starts and ends with the business objectives such as improving performance and efficiency; selling more products and services; lowering costs; enhancing the company's net worth; growing profits; generating return-on-investment

In Chapter Four an outline of the research methodology is presented explaining the build-up to the empirical work carried out in Chapter five. The objective of the empirical study was to assess the perceptions of e-learners in Afrox against the key elements identified in this chapter.



CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION

The literature study in Chapter three forms the framework for the empirical study in Chapter four and Chapter five. The key elements of effective e-learning that were identified in the previous chapter are used to investigate the e-learners' positive and negative perceptions of e-learning in Afrox.

Chapter four provides a description of the research design, the sampling strategy, the type of data that was collected, the design of the instrument used to collect the data, and the data analysis methods used. The results of the data processing and the interpretation of the tests are outlined in Chapter five.



4.2 RESEARCH DESIGN

The research methodology is a formal, exploratory study of e-learners perceptions of e-learning in Afrox. A telephone focus group was used to collect data across the Afrox businesses in South Africa. The steps detailed below outline the sample selection and size, quantitative data collection methods, instrumentation, and proposed procedures to measure learners' perceptions of the key dimensions of e-learning.

4.3 SAMPLING STRATEGY

4.3.1 Definition of the population

E-learning is widely employed in Afrox and is a strategic tool for managing consistent best commercial practice across the organisation. All Afrox employees have a competency profile on Traccess against which they are required to demonstrate competence. Afrox Industrial and Special Products business has a staff complement of approximately 2 400 employees, spread

across three geographical regions that spans South Africa. There are three regional offices and approximately 68 Afrox branches in South Africa.

The geographical composition and proximity of the customers and markets as well as transportation constraints has influenced the establishment of the three regional centers from which to distribute products and services to customers. The sampling units are therefore based on the three regional centers. The respondents are drawn have been categorised and are drawn namely from those who form part of the Southern Region, those in the Central Region and those who form part of the Northern Region.

The Southern Region office is in the Western Cape and includes employees in branches based in Namibia. The Central Region office is in Kwazulu-Natal and includes employees based in branches in Botswana. The Northern Region office is in Gauteng and includes employees based in branches in Mozambique. A fourth category of respondents is those employees mainly from Head Office support-type functions, based in Gauteng and referred to as the Enabling Functions.



4.3.2 Sampling design

The study is based on the probability sampling technique of complex random sampling. A combination of cluster (geographical split) sampling and stratified (employment category) sampling is used. The relevant elements of the population are made up of all employees who have accessed e-learning programmes in the past 12 months.

There are approximately 600 managerial employees and 1800 non-managerial employees in Afrox Industrial and Special Products Division. A random stratified sample of managerial employees and non-managerial employees will be drawn from across the organisation by means of a probability test. A total of 240 responses will be collected to meet precision and confidence requirements. The sample drawn from the population is made up as follows:

Table 4.1 Sampling design

	Southern Region	Central Region	Northern Region	Enabling Functions
Managerial employees	30	30	30	30
Non-Managerial employees	30	30	30	30

A list of all managerial employees and all non-managerial employees in the specific business areas was compiled. The list for each of these strata was prepared for each of the regional elements. There are approximately the same numbers of managerial and non-managerial employees in the Southern and Central Regions. The Northern Region is slightly larger than the other two regions. The samples drawn will be representative of the number of employees within the specific regions.

For each strata, a random selection was made of a starting number on the list between 1 and 5. Field workers were instructed to select every 4th element from the listing sheet as a respondent. This was repeated for each of the Regional sub-populations.

4.4 TYPE OF DATA TO BE OBTAINED

A quantitative approach was followed in measuring e-learners' perceptions of e-learning in Afrox, based on their experiences of an e-learning programme within the last 12 months. The results have been extrapolated to other parts of the business. The independent variables of interest in the study are measured by collecting interval data. A structured questionnaire was designed to test each of the e-learning constructs as addressed in the research questions. The data obtained included:

- Background information: this represents the subject variables and includes gender, age, the employment category, the line of business, and years of experience at Afrox.
- E-learning programmes: which represents the intervening variables as reflected in access to computers, ease of use of the programmes, and the e-learning processes applicable to the respondent's department.
- The quality of e-learning material: which represents the independent variables such as depth and level of understanding of material, delivery structure, technology, simplicity, practicality, and operational relevance.
- The e-learners' experience: reflecting the dependent variables indicating the frequency of learning, the motivation of learners to complete the training, and the learning culture of the organisation.

4.5 DATA COLLECTION METHOD

4.5.1 Measurement instrument

A structured questionnaire has been developed to collect data, using a traditional telephone interviewing collection approach. The data collected relates to the perceptions of e-learners in Afrox. The questionnaire was divided into four sections. The first part of the questionnaire, Section A was used to gather biographical data on the respondents as described above. Section B of the questionnaire served as a filtering mechanism to identify learners who had experience of e-learning in Afrox in the last 12 months. Those who had no experience of e-learning in the last 12 months were asked to indicate the reasons for not accessing their learning profiles. At that point the interview was terminated. Section C of the questionnaire was design to obtain data from those respondents who had experiences of e-learning in the last 12 months. Respondents were asked to indicate their perceptions against the eight key elements of e-learning as applied in Afrox. Section D also investigated the perceptions of the learning experience.

The measurement and scaling technique employed in Section C and Section D involved a non-comparative itemised rating scale, namely the Likert scale. The scale is a balanced rating scale in which each scale item has 5 response categories (Cooper & Schindler, 2001:299). The assignment of numbers to the responses include:

1. “Strongly Disagree”
2. “Disagree”,
3. “Neutral”,
4. “Agree”, and
5. “Strongly Agree”.

The choice of response is forced and therefore the middle response is a neutral point. The study objective is to get the respondents to rate the items to indicate their perceptions and levels of satisfaction with the key aspects of e-learning in Afrox. The numerical value reflects the degree of perceptive favourableness and allows for scores to be totalled measuring the respondents' perceptions.

The response form is based on the Likert scale and is presumed to capture interval data, allowing for the arithmetic mean to be used as a measure of central tendency. The data properties reflected in the Likert scale will allow for the average perceptive value to be measured

for managerial and non-managerial e-learners in Afrox. The standard deviation can therefore be used as the measure of dispersion of positive and negative perceptions.

The multidimensional scaling approach is aimed at survey perceptions based on eight key aspects related to the design, development, delivery and evaluation of e-learning in Afrox. By introducing only five response types, the multiple choice, single response scale ensures that only one answer can be provided.

The elimination of errors of measurement is critical to the exercise. Managerial staff may intimidate field workers as a result of their own fears to reflect negative perceptions of the major source of training. Field workers were instructed to explain that the questionnaire was anonymous and was designed to test perceptions. The results of the exercise would be used to identify methods to improve the climate and conditions under which e-learning takes place.

4.5.2 Screening enquiry and participation appeal

A minimum of 30 responses from each category is required. Responses are required only from learners who have undertaken e-learning in the last 12 months in Afrox. To mitigate the non-response error the possible contact sample is made up of 2400 e-learners in Afrox. A more detailed error reduction plan is outlined under the section related to administering the questionnaire.



The intention was to contact respondents first by e-mail to notify them of the intended call. However, due to time constraints this action was not carried out. Instead respondents were contacted for the first time telephonically to complete the questionnaire. The telephone survey method was preferred to a mail survey in order to build rapport and overcome unwillingness to complete the questionnaire. Participants were thanked telephonically for completing the questionnaire.

4.5.3 Administering the questionnaire

A briefing note was prepared for the field workers. The note was used to introduce field workers to the respondents and to obtain answers quickly and effectively from respondents. The rationale for comprehensively briefing field workers who administered the questionnaire, was to reduce the number of refusal responses and to increase the level of co-operation of respondents. (Please refer to Table 4.1 to view the process flow.)

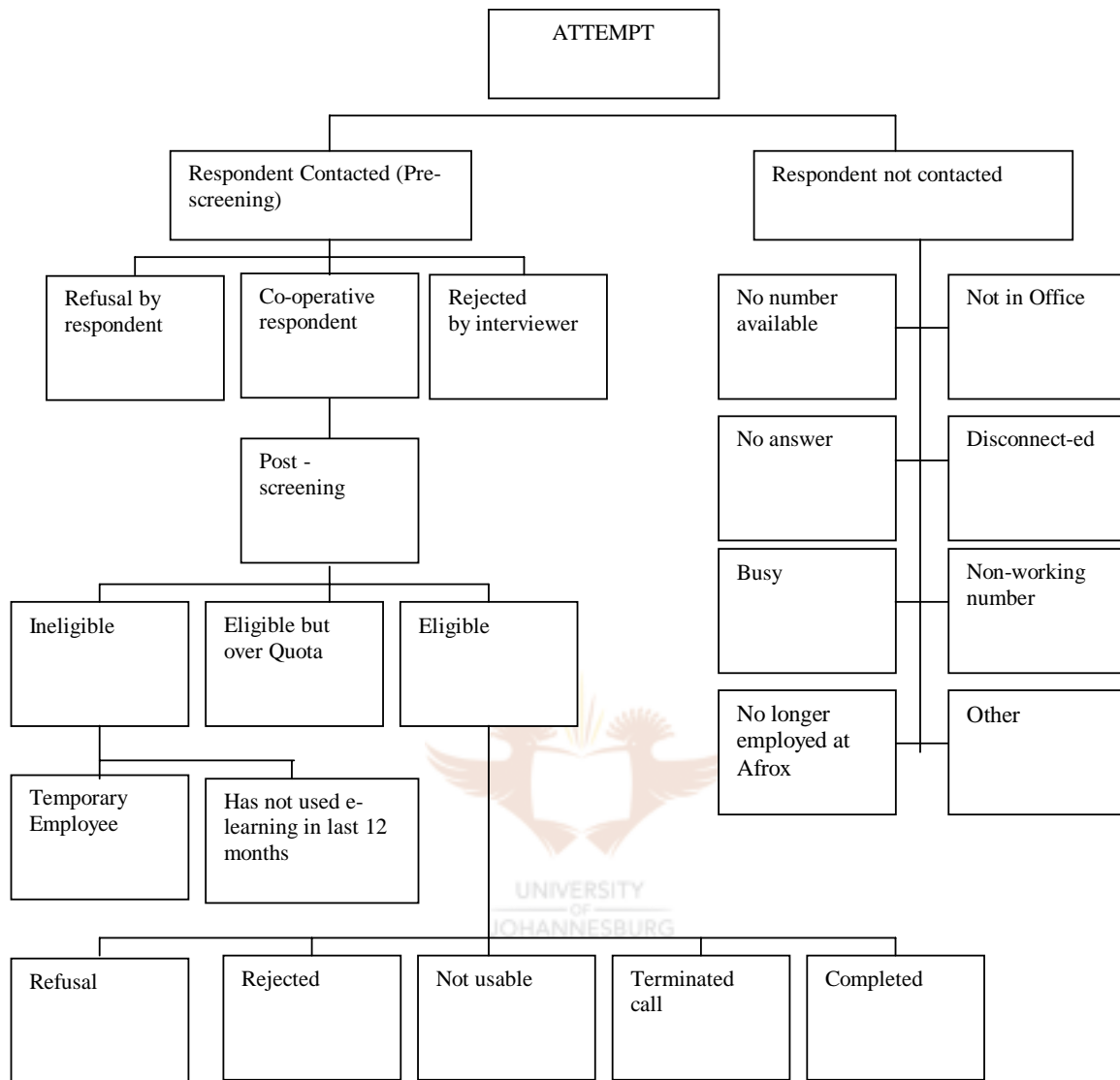
The team administering the questionnaire was made up of the researcher and six field workers who gathered the data telephonically. Each of the field workers were provided with a private office equipped with a telephone, a batch of 30 questionnaires, pens and a writing pad to note any queries. Each interview lasted between 5 minutes and 15 minutes.

