USING E-LEARNING TO ENHANCE EDUCATION IN CORRECTIONAL INSTITUTIONS IN SOUTH AFRICA

by

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INFORMATION SYSTEMS

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DECLARATION

Student number: 34394672

I, **Karl Gustav Greyvensteyn**, declare that:

USING E-LEARNING TO ENHANCE EDUCATION IN CORRECTIONAL INSTITUTIONS IN SOUTH AFRICA

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

SIGNATURE

(Mr)

8 August 2014

DATE

DEDICATION

I dedicate this work to God, my Lord and Saviour, and to my parents who I know will be proud of me.

ACKNOWLEDGEMENTS

First of all I would like to thank God for giving me life and a purpose to serve Him. Without His guidance nothing in my life will be right. If it was not for Him, I would have given up a long time ago already.

I must thank two people that are very dear to me as well. They are Christo and Rolien Pretorius, who without I would never have come as far in my studies as I have. They have helped and encouraged me beyond what any other people have. They are truly saints in my eyes.

I must thank my supervisor Ms Elsa Naude. She has shown a willingness to help me in my difficult situation and without her guidance I would never have completed my dissertation. I must also thank Filistea Naude the head librarian at Unisa. She helped me quite a bit with my research and thanks is in order.

ABSTRACT

The new millennium saw the explosion of Information Communication Technologies (ICTs), coupled with the Internet as the way to communicate and gain knowledge. Traditional schooling has moved to open and distance e-learning and many educational institutions are offering these as alternatives. In correctional institutions the education centres have fallen behind in this regard.

This dissertation is based on a participatory study that will show how open and distance e-learning can benefit inmates. The researcher has a unique perspective as he is himself, an inmate in a correctional centre in South Africa, and has first-hand knowledge and experience of the correctional institution environment.

In-depth interviews with inmates and correctional officers were performed resulting in different views on the subject. A survey was conducted to ascertain inmates' educational levels and their requirements. This study also determines what role the digital divide plays in the education of inmates or the lack thereof.

The research indicates that education can reduce recidivism. With e-learning more inmates could receive education and become better prepared for life outside of the correctional institutions. This could result in them becoming productive members of society.

The feedback obtained via interviews shows that the majority of inmates are eager to better themselves. The major problem is financing, and the struggle with communication with the distance learning institution. With e-leaning these two problems could easily be resolved. There are a good deal of educational resources available for free called Open Educational Resources (OER), and communication with the distance institutions can be exchanged via e-mail and/or video-conferencing.

A major hurdle that would have to be overcome is to get the government of South Africa behind the drive to implement e-learning. The correctional institutions are the ideal environment to test whether South Africans will be receptive to e-learning. The research in other countries is overwhelmingly positive, and with a successful pilot project e-learning could be shown to be effective in bridging the digital divide.

KEYWORDS

ICTs; e-learning; online learning; collaborative learning; open and distance e-learning; education in correctional institutions; e-learning in correctional institutions; digital divide

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LIST OF DEFINITIONS

Digital divide: The difference between developed and developing countries pertaining to access and use of digital knowledge using ICT (Mitchell, Smith, Louw, Tshesane, Petersen-Waughtal & Du Preez, 2007: 696). For the sake of this dissertation, this term refers more specifically to the difference between inmates and the rest of the population as far as access to and knowledge and use of ICT is concerned.

Distance learning: The student and the teachers are not in the same place (Kamanja, 2007: 720). Learning is done at learner's own time and pace. Communication can be done by post or with technology like e-mail.

E-learning: The use of electronic media to deliver education to people asynchronously or synchronously, also known as online learning, computer based learning, Web-based learning, computer mediated learning (Mitchell et al., 2007: 696).

E-readiness: It is the ability that learners or teachers have to utilize multimedia technologies together with e-learning resources to make their quality of learning better (Kaur & Abas, 2006: 2).

Information communication technology (ICT): Using electronic equipment (like computers) to store and send information (Surleau, Minkley, Gaspard, Lebrun, Boyault & Gautier, 2008).

Open learning: Same as distance learning, but no prior qualifications are needed to study and educational reciprocations and feedback must be provided (Beyers, 2010: 76).

Podcast: An audio file that is placed on a server and anybody that is registered to the feed will automatically receive it (Baird & De Beer, 2009: 2).

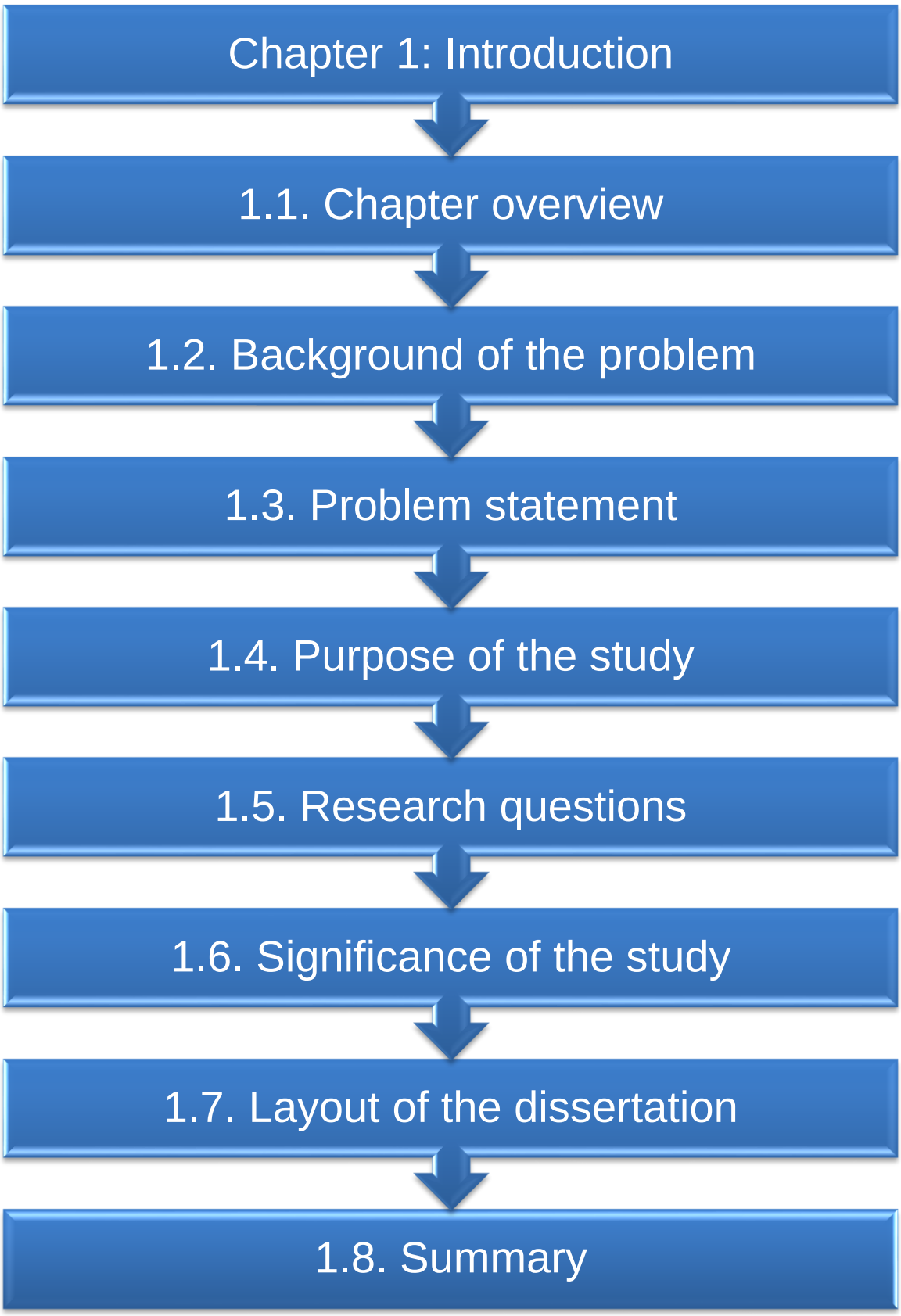
Recidivism: The habitual relapse into crime.

LIST OF ACRONYMS AND ABBREVIATIONS

ABET	Adult Basic Education and Training
AHLS	Adaptive Hypermedia Learning Systems
AI	Artificial Intelligence
CAI	Computer Aided Instruction
CAL	Computer Assisted Learning
CAT	Computer Applications Technology
CD	Compact Disc
CLS	Collaborative Learning Systems
CMC	Computer-Mediated Communication
CMS	Course Management System
CUT	Central University of Technology, Free State
DCS	Department of Correctional Services
DE	Distance education
DOC-WIL	Department of Communication's Web Internet Laboratories
DSL	Digital Subscriber Line
DVD	Digital Versatile Disc
E-LEARNING	Electronic learning
EPSS	Electronic Performance Support Systems
GB	Gigabyte
GCIS	Government Communication and Information Systems
GPRS	General Packet Radio Service
HE	Higher Education
HEI	Higher Education Institution
HR	Human Resources
HTTP	Hypertext Transfer Protocol
ICDL	International Computer Drivers' License
ICT	Information Communication Technology
IGNOU	Indira Gandhi National Open University
ISP	Internet Service Provider
IT	Information Technology
ITS	Intelligent Tutoring System
ITU	International Telecommunication Union

LAN	Local-Area-Network
LMS	Learning Management System
m-learning	Mobile Learning
MMS	Multimedia Messaging Services
MPCC	Multi-purpose Community Centres
NIC	Network Interface Card
ODeL	Open and Distance E-Learning
ODL	Open Distance Learning
OER	Open Education Resources
OLEDS	Organic Light-Emitting Devices
OS	Operating System
OU	Open University
OUM	Open University Malaysia
PAR	Participatory Action Research
PC	Personal Computers
PDA	Personal Digital Assistant
PSTN	Public Switched Telephone Network
SA	South Africa
SMS	Short Message System
TCO	Total Cost of Ownership
UK	United Kingdom
UNISA	University of South Africa
UPS	Uninterruptible Power Supply
US	United States of America
USB	Universal Serial Bus
VET	Vocational Education and Training
WB-ITS	Web-based Intelligent Tutoring System
WBL	Web-Based Learning
W/H DEVICES	Wireless and Handheld devices
WI-FI	Wireless Fidelity
WWW	World Wide Web

1. INTRODUCTION



1.1. CHAPTER OVERVIEW

This chapter introduces the background to the problem in section 1.2. In section 1.3 the problem statement is given and section 1.4 gives the purpose of the study. In section 1.5 all the research questions is posed and in section 1.6 the significance of the study is explained. In section 1.7 the layout of this dissertation is shown. The chapter ends with a summary to recap the whole chapter.

This chapter links to chapter 2 by giving the reader first the reason for the research and the wider environment surrounding education in correctional institutions. This is needed to understand where e-learning will fit into the picture.

1.2. BACKGROUND OF THE PROBLEM

The growth of Information Communication Technologies (ICTs) and the Internet have changed the way of education. E-learning is being used to transform the way education is brought to the masses (Sun, Tsai, Finger, Chen & Yeh, 2006: 1183). A study done by Matodzi, Herselman and Hay (2007: 69), shows how e-learning can benefit and help develop rural communities. It demonstrates how the digital divide may be bridged.

The digital divide plays a significant factor when it comes to South Africa. Currently in the world, according to the International Telecommunication Union (ITU)[1], there are approximately 1.7 billion households ("The World in 2011 - ICT Facts and Figures"[2], 2011). Of these, 0.7 billion have computers and 0.6 billion have Internet access at home ("The World in 2011 - ICT Facts and Figures"[2], 2011). According to the ITU at the end of 2011, out of every 100 individuals in the world, 33 use the Internet ("Global numbers of individuals using the Internet, total and per 100 inhabitants, 2001-2011"[2], 2012). In 2001 the figure was 8 out of every 100 individuals in the world. In Africa 12.4 individuals out of every 100 use the Internet ("Individuals using the Internet per 100 inhabitants, 2011"[2], 2012). This highlights the fact that Africa is still developing. According to the Internet World Statistics[3] on 31 December 2011, the number of

[1] http://www.itu
[2] Source: ITU World Telecommunication /ICT Indicators database
[3] http://www.internetworldstats.com/stats.html

Internet users in the world was approximately 2,267,233,742. That is about 32.7% of the world population (See figure 1.1).

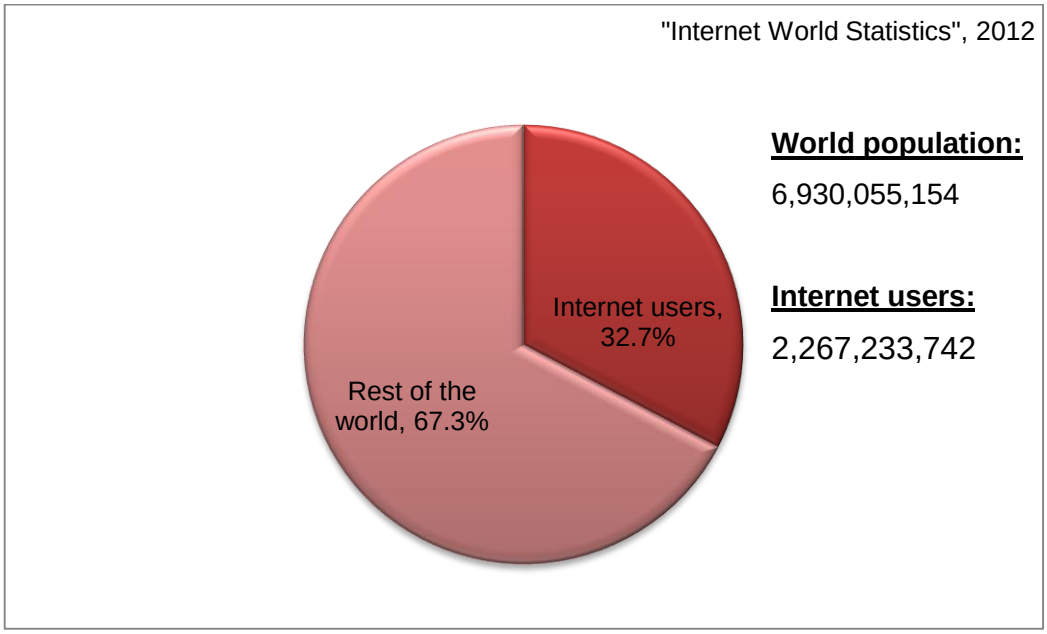


Figure 1.1: 32.7% World Internet penetration rate.

Of these Internet users 44.8% reside in Asia, 22.1% in Europe, 12% in Northern America, and 6.2% in Africa (See figure 1.2).

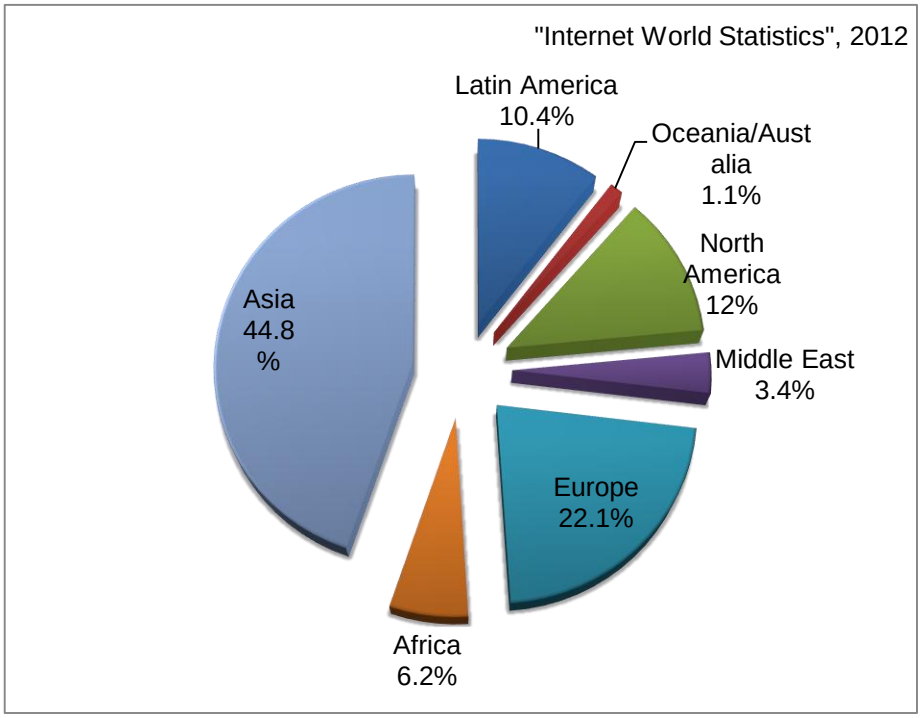


Figure 1.2: Internet users in the world.

When looking at Africa as a continent we can see that only 13.5% of the inhabitants have access to the Internet ("Internet World Statistics", 2012). The world average is 32.7%, showing that Africa is far below the average ("Internet World Statistics", 2012). If we look at say Northern America their Internet penetration rate is 78.6% ("Internet World Statistics", 2012). This highlights the immensity of the digital divide.

Looking at the top 10 countries for Internet penetration rate in Africa, South Africa only has 13.9% penetration rate (5th in Africa). South Africa also contributes only 4.9% to Africa's penetration rate (See figure 1.3).

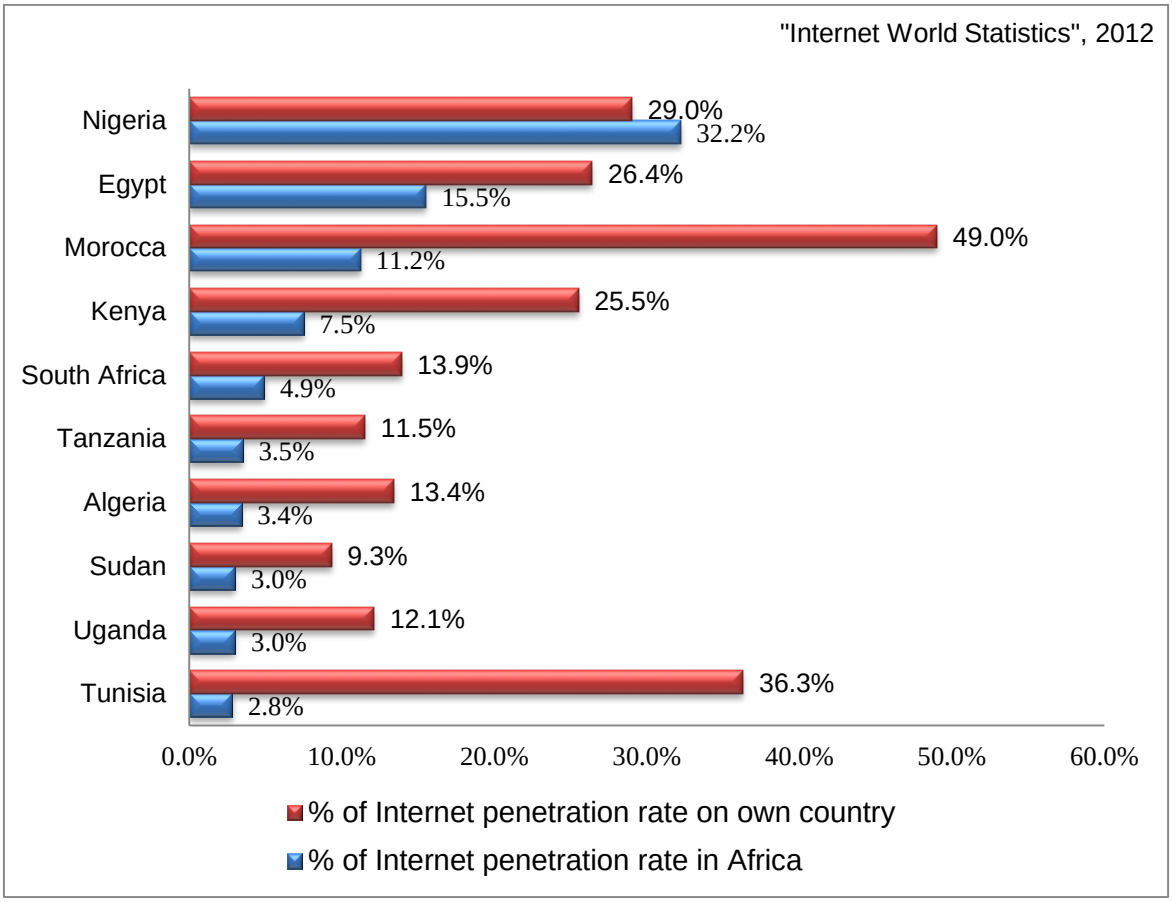


Figure 1.3: Top 10 Internet usage countries in Africa.