The objective was to complete a total of 240 surveys telephonically by calling employees in Afrox. Each field worker was required to complete a minimum of 30 surveys, 15 surveys from managerial staff and 15 from non-managerial staff. Employees were called at the business unit telephone number where they were stationed.

A further means of increasing the respondents' interest and eliciting their co-operation, was for field workers to advise the respondents that the results of the survey would be used to improve the learning process in Afrox.

The questionnaire was revised over several iterations to reduce miscommunication and improve the rate of response. The questionnaire comprised of five questions that were related to biographical data, three questions relating to e-learning programmes and two batteries of questions relating to the respondents experience of e-learning. The questionnaire contains a screening question that enables data to be collected only from those learners who have undertaken e-learning in the last 12 months. In the case of those learners contacted who have not undertaken learning in the last 12 months, the field workers noted the reasons for not being able to access e-learning facilities and terminated the interview after question 6.

Table 4.2 Process flow of possible outcomes for telephone contacts



Source: adapted from Dillon, W. R., Madden, T. J., & Firtle, N. H. (1993). **Essentials of Marketing Research**, Boston: Irwin:167

4.5.4 Logistics

The respondents were contacted telephonically to complete the questionnaire. Each interview lasted between 8 and 15 minutes.

The total number of interviews consumed approximately 2400 minutes or 40 hours. This equates to 5 working days. The interviews were conducted during working hours. No computer-assisted mechanisms were used in the interviewing process.

A branch list with telephones was supplied to each field worker and was used in conjunction with the sample lists. For logistical purposes the interviews were conducted over a two-day period with each interviewer, including the researcher, conducting 30 interviews. Each interviewer spent approximately 2 hours and 30 minutes per day, over two days, collecting the required data.

4.6 DATA ANALYSIS METHOD

4.6.1 Data preparation

Raw data collected from the surveys completed was edited for errors and omissions, and also checked for compliance with minimum data quality standards. Standards include accuracy, consistent with intent of the question and other information in the survey, uniformity of entry, completeness, simplified coding and tabulation. The researcher supervised all field workers during the survey, ensuring that consistency of process was observed. All improvisations were dealt with at the end of each day to minimise entry gaps.

All the data collected was edited for consistency by the researcher. Where there were significant variations, responses in other questionnaires were reviewed for identifying the most appropriate response.

The coding of the data involved assigning numbers to answers so that responses could be grouped into a limited number of categories. The instrument was annotated with numbering for each possible response in an attempt to speed up the process of data capture. The following code key was used:

Section A (Background)

Gender

- 1 = Male
- 2 = Female

Age

- 1 = 30 years and younger
- 2 = 31 years but less than 40 years
- 3 = 41 years but less than 50 years
- 4 = Older than 50 years

Completed years of service at Afrox

- 1 = Less than 2 years
- 2 = 2 years but less than 5 years
- 3 = 5 years but less than 10 years
- 4 = 10 or more years



Employment category

- 1 = Managerial
- 2 = Non-managerial

In which Division are you employed?

- 1 = Enabling Functions (EF)
- 2 = Northern Region (NR)
- 3 = Southern Region (SR)
- 4 = Central Region (CR)

Section B

Question 6 (q_b6)

- 1 = Traccess and or IMSS
- 2 = SA eLearning Portal
- 3 = Ashridge on-lineCD Rom
- 4 = Other e-learning systems

Question 7 (q_b7)

- 1 = No access to a computer
- 2 = Do not know how to operate a computer
- 3 = There is no time allocated for learning
- 4 = I prefer other learning methods
- 5 = Other - specify

Section C

Question 8 (q_c8) - Question 30 (q_c30)

Which of the following Afrox e-learning programmes have you used in the past 12 months?

e-learning programmes	YES	NO
Safety training	1	2
Technical skills training	1	2
Product knowledge training	1	2
Computer skills training	1	2
Customer service training	1	2
Soft skills training	1	2
Other (specify)	1	2



Section D

Question 9 (q_d9) - Question 10 (q_d10)

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly agree

***Note when no response, cell is left blank.

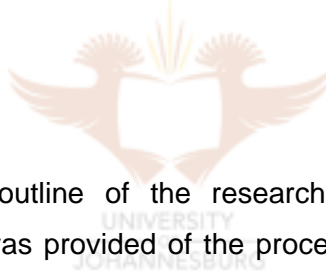
The data entry was carried out manually using the key described above. Data obtained from the questionnaire was captured on a Microsoft Excel spreadsheet specially prepared to collate all the responses received. The results were computed and analysed to determine specific trends in response to the key aspects that influence how learning is experienced in Afrox by e-learners.

4.6.2 Descriptive statistical summary

The information obtained from the computation is represented both graphically and descriptively in Chapter 5. The data has been presented using tabulation methods or graphical representations in histograms. The objective is to reduce the volume of data obtained and to present it in meaningful information in order to make deductions.

The descriptive statistical summaries include standard normal distribution, measures of location, measures of spread, and measures of shape. The data was coded, processed and analysis in collaboration with statisticians from the RAU Statistical Consultation Services (Statskon) Department.

The Statistical Consultation Services (Statkon) of the Rand Afrikaans University have been instrumental in processing, analysing and interpreting of the data. All empirical data was collected and captured by the researcher and his team. The figures and tables used in this chapter are the result of the statistical tests carried out on the data by Statkon.



4.7 CONCLUSION

Chapter Four dealt with an outline of the research methodology and the design of a questionnaire. A presentation was provided of the process in the formulation of questions and the sampling procedure.

Chapter five will deal with the results of the analysis of the empirical study.

CHAPTER FIVE

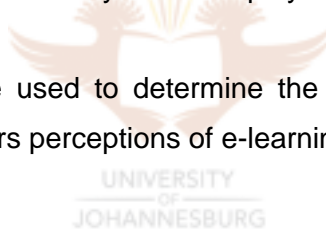
ANALYSIS AND INTERPRETATION OF EMPIRICAL DATA

5.1 INTRODUCTION

Chapter four dealt with a description of the research design, the sampling strategy, the data collection instrument, and the data analysis procedures. Chapter five deals with the results of the empirical study.

This chapter describes the data obtained; and it also describes the statistical process including a definition of the hypotheses, the statistical tests used, the level of significance and calculated differences, and the interpretation of the results of the statistical tests. In addition, an assessment of the strength of relationships is provided in a cross classification of tables by looking at two specific elements of e-learning that are related firstly to the division in which respondents are employed, and secondly to the employment category.

The results of all the tests are used to determine the statistical likelihood of any significant differences that exist in e-learners perceptions of e-learning in Afrox.



5.2 BIOGRAPHICAL DATA

This research examined managerial and non-managerial employees perceptions and experiences of e-learning in Afrox Industrial and Special Products (ISP) business. There are approximately 600 managers in the Industrial and Special Products business and 1800 non-managerial employees. In the process of gathering data one hundred and twenty managerial e-learners were surveyed (n = 120) telephonically and one hundred and twenty non-managerial e-learners were surveyed (n = 120). The employees had work experience from less than 2 years to more than 10 years in Afrox.

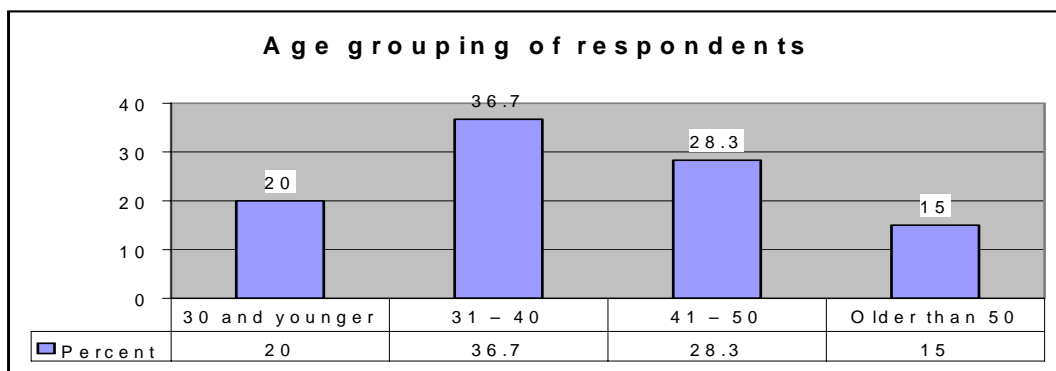
The 240 questionnaires answered revealed the following biographical spread. There were 154 respondents who were male and 86 respondents who were female. The age distribution was made up as follows:

Table 5.1a Age distribution of respondents

Age	Frequency	Percent
30 and younger	48	20.0
31 – 40	88	36.7
41 – 50	68	28.3
Older than 50	36	15.0

The age distribution of respondents is graphically displayed as follows:

Table 5.1b Graphical description of age distribution of respondents



There were 37,5% of respondents who had 10 or more completed years of service at Afrox, followed by 25% with 2 years but less than 5 years of service, 20% with 5 years but less than 10 years, and 17,5% with less than 2 years of service at Afrox.

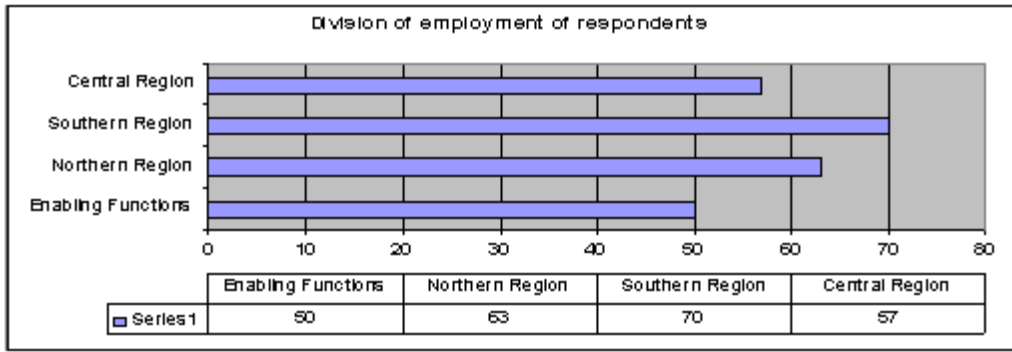
Although the research survey sought to collect data from 120 managerial and 120 non-managerial employees, 40,8% of respondents referred to themselves as managerial employees and 59,2% as non-managerial employees. This is indicated in the following table:

Table 5.2a Responses by employment category

Employment category	Frequency	Valid Percent
Managerial	98	40.8
Non-managerial	142	59.2
Total	240	100

The frequency representing division employed indicated that 29.2% of respondents were from Southern Region, 26.3% were from Northern Region, 23,9% were from Central Region and 20.8% were from the Enabling Functions.

Table 5.2b Responses by division of employment



With regard to having accessed e-learning facilities available in Afrox in the last 12 months:

- 45% of the total number of respondents indicated that they had accessed Traccess and IMSS system;
- 16.7% had accessed the SA eLearning Portal;
- 4.6% had accessed Ashridge on-line CD ROM; and
- 8% had accessed other e-learning systems.

Respondents were able to choose more than one option.

A total of 50.8% of respondents indicated that they had not accessed any e-learning system at Afrox in the last 12 months. The reasons for not accessing e-learning were made up as follows:

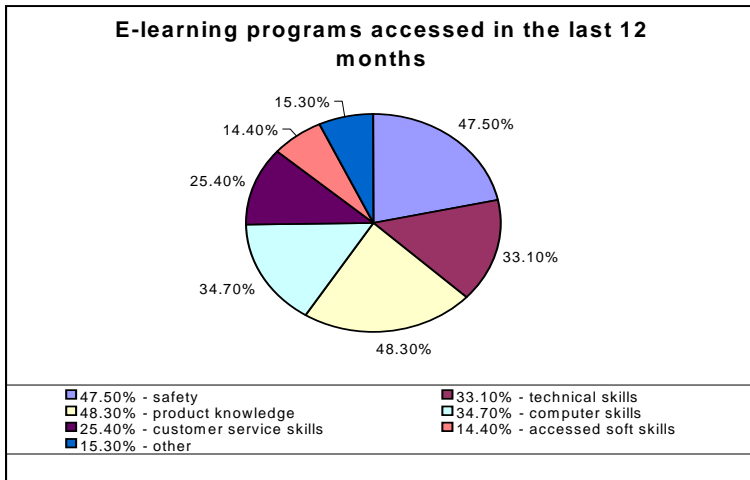
Table 5.3 Reasons for not accessing e-learning

Reason	%
No access to a computer	4.6
Do not know how to operate a computer	1.7
There is no time allocated for learning	20.8
I prefer other learning methods, e.g. classroom based, etc.	2.1
Other – specify	21.6

While there were a variety of reasons lists under “Other”, most respondents stated that there was no particular reason for not accessing their learning profile.

There were 49.3% of respondents who had accessed e-learning programmes in the last 12 months. A respondent was able to choose more than one option of the available e-learning programmes, and is depicted as follows:

Table 5.4 E-learning programmes accessed in the last 12 months



- 47.5% indicated that they had accessed safety training;
- 33.1% had accessed technical skills training;
- 48.3% had accessed product knowledge training;
- 34.7% had accessed computer skills training;
- 25.4% had accessed customer service skills training;
- 14.4% had indicated that they accessed soft skills training; and
- 15.3% indicated that they had accessed other types of training.

The above data is analysed further by conducting a factor analysis and interpreting the respondent's perceptions of the key elements of e-learning in relation to employment category and in relation to division employed.

5.3 DESCRIPTION OF THE STATISTICAL PROCESS

The evaluation of the measurement tool is first addressed in this section. The data obtained through the use of the structured questionnaire was subjected to two major criteria, namely construct validity and internal reliability (Cooper & Schindler, 2001:446).

5.3.1 Construct validity

The purpose of this measure was to account for the variance in the measure and to gain some assurance that the measurement has an acceptable degree of validity. Attempts were made to

identify the underlying construct being measured, namely the perception of e-learning, and to determine how well the test represents the construct. A high score represented a positive perception and a low score a negative perception. The method employed in this instance was a factor analysis specifically of Section D and Section E of the questionnaire.

Factor analysis was used to assist in identifying patterns among the dimensions or elements of e-learning to discover if there were underlying combinations of the elements, using the principal component analysis approach (Cooper & Schindler, 2001:592). The statistical measures used for this purpose were the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett Test of Sphericity (BTS). In the KMO a measure greater than 0.7 is required for sufficient correlation to exist in the dimensions, while in the BTS a measure less than 0.05 is required for significance. The diagnostics of these measures indicate overall an adequate level of validity, and are summarised as follows:

Table 5.5 Kaiser-Meyer-Olkin Measure of Sampling Adequacy

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.734
Bartlett's Test of Sphericity	Approx. Chi-Square	449.376
	Df	120
	Significance.	.000

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However, it is important to understand the degree of validity present across the variables. The 14 statements in the questionnaire were therefore transformed to arrive at four manageable linear combinations of variables, forming the best combination referred to as the first order factor. The second principal component or linear combination of variables for explaining the variance not accounted for by the first factor comprised question 9.6 and question 10.2.

5.3.1.1 First order factor analysis

The first order factor analysis indicate the following measures of sampling adequacy from the KMO and BTS:

Table 5.6 Kaiser-Meyer-Olkin Measure of Sampling Adequacy: first order factor

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.797
Bartlett's Test of Sphericity	Approx. Chi-Square	392.091
	Df	91
	Sig.	0

The first four factors or best combination all had required eigenvalues greater than 1.000, while retaining 58.661% of variance. The test results are summarised as follows:

Table 5.7 Total variance explained: first order factor

Total Variance Explained			
Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.338	30.983	30.983
2	1.566	11.189	42.173
3	1.231	8.793	50.966
4	1.077	7.695	58.661
5	0.954	6.817	65.478
6	0.804	5.745	71.223
7	0.75	5.355	76.578
8	0.666	4.759	81.337
9	0.571	4.08	85.417
10	0.542	3.87	89.286
11	0.438	3.126	92.413
12	0.404	2.887	95.3
13	0.366	2.615	97.915
14	0.292	2.085	100

Extraction Method: Principal Axis Factoring.

Using factor loadings to reduce the degree of ambiguous conditions between factors and variables, the rotated factor matrix below shows that the following patterns highlighted in bold in the variables can be detected:

Table 5.8 Rotated factor matrix: first order factor

	Rotated Factor Matrix(a)			
	1	2	3	4
q10.8 E-learning is less effective than other learning methods	-0.706	-0.14	-0.157	
q10.6 The e-learning programmes at Afrox are of high quality	0.571	0.28	0.226	0.106
q10.7 E-learning enhances productivity	0.461		0.417	

	Rotated Factor Matrix(a)			
	1	2	3	4
q9.7 The practicality of the E-learning makes it easy to apply back on the job	0.391	0.377	0.178	0.362
q9.1 E-learning programmes have clearly defined goals and objectives.		0.853	0.104	0.119
q9.2 E-learning programmes have clearly defined performance standards for success.	0.143	0.461		0.342
q9.8 There is sufficient depth of information in the e-learning courses	0.395	0.405	0.186	0.18
q10.4 I do not have the technical skills to benefit from e-learning	-0.175	-0.316		
q9.5 On-line technical support for e-learning programmes is readily available	0.168	0.277	0.248	0.219
q9.4 The equipment used to deliver e-learning is technologically advanced	0.131		0.802	
q9.3 The simplicity of e-learning programmes facilitates easy learning and convenient access	0.195	0.272	0.531	0.114
q10.3 E-learning empowers employees	0.105	-0.108	0.459	0.114
q10.1 E-learning is efficient	0.516	0.195	0.118	0.626
q10.5 The e-learning programmes offered at Afrox are relevant to my job requirement			0.177	0.575
Extraction Method: Principal Axis Factoring.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 6 iterations.				