This is only slightly higher than the African continents' penetration rate (13.9% vs. 13.5%), but much lower than the world average. The number of Internet users in South Africa according to the Internet World Statistics, on 31 December 2000, was 2,400,000. On 31 December 2011, the number was 6,800,000 ("Internet World Statistics", 2012). The penetration rate in 2000 for South Africa was 5.5% ("Internet

World Statistics", 2012), and now it is 13.9%. This is a growth rate of Internet users of 283%.

Many projects in South Africa are trying to bridge the digital divide. Some examples of projects mentioned by Conradie, Morris and Jacobs (2003: 200) are:

- The SchoolNet SA project that supplies schools with Internet access. It is supported by the Department of Education (Riordon, 2001; Schoolnet SA, 2010).
- The Intel Teach Elements program that provides teachers with computer training (SchoolNet SA, 2011).
- The Government Communication and Information Systems' (GCIS) Multi-purpose Community Centres (MPCCs) (Government Communication and Information System, 2002).
- The Universal Service Agency's setting up of Telecenters (Oestmann & Dymond, 2001; Universal Service Agency, 1997).
- The "Public Information Terminal" project by the Department of Communications (Mahlangu, 2001).
- The Department of Communication's Web Internet Laboratories (DoC-WIL) (Department Of Communications, 1999).

These are but a few examples. This indicates that South Africa is slowly but surely trying to bridge the digital divide as the rate of Internet user's growth indicates.

Numerous studies into open and distance e-learning have been done on the impact thereof and its possible benefits on developing communities and countries (Mashile & Pretorius, 2003; Matodzi, Herselman & Hay, 2007; Beyers, 2010; Conradie, Morris & Jacobs, 2003; Kamanja, 2007).

One major area of development has been neglected – correctional institutions. Not enough is being done in correctional institutions. There is no adequate means of engaging prisoners not to commit crimes again. Very little is done to reconcile families that have been broken up because of crime. Very little is also done for victims, the wider communities, and voluntary and business sectors when it comes to rehabilitation (Social Exclusion Unit (SEU), 2002).

Education and development are crucial to the rehabilitation of the inmates at these institutions (Bazos & Hausman, 2004). According to a study done by Bazos and Hausman (2004: 2), inmates that have received education in correctional institutions are between 10% and 20% less likely to re-offend than the average released inmate. If one million dollars is spent on education, 600 crimes are prevented, and if it is spent on imprisonment, only 350 crimes are prevented (Bazos & Hausman, 2004: 2). This shows that education in correctional institutions is almost double as cost-effective as imprisonment to prevent crime.

A study done by Becta (2008: 4) identified four trends that will have an impact on education and the training system: “

- *Online spending and access to services are accelerating the consumer purchasing, private sector business procurement and delivery, and public sector procurement, access to and consumption of resources.*
- *The school sector is in the midst of a migration from heavy dependence on traditional procurement channels to online procurement channels.*
- *Decision-makers in education and training increasingly favour free ICT resources over one-off purchases or subscription models.*
- *Peer-to-peer approaches are emerging as the preferred means of disseminating innovative ideas and practices relating to ICT*.”

These trends show the way the wind is blowing when it comes to education. Everything points to the Internet and the use of ICTs to get information, education and training.

Many careers today need basic computer skills (Becta, 2008: 3). Most inmates lack these skills and this prevents them from getting a proper job when they are released. This may create a cycle of repeat offenders, as they cannot find a suitable job and fall back into crime.

This study investigates the possibility of using e-learning to provide better educational opportunities to inmates.

1.3. PROBLEM STATEMENT

Most correctional institutions in South Africa do not allow inmates' access to the Internet for educational purposes. Cell phones are also prohibited for security reasons, and this makes communication with educational institutions very difficult for inmates.

Adult Basic Education and Training (ABET) and secondary education is done by teachers and tutors in a classroom using text books. The number of students that can be accommodated is limited due to small classrooms and a limited numbers of teachers. Correctional institutions only provide inmates education up to grade 12.

Higher education (HE) is usually done through an Open and Distance Learning Institution (for example Unisa and Intec). Because of the limitations on Internet access and telephonic communication, inmates have to rely on traditional snail mail for receiving study material and for submission of assignments. Higher education must be done by inmates at their own cost with very little assistance.

Research has been done on the use of ICTs to develop rural communities where the digital divide is a significant factor (Conradie, Morris & Jacobs, 2003: 203). This knowledge may lay the foundation for the use of e-learning to develop inmates. E-learning can benefit not only inmates but also educators in the rehabilitation process.

Although inmates are locked away from society for unacceptable behaviour, they should still be afforded the opportunity to gain knowledge to better themselves and change their behaviours. Better education should result in better prepared inmates when they are released (Craig, Cagliano, Kirk, Lawrence, Nelson, Parker, Spurlock, and Werner as cited in Owens, 2001: 11), and should then have a positive influence on society in general as they do not become repeat offenders.

Research is needed in correctional institutions to determine how e-learning can be implemented in a safe and risk free manner. A new strategy and method targeted at aligning the use of e-learning to the correctional institutions' unique environment, context and needs should be developed.

1.4. PURPOSE OF THE STUDY

The main objective with this research is to develop a feasible model for the implementation of e-learning, and ICT-usage by inmates without compromising the correctional institution's security or the public's safety.

The main objective can be broken down into the following sub-objectives:

1. Uncover how the digital divide can be bridged in correctional institutions to develop inmates as it pertains to inmates, as mentioned defined in the specific definition on page xii.

2. Determine how e-learning can be used to develop inmates and prepare them for the world outside the correctional institution walls.

3. Determine possible advantages and challenges of implementing e-learning in correctional institutions.

4. Develop a feasible model for the implementation of e-learning and ICT-usage by inmates without compromising the prison's security or the public's safety. The development of this model will partly answer the main research question below, namely how e-learning can be used in correctional institutions in South Africa.

1.5. RESEARCH QUESTIONS

The main research question for this dissertation is:

How can e-learning be used in South African correctional institutions to provide educational opportunities for inmates?

This main question has subsections, and therefore the sub questions that will be addressed are:

1. Which challenges and obstacles prevent the use of ICTs to develop inmates and bridge the digital divide?

2. What types of e-learning can be used to provide learning opportunities for inmates?

3. How can inmates and the correctional institution teachers benefit from e-learning?

4. Do inmates want to use e-learning to better themselves and change their behaviour?

5. Will inmates have the necessary skills to use e-learning facilities, and if not, can the correctional institution authorities provide the necessary facilitation to develop these skills?

6. How will correctional institutions be able to provide e-learning without compromising the security of the correctional institutions or the safety of the public?

   This question will be answered by the development of a model on how e-learning can be used in correctional institutions in South Africa, as discussed in 1.4 above.

1.6. SIGNIFICANCE OF THE STUDY

People now use laptops, mobile phones, PDA's (Personal Digital Assistant) and a wide range of other devices to gain access to information and for learning purposes almost daily. Because correctional institutions do not have access to these devices and technologies, inmates fall behind in the quest for knowledge to better themselves.

This study aspires to show that the use of ICTs and e-learning to develop inmates will not only benefit the inmates, but also society. Studies have been done in under-developed communities to bridge the digital divide, but not in correctional institutions. This study shows the benefits that may result from the use of ICT's and e-learning at correctional institutions. A model for the possible implementation and use thereof was developed. It may also result in a more positive attitude of correctional institution authorities in South Africa towards e-learning and the provision of education to inmates in general.

The study provides a platform for further research on the topic. The results of the study will be distributed to the broader academic community via a conference presentation or alternatively as an academic paper in a relevant journal.

1.7. LAYOUT OF THIS DISSERTATION

Figure 1.4 summarizes the layout of the paper.

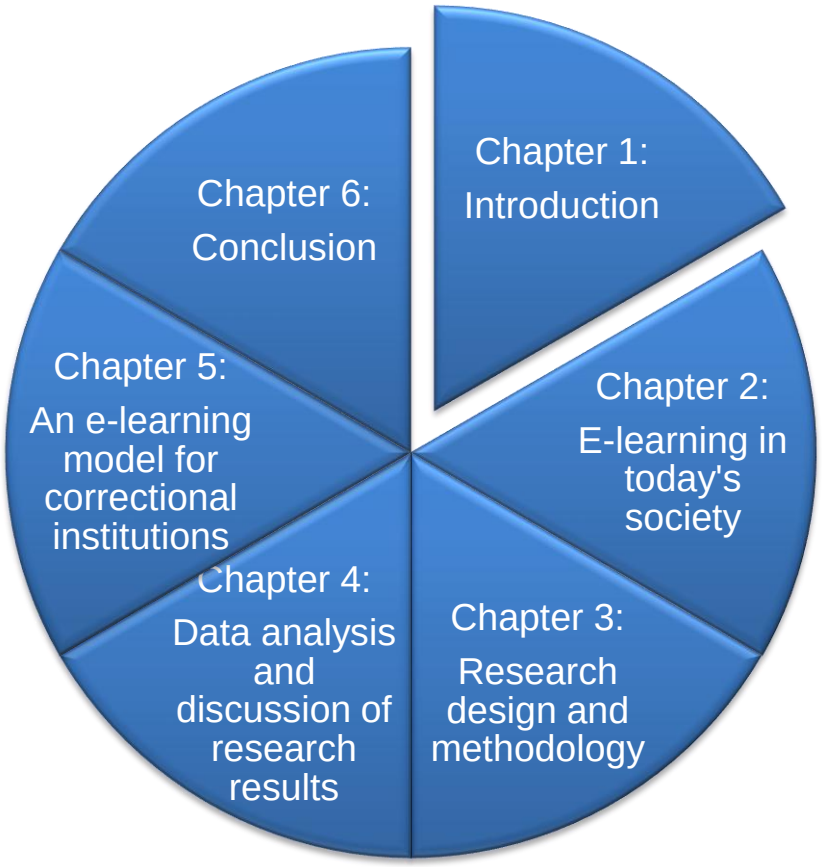


Figure 1.4: Chapter layout

Chapter 1: Introduction

This chapter introduces the reader to the purpose of the research namely to use e-learning in correctional institutions in South Africa to enhance the inmates education. E-learning is used to develop rural and underdeveloped communities and may therefore also be used in correctional institutions.

Chapter 2: E-learning in today's society

The chapter is a literature study that explains why and how e-learning is used in underdeveloped communities to uplift the people. It also covers the different types of e-learning that exist and the existing types of ICTs that is used.

Chapter 3: Research design and methodology

In this chapter the author discusses some research designs. The specific design and methodology used by the researcher is also discussed and motivated. The researcher uses participatory research to conduct a study into the situation of inmates. The researcher uses the mixed methods approach by using interviews, questionnaires in a survey, and personal observation to get qualitative and quantitative results.

Chapter 4: Data analysis and discussion of research results

In this chapter the researcher analyses and draws conclusions from the data obtained from the interviews and questionnaires. These results are then used to endorse the reason why the researcher wants to implement e-learning in correctional institutions.

Chapter 5: An e-learning model for correctional institutions

In this chapter the researcher proposes a model for all correctional institutions in South Africa. This model indicates how e-learning may be used in correctional institutions to develop inmates in a secure and safe manner without endangering the security of the correctional institutions.

Chapter 6: Research summary and conclusion

The last chapter provides a summary of the findings from all the chapters and conclusions drawn. The results are compared to the literature and to the situation in the real world.

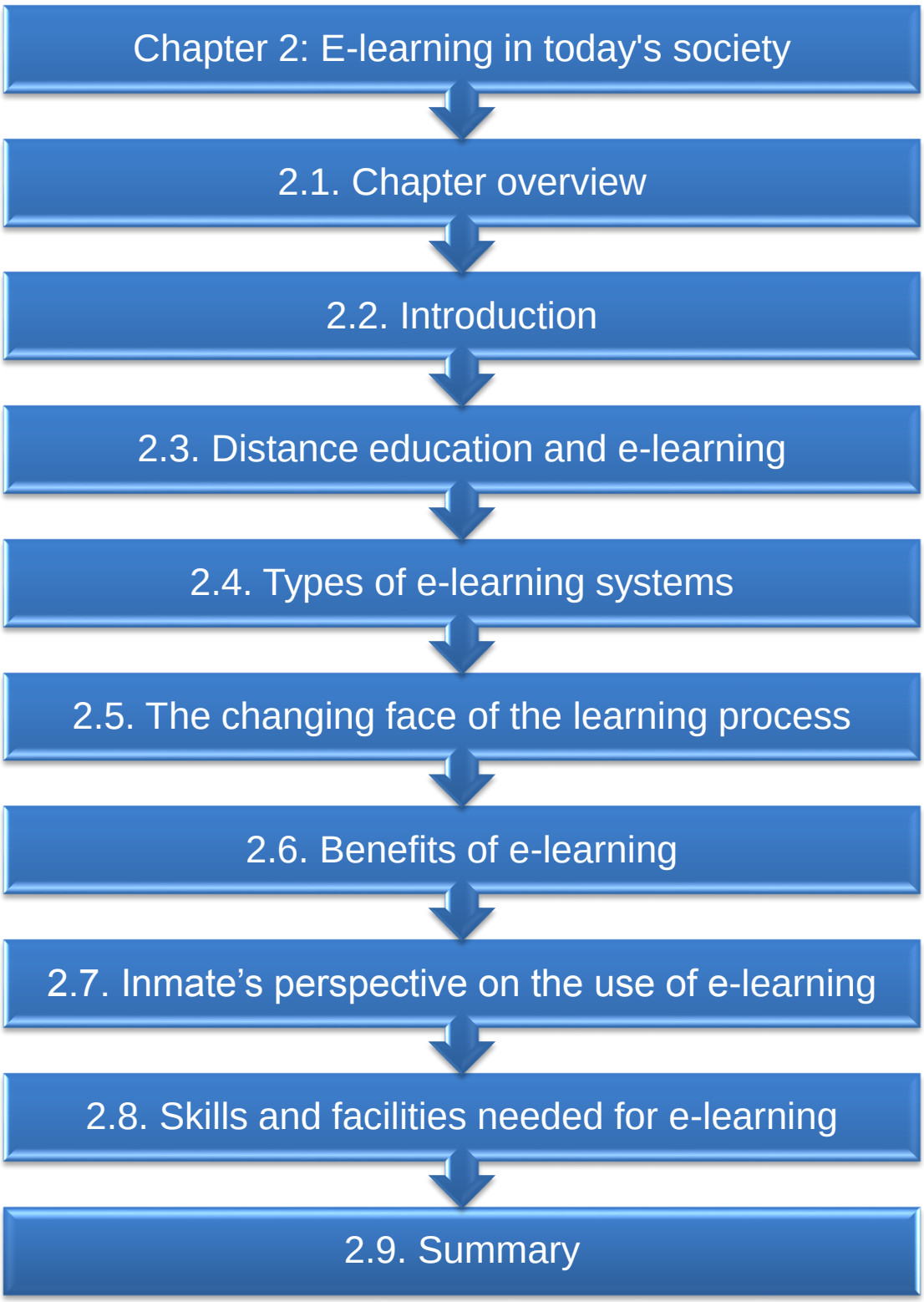
1.8. SUMMARY

Chapter 1 explained the background to ICTs and the way the world is today. With the advent of the Internet and the WWW all areas of business, society, and education are affected. In universities, colleges, DE institutions and schools ICTs combined with Internet access are used to educate learners and expose them to the wider world out there. When it comes to inmates in correctional institutions they are cut off from all of these. Therefore learning opportunities are also limited. Limited secondary education up to matric is provided at some institutions but for higher education only distance

education is available. The motivation and morale of this dissertation is to introduce e-learning in correctional institutions to provide education to more inmates.

Chapter 2 provides a detailed discussion of e-learning. It explains in detail what it is and how it can be used to uplift underprivileged communities. In this instance the underprivileged communities are inmates at correctional institutions.

2. E-LEARNING IN TODAY'S SOCIETY



2.1. CHAPTER OVERVIEW

Chapter one explained the background to the problem of the educational needs of inmates and more specifically the possible need for e-learning. The purpose of the research and how it was conducted was explained. This chapter introduces the state-of-the-art of e-learning today and introduces the reader to its wider spectrum.

This chapter begins by introducing the background of traditional educational and how it has changed. Then the differences and similarities between distance education and e-learning is discussed in section 2.3. The different types of e-learning are explained in section 2.4. The discussion continues in 2.5 by looking at the changing face of learning. Examples of traditional distance education institutions that successfully migrated to an online environment are given. The benefits of e-learning are discussed in section 2.6. A perspective on the possible use of e-learning in correctional institutions is given in section 2.7. Lastly the skills and facilities needed for e-learning are discussed in section 2.8. This includes a discussion as to whether the correctional institution might be able to provide them in a secure and safe manner. The information given in the chapter is summarized in section 2.9.

A literature study to determine and get acquainted with the body of knowledge of a research area is necessary before embarking on a research project. It provides a theoretical framework for the study and gives context to the research. This paves the way for the design of the research project and for choosing the research methodology. This is done in chapter 3.

2.2. INTRODUCTION

Traditionally, schooling happened in a class room with a number of students and a teacher. It is usually done by each student receiving a text book and the teacher using a black-board to teach and illustrate. The students took notes and received homework that had to be done in exercise books. Some technological devices like a projector using transparencies and instructional videos were used to illustrate some aspects. This has always been face-to-face for students starting from grade 1 in elementary school up until grade 12 in secondary school.

As technology has become more advanced, projectors have become state of the art and teachers no longer use transparencies but computers that are hooked up to digital projectors and electronic white boards. Electronic white boards are wall-sized displays that allow electronic scribbling, editing and wiping with a pen-based tool, mimicking traditional whiteboards (Moran, van Melle & Chiu, 1998: 1). Most secondary schools and some primary schools now also have courses on end user computing.

In South Africa there are currently two computer related subjects available from grades 10 to 12, namely Computer Applications Technology (CAT) and Information Technology (IT) (Jacobs & Sewry, 2009: 86). CAT teaches students how to solve problems pertaining to the processing, displaying and conveying of information using ICTs in an end-user environment (Department-of-Education, 2008: 7). IT teaches students all about the complicated structures of software and hardware of ICTs. It also teaches them how to solve problems using digital technology. This is done with programming. It begins with planning, followed by carrying out the plan and finally using the completed system to solve the problem (Department-of-Education, 2008b).

According to Swan, van't Hooft, Kratcoski and Unger (2005: 99) children at a young age are much more technologically literate than they were ten years ago at the same age. Children have a great deal more access to devices and services like:

1. Computers (ranging from laptops, notebooks, netbooks and desktop computers that have huge processing capacity)
2. Video games (for example: Playstation, Xbox, Nintendo WII).
3. Cell phones (ranging from ordinary ones to smart phones with Internet access, games and music capabilities).
4. The Internet (with services like instant messaging and search engines).
5. Mobile gaming devices (Sony's Playstation Portable – PSP, Nintendo DS)
6. Mobile devices (PDA, e-book readers, pocket PC, tablet, mp3 and mp4 players, IPod)

As mentioned by Swan et al. (2005: 99), children use these technologies integrally in their everyday lives, all the while learning to use them by themselves outside of school (U.S. Department of Education, 2004).

Sharples (2000: 185) explains that when it comes to learning, the smaller the device is and the less it interferes with what you are currently doing, the more likely it will become a tool used for lifelong learning whenever, wherever and by whomever.

The teachers on the other hand are struggling to integrate all the new technologies into their curriculums (Swan et al., 2005: 99). Mashile and Pretorius (2003: 2) state that in a study done by Muirhead (2000: 317) teachers that use computer technologies for teaching often do not have lots of confidence, because they received no formal training in them.