In an effort to further clarify the factors a Varimax rotation was used to arrive at the following matrix for the four factors:

Table 5.9 Factor transformation matrix: first order factor

Factor Transformation Matrix				
Factor	1	2	3	4
1	0.593	0.518	0.474	0.394
2	0.078	-0.655	0.738	-0.145
3	-0.778	0.203	0.356	0.476
4	0.191	-0.512	-0.323	0.773

An extraction method known as principal axis factoring was used in the Varimax rotation method to clarify the relationship among the key elements of e-learning. However, it is acknowledged that these may still contain a degree of subjectivity. Therefore an additional measure, effect-size, will be used in the interpretation of the scores in section 5.4 to determine the degree to which differences exists among managerial and non-managerial perceptions as well as among regions.

5.3.1.2 Second order factor analysis

The second factor comprised of question 9.6 and question 10.2, namely:

q9.6	Face to face support from local staff is available for e-learning programmes, and
q10.2	E-learning is time consuming.

The KMO and the BTS measure of sampling adequacy indicated that there was sufficient correlation between the factors with an adequate degree of validity in the data. The measure is summarised as follows:

Table 5.10 Kaiser-Meyer-Olkin Measure of Sampling Adequacy: second order factor

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.714
Bartlett's Test of Sphericity	Approx. Chi-Square	76.298
	Df	6
	Sig.	.000

The second factor is the best linear combination of variables for explaining the variance not accounted for by the first order factor. The second order factor had one eigenvalue of 2.136, which is greater than the required value of 1.000, with a 53.398% variance. Using the Principal Axis Factoring extraction method, the results are summarised as follows:

Table 5.11 Total variance explained: second order factor

Total Variance Explained			
Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	2.136	53.398	53.398
2	0.733	18.32	71.718
3	0.682	17.05	88.768
4	0.449	11.232	100

5.3.2 Internal reliability measures

The reliability measure looks at how consistently respondents answered the statements regarding the key elements of e-learning in the questionnaire. More specifically internal consistency was used to assess the homogeneity among the elements. The objective of this measure was to identify the degree to which the measurement was free of random or unstable error as well as the degree to which the instrument was robust.

The instrument used to assess reliability was the Cronbach's coefficient alpha, which has the most utility for standardising conditions under which measurement occurs, particularly at the interval level of measurement. A coefficient alpha greater than or equal to 0.7 indicates reliability. A higher score indicates a higher degree of internal consistency and similarity among the items.

5.3.2.1 First order factor one

The results of Cronbach Alpha in terms of the first order factor-one was below the required coefficient and is summarised as follows:

Table 5.12 Cronbach's Alpha: first order factor

Reliability Statistics	
Cronbach's Alpha	Number of Items
0.69	4

The following item statistics were correlated to arrive at the above score:

Table 5.13 Item statistics: first order factor

Item Statistics	Mean	Std. Deviation	N
q10.8 E-learning is less effective than other learning methods	3.4052	0.90389	116
q10.6 The e-learning programmes at Afrox are of high quality	3.9138	0.5368	116
q10.7 E-learning enhances productivity	3.7069	0.81312	116
q9.7 The practicality of the E-learning makes it easy to apply back on the job	3.7328	0.72661	116

The response to q10.8 has an inverse effect on the score for this factor. A positive reply carries a lower score and a negative response carries a higher score. The score of 0.69 indicates that there is slightly less than is required in the reliability criteria to warrant its use in making a distinction among groups of people.

5.3.2.2 First order factors two, three and four

The remaining factors two, three and four in the first order factor all have a coefficient alpha of less than 0.7, namely 0.589; 0.610; and 0.490 respectively. This indicates that there are even lower levels of reliability with the potential for incorrect inferences among the items. An explanation for the low correlation could be that there are too few differences in perceptions among managerial and non-managerial staff. The low correlation therefore does not warrant distinctions between the groups. Overall, reliability is low for all the first order factors.

5.3.2.3 Second order factor

The results of Cronbach Alpha in terms of the second order factor was above the required coefficient and is summarised as follows:

Table 5.14 Cronbach's Alpha: second order factor

Reliability Statistics	
Cronbach's Alpha	Number of Items
0.761	16

The score indicates that there is more than adequate reliability in the item scale and that there is similarity among the items. To calculate the Cronbach Alpha, the following item statistics were correlated.

Table 5.15 Item Statistics on the perceptions of e-learning: second order factor

Item Statistics	Mean	Std. Deviation	N
q9.1 E-learning programme's have clearly defined goals and objectives.	3.9346	0.603	107
q9.2 E-learning programmes have clearly defined performance standards for success.	3.8505	0.57959	107
q9.3 The simplicity of e-learning programmes facilitates easy learning and convenient access	3.757	0.81079	107
q9.4 The equipment used to deliver e-learning is technologically advanced	3.6449	0.7679	107
q9.5 On-line technical support for e-learning programmes is readily available	3.5514	0.6621	107
q9.6 Face to face support from local staff is available for e-learning	3.1869	0.87016	107

Item Statistics	Mean	Std. Deviation	N
programmes			
q9.7 The practicality of the E-learning makes it easy to apply back on the job	3.757	0.72478	107
q9.8 There is sufficient depth of information in the e-learning courses	3.7664	0.78403	107
q10.1 E-learning is efficient	3.7944	0.64043	107
q10.2 E-learning is time consuming	3.6355	1.12763	107
q10.3 E-learning empowers employees	3.9159	0.63128	107
q10.5 The e-learning programmes offered at Afrox are relevant to my job requirement	3.7664	0.83077	107
q10.6 The e-learning programmes at Afrox are of high quality	3.8972	0.53083	107
q10.7 E-learning enhances productivity	3.6916	0.82886	107
q10.4 inverse scoring	3.5888	1.18125	107
q10.8 inverse scoring	3.4299	0.89139	107

In this particular instance all the questions were grouped to reflect a measure of the **perception of e-learning**. The higher the score, the higher there is a degree of a positive perception, and the lower the score the greater the degree there is a negative perception.

5.3.2.4 Interpretation of reliability and validity measures

In summary, the correlation of items reflecting learners' "perceptions of e-learning in Afrox" shows less than adequate reliability for the first order factors. However, there is a sufficient degree of reliability for the second order factor.

There is sufficient evidence of validity in the first order factors and in the second order factor to warrant the use of the data in making rough distinctions among groups of people. No tests will be conducted on the first order factors. However, some cautions needs to be applied to interpreting the final scores for the second order factor. For this reason more than one test is conducted and an additional measure known, as effect-size will used to determine the extent of any difference that may exist.

5.4 HYPOTHESES TESTING

The hypotheses below were advanced to determine the statistical likelihood that the data reveals true differences in managerial and non-managerial learners perceptions of e-learning. All

learners are from the Industrial and Special Products business of Afrox. Secondly, the hypothesis also sought to determine the likelihood that the data revealed true differences in learners perceptions of e-learning across the regions and the enabling functions. What follows is an evaluation of the importance if any, of a statistical significant difference by weighting the practical significance of changes in the following hypotheses.

The first hypothesis is as follows:

- I. The null hypothesis (H_0) is: There is a difference in the mean score of managerial and non-managerial perceptions of e-learning.

The null hypothesis maybe stated as (H_0): $\text{mean}_{\text{managers}} = \text{mean}_{\text{non-managers}}$

- II. Alternative hypothesis (H_1): There is no difference in the mean score of managerial and non-managerial perceptions of e-learning.

The alternative hypothesis maybe stated as (H_1): $\text{mean}_{\text{managers}} \neq \text{mean}_{\text{non-managers}}$

The second hypothesis is as follows:

- I. The null hypothesis (H_0) is: There is no difference in the mean score of the learners perceptions of e-learning in Northern Region, Central Region, Southern Region and Enabling Functions.

The null hypothesis maybe stated as (H_0): $\text{mean}_{\text{North}} = \text{mean}_{\text{Central}} = \text{mean}_{\text{Southern}} = \text{mean}_{\text{Enabling}}$

- II. Alternative hypothesis (H_2): There is a difference in the mean score of the learners perceptions of e-learning in Northern Region, Central Region, Southern Region and Enabling Functions.

This maybe stated as (H_2): $\text{mean}_{\text{North}} \neq \text{mean}_{\text{Central}}, \text{mean}_{\text{North}} \neq \text{mean}_{\text{South}};$

$\text{mean}_{\text{North}} \neq \text{mean}_{\text{Enabling}}; \text{Mean}_{\text{South}} \neq \text{mean}_{\text{Central}}; \text{mean}_{\text{South}} \neq \text{mean}_{\text{Enabling}};$

$\text{mean}_{\text{Enabling}} \neq \text{mean}_{\text{Central}}$

5.4.1 Testing approach

The classic statistic approach (Cooper & Schindler, 2001:486) has been followed to test the hypothesis. It is an objective view of probability in which the decision-making rests totally on an analysis of available sampling data. The established hypothesis is either rejected or fails to be rejected. The decision to accept or reject the above hypothesis will therefore be based on statistical significance, where the difference in the measure does not represent random sampling fluctuations.

5.4.2 Selection of statistical tests

The following tests were selected to test the hypotheses, namely the t-test, the one-way analysis of variance (ANOVA), and the post hoc Scheffe's S test. These tests were selected on the basis of the independent samples involved and the multiple comparisons required. The t-test, an independent samples parametric test was selected to test the first hypothesis. The ANOVA was selected to test the second hypothesis, where there are more than three samples involved (Cooper & Schindler, 2001:497-498).

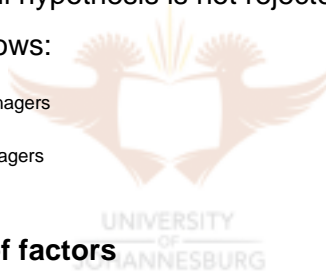
5.4.3 Using the t-test for independent samples

To test the first hypothesis the t-test, an independent samples parametric test was selected to determine the statistical significance in the perceptions of e-learning among managerial and non-managerial scores. The t-test is useful in measuring interval data and where there are independent samples. The significance level for the t-test is 0.05. Where the probability or p value is less than this significance level the null hypothesis will be rejected, i.e., p (sig.) < 0.05. However, if $p > 0.05$ than the null hypothesis is not rejected.

The hypotheses is stated as follows:

(H₀): mean_{managers} = mean_{non-managers}

(H₁): mean_{managers} ≠ mean_{non-managers}



5.4.3.1 Statistical testing of factors

As a result of the low level of internal reliability identified in the correlation of the first order factors, it was not deemed appropriate to carry out the t-test.

The second order factor meets with both construct validity and internal reliability criteria. In conducting the independent sample test for the equality of means between managerial and non-managerial employees the following t-test results were obtained:

Table 5.16 T-Test for equality of means: independent samples

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Section D & E - First order factor 1	Equal variances assumed	0.523	0.471	0.033	114	0.974	0.00347	0.10481	-0.20416	0.2111
	Equal variances not assumed			0.034	97.82	0.973	0.00347	0.10239	-0.19971	0.20666
Section D & E - First order factor 2	Equal variances assumed	1.745	0.189	2.962	108	0.004	0.27765	0.09372	0.09188	0.46341
	Equal variances not assumed			3.143	92.455	0.002	0.27765	0.08834	0.1022	0.45309
Section D & E - First order factor 3	Equal variances assumed	12.601	0.001	-2.18	115	0.031	-0.2213	0.10153	-0.42241	-0.02018
	Equal variances not assumed			-2.399	114.839	0.018	-0.2213	0.09226	-0.40405	-0.03854
Section D & E - First order factor 4	Equal variances assumed	0.898	0.345	-0.537	113	0.593	-0.06194	0.11541	-0.29059	0.16671
	Equal variances not assumed			-0.555	100.77	0.58	-0.06194	0.11168	-0.28349	0.15961
Section D & E - Second order factor	Equal variances assumed	4.54	0.035	0.681	105	0.497	0.05546	0.08144	-0.10601	0.21693
	Equal variances not assumed			0.743	92.755	0.459	0.05546	0.07462	-0.09272	0.20364

5.4.3.2 Interpretation of t-test results

The results of the t-test for the second order factor indicate that the calculated p value of 0.459 is higher than the significant level of 0.05. Therefore, the null hypothesis cannot be reject, which leads us to conclude that there is no difference in managerial and non-managerial perceptions of e-learning.



5.4.4 ANOVA - one way for three or more samples

In the second hypothesis, there are three or more samples involved. Again, the data is measured on an interval scale. The ANOVA, which is a k independent sample test, is useful in this respect for comparing the samples from the Northern Region, Southern Region, Central Region, and the Enabling Functions. The above tests are complemented by a post hoc test, namely the Scheffe for comparing more than two independent sample means. The second hypothesis was stated as follows:

(H_0): mean_{North} = mean_{Central} = mean_{Southern} = mean_{Enabling}.

(H_2): mean_{North} \neq mean_{Central}; mean_{North} \neq mean_{South}; mean_{North} \neq mean_{Enabling}; mean_{Central} \neq mean_{South}; mean_{Central} \neq mean_{Enabling}; mean_{South} \neq mean_{Enabling}

South; mean_{Central} \neq mean_{Enabling}; mean_{South} \neq mean_{Enabling}

5.4.4.1 Statistical testing of factors

Again, as a result of the low level of reliability identified in the correlation of the first order factors, it was not deemed appropriate to interpret the scores in the ANOVA computation.

The second order factor meets with both construct validity and internal reliability criteria. The ANOVA summary table below provides an analysis of the equality of means for the samples from the Northern Region, Southern Region, Central Region, and the Enabling Functions.

Table 5.17 Summary table for one-way ANOVA: second order factor

		Sum of Squares	df	Mean Square	F	Sig.
Section D & E - First order factor 1	Between Groups	2.914	3	0.971	3.477	0.018
	Within Groups	31.289	112	0.279		
	Total	34.203	115			
Section D & E - First order factor 2	Between Groups	2.794	3	0.931	4.287	0.007
	Within Groups	23.026	106	0.217		
	Total	25.82	109			
Section D & E - First order factor 3	Between Groups	1.462	3	0.487	1.683	0.175
	Within Groups	32.722	113	0.29		
	Total	34.184	116			
Section D & E - First order factor 4	Between Groups	5.538	3	1.846	5.78	0.001
	Within Groups	35.453	111	0.319		
	Total	40.991	114			
Section D & E - Second order factor	Between Groups	2.235	3	0.745	5.222	0.002
	Within Groups	14.694	103	0.143		
	Total	16.93	106			

5.4.4.3 Interpretation of ANOVA test results

The results of the ANOVA for the second order factor indicate that the calculated p value of 0.002 is lower than the significant level of 0.05. Therefore, the null hypothesis is rejected. With on 95% confidence level we can conclude that there are differences in regional perceptions of e-learners across the regions and enabling functions.

5.4.4.4 Post hoc test: Scheffe's S test

To reduce the Type I error in the rejection of the null hypothesis, the above post hoc test was conducted on the second order factor only. The objective was to channel the power of the test into fewer degrees of freedom by stating the areas of common interest. Using a multiple comparison procedure this test assists in determining which group means of the four samples differ significantly from the others. The null hypothesis for the Scheffe was tested at the significance level of 0.05. The results were computed as follows:

Table 5.18 Scheffe's S test (multiple comparisons)

Dependent Variable		(I) Division Employed	(J) Division Employed	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Section D & E - Second order factor	Scheffe	EF	NR	-.41801(*)	0.11959	0.009	-0.7579	-0.0781
			SR	-.34930(*)	0.10763	0.018	-0.6552	-0.0434
			CR	-.36901(*)	0.10939	0.013	-0.6799	-0.0581
		NR	EF	.41801(*)	0.11959	0.009	0.0781	0.7579
			SR	0.06871	0.10426	0.933	-0.2276	0.365
			CR	0.049	0.10607	0.975	-0.2525	0.3505
		SR	EF	.34930(*)	0.10763	0.018	0.0434	0.6552
			NR	-0.06871	0.10426	0.933	-0.365	0.2276
			CR	-0.01971	0.09238	0.997	-0.2823	0.2429
		CR	EF	.36901(*)	0.10939	0.013	0.0581	0.6799
			NR	-0.049	0.10607	0.975	-0.3505	0.2525
			SR	0.01971	0.09238	0.997	-0.2429	0.2823

* The mean difference is significant at the .05 level.

5.4.4.5 Interpretation of Scheffe's S test results

From the analysis above it can be seen that the Enabling Functions is most different from the other three regions. The other three regions appear to have similar scores as opposed to those from the Enabling Functions.

Table 5.19 Interpretation of Scheffe's S test: second order factor

	Division Employed	N	Subset for alpha = .05	
			1	2
Scheffe(a,b)	EF	19	3.4323	
	SR	35		3.7816
	CR	32		3.8013
	NR	21		3.8503
	Sig.			1

Means for groups in homogeneous subsets are displayed.
a Uses Harmonic Mean Sample Size = 24.989.
b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Based on a 95% confidence level, the above analysis also provides information for understanding the rejection of the null hypothesis. The scores above would appear to indicate that there are significant differences. An understanding of the differences is further enhanced by the directional measures outlined below.

Table 5.20 Section D & E - Second order factor * Division employed

Directional Measures	Value
Nominal by Interval Eta Section D & E - Second order factor Dependent	.363

The effect size measure outlined above provides insight into the degree of significance that exists in the differences between the Enabling Functions and the other regions. Based on a scale of 0.0 to 1.0 the score of 0.363 above indicates that there is a medium effect in the difference between the Enabling Functions and the other regions. A score above 0.5 would have indicated a large effect.

5.5 MEASURES OF ASSOCIATION

Measures of association help to answer tactical or strategic questions by predicting the values of one variable from those of another (Cooper & Schindler, 2001:531). In this particular instance a technique known as cross-tabulation is used to test the relational hypothesis below.

The measures of association tested are based on the two e-learning elements in the second order factor comprising of question 9.6 and question 10.2, namely:

q9.6	Face to face support from local staff is available for e-learning programmes, and
q10.2	E-learning is time consuming.

Each of these statements is tested first against “employment category” and second in relation to “division employed”.



5.5.1 Relational hypothesis

The null hypothesis is that the differences in marginal percentages between managerial and non-managerial respondents reveal that samples are independent of each other, and that there is no association between the variables. The alternate hypothesis is that managerial and non-managerial samples are dependent and there is an association between the variables.

- I. Null hypothesis (H_0): marginal percentages_{managers} = marginal percentages_{non-managers}
- II. Alternate hypothesis (H_1): marginal percentages_{managers} \neq marginal percentages_{non-managers}

By examining the frequencies in the responses, it is possible to identify where there are relationships between the above cross-tabulated variables. A calculated coefficient that is below a significance level of 0.05 indicates the null hypothesis can be rejected. Alternatively where the calculated correlation coefficient is above the significance level of 0.05 the null hypothesis cannot be rejected.

The strength of the relationship can be gauged from the use of Cramer's V and Chi-square coefficient that ranges from 0 to +1.0. A score below 0.5 indicates that the samples are independent and with no association, while a score above 0.5 indicates a high degree of dependency between the samples and some form of association (Cooper & Schindler, 2001:554).

5.5.2 Statistical testing using cross-tabulation

Cross-tabulation allows for the examination of frequencies of observations that belong to specific categories on more than one variable. The resulting tables below represent a unique combination of the specific values of the cross-tabulated variables.