Once formal tertiary education is started there are possibilities such as full-time studying at a college or university or part-time studying through after-hour classes, distance education and/or e-learning. At this level the choice of interaction is up to the student. At university and college there is mostly still face-to-face interaction between learners and teachers but a lot of technology is also used. A great deal of instruction is done on computers. Computer laboratories are available to registered students to gain access to all the resources that the universities and colleges offer. Now students can even access classes and notes online when they missed one. Podcasting and even vodcasting is becoming common in the e-learning environment.

Podcasting is when an audio file is placed on a server and anybody that is registered to the feed will automatically receive it (Baird & De Beer, 2009: 2). Podcasting is being used to deliver lectures to students before a classroom session so that the students can come prepared to the classroom. These podcasts can range from tests to notes and discussions (Baird & De Beer, 2009: 4). With vodcasting a video file is available for downloading.

2.3. DISTANCE EDUCATION AND E-LEARNING

'Distance Education' (DE) is when a learner and the teacher are at two separate locations – at a distance (Kamanja, 2007: 720). The student normally studies at his/her own time and own pace. Students-to-teacher ratios are quite high. There is no direct regular contact between teachers and students. Most of the communication is done by traditional mail, but today this is increasingly done through e-mail and the online distribution of study material and online submission of assignments.

A more comprehensive definition of DE is provided by Keegan (1996: 50):

- The semi-permanent separation of the student and the teacher for the whole duration of the learning process, thereby differentiating it from the traditional face-to-face teaching.
- To differentiate DE from private study and teach-yourself a curriculum, an institution of higher learning produces learning materials and provides support to students when in need.
- Printed-based material together with multimedia audio and video is used coupled with a computer and the Internet to connect students and lecturers and to transfer the subject matter of the courses being studied.
- Communication can happen in both directions, between students and lecturers, and students can even start the communication at their own behest. This marks DE apart from other practices using technology for educational purposes.
- Semi-permanently there are no groups involved when it comes to teaching. Students are taught as individuals in the place of teaching in a group. There are exceptions of meetings like workshops or instructive face-to-face or even electronic meetings with the intention to socialize as well.

E-learning, on the other hand is when technology is:

- either used in a classroom as a tool for instruction
- or replacing the teacher by moving away from face-to-face instruction to instruction online (Guri-Rosenblit, 2005: 469). This happens asynchronously or synchronously on any electronic media (Mitchell et al., 2007: 697).

Here are some statistics from Keegan (2002: 31) that was compiled in the year 2000 about e-learning:

- In the year 2000 there were approximately 1 million courses available on the Internet. Out of these, 3,000 abided by the definition of online according to scientific measures.
- WebCT kernel was being utilized in 123,000 courses that were developed by 33,000 university and college faculties, and being used by 5,100,000 students, studying at 1,100 institutions that resided in 48 different countries.

- CISCO provided technical training for more than half of its employees utilizing e-learning in 2003.
- Riverdeep, an Irish e-learning company, was launched in March 2000 on the New York Nasdaq exchange for $1,000,000,000.
- When it comes to Vocational Education and Training (VET), e-learning has become a big concern in business.
- The Open University (OU) in the UK has 180,000 students and a network of 7,000 part-time tutors all using e-learning (Sclater, 2008: 2).

A survey done by the US Department of Education in 2002 identified that people most likely to use DE courses are already employed and they study part-time. They are people with families and responsibilities (US Department of Education, 2002).

E-learning, on the other hand is for all types and ages of people ranging from kids in kindergarten to professional people doing their doctorates (Guri-Rosenblit, 2005: 473). In does not necessarily have to happen at a distance and can be used in classrooms at the school or campus.

In the DE institution a team of highly trained experts come together and develop courses that have to pass stringent measures for self-study purposes (Guri-Rosenblit, 2005: 473). These courses are quite expensive to develop but once they are done they can be used by literally unlimited amount of students. These experts do not need to be involved further, because all the work after this will be done by lower staff in the institution and thereby lowering the costs (Guri-Rosenblit, 2005: 474). In the DE institution the more students register for a course the lower the cost per student for the institution. Some DE institutions even publish these study materials that can be used by other universities and colleges in their curriculums, bringing in even more revenue (Guri-Rosenblit, 2005: 474).

E-learning usually costs more than teaching in a classroom face-to-face (Guri-Rosenblit 2005: 474). One of the reasons for this is that communication between the students and the lecturers will increase. Potentially thousands of students can use an e-learning system and the amount of asynchronous and synchronous traffic that would be generated will require attention from professors, lecturers and assistants. This means more employees need to be employed and trained in the use of the e-learning

system and how to provide feedback to students (de Beer, 2009: 61). These professionals need to be knowledgeable in the specified field of study and this means higher salaries.

Another cost for an e-learning system is the development of the system itself. This software and/or hardware combination will need a team of top professionals to complete. Testing has to be done when the product is finished and as time goes on glitches will be discovered that would have to be fixed. This can be either new versions of the e-learning system or updates that patch over the problems. The system for communication between students and the institution staff would also have to be maintained. The huge amount of traffic that would go through this system would have to be monitored and the administrator would have to ensure that the system could handle the traffic. This all adds more expense to the creation of an e-learning system.

These reasons have prevented DE institutions from using ICTs more in their curriculum. The huge benefit of DE - lower cost, is still a big concern and withholds the institutions from moving in the direction of using e-learning for DE (Guri-Rosenblit, 2005: 474).

E-learning might be a solution for inmates who cannot move or communicate freely with the outside world. According to Wu et al. (2006) the e-learning market has a worldwide growth rate of 35.6%. This indicates that it is being used more and more.

2.4. TYPES OF E-LEARNING SYSTEMS

Computers are used in education in many forms. According to Alotaiby (2005: 1) it has been used for Computer-Assisted Instruction (CAI), Intelligent Tutoring Systems (ITS), Web-based Intelligent Tutoring System (WB-ITS), Adaptive Hypermedia Learning Systems(AHLSs), Course Management System (CMS) , Collaborative Learning systems (CLS), and most recently in e-learning. In the past these systems were created for a specific institution to either help the teachers with marking or students with tutoring or employees with training (Alotaiby, 2005: 1). These systems are discussed next.

2.4.1. Computer-Aided Instruction (CAI):

CAI also called Computer Assisted Learning (CAL), according to Alotaiby (2005: 18) were the first education systems that used computers. According to the Encyclopaedia Britannica ("Computer-assisted instruction (CAI)", 2010) CAI is the use of computers to either layout data for a student to study or a tutorial program. These tutorial programs ask questions and elicit responses from students with immediate feedback as to the correctness. As more and more answers are correct the level of questions also rises in the level of difficulty.

2.4.2. Intelligent Tutoring Systems (ITS):

ITSs are a step up from CAI. ITSs can adjust to an individual student's needs, look for mistakes made by the student, and figure the place the mistake was made by the student and in which manner it was accomplished (Alotaiby, 2005: 19). ITSs try to mimic humans and act as a tutor using Artificial Intelligence (AI) to provide services like coaching, Sims, and teachers in a laboratory (Alotaiby, 2005: 19). Sims is simulations that imitate the real world using a computer program. ITSs are developed around a specific subject matter through the use of exercises to quiz people to test their know-how on the subject and then to provide specific data to remedy where the student lacks certain knowledge in the specific subject area (Alotaiby, 2005: 19). The ITSs consists of four modules as seen in figure 2.1.

These four modules shows the difference between CAI and ITS. According to Alotaiby (2005: 22) the student module is the key difference between them, because the system keeps each student's information pertaining to all that the student knows and his/her skill level according to the specific domain as well as the student's general characteristics. This lets the system treat each student as an individual and it can tailor specifically to each student when interacting with the system.

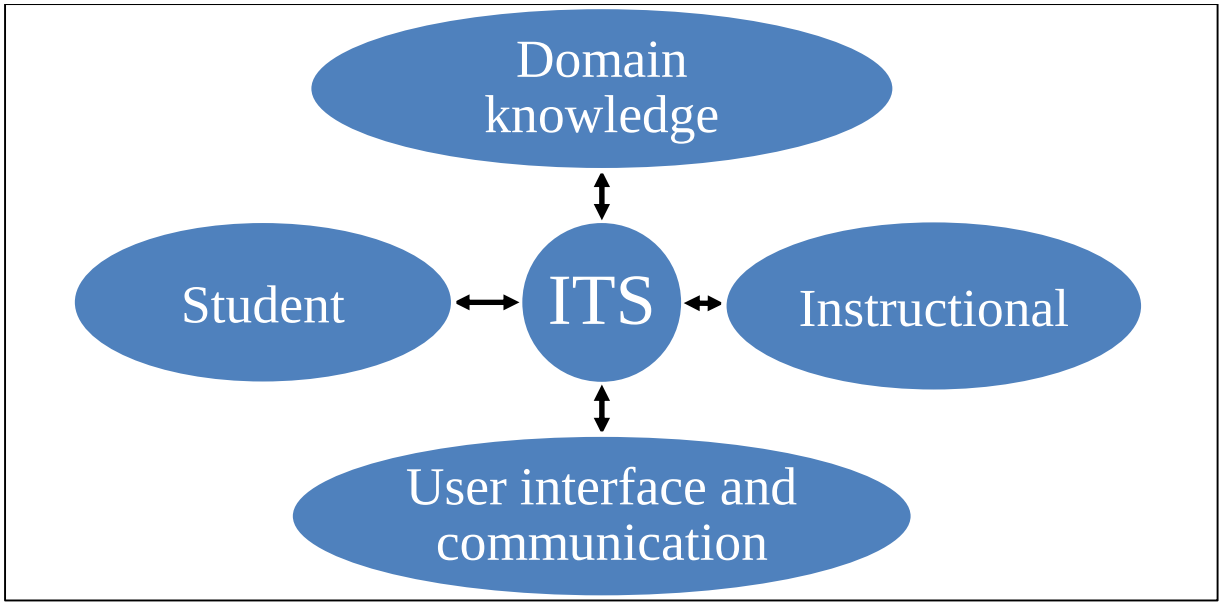


Figure 2.1: Intelligent Tutoring System parts (Alotaiby, 2005: 22)

2.4.3. Web-based Intelligent Tutoring System (WB-ITS):

WB-ITS also known as Web-Based Learning (WBL) is e-tutoring through the Internet using the WWW. It is ITSs through the web and can reach anybody anywhere as long as they have a computer and Internet.

2.4.4. Adaptive Hypermedia Learning System (AHLS):

Adaptive Hypermedia Systems (AHS) combine hypermedia with AI. Hypermedia is basically multimedia systems where items of information that are associated together and affiliated to each other are presented together. This is not done sequentially but through the use of hyperlinks that allows a person to navigate with electronic links to certain places without going sequentially through everything ("World Wide Web (WWW)", 2010).

Alotaiby (2005: 30) states that an AHLS: "*combines the Intelligent Tutoring Systems (ITSs) with the hypermedia by using the student model technique and some other knowledge to guide the student dynamically and intelligently*." The problems with AHLSs are that the interface is not too stable and this can discourage some students, and changes to the presentation require a very high degree of knowledge of the specific domain.

2.4.5. Course Management System (CMS):

Course Management Systems (CMSs) are a propagation from the Human Resources (HR) databases that keeps track of user's actions and behaviour (Alotaiby, 2005: 31). Alotaiby (2005: 31) maintains that CMSs: "*exist for creating, delivering and managing contents, and managing student learning*." These systems do not just offer one service. They offer a number of services in one package and are capable of much more than just the delivery of one domain of studies (Alotaiby, 2005: 32). The problem with CMSs is that they can't share their information with other systems as each package is different in their structure style from another due to copyright (Alotaiby, 2005: 32).

2.4.6. Collaborative Learning System (CLS):

Collaborative Learning Systems (CLS) are systems that are put into place to supply computer-supported environments to make it easier for collaborative learning to take place (Lim & Zhong, 2006: 57). Nearly all of the groupware applications sustain a discussion database and this in turn functions as a systems development platform which CLS can be constructed on (Lim & Zhong, 2006: 57). CLS use cognitive principles that are built into the designing process to sustain distributed discussion between the students (Lim & Zhong, 2006: 57). CLS facilitate excellent learning for students by using teamwork and interactive communication to be accomplished in addition to the traditional cognitive learning (Lim & Zhong, 2006: 57).

CLSs main objective is for students to work together and collaborate on problems and projects sharing information and thereby supporting and encouraging each other (Alotaiby, 2005: 33). Alotaiby (2005: 33) states that: "*Furthermore, it enhances instructional effectiveness, promotes teamwork skills among students, and helps them to accomplish something that they could not achieve individually*." For organizations the use of this type of e-learning means that there is a remarkable progress in the development of students and their productivity (Alotaiby, 2005: 34).

Feather (1999: 31) proposes that students prefer using CLS above the traditional face-to-face classroom in the following instances: when students prefer to remain anonymous, when students struggle to speak out in front of others, and when students take more time than normal to answer questions posed to them.

CLS can bring great benefits to users. Bargh and McKenna (2004: 586) tells how computer-mediated communication (CMC) will afford students anonymity to express themselves more easily and this in turn will help students to link easily with other students. Any group member can make a comment and nobody will know from whom it comes (Valacich, Jessup, Dennis & Nunamaker, 1992: 220). In the educational environment this can benefit those students that have social interaction problems. This means that there can be open and frank discussions, without the threat of embarrassing oneself. Research proved that the relative anonymity feature of CMC will boost the self-expression of a person and the fact that there are no physical and nonverbal interaction cues like for instance a person being attractive or not, will make it easier for a person to connect with others with the same beliefs, in this instance it would be students connecting with other students easier (Bargh & McKenna, 2004: 586). Li (2002: 505) explains how CMC tools used for CLS are very capable to deal successfully with the deficiency of peer interaction that is supposed to happen in a classroom.

Dennis and Valacich (1999: 5) describes the media synchronicity theory that shows to what degree people in a group setting work together at the same time on a specific activity. All the people in the group have the same focus towards the end result and Dennis and Valacich (1999: 5) suggests that immediacy of feedback, symbol variety, parallelism, reprocessability, and rehearsability are the five media features that determines communication. CLS has a high ranking when it comes to parallelism, reprocessability, and rehearsability due to the multiple-access features, text-recording and anonymity offered (Lim, 2006: 57). Immediacy of feedback and symbol variety has lower rankings when these rankings are compared to face-to-face meetings (Lim, 2006: 57).

Herring (1999) explains how in the group-based CMC environment all of the conversations are recorded and stored. This can allow students to go back and reread comments made in discussions about study related matters. This will enhance the learning experience and offer an extra tool to students that might battle when not studying in their native language (Herring, 1999).

Wellman, Salaff, Dimitrova, Garton, Gulia and Haythornthwaite (1996: 218) explains that the benefits of CMC are: the number of participants tends to be more, there is

more social equality under the participants, the number of ideas offered is more, and the leadership tends to be less centralized. This can all lead to better quality ideas but it also increases the complexity of the decision process (Wellman et al., 1996: 218). Wellman et al. (1996: 218) tells that CMC can be used to exert a social distance when controversial issues are discussed and documented or when a subject matter is discussed that could affect some with fear, disapproval, ineptitude, or intimidation.

2.5. THE CHANGING FACE OF THE LEARNING PROCESS

Now that all of these systems have been discussed the learning process can be discussed. With the advances of the Internet the learning process has dramatically changed. The Internet with the World Wide Web has changed the way for the development of the learning process. No longer are these systems created for single institutions. The web is now used for the delivering of the learning process (Alotaiby, 2005: 1). Systems are designed with the global market as their target market and most teaching institutions are making use of the web for this purpose.

Most institutions (especially on tertiary level) no longer just use teachers in a class room to teach students. The web is used to deliver course material in the instance of DE. Universities and colleges all use some form of e-learning in the development process. This means that computers are now an integral part of the learning process. Students and teachers need to both the skills and knowledge to use e-learning. The term being used today is e-readiness. According to Kaur and Abas (2006: 2) e-readiness is the ability that learners or teachers have to utilize multimedia technologies together with e-learning resources to make their quality of learning better. This means computers are now added to the traditional face-to-face method of teaching and learning (blended learning).

2.5.1. Blended learning or adaptive learning:

Bliuc, Goodyear and Ellis (2007: 232) describes blended learning as the learning process between students and teachers using the combination of face-to-face interaction and the use of ICTs to interact, communicate and to use it as a learning resource.

Harris, Connolly and Feeney (2009: 4) gives the reasons why organizations are considering blended learning: “

1. *The uptake and effectiveness of current learning delivery systems may be limited by their rigidity.*
2. *The broad geographic spread and commitments of learners may necessitate greater access and flexibility.*
3. *Blended learning may offer a more flexible and responsive way to learn and work.*”

According to Diana Oblinger (as cited in de Beer, 2009: 62-63) blended learning (in this case Open Distance Learning (ODL) and e-learning) will be fuelled by the following technological trends:

- *“New applications of Web technology will keep appearing.*” New applications can be developed and modified very easily nowadays. Also, the cost of entry is very low. Due to these points, new products and services come along every day (de Beer, 2009: 62).
- *“The Net gets bigger and faster.”* With Next-generation Internet, people can look forward to low-costing and high bandwidth Internet. Improvement in reliability, coupled with better delivery of service and security will also be on the table. One benefit already is the integration of voice, video and data. The value of networks is increased due to the huge amount of storage available on very powerful servers (de Beer, 2009: 62).
- *“Reliability will improve.”* In all the different types of businesses and education the importance of the Internet will grow. Because of this, planning and a course of action will be taken to ensure that the Internet is protected against malicious attacks and the catastrophic failure due to technical failure (de Beer, 2009: 62).
- *“Wireless gains ground.”* Wireless access and services of voice, video and data will be expanded with new satellite systems. Due to the drop in price of wireless, remote areas where other telecommunication services are inaccessible economically, wireless could potentially become very important (de Beer, 2009: 62).
- *“Sizes get smaller.”* Hand-held PCs, tablets, palmtops, and PDAs are gaining popularity. This growth coupled with the improved communications capabilities

and wireless digital services offered, will contribute to the use of these smaller form-factor devices in education (de Beer, 2009: 62).

- *"Storage increases."* The demand for storage is growing due to the huge amount of multimedia and other types of applications available. Luckily, the price of storage is decreasing. The prediction of the price per megabyte dropping by 50% every 15 to 18 months is still keeping up. Coupled with the density increasing and size of storage for PCs getting smaller, the future is looking brighter (de Beer, 2009: 62).
- *"Displays become flexible."* Computer displays are now becoming lighter and they have better resolution. There are even some new technologies like organic light-emitting devices (OLEDS) that are very bright. They function at low voltages very efficiently and can be produced at a very low-cost. These new types of displays will be very flexible, light in weight and thin in size. This will make them ideal for traveling with (de Beer, 2009: 63).
- *"Mainframes are still cost effective."* Mainframes will be part of the applications that are and will be used for open and distance education in the foreseeable time to come. Their benefits include robustness, superior scalability, security and the managing of data-intensive applications, like for instance data warehousing and decision support systems. A lower total cost of ownership (TCO) is also offered by mainframes for many enterprise-wide applications when compared to other platforms (de Beer, 2009: 63).

To ensure the organizations clients and employees stay up to date on the learning curve, this new method of delivery over the web is a must. With a system that must be able to expand and adjust in different conditions and reach anybody in the world, this is truly for the future (Harris et al., 2009: 5).

2.5.2. Open and Distance E-Learning (ODeL):

According to de Beer (2011: 43) ODeL: "*modes blend multiple learning curriculum delivery into the most effective delivery mode for a specific part of a curriculum, utilizing a variety of strategies such as problem based learning, dual contact lectures, e-learning, videoconferencing, experimental education, et cetera."* It uses Open Education Resources (OER). UNESCO in 2002 made allowance for OER as digitalized materials that are available openly and freely to anybody who wants to use

it, either educators or learners using it for self-study. These materials have very relaxed or in some cases no intellectual property rights at all and the OER encourages open access to the design process (de Beer, 2011: 45).