5.5.2.1 Face to face support from local staff: employment category

This question related to the e-learning element regarding the availability of face-to-face support from local staff. In assessing the relationship between the managerial and non-managerial learners, the following cross-tabulation of managerial and non-managerial responses is provided:

Table 5.21 Cross-tabulation – Face-to-face support from local staff* Employment category

		Employment category		Total
		Managerial	Non Managerial	
Strongly Disagree \ Disagree	Count	21	9	30
	% within Face to face support from local staff is available for e-learning programs	70.00%	30.00%	100.00%
	% within Employment category	29.20%	19.60%	25.40%
Neutral	Count	21	11	32
	% within Face to face support from local staff is available for e-learning programs	65.60%	34.40%	100.00%
	% within Employment category	29.20%	23.90%	27.10%
Agree	Count	30	25	55
	% within Face to face support from local staff is available for e-learning programs	54.50%	45.50%	100.00%
	% within Employment category	41.70%	54.30%	46.60%
Strongly Agree	Count	0	1	1
	% within Face to face support from local staff is available for e-learning programs	0.00%	100.00%	100.00%
	% within Employment category	0.00%	2.20%	0.80%
Total	Count	72	46	118
	% within Face to face support from local staff is available for e-learning programs	61.00%	39.00%	100.00%
	% within Employment category	100.00%	100.00%	100.00%

5.5.2.1.1. Interpretation of scores: employment category

The frequencies in the cross-tabulation of managerial and non-managerial samples indicate that there is no significant difference in the perception of managerial and non-managerial learners in the category “agree”. The calculated score of 0.28 is greater than the significance level of 0.05, which leads us to conclude that we cannot reject the null hypothesis. The samples appear to be independent and with no associations.

The strength of the relationship as indicated in the phi coefficient also of 0.28 as well as Cramer’s V shows a small relationship between the employment category and the extent of agreement in the responses. There is therefore no suggestion in this interpretation that one variable causes the other, nor is there an indication of the direction of the relationship. It is evident that there is a degree of independence between the groups of managerial and non-managerial e-learners on this dimension of e-learning. The null hypothesis therefore, cannot be rejected.

Table 5.22 Chi-square measures of association – Face-to-face support * Employment category

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.837(a)	3	0.28
Likelihood Ratio	4.18	3	0.243
Linear-by-Linear Association	2.812	1	0.094
N of Valid Cases	118		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .39.			
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	0.18	0.28
	Cramer's V	0.18	0.28
N of Valid Cases		118	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

5.5.2.2 Face to face support from local staff: division employed

The cross-tabulation of the regional and enabling function e-learners in the category “agree” indicates that there is a greater degree of similarity in the scores of the regional e-learners, and to a lesser degree of similarity with those of the enabling functions. Overall however, the testing level of 0.457 is greater than the significance level of 0.05, indicating that the null hypothesis cannot be rejected. The results of the cross-tabulation are summarised below:

Table 5.23 Cross tabulation - Face-to-face support from local staff * Division employed

		Division Employed				Total
		EF	NR	SR	CR	
Strongly Disagree \ Disagree	Count	4	5	10	11	30
	% within Face to face support from local staff is available for e-learning programs	13.30%	16.70%	33.30%	36.70%	100.00%
	% within Division Employed	17.40%	20.80%	27.00%	32.40%	25.40%
Neutral	Count	10	5	10	7	32
	% within Face to face support from local staff is available for e-learning programs	31.30%	15.60%	31.30%	21.90%	100.00%
	% within Division Employed	43.50%	20.80%	27.00%	20.60%	27.10%
Agree	Count	9	13	17	16	55
	% within Face to face support from local staff is available for e-learning programs	16.40%	23.60%	30.90%	29.10%	100.00%
	% within Division Employed	39.10%	54.20%	45.90%	47.10%	46.60%
Strongly Agree	Count	0	1	0	0	1
	% within Face to face support from local staff is available for e-learning programs	0.00%	100.00%	0.00%	0.00%	100.00%
	% within Division Employed	0.00%	4.20%	0.00%	0.00%	0.80%
Total	Count	23	24	37	34	118
	% within Face to face support from local staff is available for e-learning programs	19.50%	20.30%	31.40%	28.80%	100.00%
	% within Division Employed	100.00%	100.00%	100.00%	100.00%	100.00%

5.5.2.2.1. Interpretation of scores: division employed

The strength of the relationship in the perceptions of regional e-learners in the category “agree” is small as indicated by the phi coefficient of 0.278 and Cramer's V coefficient of 0.160 in comparison to the significance level of 0.5. This also indicates that the samples are independent with no clear indication of the direction of the relationship. The null hypothesis cannot be rejected.

Table 5.24 Chi-square measures of association Face-to-face support* Division employed

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.108(a)	9	0.427
Likelihood Ratio	8.138	9	0.52
Linear-by-Linear Association	0.465	1	0.495
N of Valid Cases	118		
a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is .19.			
Symmetric Measures			
	Value	Approx. Sig.	
Nominal by Nominal	Phi	0.278	0.427
	Cramer's V	0.16	0.427
N of Valid Cases	118		
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

5.5.2.3 E-learning is time consuming: employment category

The second dimension that forms part of the second order factor relates to the e-learning delivery platforms. The cross-tabulation for this dimension is as follows:

Table 5.25 Cross-tabulation – E-learning is time consuming * Employment category

	E-learning is time consuming	Employment category		Total
		Managerial	Non Managerial	
Strongly Disagree	Count	14	15	29
	% within E-learning is time consuming	48.30%	51.70%	100.00%
	% within Employment category	19.40%	33.30%	24.80%
Neutral	Count	4	6	10
	% within E-learning is time consuming	40.00%	60.00%	100.00%
	% within Employment category	5.60%	13.30%	8.50%
Agree	Count	28	21	49
	% within E-learning is time consuming	57.10%	42.90%	100.00%
	% within Employment category	38.90%	46.70%	41.90%
Strongly Agree	Count	26	3	29
	% within E-learning is time consuming	89.70%	10.30%	100.00%
	% within Employment category	36.10%	6.70%	24.80%
Total	Count	72	45	117
	% within E-learning is time consuming	61.50%	38.50%	100.00%
	% within Employment category	100.00%	100.00%	100.00%

5.5.2.3.1. Interpretation of scores: employment category

By examining these frequencies above there appears to a significant difference in the category “strongly agree”. 89.7% of Managerial learners are more likely to perceive e-learning as time consuming, compared to 10.3% non-managerial learners. In this particular instance, the null hypothesis is rejected based on the calculated coefficient of 0.003 being significantly smaller than the significance level of 0.05.

The strength of the relationship can be determined from the phi coefficient and Cramer’s V coefficient of 0.348. The score in Table 5.26 indicates that there is a moderate relationship between time available for e-learning and the employment category. The direction of the relationship therefore appears to be medium to strong indicating some degree of dependency between the variables, providing for predictions on the basis of the employment category of e-learners in Afrox.

Table 5.26 Chi-square measures of association E-learning is time consuming* Employment category

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.201(a)	3	0.003
Likelihood Ratio	16.065	3	0.001
Linear-by-Linear Association	9.558	1	0.002
N of Valid Cases	117		
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.85.			
Symmetric Measures			
	Value	Approx. Sig.	
Nominal by Nominal	Phi	0.348	0.003
	Cramer's V	0.348	0.003
N of Valid Cases	117		
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

5.5.2.4 E-learning is time consuming: division employed

The cross-tabulation at the level of division employed indicates that there is little significant difference in the regional responses of e-learners in the category “agree” and “strongly agree”. These inconclusive scores are summarised below:

Table 5.27 Cross-tabulation – E-learning is time consuming * Division employed

E-learning is time consuming * Division Employee

		Division Employed				Total
		EF	NR	SR	CR	
Strongly Disagree \ Disagree	Count	8	3	9	9	29
	% within E-learning is time consuming	27.60%	10.30%	31.00%	31.00%	100.00%
	% within Division Employed	34.80%	12.50%	24.30%	27.30%	24.80%
Neutral	Count	1	4	0	5	10
	% within E-learning is time consuming	10.00%	40.00%	0.00%	50.00%	100.00%
	% within Division Employed	4.30%	16.70%	0.00%	15.20%	8.50%
Agree	Count	7	13	17	12	49
	% within E-learning is time consuming	14.30%	26.50%	34.70%	24.50%	100.00%
	% within Division Employed	30.40%	54.20%	45.90%	36.40%	41.90%
Strongly Agree	Count	7	4	11	7	29
	% within E-learning is time consuming	24.10%	13.80%	37.90%	24.10%	100.00%
	% within Division Employed	30.40%	16.70%	29.70%	21.20%	24.80%
Total	Count	23	24	37	33	117
	% within E-learning is time consuming	19.70%	20.50%	31.60%	28.20%	100.00%
	% within Division Employed	100.00%	100.00%	100.00%	100.00%	100.00%

5.5.2.4.1. Interpretation of scores: division employed

The calculated coefficient of 0.159 is larger than the significance level of 0.05, indicating that the null hypothesis cannot be rejected. The strength of the relationship between regional site and the degree to which e-learning is perceived as time consuming is small as indicated by the calculated Cramer V coefficient of 0.193. This suggests that no one variable causes the other, nor is there a clear indication of the direction of the relationship. The samples are independent with no association between the variables.

Table 5.28 Chi-square measures of association E-learning is time consuming* Division employed

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.086(a)	9	0.159
Likelihood Ratio	15.911	9	0.069
Linear-by-Linear Association	0.032	1	0.857
N of Valid Cases	117		
a 4 cells (25.0%) have expected count less than 5. The minimum expected count is 1.97.			
Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	0.334	0.159
	Cramer's V	0.193	0.159
N of Valid Cases		117	
a Not assuming the null hypothesis.			
b Using the asymptotic standard error assuming the null hypothesis.			

5.6 CONCLUSION

Chapter five provided an outline on the results of the empirical study. The factor analysis of items reflecting learners' "perceptions of e-learning in Afrox" shows that while there was a sufficient degree of construct validity for both the first order and second order factor, there was less than adequate internal reliability for the first order factor. There was however, a sufficient degree of internal reliability for the second order factor. As a result of the low internal reliability in the first order factor, only the second order factor was used to test perceptions of e-learners.

In testing the hypothesis we can conclude that at the employment category level, managerial and non-managerial learners do not differ in their perceptions of e-learning in the second order factor. With regard to the division of employment, regional differences exist only in the second order factor, where the difference is greatest between the Enabling Functions and the other three regions. There appears to be insignificant differences between the other three regions.

A cross-tabulation of variables in the second order factor also indicates that there are no differences in the perceptions of managerial and non-managerial learners as well as regional learners with regard to "face to face support from local staff is available for e-learning programmes". However there are significant differences in managerial and non-managerial learners perceptions that "e-learning is time consuming". 89.7% of managerial e-learners were more likely to perceive e-learning as time consuming, compared to 10.3% non-managerial e-learners.

Chapter six provides an outline of the findings, the recommendation and concluding remarks to this study.

CHAPTER SIX

SUMMARY, FINDINGS AND RECOMMENDATIONS

6.1 INTRODUCTION

The management problem that this research sought to answer was based on the low levels of utilisation of e-learning facilities in Afrox. Although e-learning is viewed as a useful medium of learning, there are differing opinions in Afrox of the current system of e-learning. The need for the licence to work program, the formulation of competency profiles for all employees, and the reliance on learning management systems has highlighted the strategic advantage of e-learning. The research sought to answer the question with regard to what should be done to increase the use of e-learning as a medium for skills development in Afrox?

The primary objective of this study therefore, was to evaluate learners' positive and negative perceptions of e-learning in Afrox and to identify those areas requiring corrective action. The first step involved identifying the key elements of effective e-learning practices, then and using these elements to test e-learners' perceptions of e-learning in Afrox. The details are documented in chapter three.

The second step involved an empirical study of the perceptions of e-learners. Chapters four dealt with the methodology employed in this exercise. It involved sampling managerial and non-managerial employees from the company's Industrial and Special Products Division, and who were based in each of the three regional offices as well as the enabling functions. A structured questionnaire was used to collect data by means of a traditional telephone interview. The raw data was coded and captured on a Microsoft Excel spreadsheet and forwarded to the Statistical Consultation Services (Statkon) Department of Rand Afrikaans University for computing.

Chapter Six provides a summary of the key findings and recommendations to be adopted in implementing e-learning in an outcomes-based learning environment.

6.2 FINDINGS

It has been argued that there are eight key aspects that influence the provision of an effective e-learning offering. The findings are presented from those in the literature study and those findings

from the empirical study. The key theme emerging from this study is that the use of e-learning has a major impact on the competitive position of an organisation. The following are the main findings from the study.

6.2.1 Findings from the literature study

6.2.1.1 Growth of e-learning in the corporate environment

There is a growing trend towards the use of e-learning to enable competitive advantage for organisations. When e-learning is ingrained into the work culture of an organisation there is an opportunity for expanding the value proposition of an organisation. This requires that learning be seen as part of the productive activities of individuals. The opportunities presented by global connectivity have the potential to enable companies to develop and implement training and education for learners who are geographically dispersed. Organisations that fail to capitalise of this opportunity will be disadvantaged.

6.2.1.2 Key elements of e-learning systems

There are eight key elements that influence the effectiveness of an e-learning offering. These key elements should be carefully considered during the design, development, delivery and maintenance phases of making available an e-learning offering in an organisation or learning institution. The elements and the corresponding components can be depicted as follows:

Table 6.1 Key elements in the design, development and delivery of e-learning.

Elements and Components	Design	Development	Delivery	Maintenance
Clearly defined program goals and objectives	X		X	
Course content		X	X	
Delivery platform			X	
Equipment and infrastructure	X	X	X	X
The availability of technical support			X	
The availability of face to face support			X	
Instructional methodology		X	X	
Application of the learning			X	X

- i. The element referring to programme goals and objectives reflects the pedagogical decisions about the fundamentals of an on-line course. The findings that should be considered in the design of e-learning programmes include the following:
- the reasons for investing in e-learning should be closely aligned to an organisations business goals;
 - e-learning prospers where there is a strong learning culture in an organisation. It is more useful to build a learning culture by enlisting collaboration from across the organisation as opposed to only from within the training department;
 - the design of the on-line course should include a component involving counselling the student about the choice of on-line learning; and
 - with regard to equipment and infrastructure, the use of technical solution providers who are SCORM compliant and who offer full-service solutions should be considered.
- ii. The element of sound course content should be complemented by the principle of effective e-learning course development. These include the multimedia principle, the contiguity principle, the coherence principle, the modality principle, the redundancy principle, and the personalisation principle. Technology that is being designed to think, feel and act like humans should be pursued responsibly.
- iii. The component of effective delivery of e-learning programmes needs to take into consideration the organisational issues defining the administration of e-learning courses, and includes the following:
- The delivery platforms should support the course content; facilitate easy learning; allow for convenient access; and be user friendly. As a guideline, users of e-learning should be able to control the experience, with individuals selecting or being directed to content specific to their needs and experience.
 - The equipment and infrastructure must be of a standard to support applications such as video streaming. At the same time, basic training in computer and technology usage should be provided before computer-based training and e-learning is made available to learners.
 - The availability of technical support and dedicated instructors to ensure learners stay enrolled on the course is equally important.
 - The instructional methodologies should be complemented by the delivery platforms. It is acknowledged that classroom-based learning will continue to play an important role in the delivery of training and education as it maybe more appropriate for certain types of

high level learning. While blended learning addresses the need for just-in-time and project-based learning, it offers opportunities to achieve maximum skills transfer. Blended learning combines on-line learning for information transfer and procedural skills training, classroom learning for role plays and face to face discussions, on-the-job learning for practical application and competency evaluation. With regard to e-learning, there is a growing acknowledgement that the tolerance for long classes has diminished. However, e-learning is not about using the latest technology to replace classroom learning. Instead, e-learning provides a new set of tools that can add value to all of the traditional learning modes. E-learners use or embrace learning technologies based on the perceived relative advantage to themselves, their departments or the organisation.

- The application of the learning during the delivery phase can be measured in terms ease and practicality of applying the e-learning back on the job. The evidence of this dimension could be found in the fact that the learning process is based on e-learners behaviour in terms of willingness to learn independently, and an attitude of empowerment to work with minimal close supervision.

iv. The maintenance of e-learning programmes concerns itself with the sustaining aspects of making available learning in the future. The following dependencies have a direct bearing in this respect:

- The extent to which programmes are constantly monitored and evaluated for effectiveness. This implies that the training of competent professionals across the economic and social spectrum needs to take advantage of up-to-date digital technologies and learning practices.
- The measurement and evaluation of the effectiveness and the retention of e-learning should therefore be measured on the basis of the perceived transfer of e-learned material into the practical situation.
- The perception of the degree to which the learning enhances productivity. E-learning should enable employees to remain focused and engaged, by making available facilities to upgrade their knowledge and skills continually. A key element of success in the global economy is the ability to access up-to-date skills and competencies just-in-time. At the same time, the costs associated with off-site learning such as travel; lodging; and lost work-time are reduced.

6.2.2 Findings from the empirical study

6.2.2.1 Biographical data

65% of the respondents reported that they were in the age group 31 to 50 indicating a mature workforce. There were 37,5% of respondents who had 10 or more completed years of service at Afrox and 20% with 5 years but less than 10 years. 25% of respondent had 2 years but less than 5 years of service with the company. This further emphasises the fact that most employees would be regarded as competent in their jobs by virtue of experience.

6.2.2.2 Use of available e-learning facilities

In response to the questions “which of the following e-learning systems at Afrox have you accessed in the past 12 months?” there were 49.2% of respondents who had accessed one or more e-learning programmes in the last 12 months. A total of 50.8% of respondents indicated that they had not accessed any e-learning system at Afrox in the last 12 months. This confirms the low level of utilisation of e-learning facilities in Afrox, and a reluctance to utilise e-learning system. Of those who had accessed e-learning almost 50% indicated that it was learn technical skills.

6.2.2.3 Perceptions of e-learning

- I. In testing the hypothesis we can conclude that at the level of employment category, that managerial and non-managerial learners do not differ in their perceptions of e-learning in the second order factor. In this particular instance all the questions were grouped to reflect a measure of the **perception of e-learning**. The higher the score, the higher there is a degree of a positive perception, and the lower the score the greater the degree there is a negative perception. The overall scores depicted in Table 5.15 reflects a mean average of 3.6 on a five point scale for all the elements combined. This indicates a positive perception of e-learning in Afrox.
- II. In testing the hypothesis with regard to the division of employment, regional differences exist only in the second order factor, where the difference is greatest between the Enabling Functions and the other three regions. There appears to be insignificant differences between the other three regions. This maybe due to the fact that the regional learners tend to operate from remote areas with little no access to immediate support and or readily available resources. The enabling function learners also tend to be support type employees

with less of a need for technical skills compared to the operational type roles predominantly in the regions.

- III. A cross-tabulation of variables in the second order factor also indicates that there are no differences in the perceptions of managerial and non-managerial learners regard to the question specifically on “face to face support from local staff is available for e-learning programmes”. The scores of managerial and non-managerial staff were similar recording insignificant differences. Both these samples were likely to agree that sufficient was available for e-learning programmes. This may also be due to the fact that Afrox subscribes to a line manager model and requires line managers to take ownership for coaching staff.
- IV. A cross-tabulation of variables in the second order factor also indicates that there are no significant differences in the perceptions of regional learners with regard to “face to face support from local staff is available for e-learning programmes”. However, there is a greater degree of similarity in the scores of the Southern and Central regional e-learners, and in the Northern Region and Enabling Functions. There is a lesser degree of similarity of in the regional scores than with those of the enabling functions. Again, the perceptions of e-learners may vary due to greater degree of available support near or at at the Head Office type functions.
- V. However there are significant differences in managerial and non-managerial learners perceptions that “e-learning is time consuming”. 89.7% of managerial e-learners were more likely to perceive e-learning as time consuming, compared to 10.3% non-managerial e-learners. A reason for this significant difference maybe due to the additional responsibilities required in meeting targets. A further reason may also be that existing equipment and infrastructure appear to be slow.
- VI. With regard to the dimension of “E-learning is time consuming” the cross-tabulation at the level of division employed indicates that there is little significant difference in the regional responses of e-learners in the category “agree” and “strongly agree”. These similar scores may indicate that overall e-learning is perceived as time consuming by most e-learners in the organisation.