Some examples where ODeL have been successfully implemented, or where institutions successfully migrated from purely DE, or purely face-to-face to ODeL will be discussed next.

2.5.2.1. Open University (OU):

An example of a DE institution that started to implement e-learning is the Open University (OU) in the United Kingdom (UK). The OU took 3 years and $10 million to produce an open source system that made their learning management system (LMS) the heart of the university (Sclater, 2008: 1). The OU moved from traditional paper based DE to offering a virtual learning environment over the Internet that students can access. Sclater (2008: 3) describes the LMS as: "*LMSs are different from other websites in that institutions can restrict access to students enrolled in a particular course, present materials automatically at staged intervals, and monitor who is accessing what.*" Learning takes place collaboratively, either asynchronously or synchronously, using integrating social software like blogs and wikis and tools like video/audio conferencing and instant messaging (Sclater, 2008: 3). The students can also use LMSs for computer simulations and online assessments that provide feedback automatically (Sclater, 2008: 3).

2.5.2.2. Indira Gandhi National Open University (IGNOU):

IGNOU offers mainly traditional DE, but also some ODeL. IGNOU in India offers over a 1000 courses in 125 programs that consist of certificates, diplomas and degrees (Panda & Mishra, 2007: 328). It is a single mode distance institution that is responsible for the national distance education assurance in India (Panda & Mishra, 2007: 328). It has international jurisdiction for being a national resource centre for ODL to develop high quality learning material that are being used in conventional campus-based universities by students and faculty (Panda & Mishra, 2007: 328). For instructional delivery using ICTs IGNOU is a leader (Panda & Mishra, 2007: 328). The technologies IGNOU are using for instruction are: videotapes, print-based materials, radio lessons, audiotapes, two-way video conferencing, television lessons, interactive radio

counselling, CD-ROMs and they use web-content delivery but their main focus is on print-based materials (Panda & Mishra, 2007: 328). It has many online programs like for instance a Bachelor of Information Technology (BIT), an Advanced Diploma in Information Technology (ADIT), a social science certificate program on resettlement and rehabilitation, online research resources that teachers of universities and colleges can use, and a virtual research environment (Panda & Mishra, 2007: 328).

2.5.2.3. Unisa:

Unisa is a DE institution in South Africa that has started to implement e-learning. It is the only "broad in scope institution" in South Africa and it is devoted only to distance education (Kritzinger & Loock, 2013: 3). Kritzinger and Loock (2013:3) is of the opinion that Unisa has embraced ODL and is no longer just a correspondence institution. According to Prof N. Barney Pityana, a previous Principal and Vice Chancellor of Unisa, Unisa is the biggest provider of ODL in Africa and it is also the biggest crusader for ODL in Africa (Barney Pityana, 2009: 12).

The following statistics are from a report by Prof B Pityana (2009:12):

- Unisa provides DE to approximately one third of all publicly funded headcount enrolments in South Africa and these comprise of approximately 90% of South Africans, just over 9% from the African continent, and just less than 1% foreign nationals.
- The enrolled students speak a diverse number of languages that includes the 11 official South African languages and other international languages.
- The average age of enrolled students is now under 30 years of age.
- On the African continent, Unisa has the highest foreign enrolment figures, and over 82% of their learners are part-time students (Barney Pityana, 2009: 13). Most of the students stay in South Africa with some in the wider Africa and beyond. Therefore Unisa supplies all of its services worldwide (Barney Pityana, 2009: 13).

2.5.2.4. Central University of Technology (CUT):

The Central University of Technology (CUT) situated in the province Free State in South Africa is another university that started to move toward ODeL. Since 2005, CUT launched Web CT 6 and subsequently later upgraded it to Blackboard Campus Edition 8 (de Beer, 2011: 41). This server offered students at the Bloemfontein main campus, Welkom campus in the Gold Fields, and the Kimberly Regional Learning Centre in the Northern Cape some limited e-learning openings. CUT is a South African historically face-to-face Higher Education Institutions (HEI's) that also offer distance education with a lot of blended methods of instructions i.e. blended learning (de Beer, 2011: 41). CUT keeps up to date with the latest developments in ODeL and has also recently started to participate in OER.

2.5.2.5. Open University Malaysia (OUM):

OUM in Malaysia uses the blended pedagogy for their university-wide learning-system. It uses a combination of print-based materials together with face-to-face tutorials and online discussions to teach students (Kaur & Abas, 2006: 2). As far as e-learning is concerned, OUM uses an online chat room and a bulletin board to have asynchronous discussions between students and teachers (Kaur & Abas, 2006: 2). Structured training sessions are used to expose teachers and learners to online teaching-learning methodology (Kaur & Abas, 2006: 2). This university relies heavily on e-learning and they provide students and teachers access to online resources like handbooks, journals, dictionaries, encyclopaedias, and digital books (Kaur & Abas, 2006: 2).

2.5.3. Mobile learning (m-learning):

Mobile learning (m-learning) is the new stage of DE and e-learning. Georgiev, Georgieva and Smrikarov (2004) describes m-learning as: "*the ability to learn everywhere at every time without permanent physical connection to cable networks. This can be achieved by the use of mobile and portable devices such as PDA, cell phones, portable computers and Tablet PC. They must have the ability to connect to other computer devices, to present educational information and to realize bilateral information exchange between the students and the teacher*."

In 2013 there are approximately over 6.8 billion mobile-cellular subscriptions in the world (see figure 2.2). According to the ITU this corresponds to a 96.2% global penetration rate ("Key ICT indicators for developed and developing countries and the world (totals and penetration rates)"[4], 2013). These figures indicate what a huge potential the mobile-cellular market is for m-learning.

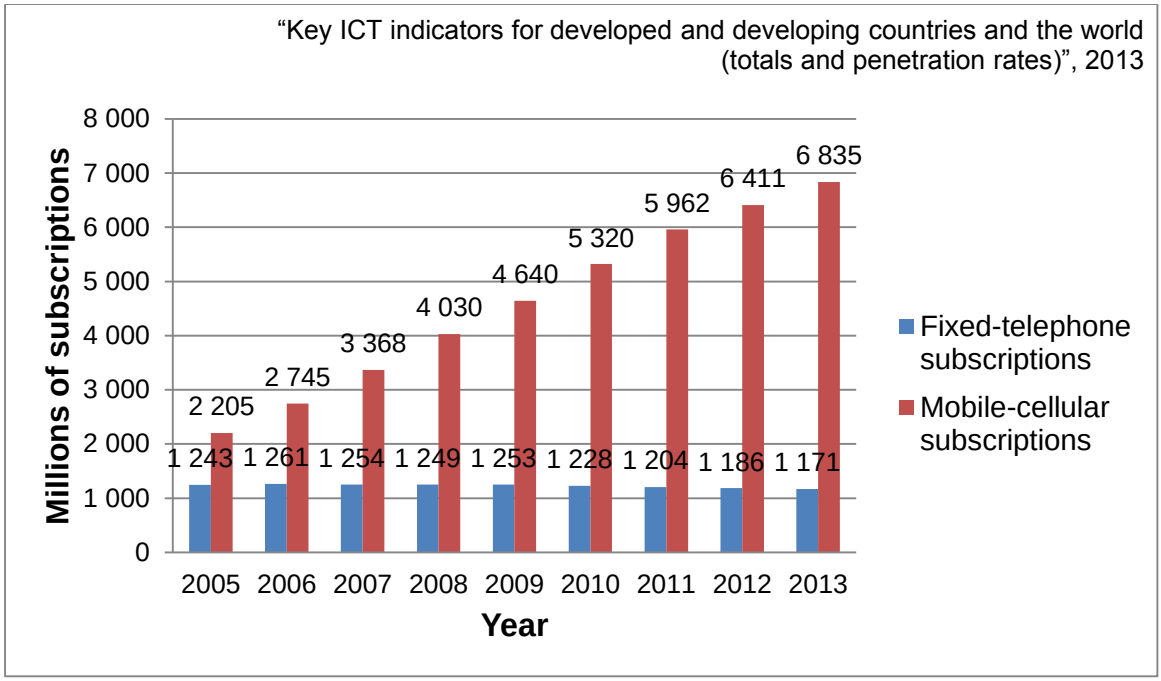


Figure 2.2: Fixed-telephone and mobile-cellular subscriptions in the world

Due to the growth of the mobile cellular market m-learning has a huge potential in the educational arena. Keegan (2002: 12-13) gives the following reasons: "

- *Over 50% of all employees spend up to half of their time outside the office.*
- *More than 75% of all Internet viewing will be carried out on wireless platforms by 2002.*
- *Mobile devices will outnumber landline PCs by 2002 and exceed the 1 billion mark the following year.*
- *More than 525 million web-enabled phones will be shipped by 2003.*
- *Worldwide mobile commerce market will reach $200 billion by 2004.*
- *There will be more than 1 billion wireless Internet subscribers worldwide by 2005."*

[4] Source: ITU Statistics http://www.itu.int/ict/statistics

Figure 2.2 (“Key ICT indicators for developed and developing countries and the world (totals and penetration rates)”, 2013) shows a comparison between the fixed-telephone subscriptions and the mobile cellular subscriptions in the world for the years 2005 up until 2013.

As can be seen from figure 2.2 the mobile-cellular subscriptions show a steady rise every year since 2005. In comparison the number of fixed-telephone subscriptions has actually declined since 2005. This motivates why mobile technologies are the future when it comes to communication and are the next technology breakthrough that needs to be utilized for education.

Mobile technologies will assist in the shift from the original face-to-face instructor centred classroom to the learner centred constructivist approach away from the educational setting in the classroom (Holzinger, Nischelwitzer, & Meisenberge, 2005: 2). The mobile-cellular phone will in this case be used as the communication medium between the student and the lecturer and to provide feedback which is an essential core element in any constructivist setting (Holzinger, et al. 2005: 2).

Gedik, Hanci-Karademirci, Kursun and Cagilty (2012) offers a similar, though somewhat more “conservative” view, by stating that m-learning can offer important learning potential for high school students as a support mechanism for traditional face-to-face learning.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Mobile cellular subscriptions	8 339 000	10 787 000	13 702 000	16 860 000	20 839 000	33 959 958	39 662 000	42 300 000	45 000 000	46 436 000	50 372 000	64 000 000
Mobile-cellular telephone subscriptions per 100 inhabitants	18.63	23.77	29.78	36.16	44.13	71.06	82.06	86.60	91.24	93.34	100.48	126.83

Table 2.1: Mobile-cellular subscriptions in South Africa (“Mobile-cellular 2000-2011”, 2012)

In table 2.1 it can be seen that in South Africa the mobile-cellular market is quite large. It is growing steadily every year and this can be exploited for education.

From 8,339,000 mobile-cellular subscriptions in the year 2000 to 64,000,000 subscriptions in the year 2011, it can be assumed that the technology has penetrated the entire country. With a population of approximately 49,004,031 according to the Internet World Statistics (2012), it shows that there are more mobile-cellular subscriptions than there are people in South Africa. This can be seen in table 2.1 as the number of mobile-cellular telephone subscriptions per 100 inhabitants at the end of 2011 were 126.83.

Therefore m-learning can be considered a possible solution for reaching a wider market. It is still in its infancy stage according to (Motiwalla, 2007: 582). M-learning is basically e-learning done on mobile devices.

E-learning gives students the option to choose when, where and how they would like to study and to get feedback from lecturers and review material (Evans, 2008: 492). M-learning enjoys these same privileges with the added bonus of being able to use handheld devices with wireless technologies (Evans, 2008: 492). This makes it much easier for students to study “on the move”, basically any free time a student has for instance at work on a lunch break, or riding in a bus or a train (Evans, 2008: 492). This makes it easier for students to transport their study materials with them and it facilitates learning where students make use of unforeseen free time to study because they have their handheld devices with them that have their study materials on them (Evans, 2008: 492). The ability to study whilst traveling or being transported somewhere sets m-learning apart from e-learning where a computer or laptop is needed which might be to awkward to carry around with a student the whole time just for when in case there is some free time to study (Evans, 2008: 492).

New technologies on mobile cellular phones offer exciting opportunities for m-learning. General Packet Radio Service (GPRS) is being used on mobile cellular phones to send multimedia messages (consisting of audio, video and pictures) called Multimedia Messaging Services (MMSs), in the place of the older type of Short Messaging Services (SMSs) that only allow text to be sent (Brown, 2003: 7). Brown (2003: 7) also explains that LMS (Learning Management Systems) for m-learning will emerge.

Incorporating Electronic Performance Support Systems (EPSS) into m-learning using mobile handheld devices will enable instant access to learning materials, learning feedback, information advice, tools, support, etc. (Brown, 2003: 7).

Podcasts and vodcasts are more technological services that are ideal for when it comes to m-learning. A handheld device could be used to listen to audio received from lecturers or watching a video broadcast that gets downloaded automatically through the Internet to a student (Evans, 2008: 492). Podcasts are part of "push" or "subscription" technology that automatically, without the user actively searching and downloading it, sends the material from the origin on the Internet to the user (Evans, 2008: 492).

With the lack of infrastructure (consisting of cables to access the Internet and telecoms) for ICTs in rural Africa, the growing wireless technologies are the answer to learning (Brown, 2003: 8). As can be seen from table 2.1 mobile cellular subscriptions in South Africa per 100 inhabitants in the year 2000 were 18.63 and in the year 2011 it was 126.83. This is a growth rate of 681% in just 11 years which demonstrates that m-learning is a very big opportunity to expand and bring learning to the masses especially where land-based infrastructure is lacking.

2.5.4. SMS technology used for learning:

Short Message Systems (SMS) according to the Gartner Group (as cited in Brown, 2003: 6) is being used more in Europe than e-mail. Some of the statistics in their research for 2002 are: "

- *Around 62% of all adults across the major European countries now use a mobile phone.*
- *Currently, 41% of European adults use SMS, compared to 30% that use the Internet/e-mail.*
- *SMS is particularly popular in the UK where 49% of adults use it, compared to 39% who are online.*
- *In Germany, 43% of adults use SMS as opposed to 29% of adults who use the Internet/e-mail.*
- *In France, 30% of adults use SMS compared to 25% who go online."*

These figures indicate that SMSs have huge potential as an aid when it comes to learning. Next some examples of where SMSs are being used for learning will be discussed.

In a pilot study done at the University of South Africa (Unisa) the use of SMS technology for DE was tested. According to van Rooyen (2010: 53) the aim of the study was to see if mobile-cellular phones could be used to enhance the learning experience and bring about a more gratifying experience. These results indicated that students had a better sense of direction in their studies; they were more motivated to perform; it made them feel more like a participant in group than on their own and isolated (van Rooyen, 2010: 53).

A study done at the Unit for Distance Education at the University of Pretoria used SMS technology for the in-service support for the training of teachers (Viljoen, du Preez, & Cook, 2005: 115). This pilot study was for rural people that do not have access to the university or even landlines and are mostly full time workers. Most of them had rudimentary mobile phones and were ideal for the pilot study. At first it was just for administrative support and the result was: "*In our experience these administrative SMSs have proved to be beneficial from a quality, time management and financial point of view*" (Viljoen et al, 2005: 117). Later the SMSs provided academic support that consisted of four learning support tools.

The four learning support tools were (Viljoen et al, 2005: 118-121):

1. An academic instruction type of message to prepare the students to building up certain concepts for future use.
2. A message to take part in a questionnaire with answers that the students would have to provide back via SMS and if correctly answered to proceed to the next questions.
3. The student is encouraged to ask questions via SMS about a specific topic in the syllabus to identify problems the students might have and to help them in turn.
4. A message was sent to inform students to phone a number and with their student number to access a pre-recorded mini-lecture that provided a compact summary about frequently asked questions and their answers.

The reason for these tools were: "*we set out to support the existing printed learning resources by introducing carefully crafted and strategically applied aspects of m-learning into the student learning environment*." (Viljoen et al, 2005: 117). The outcome of this study was: m-learning can only be successful if the design and implementation of the system is tailored to its unique environment.

2.6. BENEFITS OF E-LEARNING

From the DE point of view, the biggest advantage of e-learning is probably that the student is no longer on his/her own with self-study materials. The student and the teacher are in communication either asynchronously or synchronously. This means that it does not matter where the student is or at what time it is, communication can occur using the Internet (Sun et al., 2006: 1183). The answer can be received at the same time or later, but an answer will be provided. This also means that students can be in contact with each other and can learn from one and another and share the burden of the difficulties of the studies (Sun et al., 2006: 1183).

E-learning offers many advantages. Panda and Mishra (2007: 325) describes these benefits as:

1. On a global scale providing access instantly to educational resources that does not come from institution itself.
2. Low-cost off-the-shelf software is used to easily and quickly make new, or update, or revise course materials.
3. Students communicate frequently through e-mail and discussion forums which demonstrate that it has grown very flexible.
4. Couse materials like notes, reading lists, diagrams et cetera can be delivered anytime and anywhere.
5. Very high quality course material is created using graphics, text, and some multimedia.
6. Experts in any subject related field can be accessed in real time with no loss in productivity.
7. Online assessment tools, animated learning objects, and animation is used to provide a dynamic and interactive learning experience.

8. Any computer, no matter what platform, can be used for access by using a browser for an interface.
9. Hypertext-based display is used to showcase information which enhances the learner's control.
10. An opportunity exists for learning to take place across different countries and cultures collaboratively.
11. A large amount of learners can be educated at a possibly lower cost.

Sun et al. (2006) researched the critical factors affecting learners' perceived satisfaction. Their results indicated these factors are (Sun et al., 2006: 1196): "

- *Learners' computer anxiety.*
- *Instructor attitude toward e-Learning.*
- *E-learning course flexibility.*
- *E-learning course quality.*
- *Perceived usefulness.*
- *Perceived ease of use.*
- *Diversity in assessment.*"

Virvou and Alepis (2005: 54) explain that wireless and handheld (W/H) devices add another benefit to the e-learning environment as students can use their time when they are traveling by bus or train to do some work on their studies. This also means that whenever and wherever a students has a spare moment for instance waiting for an appointment or traveling somewhere and their hands are free they can communicate with lecturers or students and complete some assignments or study. This makes most of a person's spare time effective, contributing towards something worthwhile and productive.

2.7. INMATE'S PERSPECTIVE ON THE USE OF E-LEARNING

A perspective from students outside of the correctional institution environment is explained first. In a study done by Brown and Czerniewicz (2007: 730) a survey was done on students in DE institutions in the Western Cape to determine the outcome of access to ICTs and the use thereof for learning purposes.

The study showed that the higher the access to ICTs, the higher the rate of frequency of use for learning are, and the lower the access to ICTs are, the lower the frequency of use of ICTs for learning are (Brown & Czerniewicz, 2007: 731). Another result of this study by Brown and Czerniewicz (2007: 731) is that the higher the access to ICTs, the more wide-ranging the use of the ICTs by students for learning purposes. This study also discovered that students that come from lower socio-economic groups and do not have access to ICTs at home use them less for learning purposes even when high access is provided at the institution (Brown & Czerniewicz, 2007: 731). Here the digital divide plays a role. Where the students come from, and whether they have access at the moment to ICTs, are major factors when it comes to the use of ICTs for learning.

Adams and Pike (2008) differentiate between the correctional institution and the health care service in their use of e-learning programs for learning purposes. Adams and Pike (2008: 1) states that: "*Recent health service studies identified the potential of work-based e-learning to increase student perceptions of professional empowerment (*Adams & Blandford*, 2005)."* In the correctional institution setting inmates making use of distance education and HE feel that they are taking control of their lives and this gives them a sense of power (Hughes, 2005). Adams and Pike (2008: 1) explains that the struggle for inmates to master all the roadblocks in their way to study is a valuable life skill that they learn and can be used as motivation once they are released from the correctional institution.

In both these settings the students and all the stakeholders have to be aware of what e-learning is and what can be accomplished through the use thereof. Then there must be access to the e-learning resources. In the medical care setting access is not too big a problem, but in correctional institutions it is a huge problem. Security plays a role here. The final part in these two settings is that all stakeholders must accept the concept as beneficial and provide all the necessary help in implementing the e-learning program (Adams & Pike, 2008: 4).