6.3 RECOMMENDATIONS

The aim of this study is to investigate learners' perceptions of e-learning in Afrox . The findings of this research would provide the basis for corrective action in an effort to increase the use of e-learning to address skill deficiencies. These findings are specific to Afrox but may also be applied in general to any institution.

6.3.1 Policy issues

The following factors within policy and practice affect learning within the context of technology:

- Equitable access to computers and technology at all levels of employment should be maintained. A digital divide is bound to occur and barriers created to learning using technology unless all employment levels are provided with a means of access to computers. The research indicates that of the 50.8% who had not accessed the e-learning facilities in the last 12 months, 4.6% had no access to a computer and a further 1.7 did not know how to operate a computer.
- A policy guideline should be developed and implemented to offer a consistent approach for setting aside time for learning. The research indicates that more than 21% of learners cite that there is no time for e-learning.
- A policy on certification of competence should be defined in terms of appropriate systems and processes for assessing competence and knowledge that are recognised for their credentials.
- Funding sources and models should be examined to ensure that adequate provision is made for the development of on-line learning. In terms of the Skills Development Levies Act, special grants and funding from the state should be pursued to develop infrastructure and course content. Tax and regulatory policies should also be reviewed to understand the extent to which online learning can be claimed in terms of incentives.

6.3.2 Technology

Partnering for the provision of training and development will become more critical as organisations seek to better equip employees. Most e-learning programs in Afrox are part of a global agreement and may not be supported locally. Contracting with a full service provider is important to ensure that the maintenance of the system architecture is maintained. As a

business imperative it is vital that the Afrox IT department and the HR Department work closely in the development and implementation of e-learning.

IT and HR serve the needs of business individuals with common interests and a need to share information. The challenge is to integrate resources, information, and reports, which may be in a number of places, and IT systems already in place, so that they appear seamless to the user. This can be done by building a portal, which takes a great deal of time and money to do properly; using source code developed by others; or obtaining the recommended portal software. However, the portal should avoid redundancy and result in greater efficiency. Politics in the corporate institutions also plays a large role.

6.4 FURTHER RESEARCH

It is recommended that further research be pursued to assess the risk profiles involved in implementing e-learning more aggressively in the organisation. A change management risk analysis study with key stakeholders may assist in addressing the gaps that exist in effectively implementing the key elements of e-learning. If adequately addressed e-learning has the capacity to provide Afrox with maximum return on investment. The benefits of such a strategy have implications for the business success of the organisation in gaining a competitive edge.

6.5 EVALUATION OF THE RESEARCH

Reliability and validity criteria were of great concern to the researcher. The use of tests to determine the reliability and validity levels was therefore carried out. The factor analysis of items reflecting learners' "perceptions of e-learning in Afrox" shows that while there was a sufficient degree of construct validity for both the first order and second order factor, there was less than adequate internal reliability for the first order factor. There was however, a sufficient degree of internal reliability for the second order factor. As a result of the low internal reliability in the first order factor, only the second order factor was used to test perceptions of e-learners.

A number of constraints were also experienced in carrying out the fieldwork and completing the dissertation, with the main difficulties due to work pressures and travelling abroad. Managing field workers remotely was overcome through the use of e-mails and telephone contacts on a regular basis. Through effective planning and disciplined action over weekends the workload was completed and targets achieved.

6.6 CONCLUSION

This research project finds that an e-learning offering that complies with the eight key elements outlined in this study has the capacity to transform Afrox, as well as the corporate environment in general. The opportunity exists for those businesses operating in the South African economy and the global arena to use e-learning to create a competitive advantage. The just-in-time nature of e-learning has the capacity to:

- develop employees to anticipate and adapt more quickly to environmental effects,
- expedite the transfer of knowledge from one part of the organisation to another,
- reach employees at all levels of the organisations,
- shorten the time required to implement strategic changes, and
- stimulate continuous improvement in all areas of the organisation.

Afrox needs to use the disciplines of change management and project management to address gaps identified against the eight key elements in order to increase the use of e-learning in the organisation.



QUESTIONNAIRE

Francis Graham
Training and Development Unit
P O Box 1570
Bedfordview,
2008

10 May 2004

Masters research – An investigation into e-learners positive and negative perceptions of e-learning in Afrox

I am currently conducting research into the above topic as part of the course requirements for the MCom. degree for which I am registered at the Rand Afrikaans University (RAU). The results of the research will be used to guide planning in Afrox to determine the optimal conditions for e-learning in an outcomes-based learning environment.

To this end we kindly request your input by completing the following short questionnaire regarding your perceptions about e-learning. It should take no longer than 10 minutes of your time. Your name and contact details should not be entered on the questionnaire. It remains anonymous.



Summary results of this research will be made available on request toward the end of October 2004.

Should you have any queries or comments regarding this survey, you are welcome to contact me. My contact details are:

E-mail : francis.graham@Afrox.boc.com

Fax : (011) 456 3827

Phone: (011) 456-3827

Internal post at TDU Industrial, P.O. Box 1570, Bedfordview, 2008.

Your response is of the utmost importance.

Regards

Francis Graham

E-Learning Survey

Please answer the following questions by crossing (X) the relevant block or writing down your answer in the space provided.

EXAMPLE of how to complete this questionnaire:

E.g., Your gender? If you are female:

Male	1
Female	2

Section A – Background information

This section of the questionnaire refers to background or biographical information. Although we are aware of the sensitivity of the questions in this section, the information will allow us to compare groups of respondents. Once again, we assure you that your response will remain anonymous. Your co-operation is appreciated.

1. Gender

Male	1
Female	2

2. Age

1	2	3	4
30 and younger	31 years but less than 40 years	41 years but less than 50 years	Older than 50

3. Completed years of service at Afrox

Less than 2 years	1
2 years but less than 5 years	2
5 years but less than 10 years	3
10 or more years	4

4. Employment category

* Managerial	1
** Non Managerial	2

* Managerial refers to an employee with the title manager or who has direct reportees.

** Non-managerial refers to an employee without the title manager or who does not have direct reportees

5. In which Division are you employed?

1 = Enabling Functions (EF) ; 2 = Northern Region (NR),
3 = Southern Region (SR) , 4 = Central Region (CR)

HR (EF)	1	2	3	4
Finance (EF)	1	2	3	4
Information Management (EF)	1	2	3	4
Sales (EF)	1	2	3	4
Marketing (EF)	1	2	3	4
Operations and Technology (EF)	1	2	3	4
Customer Service Centre (EF)	1	2	3	4
Welding Operations (NR)	1	2	3	4
Special Products & Hospitality (EF)	1	2	3	4
Central Region (CR)	1	2	3	4
Northern Region (NR)	1	2	3	4
Southern Region (SR)	1	2	3	4
Other – Specify	1	2	3	4

SECTION B

6. Which of the following e-learning systems AT Afrox have you accessed in the past 12 months?

e-learning system	Yes	No
Traccess and or IMSS	1	2
SA eLearning Portal	1	2
Ashridge on-line CD Rom	1	2
Other e-learning systems – please specify	1	2

If you answered **YES** to any one of the above, please do not answer question 7. If you have answered **NO** to all of the above questions, answer only question 7 of this questionnaire.

7. If you have not accessed any e-learning systems AT Afrox, please indicate why?

Mark all applicable options

No access to a computer	1
Do not know how to operate a computer	2
There is no time allocated for learning	3
I prefer other learning methods, e.g. classroom based, etc.	4
Other – specify	5

Thank you for your participation.

SECTION C

8. Which of the following Afrox e-learning programmes have you used in the past 12 months?

e-learning programmes	YES	NO
Safety training	1	2
Technical skills training	1	2
Product knowledge training	1	2
Computer skills training	1	2
Customer service training	1	2
Soft skills training	1	2
Other (specify)	1	2

SECTION D

9. Listed below are key aspects of e-learning programmes. Please indicate how strongly you agree or disagree with each of the statements using the following 5-point scale where


1 = Strongly disagree

2 = Disagree

3 = Neutral or undecided

4 = Agree

5 = Strongly agree



In my experience,	Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
E-learning programmes have clearly defined goals and objectives.	1	2	3	4	5	
E-learning programmes have clearly defined performance standards for success.	1	2	3	4	5	
The simplicity of e-learning programmes facilitates easy learning and convenient access	1	2	3	4	5	
The equipment used to deliver e-learning is technologically advanced	1	2	3	4	5	
On-line technical support for e-learning programme is readily available	1	2	3	4	5	
Face to face support from local staff is available for e-learning programme	1	2	3	4	5	
The practicality of the E-learning makes it easy to apply back on the job	1	2	3	4	5	
There is sufficient depth of information in e-learning courses	1	2	3	4	5	

SECTION E

10. To what extent do you strongly agree or disagree with each of the following statements about e-learning in Afrox. Please indicate your answer using the following 5-point scale where:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neutral undecided
- 4 = Agree
- 5 = Strongly Agree

If a statement does not apply to you, please mark NA

In my experience,	disagree	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N/A
E-learning is efficient	1	2	3	4	5	6	
E-learning is time consuming	1	2	3	4	5	6	
E-learning empowers employees	1	2	3	4	5	6	
I do not have the technical skills to benefit from e-learning	1	2	3	4	5	6	
The e-learning programmes offered at Afrox are relevant to my job requirement	1	2	3	4	5	6	
The e-learning programmes at Afrox are of high quality	1	2	3	4	5	6	
E-learning enhances productivity	1	2	3	4	5	6	
E-learning is less effective than other learning methods	1	2	3	4	5	6	

Thank you for your co-operation in completing this questionnaire.

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