From inmates in correctional institutions perspective the obvious benefit is that if allowed, e-learning can help them to get an education that is lacking and prepares them for the outside world. It also allows them to communicate with lecturers outside

the walls that they are confined to. This will enable them to get much needed education and help to prevent recidivism. This is the biggest motivation for this dissertation.

According to O'Brien (2010: 30) to receive education and training for employment once on the outside: "…*having a job can reduce the risk of reoffending by between a third and a half. There is a strong correlation between offending, poor literacy, language and numeracy skills and low achievement.*"

According to Adams and Pike (2008: 4) inmates see e-learning as a way to recreate themselves to what they want to be when they leave the correctional institution, and also as an aid to their rehabilitation.

2.8. SKILLS AND FACILITIES NEEDED FOR E-LEARNING

2.8.1. Motivation:

The first point that needs to be attended to is that students need motivation. Without motivation inmates will never start education in correctional institutions. According to Rubie-Davies, Hattie and Hamilton (2006) motivation works both ways: the teacher's anticipated results from the inmates will affect the students' desire to succeed and the overall educational outcomes. If the bar is set to low then the anticipated results will also not match the desired results (O'Brien, 2010: 35).

According to Panda and Mishra (2007: 334) through a study done at IGNOU with faculty members as the participants the motivators for using e-learning in the workplace are (ranked from highest to lowest): "

1. *Personal interest to use technology.*
2. *Intellectual challenge.*
3. *Improved infrastructure (hardware and software) deployment.*
4. *Training on e-learning.*
5. *Self-gratification.*
6. *Better Internet bandwidth at workplace.*
7. *Technical support.*
8. *To be a trendsetter by early adoption.*
9. *Release time/Reduction in existing workload.*
10. *Professional incentives to use e-learning.*

11. *Credit towards promotion.*
12. *Peer recognition, prestige and status.*"

According to Zhu and Kaplan (as cited in Motiwalla, 2007: 583) the use ICTs for education may improve learning particularly when it is paired with a more learner-centred pedagogy.

O'Brien (2010: 50) states that technology can cater for many different modes and ways of teaching and this can be the deciding factor to motivate inmates to study. Thus e-learning may motivate students by providing them with a more interesting way of learning.

2.8.2. Facilities:

If the motivation is there, facilities are needed. This involves more than just buying computers and setting them up in a room for inmates to use. A great deal more than PCs will be needed: access to the Internet will be needed and specialized software will also be needed to accomplish efficient e-learning. This must be provided by the e-learning institution that will be used.

Security is a big issue and the computers need to be monitored and prohibited from being used for activities that can compromise the safety of the correctional institution. Chapter 5 proposes a system that can be used in the correctional institution environment in a safe and secure manner.

2.8.3. Skills of learners:

When facilities are available the first hurdle that needs to be overcome is to teach to inmates who cannot read and write to do so. This can be done in the traditional face-to-face manner in a classroom or using computers. There are software applications available that can do that. The next step will be to teach the inmates computer literacy. This means the teachers must also be qualified to teach computer literacy and certification must be obtained to provide inmates with a qualification in computer literacy that is recognized on the outside. Once this is in place other courses can be undertaken.

2.8.4. Trained personnel, teachers and/or facilitators:

The lecturers at IGNOU indicated through a study done by Panda and Mishra (2007: 333) the following barriers that had to be overcome for e-learning to be implemented (ranked from the highest to the lowest barrier): “

1. *Concern about access to students.*
2. *Lack of training on e-learning.*
3. *Poor Internet access and networking at the university.*
4. *Lack of technical support at the university.*
5. *Lack of instructional design support for e-learning.*
6. *Lack of institutional policy for e-learning.*
7. *Inadequate availability of hardware and software.*
8. *Concern about faculty overload.*
9. *Lack of time to develop e-courses.*
10. *Concern about the quality of e-courses.*
11. *Lack of incentives to use e-learning.*
12. *Concern about security issues on Internet.*
13. *Lack of credit towards promotion.*
14. *Self-intimidated by technology.*
15. *No role models to follow.*
16. *Lack of professional prestige.”*

These are concerns expressed by trained lecturers at a University. One can only imagine the extent of these concerns amongst the teachers at a correctional institution. It is indicative of the huge challenge faced in this regard. Teachers need to be qualified and proficient in the use of ICTs. Lots of teachers in the correctional institution environment are not. They have been teaching in the correctional institution environment for many years but do not have the necessary training, skills and experience needed to use ICTs. Teaching in the correctional institution environment has been with the traditional face-to-face method. To suddenly switch over to using ICTs and e-learning will take considerable training. To bring in outside facilitators will in turn necessitate training them on how to behave in the correctional institute environment and what to watch out for. The correctional institute environment is a

dangerous one and in some cases a life threatening one. Facilitators will have to be adequately prepared.

With the wide range of courses and material that is available, it is open season when it comes to what can be studied. With communication over the Internet in place any problems with studies can be overcome by contacting the necessary lecturers or tutors at the institution to help solve the problem. This means that the teacher in the correctional institution does not need to be qualified in the professional field that an inmate is studying, only in how the ICTs are used for instruction. All specific course-related questions will be answered by the specific institution outside the correctional institution. This substantially lowers the cost to the correctional institution. However, without the necessary commitment to fast responses from the subject specialist, this may once again result in frustrating delays which demotivates the student.

The personnel/teachers/facilitators would have to know how to teach first time computer students to operate a computer. If reading and writing is a problem they would have to know how to use and teach inmates by using software specially designed for teaching people to read and write. This all needs to be addressed to get the teachers up to date and fully trained to be able to teach using ICTs and to facilitate e-learning.

2.9. SUMMARY

These days traditional distance learning for HE has moved to the use of ICTs, combined with the Internet and WWW to e-learning. This chapter explored e-learning. The different types of e-learning were explained as well as their evolution over time. All these new technologies and how they affect leaners were examined.

The current e-learning trend is m-learning, that provides access to and the use of learning facilities anywhere anytime. M-learning is the evolution of e-learning. The change from teaching in traditional face-to-face classrooms to using ICTs and virtual environments was also discussed.

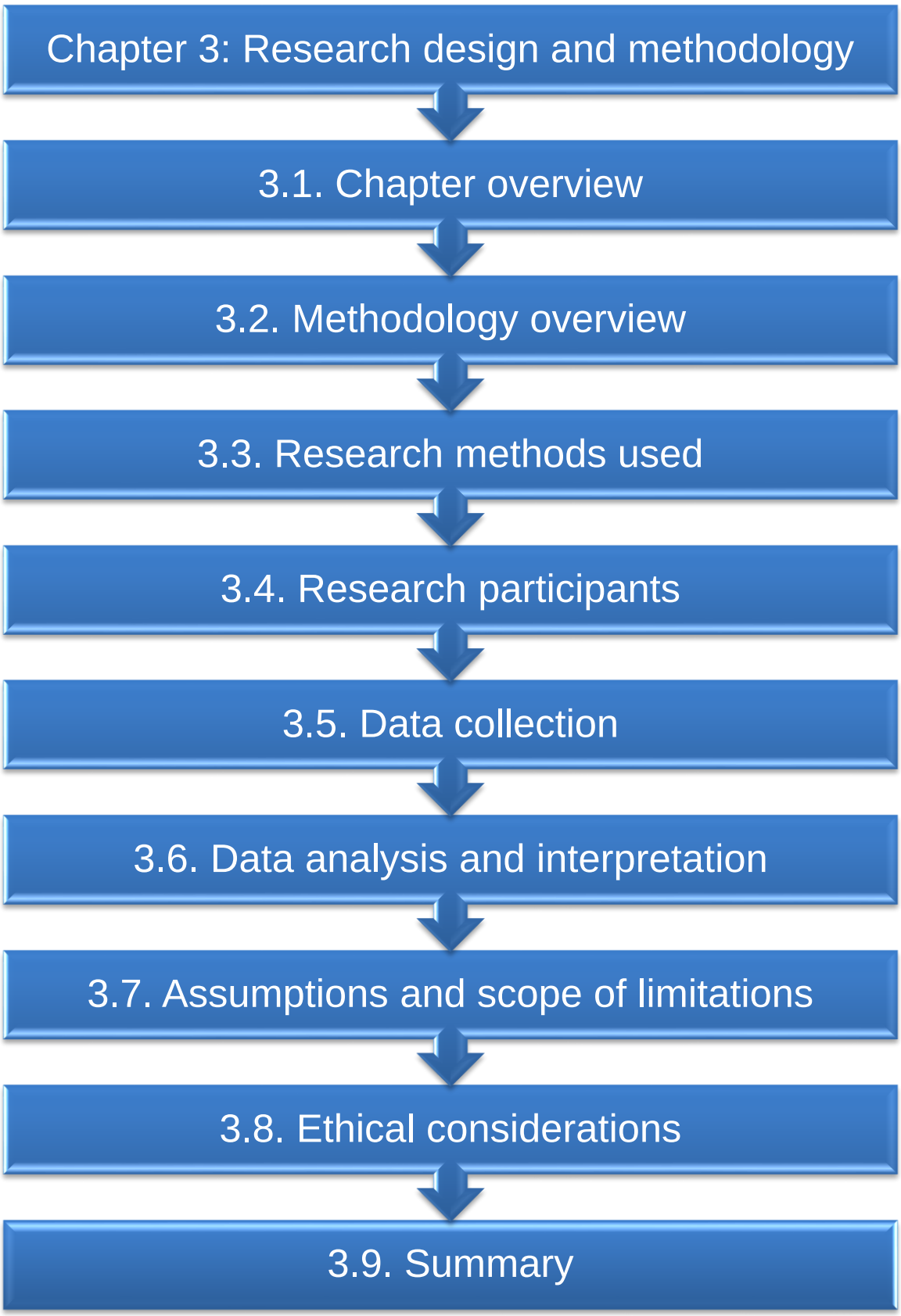
The benefits of e-learning were further explained as well as the benefits for students far from learning institutions, having to study after hours as they are employed.

The skills and facilities required for e-learning to be correctly implemented in correctional institutions were discussed.

Motivation is the primary aspect in getting inmates to study. Once the right motivation is in place the facilities, facilitators and the necessary skills that are needed can be utilized to empower inmates to better themselves.

Chapter 3 explains how the research for this paper was designed and conducted. It explains the methodology used and how data was collected.

3. RESEARCH DESIGN AND METHODOLOGY



3.1. CHAPTER OVERVIEW

Chapter 2 explained e-learning and what it all entails. The literature study gave the researcher the necessary background information and knowledge about e-learning and its possible uses. This also provides the background needed for the researcher to indicate the need and advantages of implementing e-learning in correction institutions.

This chapter explains the research methodology and the different research techniques used to gather data. Section 3.2 reviews and motivates the methodology used and section 3.3 shows the methods used to gather data. Section 3.4 provides information on the participants used in the study and section 3.5 shows how and where the data was collected. Section 3.6 explains all the assumptions made and the scope of the limitations of the study. Section 3.7 discusses all the ethical considerations and the chapter ends with a summary.

This chapter links with chapter 4 by showing how all the data was collected and gathered. This data is then analysed in chapter 4 and conclusions can be gained from it to demonstrate why e-learning should be used in correctional institutions.

3.2. METHODOLOGY OVERVIEW

Research methodology is a system or an outline of procedures that enables the researcher to gather, analyse and interpret data as a way of achieving the goals and objectives (Nkatini, 2005).

3.2.1. Empirical research

This paper entails empirical research. Empirical studies rely on experimentation or observation of something rather than from theory. The research questions (see chapter 1) are mainly exploratory and descriptive questions which are listed by Mouton (2001: 54) as examples of empirical research questions. In this instance the empirical study consisted of participatory action research (PAR) which involved a survey. The survey included both a questionnaire as well as semi-structured interviews. Although the research process included a literature review, no non-empirical type of research questions, as listed by Mouton, was asked. Therefore the research cannot be classified as non-empirical research.

3.2.2. Participatory Action Research (PAR):

With PAR the research participants are all inherent in the design meaning that they are all a part of it (Mouton, 2001: 150). According to Baum, MacDougall and Smith (2006: 854) PAR wants to better the world we live in through change. Baum, MacDougall and Smith (2006: 854) state that: “At its heart is collective, self-reflective inquiry that researchers and participants undertake, so they can understand and improve upon the practices in which they participate and the situations in which they find themselves.”

PAR uses qualitative methods to get a better understanding and perception of the situation under the study of the researcher (Mouton, 2001: 150). In this instance the researcher is himself an inmate in a correctional institution where the study is conducted on inmates in the correctional institution environment. Other inmates as well as the correctional services officers also participated by providing suggestions and input on how the model for the provision of education through e-learning should look like.

Mouton (2001: 150) states that in most cases of PAR the reason behind the dedication of the researcher is to empower the people participating in the research and to alter their social circumstances. Baum, MacDougall and Smith (2006: 854) states that PAR’s purpose is to bring about action. In this research case, the researcher (an inmate himself) would like empower inmates through the use of education. The researcher would like to introduce e-learning with all of its benefits to inmates that are economically and technologically challenged. If inmates could receive education that could actually benefit them once they leave the correctional institution, the chance of recidivism might be reduced. This research aims to show that.

According to Mouton (2001: 151) PAR is inductive rather than deductive, with special significance placed on the participants and how they see the world. PAR uses observation of the participants and interviews together with any documentation about the situation under study to obtain data without any predetermined theories or accounts (Mouton, 2001: 151).

The strengths of using PAR are that the participants themselves are engaged and part of the research which makes them feel that they are contributing positively to the

project which makes the chances of success and a high degree of build validity that much better (Mouton, 2001: 151).

The limitations of PAR are that the small degree of control coupled with the small number of cases can have an impact on the main features of what was inferred from the research and can also have an impact on how the case is structured and on what grounds it was based (Mouton, 2001: 151). PAR also contrasts with other approaches that are less dynamic that take away data and information from their contexts (Baum, MacDougall & Smith, 2006: 855).

3.2.3. Literature Review:

A literature review is basically generalization. A researcher takes detailed facts and creates general principles by applying reasoning. The researcher takes a sample of texts on a specific domain of knowledge under investigation and reads up on the specified topic (Mouton, 2001: 179). The researcher basically provides a summary on a specific scholarly topic by examining certain trends that occur, and by deliberating on the pros and cons of the issue.

The literature review is an essential component of any research (Mouton, 2001:180). It must be done beforehand to get an idea of the research topic or subject. The strength of the literature review is that it gives the researcher a better appreciation of what the research topic or subject is about, what the current theories and disputes are, and what other former research was done and their findings (Mouton, 2001: 180).

The limitations as reported by Mouton (2001: 180) are that a literature review is basically only a summary of other researchers results, nothing new can be proven or derived from other researchers empirical work. A literature review can produce new hypotheses, but these need to be proven by empirical research (Mouton, 2001: 180).

3.2.4. Survey(Questionnaires):

According to Mouton (2001: 152) the purpose of a survey is to get an encompassing summary of a subject under research in a sample taken from a large group or section of the population. The data is usually numeric (quantitative). Mouton (2001: 152) explains that surveys can be motivated by a theory that the researcher wants to prove

or it can be more inductive by proceeding from particular facts to a general conclusion and be a-theoretical.

Surveys use questionnaires that are structured and can be delivered over the telephone (orally), through the normal mail, or electronically like for instance through e-mail or through a website that somebody logs on to and fills out (Mouton, 2001: 153).

According to Mouton (2001: 153) one strong suit of surveys is that if the sample is representative of the population then the results can be generalized to the whole population. Furthermore if proper controls were used in the design of the questionnaire then the results can be reliable (Mouton, 2001: 153).

Some limitations of surveys that will be kept in mind when the results of the study are analysed, are:

- Because there are only questionnaires and not in-depth and insider views of the subject, the results can be accused of being too general (Mouton, 2001: 153);
- The data of surveys can also be too sample and circumstance specific (Mouton, 2001: 153);
- “Data collection in a survey relies on the people’s beliefs or what they would like to hear about the phenomena being studied” (Leedy & Ormrod, 2010: 188).
- “The attitudes expressed by people may not necessarily be a true reflection of reality or their true opinion but a view formulated as a result of the question posed with not much thought applied to the question at hand” (Leedy & Ormrod, 2010: 188).

3.2.5. Interviews:

Semi-structured interviews are characterized by not having a stringent set of questions that has to be abided by. As the interviewee answers the questions the interviewer can feel free to explore different avenues. The only guideline the interviewer has is a set or framework of themes that need to be inquired into (*See* Wikipedia*, Semi-structured interview*, http://en.wikipedia/wiki/Semistructured_ interview (describing

semi-structured interviews as a method of research) (as of July 23, 2013, 13:20 GMT)).

This does not mean that the interviewer does not have to prepare a set of questions. No, the interviewer needs to consider carefully and rationally the topic that needs to be researched beforehand (*See* Wikipedia*, Semi-structured interview*, http://en.wikipedia/wiki/Semi-structured_interview (describing semi-structured interviews as a method of research) (as of July 23, 2013, 13:20 GMT)).

The interviewer should have an interview guide that consists of an informal grouping of questions and topics that need to be covered during the interview (*See* Wikipedia*, Semi-structured interview*, http://en.wikipedia/wiki/Semi-structured_interview (describing semi-structured interviews as a method of research) (as of July 23, 2013, 13:20 GMT)). These can be approached in many different ways according to how each individual interviewee responds to the interviewer's prompts and questions (*See* Wikipedia*, Semi-structured interview*, http://en.wikipedia/wiki/Semistructured_interview (describing semi-structured interviews as a method of research) (as of July 23, 2013, 13:20 GMT)). This allows the interviewer to explore any avenue as seemed interesting and relevant.

One negative aspect is that an interviewer can sometimes move away from the topic at hand and move the interview in a whole new direction. The interviewer needs to be aware at all times not to stray too much to topics that are not relevant to the research. Some latitude is appropriate to explore new ideas and concepts, the researcher should just always keep focus on the main topic and aim of the interview. The interviewer should also always keep note of the time of the interview, to not stretch it out too long. A second and/or third interview is a better option to give both participants a chance to recover and think about the ideas discussed and explored.

3.3. RESEARCH METHODS USED

A literature study was done to determine the available technologies (ICT's) that may be used and the reasons for using e-learning in under-developed communities in general, and at correctional institutions in particular.

Next, the situation in South African correctional institutions was investigated. The mixed methods approach was used. Thus part of the research was qualitative and part of it was quantitative.

3.3.1. Qualitative research:

The aim of qualitative research is to get a comprehensive and complete understanding of human behaviour and the rational about why the behaviour occurs (*See* Wikipedia, *Qualitative research*, http://en.wikipedia/wiki/Qualitative_research (describing qualitative research as an academic method of inquiry) (as of Aug. 26, 2013, 18:24 GMT). Qualitative research does not only investigate the what, where and when, but especially the why and the how of the decision making process (*See* Wikipedia, *Qualitative research*, http://en.wikipedia/wiki/Qualitative_research (describing qualitative research as an academic method of inquiry) (as of Aug. 26, 2013, 18:24 GMT). For these reasons smaller groups are investigated instead of larger ones (*See* Wikipedia, *Qualitative research*, http://en.wikipedia/wiki/Qualitative research (describing qualitative research as an academic method of inquiry) (as of Aug. 26, 2013, 18:24 GMT).

The information acquired through qualitative research is only relevant to the particular case studied and any general assertions made are only suggestions or informed assertions (*See* Wikipedia, *Qualitative research*, http://en.wikipedia/wiki/ Qualitative research (describing qualitative research as an academic method of inquiry) (as of Aug. 26, 2013, 18:24 GMT). Quantitative methods must be used to lend empirical support (*See* Wikipedia, *Qualitative research*, http://en.wikipedia/wiki/ Qualitative_research (describing qualitative research as an academic method of inquiry) (as of Aug. 26, 2013, 18:24 GMT).

3.3.2. Quantitative research:

The aim of quantitative research is to formulate and to apply mathematical models, theories and/or hypotheses that have bearing on the subject under investigation (*See* Wikipedia, *Quantitative research*, http://en.wikipedia/wiki/Quantitative_research (describing quantitative research as an academic method of enquiry) (as of July 30, 2013, 14:51 GMT). Quantitative research is the systematic empirical probing through the use of mathematical, statistical and computational techniques (*See* Wikipedia,

Quantitative research, http://en.wikipedia/wiki/Quantitative_research (describing quantitative research as an academic method of enquiry) (as of July 30, 2013, 14:51 GMT). Quantitative data consists of any numerical data like percentages or statistics (*See* Wikipedia*, Quantitative research*, http://en.wikipedia/wiki/Quantitative_research (describing quantitative research as an academic method of enquiry) (as of July 30, 2013, 14:51 GMT).

Basically a researcher collects numerical data from a large group of participants. Through the use of statistics the researcher hopes to lend support to the conclusions drawn from the statistical analysis to infer generalizations on a larger segment of the population (*See* Wikipedia*, Quantitative research*, http://en.wikipedia/wiki/ Quantitative_research (describing quantitative research as an academic method of enquiry) (as of July 30, 2013, 14:51 GMT).

3.4. RESEARCH PARTICIPANTS

3.4.1. Inmates: Questionnaires

The 300 inmates who received the questionnaire were selected randomly. The researcher moved from an ultra-maximum correctional institution to a medium security one and therefore the inmates were from two different correctional institutions. These inmates all had different educational backgrounds. Some of them were in school in the correctional institution and some were not. The researcher spoke to each inmate before the questionnaire was given to explain what the questionnaire was all about and the purpose thereof. It was also explained that the questionnaires were anonymous and that all information would be kept confidential. In some instances the researcher had to fill out the questionnaire for the inmates as they could not read or write or language was a problem and the questions had to be explained.

3.4.2. Inmates: Interviews

Thirty-three inmates who were busy with DE and schooling in the correctional institution were also interviewed. This was done to get a perspective from their point of view of what they perceive could enhance their learning experience. This also gave some insight as to what motivates inmates to study as well as the problems that they experience and the challenges that they face. The interviews also allowed the

researcher to compare his own experience of problems and challenges with others in the same situation as himself.

3.4.3. Correctional institution officers: Interviews

The 12 correctional institution officers interviewed were all part of the correctional services education department. Because of the move of the researcher from an ultra-maximum correctional institution to a medium security correctional institution, correctional officers of two different correctional institutions were interviewed. All of the correctional institution officers were approached beforehand personally by the researcher for an interview and a time was set for the interview.

Each correctional officer was asked some questions about their qualifications and experience in education. The purpose of the interview was explained to each correctional institution officer and anonymity and confidentiality were guaranteed.

3.5. DATA COLLECTION

The questionnaires and interviews with inmates and correctional institution officers were done at an ultra-maximum correctional institution at the end of 2011 and the beginning of 2012, and in the medium security correctional institution at the beginning of 2013. Through these questionnaires and interviews the researcher aimed to obtain a clear sense of the respondents' attitudes towards the possible use of e-learning in correctional institutions. The respondents included the inmates as well as the correctional officers.

3.5.1 Questionnaires:

The questionnaires were handed out to inmates to complete and in some instances the researcher had to help fill in the questionnaires as language was a problem. However, all the answers were the inmates', without any interference or leading of the subjects. The questions were simply translated so that the inmate would understand them, and the different options to each answer were offered.

The questionnaire was handed out to 300 inmates. In the ultra-maximum security correctional institution the inmate population was just under 3000 inmates and in the medium security correctional institution the inmate population was just over 1200

inmates. All the inmates that the researcher had direct contact to were given a questionnaire to fill in. The response rate was very high in that 254 inmates filled in the questionnaire and returned it.

All data collected were kept secure from anybody else seeing it. As soon as the data was collected it was entered into the computer and kept confidential and secure so that nobody but the researcher had access to it.

3.5.2 Interviews with inmates:

The researcher interviewed 33 inmates busy with DE and schooling in the correctional institution. The researcher simply asked as many inmates as possible whether they want to participate and because of the small size of a correctional institution, all the ones that replied positively were interviewed. Each inmate that was interviewed also filled out a questionnaire beforehand and was therefore already familiar with the research project.

The inmates ranged from ages 23 to 55. They all had varied educational backgrounds ranging between grade 1 and matric and some even had tertiary education. Some obtained their education outside of the correctional institution environment and some achieved theirs while incarcerated.

3.5.3 Interviews with correctional institute officials:

The researcher interviewed 12 correctional institute officials. The researcher focused on the officials that were part of the educational department. Two officials who were interviewed were part of upper management and had a wider view of what the situation is in the correctional institutions. They had more knowledge than just pertaining to the educational department.

3.6. Data Analysis and Interpretation

Quantitative data analysis involves using numbers to discover and describe patterns and/or to estimate the degree of confidence that can be placed in generalizations inferred from the collected data (Chambliss and Schutt, 2013: 157). Statistical measures observed from collected data can be grouped under descriptive or inferential statistics. Descriptive statistics are used to describe how parameters and

information are observed from the data. Examples of descriptive statistical techniques include frequency distribution, graphs central tendency and variation, and reliability tests.

The choice of the appropriate statistical techniques to use depends on the type of data gathered from the questionnaires. Since the data gathered from the questionaries' was categorical in nature, descriptive statistics will be used in chapter 4 to describe and analyse this quantitative data obtained.

The researcher used the Grounded Theory approach to analyse the qualitative data. According to Merriam (2001: 6) Grounded Theory's goal is: "this type of qualitative study is to derive inductively from data a theory that is 'grounded' in the data." Merriam (2001: 6) explains that discovery with description is the most important aspect of the Grounded Theory and that the verification of it comes second. The data collected by the researcher is analysed in chapter 4 with the constant comparative method of data analysis.

The constant comparative method in concert with theoretical sampling make up the core of qualitative analysis in the Grounded Theory approach developed by Glaser and Strauss (Boeije, 2002: 391). A view of comparison by Tesch (as cited in Boeije, 2002: 392-393) is: "The main intellectual tool is comparison. The method of comparing and contrasting is used for practically all intellectual tasks during analysis: forming categories, establishing the boundaries of the categories, assigning the segments to categories, summarizing the content of each category, finding negative evidence, etc. The goal is to discern conceptual similarities, to refine the discriminative power of categories, and to discover patterns."

3.7. ASSUMPTIONS AND SCOPE OF LIMITATIONS

The first limitation was that the research was only done in one South African ultra-maximum security correctional institution and one medium security correctional institution. The research was limited to the situation in South African correctional institutions at the time the research was done from 2011 to 2013. However, the researcher assumes that these two correctional institutions are typical of all of the correctional institutions in South Africa.

The second limitation was that the researcher could interview inmates from only one ultra-maximum security correctional institution and one medium security correctional institution as he was incarcerated in these correctional institutions at the time when the research was conducted. Thus he did not have access to any inmates from other institutions. It may once again be assumed that these inmates probably do not differ from those in other similar institutions. An advantage is that the researcher has knowledge and experience not normally possessed by outsider researchers. This probably resulted in more cooperation from inmates.

A third limitation was the fact that only male inmates participated.

The fourth limitation was that the researcher could not interview all of the officers in the two correctional institutions. Only a small sample was interviewed. The focus was on the officials that were involved in the school for education purposes and the teachers.

3.8. ETHICAL CONSIDERATIONS

- Informed consent and voluntary participation: The researcher approached some correctional institution officers in the education department and some inmates and asked them if they would be willing to be participants in the research. The purpose of the research and what it entails were explained and any questions answered. Participation was completely voluntary. Participants that agreed was handed a consent form to sign (See appendix B).

- Anonymity and confidentiality: Anonymity is guaranteed when no-one (not even the researcher) can identify a given response with a given respondent (Babbie, 2001: 523). Confidentiality is guaranteed when the researcher can identify a given person's response, but promises not to do so (Babbie, 2001:523). The participants of the questionnaires all had anonymity as their questionnaires were collected and input into the computer without knowing which results is which inmates. Each entry of results had no identity linked to it. All participants in the interviews were assured that all the information that they give as well as their identities will be kept confidential. They were told that if at any time they would like to withdraw consent,

it would be done immediately and any information that has already been collected will be destroyed immediately.

- Correctness: The researcher explained to all the participants that once the information gathered through the interviews were transcribed each one would have access to transcript of his own interview to verify that all the information collected was in fact captured correctly. If changes had to be made, the researcher did so. The researcher also assured the participants that everything possible will be done to ensure that all the information received would be kept safe and their identities closely guarded.

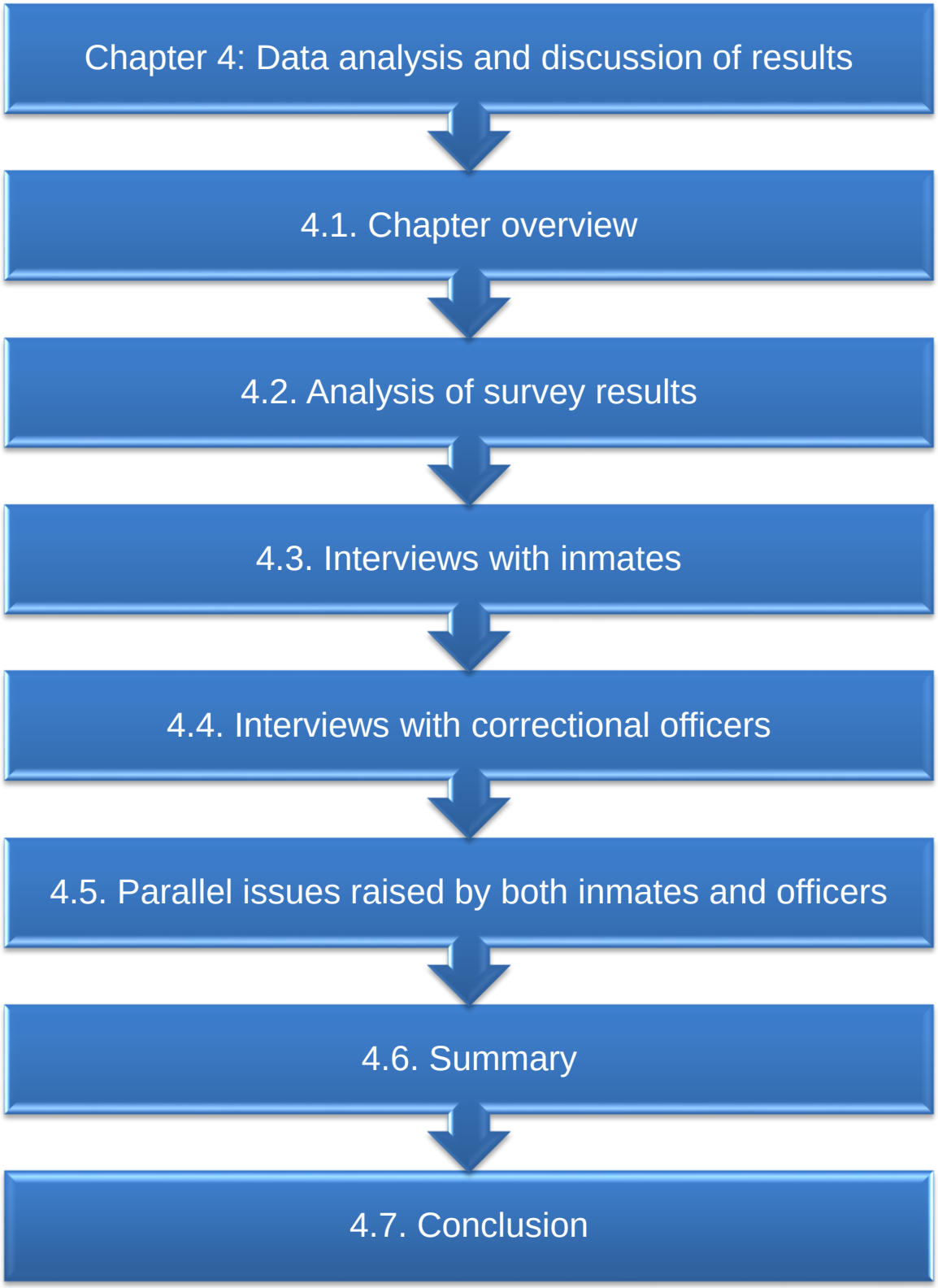
- Ethical clearance at Unisa: The researcher obtained the necessary ethical clearance from the institution where he is registered at.

3.9. SUMMARY

In chapter 3 the researcher explained the methodology and research design used. The researcher used a literature review to get a better understanding of the e-learning environment and how ICTs can be used to bridge the digital divide. All this gave the researcher the background needed to use in interviews with correctional institution officers and inmates. A survey was done to determine the level of education of inmates and to obtain some educational statistics to motivate the proposal of using e-learning in correctional institutions. The researcher also explained how ethical principles were considered and adhered to.

In chapter 4 all the results obtained from the literature review, interviews and survey are discussed. These results are analysed and used to substantiate the proposal of using e-learning in South African correctional institutions.

4. DATA ANALYSIS AND DISCUSSION OF RESERCH RESULTS



4.1. CHAPTER OVERVIEW

Chapter 3 explained the research design and the methodology. The methods of literature review, survey and interviews were defined and how they were implemented. All the assumptions and scope of limitations were identified and ethical assurances were provided.

This chapter takes all the data and information received from the literature review, survey and interviews and analyse it. The results received are then used to discuss and demonstrate the validity of the aim of the research and that is to implement e-learning in correctional institutions in South Africa.

This chapter links with chapter 5 by laying down the reasons for implementing e-learning in correctional institutions. Chapter 5 suggests a safe and secure manner for e-learning to be implemented that will not compromise the security of correctional institutions in South Africa.

4.2. ANALYSIS OF SURVEY RESULTS

4.2.1. OVERVIEW

The survey was handed out to 300 inmates. The researcher received 254 replies. This is a response rate of 85%. The questionnaire used in the survey is available in appendix A. The results are shown in table 4.1.

	Answers (Count and Percentage)							
Question	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
1	**10 (3.9%)**	**63 (24.8%)**	**53 (20.9%)**	**46 (18.1%)**	**59 (23.2%)**	**23 (9.1%)**		
2	**0 (0%)**	**30 (11.8%)**	**214 (84.3%)**	**3 (1.2%)**	**4 (1.6%)**	**3 (1.2%)**		
3	**40 (15.8%)**	**26 (10.2%)**	**59 (23.2%)**	**50 (19.7%)**	**49 (19.3%)**	**30 (11.8%)**		
4	**99 (39%)**	**76 (30%)**	**56 (22%)**	**3 (1.2%)**	**20 (7.9%)**	**0 (0%)**		
5	**99 (39%)**	**66 (26%)**	**66 (26%)**	**7 (2.8%)**	**16 (6.3%)**			
6	**23 (9.1%)**	**13 (5.1%)**	**10 (3.9%)**	**23 (9.1%)**	**36 (14.2%)**	**17 (6.7%)**	**10 (3.9%)**	**122 (48%)**
7	**56 (22%)**	**198 (78%)**						

8	**30 (11.8%)**	**6 (2.4%)**	**12 (4.7%)**	**5 (2%)**	**2 (0.8%)**	**1 (0.4%)**		
9	**178 (70.1%)**	**33 (13%)**	**20 (7.9%)**	**17 (6.7%)**	**6 (2.4%)**			
10	**10 (3.9%)**	**244 (96.1%)**						
11	**165 (64.9%)**	**10 (3.9%)**	**40 (15.6%)**	**13 (5.2%)**	**30 (11.7%)**	**3 (1.3%)**		

Table 4.1: Responses from survey (number of occurrences)

Table 4.1 provides the numbers of answers and the percentages per option. The numbers are exact, but the percentages have been rounded off to one decimal. This explains why in some instances the total for a question is not 100%. The 0.1% difference in these situations is therefore acceptable.

4.2.2. BIOGRAPHICAL INFORMATION (QUESTION 1 – 4)

Questions 1-4 were used to get some demographics about the population in the correctional institution system. The age, race, length of sentence and length of sentence already served, were determined for each inmate.

Figure 4.1 visually shows that the age difference is wide-ranging in the correctional institutions.

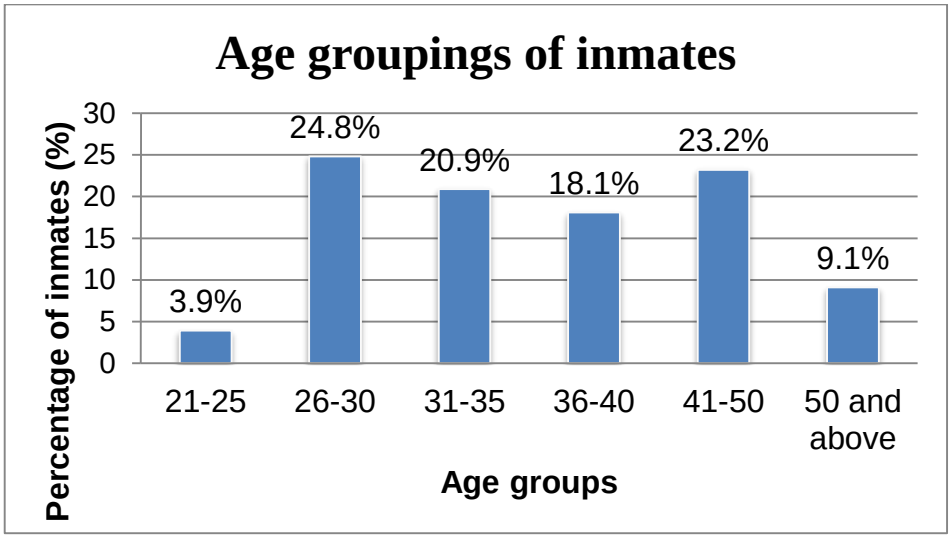


Figure 4.1: Number of inmates per age group

Starting with the range of ages, as illustrated in figure 4.1, it can be seen that is quite varied. As the researcher only did research in adult correctional institutions there are

no juveniles (under 21 years old). The data collected shows that the inmates' ages range from 21 years old to over 50 years old. The highest percentage of inmates ages are in the 26 to 30 years old range. This is followed closely by the range of 41 to 50 years old. This shows that there cannot be age-related bias in the results achieved from the survey. The ages span two whole generations.

Question 2 follows up on the demographics concerning question 1. The population of the inmates in the correctional institution is made up of more than one race. Figure 4.2 illustrates this.

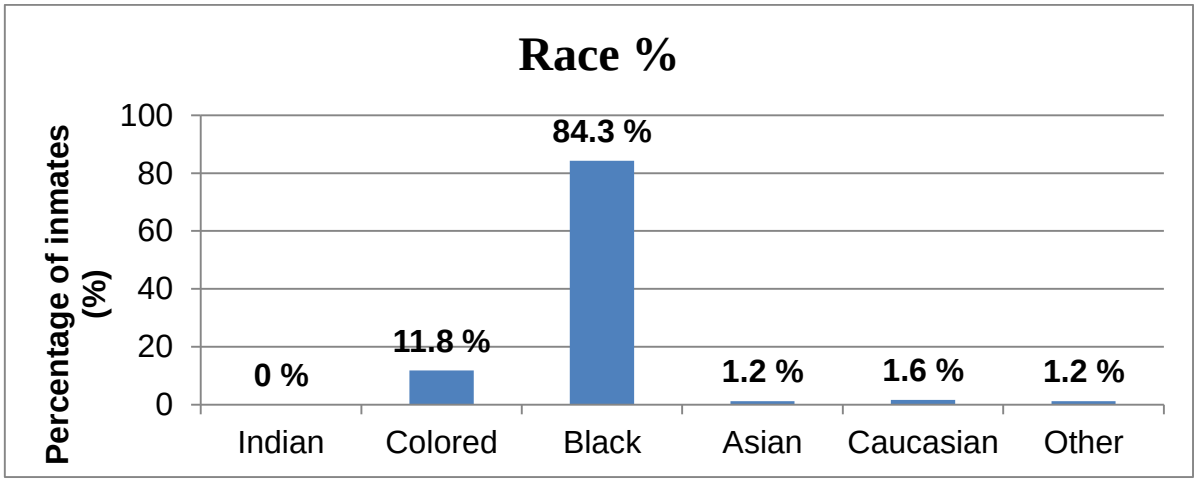


Figure 4.2: Distribution of race in survey group

Figure 4.2 illustrates that the dominant race in correctional institutions is blacks according to the survey results. According to the Department of Correctional Services[5] (DCS) in South Africa on the 28 of February 2011 the inmate population is 80.2% black (Inmate Gender and Racial Composition, 2013). Compared to the survey, the figures are similar.

When comparing it to the South African population in general, the numbers correspond to the part of the population not incarcerated. According to Statistics South Africa[6] 79.8% of the population is black (Mid-year population estimates, 2013: 3). Therefore the representation of the population inside the correctional institution is a close mirror of what the situation is on the outside of the correctional institution walls. The author

[5] http://www.dcs.gov.za
[6] http://www.statssa.gov.za

wanted to show that there were no discrimination because of race concerning who filled out the questionnaire.

Question 3 was used to ensure that inmates serving short to very long (lifelong) sentences were included. Figure 4.3 shows the percentages of inmates doing certain length of sentences.

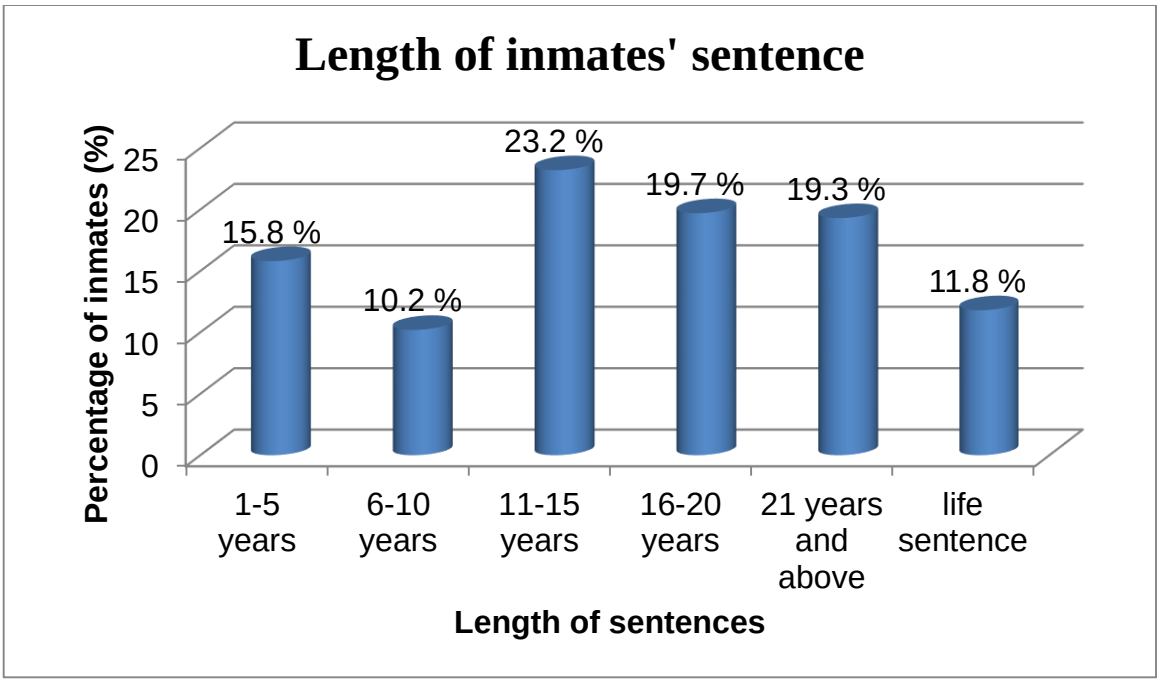


Figure 4.3: The inmates sentence lengths

According to figure 4.3, the data collected regarding the length of the sentences of the inmates are quite varied. Anything from 1 year sentences to life sentences. It is quite shocking to see that 11.8% of the inmates in the survey are serving life sentences. Currently a life sentences in South Africa means that at least 25 years must be served. This is quite a long time to spend in a correctional institution for anybody. This just highlights that something must be done to ensure that these inmates can lead a productive life outside of the correctional institution when they are paroled.

Question 4 is a follow up of question 3. Figure 4.4 shows the percentages of how much of their sentences the inmates have served.

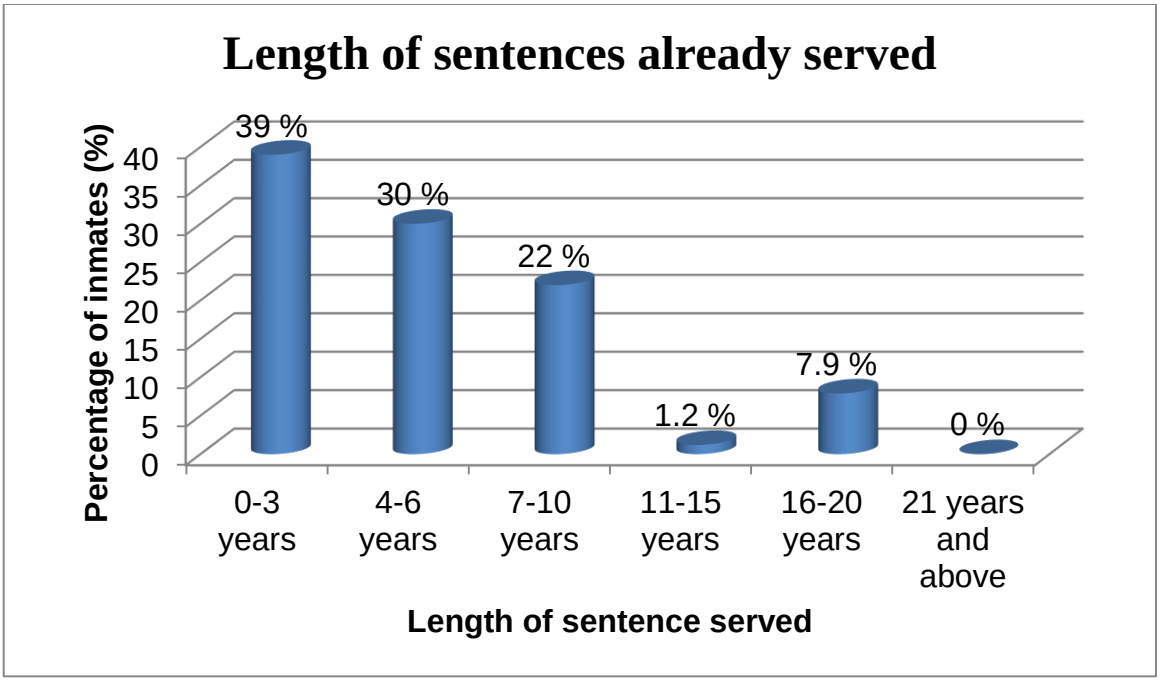


Figure 4.4: The length of sentences already served

Figure 4.4 illustrates the lengths of the sentences the inmates have already served. Most inmates have served between 0 and 10 years. This question wanted to show that the inmates who participated in the survey all have served different lengths of their sentences. The reason for this is that the assumptions made from the survey will be based on data obtained from a wide spectrum in the inmate population. One must also remember that short-term prisoners have the highest re-offending rate (Reducing re-offending by ex-prisoners, 2002: 6)

4.2.3. LEVELS OF EDUCATION (QUESTION 5 & 6)

Many of the inmates that participated in the survey could read and write a little, but that is as far as it goes for them. This is a huge problem. The correctional institution authorities might surely see that education for these inmates is a priority, or do they not see this? The researcher can understand that the correctional institutions have a limited number of resources for teaching inmates, but inmates that have no schooling at all should probably get preference before others.

Question 5 was used to get an idea of the educational level of the inmates. Figure 4.5 is an illustration of the level of education the inmates received on the outside, thus before being incarcerated.

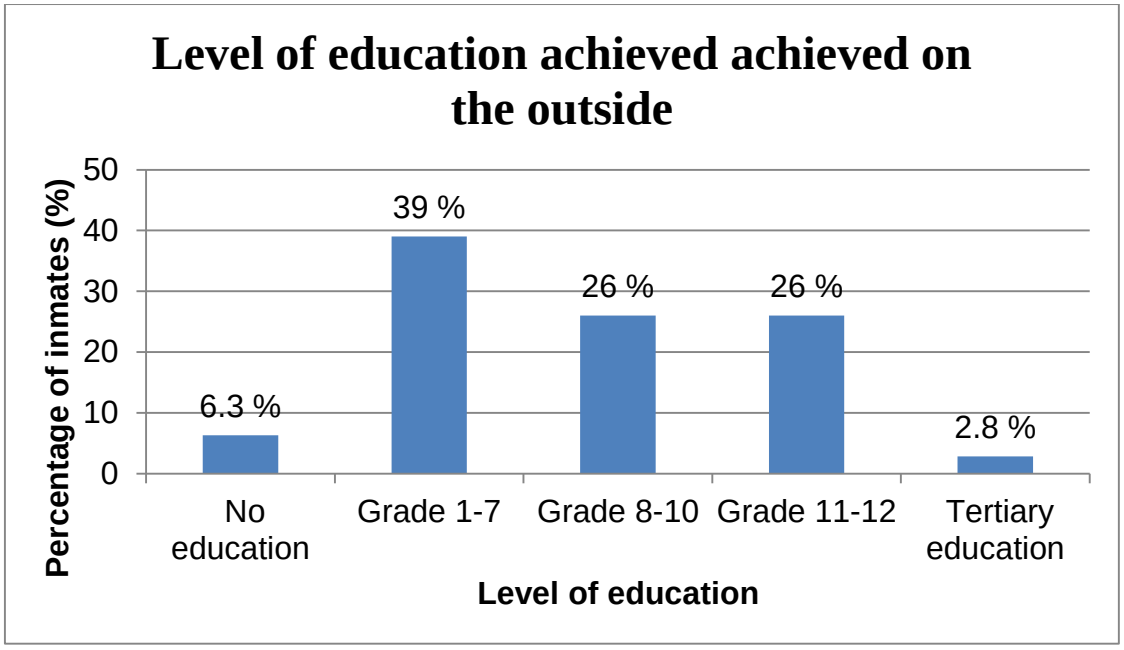


Figure 4.5: Inmates educational level achieved outside

As figure 4.5 illustrates, most inmates received education whilst growing up. Another shock for the researcher is that 6.3% of the inmates that participated in the survey had no formal schooling at all. According to the DCS, the correctional institutions in South Africa provided adult education to 4.1% of the inmate population between 1 April 2011 and 31 March 2012 (Department of Correctional Services Annual Report 2011/12, 2012: 25). The researcher believes this figure can be raised with e-learning.

This will have an impact on their ability to work in any job. If a person cannot read or write, most jobs except manual labour are out of their reach. Even computers would be out of their reach as computers involve a great deal of reading and writing. Another interesting point about this question is that 7 out of the 254 inmates of the survey had tertiary education. This shows that even highly educated people can come to correctional institutions for crimes that they committed.

Question 6 is related to question 5. It provides the answer to what education the inmates received while incarcerated. Figure 4.6 illustrates the percentages of inmates that studied while incarcerated.

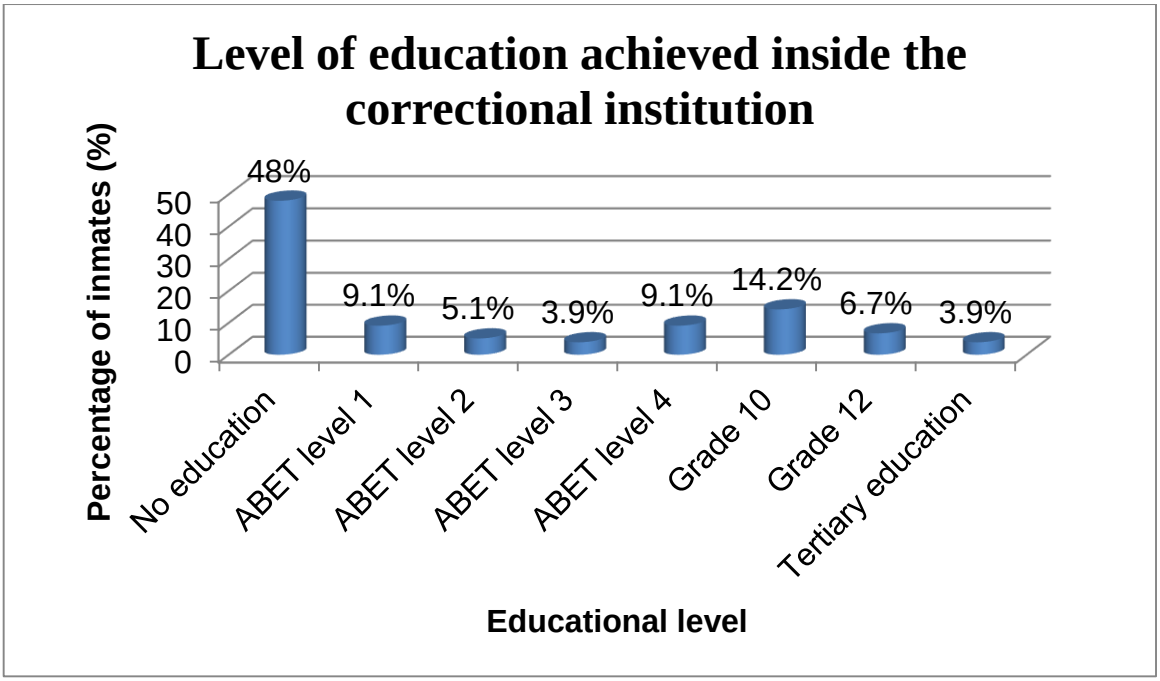


Figure 4.6: Inmates educational level achieved inside

Some background on ABET. ABET is defined as: "*Adult basic education and training (ABET) is the general conceptual foundation towards lifelong learning and development, comprising of knowledge, skills and attitudes required for social, economic and political participation and transformation applicable to a range of contexts. ABET is flexible, developmental and targeted at the specific needs of particular audiences and, ideally, provides access to nationally recognized certificates*" ("About ABET", 2013).

ABET is purely South African. In the rest of the world it is only Adult Basic Education. In South Africa the 'T' was added for Training. It was adopted in 1990 by the new South African Democratic government to show dedication to the integration of training and education into ABET ("About ABET", 2013). ABET is used for real social transformation to give adults a real chance at improving their quality of life through education ("About ABET", 2013).

Figure 4.6 illustrates that 48% of the inmates that participated in the survey never did any studies while incarcerated. This is 122 inmates out of the 254. The reasons for this can vary, but the implication of almost half of the inmate population not studying anything while incarcerated is astonishing. The researcher believes education is the way forward when it comes to rehabilitation. Bazos and Hausman (2004:4) explains

how better education leads to better job opportunities which provide a higher income and this further leads to a decrease in criminal activities.

4.2.4. COMPUTER USAGE

Question 7 asks the inmates whether they have ever used computers. Figure 4.7 shows the results of this question.

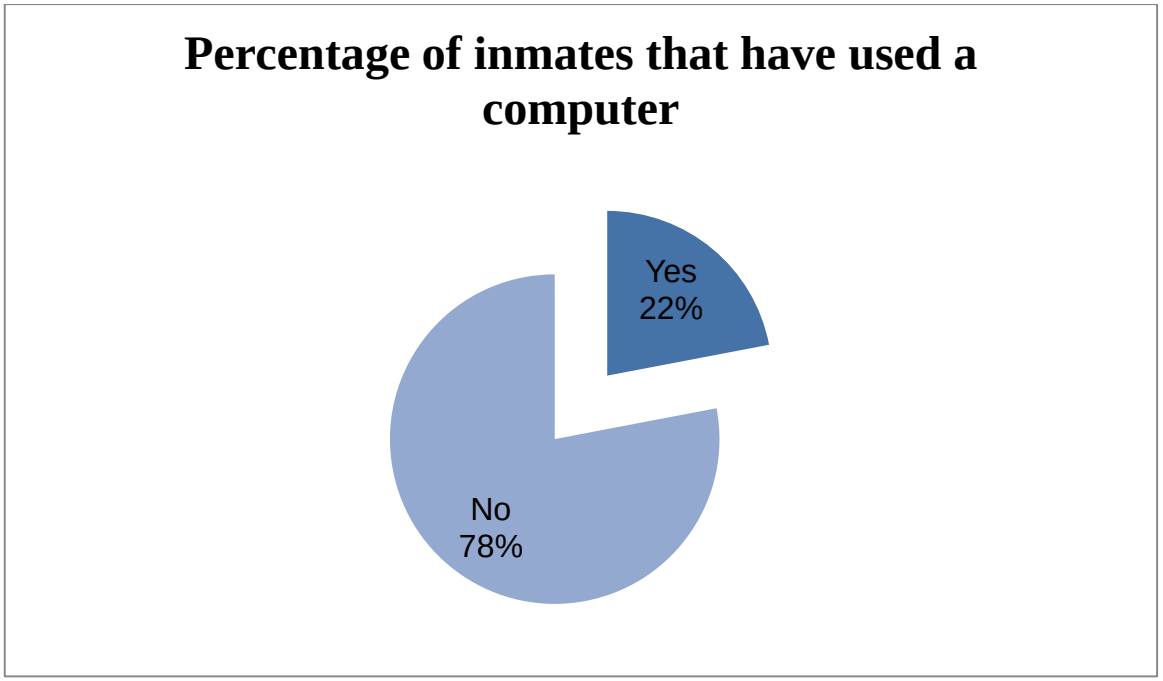


Figure 4.7: Percentage of inmates that have used computers

Figure 4.7 illustrates that only 56 (22%) of the inmates that participated in the survey have ever used a computer. This is quite shocking living in the information age. Computers coupled with the Internet have transformed businesses, and anybody that does not stay up to date falls behind. This highlights the digital divide that exists in South Africa. Most jobs today need some computer skills. Only manual labour and very few other jobs today do not need computer literacy. In many other daily chores, happenings, and events a basic knowledge of computers is a requirement. The phenomenon of the digital divide has a huge impact and is clearly illustrated in this survey.

Question 8 is a follow up of question 7. It asked the inmates what they have used the computer for. Because only 22% indicated that they have used a computer, many

inmates did not answer the question as they have never used a computer. Figure 4.8 shows the results of this question.

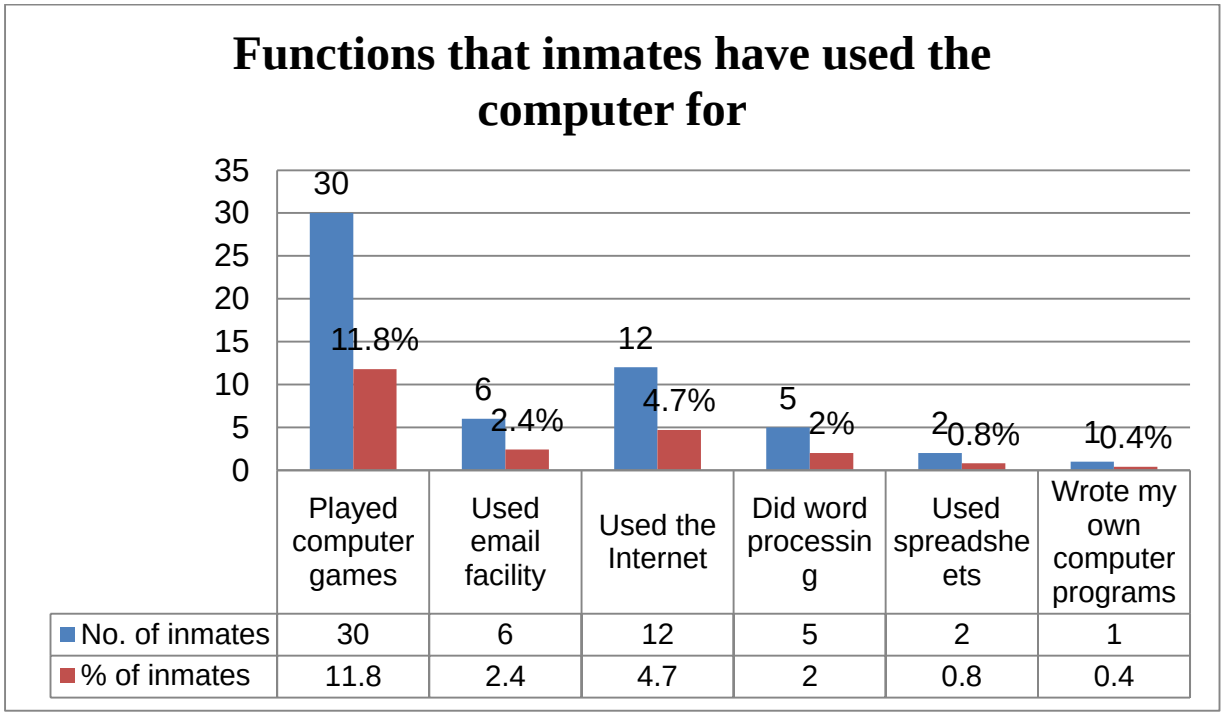
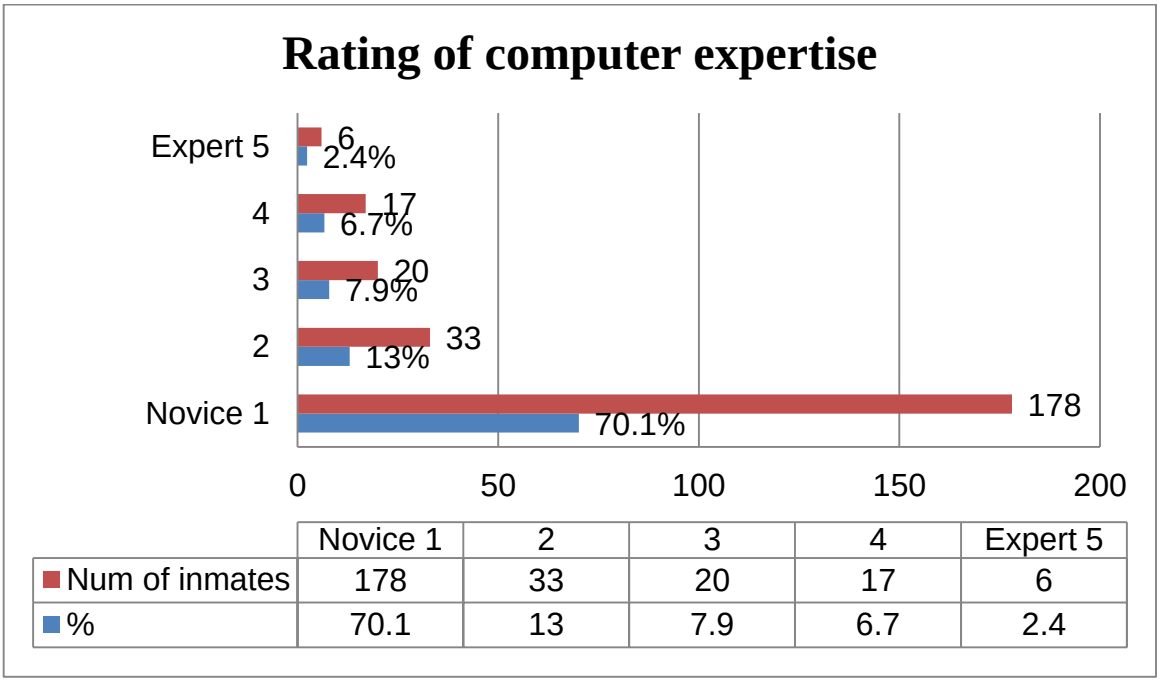


Figure 4.8: Type of computer usage of inmates

Out of the inmates that have used computers before (56 inmates out of 254), 30 (53.6%) of them used computers to play games with. Most children today grow up with television games (PlayStation, Xbox) and computer games. Even if somebody does not have one of these at their home, one of their friends will have it. There are even arcades in shopping centres that have games or Internet cafes that supply computers for people to play games on. The latest trend is games on cell phones. The exposure of children to any type of computer games is huge, and as the results of the survey show, it is the biggest attraction/reason for using computers.

Only 5 (8.9%) inmates out of the 56 used computers for word processing and a further 2 (3.6%) for working on spreadsheets. Word processing and spreadsheets are both commonly utilized in the business world. Only 12 (21.4%) out of the 56 inmates used computers to access the Internet. Out of these 12, only 6 have ever used the e-mailing facility. With e-mailing being the preferred choice of communication in business presently, inmates are at serious disadvantage.

Question 9 asks the inmates to rate themselves on how well they know computers. The results of the survey are shown in figure 4.9.



	Novice 1	2	3	4	Expert 5
Num of inmates	178	33	20	17	6
%	70.1	13	7.9	6.7	2.4

Figure 4.9: Inmates own rating of their computer experience

Figure 4.9 illustrates that the inmates themselves acknowledge that they do not know how to use computers. Out of the 254 inmates that answered the questionnaire, 178 of them rated themselves as novice users when it comes to computers. Thus 70.1% of the inmates cannot use a computer for personal or business purposes. When inmates are released or paroled, their job opportunities will be extremely limited. Manual labour is about the only option open to them.

The few that actually know computers are probably the ones that are already studying. (More research on this issue could perhaps provide a correlation in this regard, but at this stage it cannot be proven). What is shown though, is that most inmates are computer illiterate and fall on the side of the “have not’s” when it comes to the digital divide. The results clearly indicate that inmates do not have the necessary computer skills that are needed in today’s information rich society. This highlights clearly that a problem exists in the correctional institutions of South Africa.

Question 10 asks whether the inmates have done any studies over Internet. The response is shows in figure 4.10.

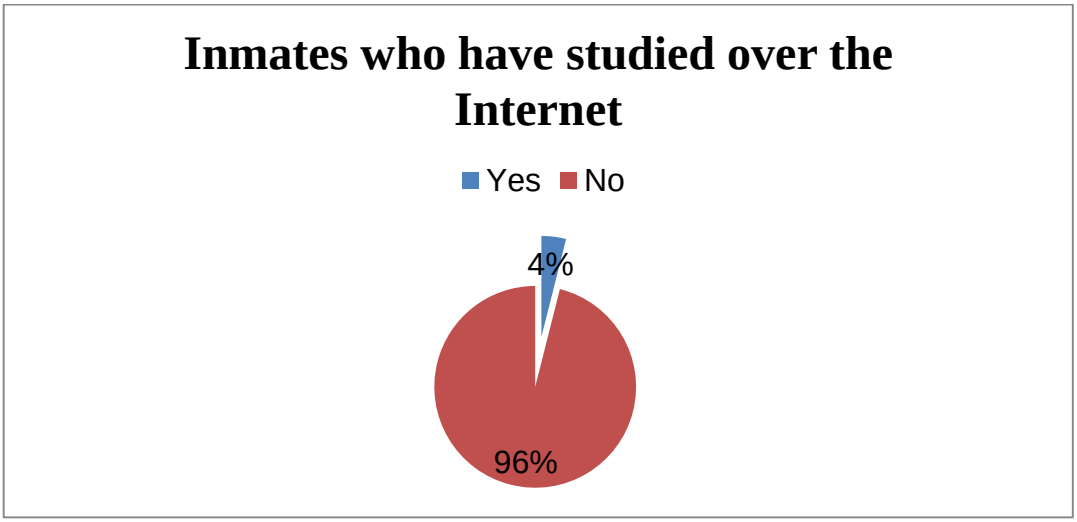


Figure 4.10: Percentage of inmates who have studied over the Internet

Figure 4.10 shows that only 4% of the inmates in the survey have used the Internet to study. This is only 10 inmates out of 254. The trend currently is that every aspect of business is moving to the Internet to save on cost and time. Education is following suit. Unisa in South Africa is moving toward e-learning, and they are the largest provider of distance learning in South Africa.

4.2.5 PREFERED TYPE OF SCHOOLING

Question 11 asked the inmates to choose the type of schooling that they would prefer. They could choose more than one option. Figure 4.11 illustrates the results received from the survey by indicating the number and percentage of inmates who chose each possible option.

In figure 4.11 “Audio tapes” refer to old fashioned, traditional audio cassette tapes and “Video tapes/DVD” refer to old-fashioned videos in VHS or Betamax format or the newer DVD or Blue-Ray format. None of these are utilized in classrooms with computers.

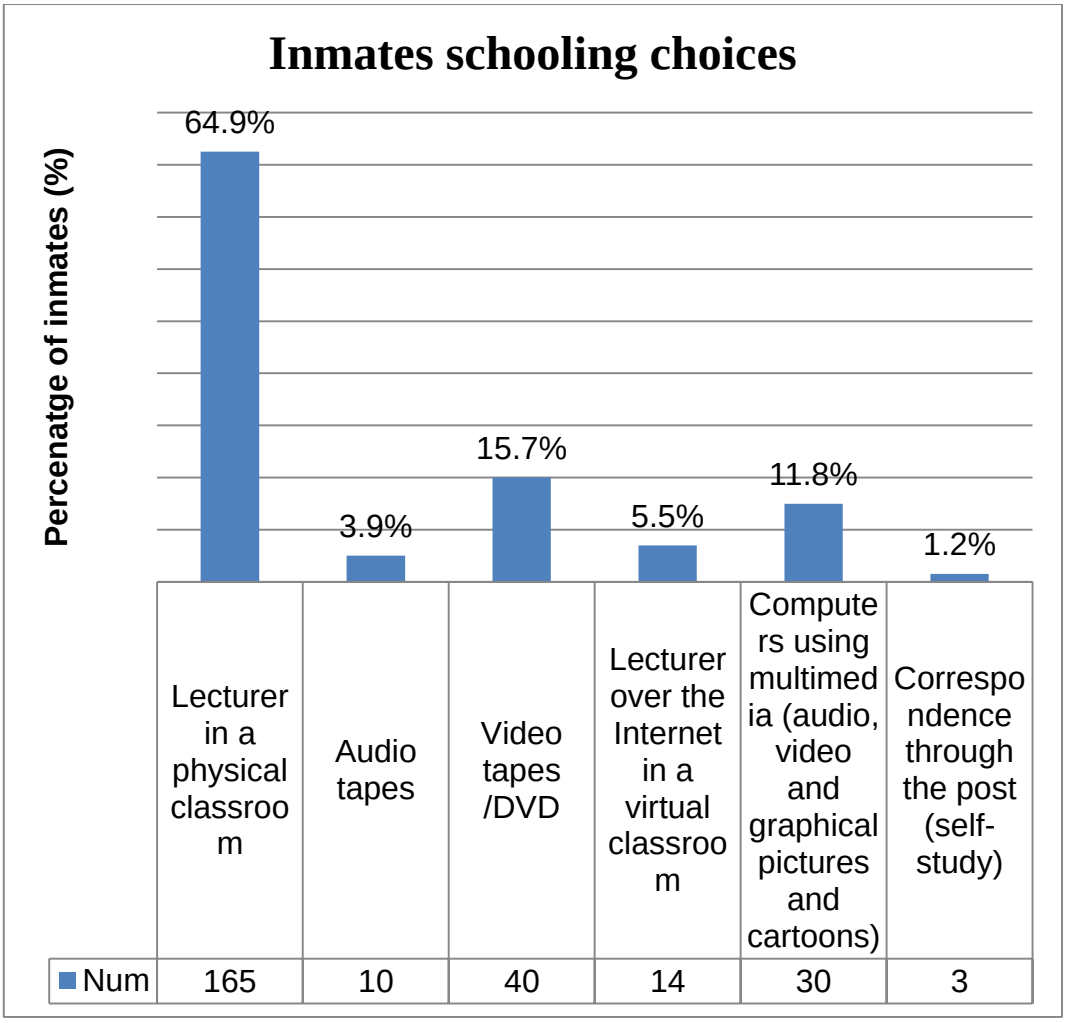


Figure 4.11: Inmates choices for educational instruction methods

From figure 4.11 it can be seen that the inmates who participated in the survey still preferred to receive instruction in the classroom by a teacher. 64.9% of the inmates still preferred a physical classroom while 44 (17%) chose one of the two e-learning alternatives. It is not surprising as only 22% of inmates have ever used a computer in their life. Also only 4% of the inmates in the survey have ever used the Internet, thereby ruling out many inmates choosing this option. It may be argued that inmates who have not been exposed to other schooling alternatives cannot choose something that they are not familiar with.

Table 4.2 below indicates how many inmates that have actually worked on a computer before (22% as indicated in figure 4.7) chose the option of using a type of e-learning for instruction - in this case either option ‘d’ or option ‘e’ on the questionnaire for

question 11. It also indicates how many inmates that have not previously used a computer, chose the option of wanting to use computers in an educational instruction.

	E-learning indicated	E-learning NOT indicated
Worked on a computer	20 (7.9%)	36 (14.2%)
NOT worked on a computer	24 (9.4%)	174 (68.5%)

Table 4.2: Number of inmates that chose e-leaning as instruction method compared to those that have used computers before

From table 4.2 it can be seen that out of the 56 inmates (22% overall) that have used computers previously, only 20 (36%) indicated they want to use computers as an instruction method. This figure is three times as high as the 24 inmates (12%) that have not used computers before, but actually do want to use it for educational instruction.

A chi-squared test was performed on the data in the table to determine if there is in fact a statistically significant difference between students who have used computers before and those who have not when they choose a specific schooling method.

H_0 : Independence vs H_A : Dependence.

The p-value (0.0005) < 0.01 and thus H_0 can be rejected based on the fact that there is a statistically significant difference between the two groups. This means that there is a dependency between whether students have used a computer before and whether they choose the option of e-learning.

It can thus be argued that many more students may have chosen e-learning if they had used computers before and if they knew about the possibilities offered by e-learning. It also highlights the fact that the digital divide does play a big role in the correctional institution environment. Inmates not only have to be taught how to use a computer, they need to be taught what a computer can be used for, including all the different applications that can make their lives easier.

In the same vein, table 4.3 indicates the number of inmates that have used the Internet for study purposes (4% overall as indicated in figure 4.10) compared to how many chose the option of using a type of e-learning for instruction, in this case either option ‘d’ or option ‘e’ on the questionnaire for question 11.

	E-learning indicated	E-learning NOT indicated
Studied over the Internet	4 (40%)	6 (60%)
NOT Studied over the Internet	40 (16%)	204 (84%)

Table 4.3: Number of inmates that chose e-learning as an instruction method compared to those that have studied over the Internet

In the case of table 4.3, only 4 (40%) inmates that have studied using the Internet chose to use computers for educational instruction. One might have expected this figure to be higher. This highlights and strengthens the above mentioned statement that inmates, even those that have made use of computers, or the Internet for study purposes still chose other methods for instruction in the educational setting. This may be indicative of the lack of knowledge of the benefits of computers and their application. Once again, the chi-squared test indicated a statistically significant difference between the 2 groups.

Table 4.4 indicates the number of inmates that have rated themselves as computer users on a scale from 1 (novices) to 5 (experts), as illustrated in figure 4.9, compared to how many chose the option of using a type of e-learning for instruction, in this case either option ‘d’ or option ‘e’ on the questionnaire for question 11. In order to indicate differences between the 5 different options for computer expertise, the percentages per row and the total per row are also indicated.

	E-learning indicated	E-learning NOT indicated	Total of each row
1 (Novice)	22 (12.4%)	156 (87.6%)	178 (100%)
2	10 (30.3%)	23 (69.7%)	33 (100%)
3	3 (15.0%)	17 (85.0%)	20 (100%)
4	3 (17.6%)	14 (82.4%)	17 (100%)
5 (Expert)	6 (100%)	0 (0%)	6 (100%)

Table 4.4: Number of inmates that chose e-learning as an instruction method compared to how they rate themselves in computer use

In table 4.4 it can be seen that out of 254 inmates, only 9 considered themselves to be computer “experts” (options 4 and 5). Out of 178 inmates who indicated that they were novices, 22 (12.4%) actually chose some form of e-learning as an educational instruction method. On the other side of the pendulum all 6 inmates who rated themselves as experts wanted to use e-learning for instructional purposes. This is very telling, as it shows that of the inmates that do know a lot about computers, 100% want to use e-learning for educational instruction.

Table 4.5 compares the educational levels achieved by inmates prior to coming to a correctional institution (refer to figure 4.5), to how many chose the option of using a type of e-learning for instruction, in this case either option ‘d’ or option ‘e’ on the questionnaire for question 11. Once again the percentages per row and the total per row are also indicated in order to indicate differences between the 5 different options for educational levels.

	E-learning indicated	E-learning NOT indicated	Total of each row
No Education	3 (18.8%)	13 (81.2%)	16 (100%)
Grade 1-7	3 (3.0%)	96 (97.0%)	99 (100%)
Grade 8-10	13 (19.7%)	53 (80.3%)	66 (100%)
Grade 11-12	20 (30.3%)	46 (69.7%)	66 (100%)
Tertiary education	5 (71.4%)	2 (28.6%)	7 (100%)

Table 4.5: Number of inmates that chose e-learning as an instruction method compared to their educational levels achieved on the outside

Table 4.5 illustrates that the higher the level of education inmates received before incarceration, the higher the choice to use e-learning as an instruction method. This is proven by 20 (30% of the inmates that have achieved grade 11 or 12 on the outside) that chose to use e-learning as an instruction method. Furthermore, 71% (5 out of 7) of the inmates that received tertiary education prior to incarceration, chose to use e-learning as an instruction method, the highest percentage out of all the different educational levels. When comparing this to the 3%-19.7% of those inmates with less than grade 11, it strengthens the statement that the higher the education received and knowledge regarding computers and their application, the greater the option to choose educational instruction in a form of e-learning.

Table 4.6 compares the educational levels of inmates that they achieved whilst incarcerated (refer to figure 4.6) to how many chose the option of using a type of e-learning for instruction, in this case either option ‘d’ or option ‘e’ on the questionnaire for question 11.

	E-learning indicated	E-learning NOT indicated	Total of each row
No education	26 (21.3%)	96 (78.7%)	122 (100%)
ABET	5 (7.2%)	64 (92.8%)	69 (100%)
Grade 10	0 (0%)	36 (100%)	36 (100%)
Grade 12	3 (17.6%)	14 (82.4%)	17 (100%)
Tertiary education	10 (100%)	0 (0%)	10 (100%)

Table 4.6: Number of inmates that chose e-learning as an instruction method compared to their educational levels achieved whilst incarcerated

The data is this table is difficult to analyse due to the fact that the researcher does not know from which educational level each inmate progressed to the level he indicated when answering this question. It may for instance be that an inmate that indicated no education received, actually already has grade 12, or that an inmate who indicated tertiary education either progressed from grade 10 or actually just attained an additional tertiary qualification.

Nevertheless, table 4.6 seems to indicate that the more education received, the higher the choice for e-learning as an instruction method for education. Out of all the inmates that achieved ABET whilst incarcerated (69 inmates), only 5 (7.2%) chose e-learning as the preferred method of instruction. The researcher discovered in the interviews that most of the inmates have never been exposed to any form of e-learning. This might indicate why this figure is so low.

For the 10 inmates that achieved a tertiary education whilst incarcerated, 100% chose e-learning as their preferred educational method of instruction. Most (if not all) of these inmates had to study at a distance education institution with all the problems and challenges this entails. They probably also used e-learning of some sort. Both these factors probably influenced their choice of e-learning as preferred mode of instruction.

These results once again confirm that higher educational levels and increased knowledge of computers and their application in an educational setting, may lead to choosing e-learning. This corresponds to the trends shown in previous tables.

Table 4.7 compares types of computer usage by inmates (refer to figure 4.8) to how many chose the option of using a type of e-learning for instruction, in this case either option ‘d’ or option ‘e’ on the questionnaire for question 11.

	E-learning indicated	E-learning NOT indicated
Played computer games	25 (9.8%)	5 (2%)
Used email facility	3 (1.2%)	3 (1.2%)
Used the Internet	9 (3.5%)	3 (1.2%)
Did word processing	4 (1.6%)	1 (0.4%)
Used spreadsheets	2 (0.8%)	0 (0%)
Wrote my own computer programs	1 (0.4%)	0 (0%)

Table 4.7: Number of inmates that chose e-learning as an instruction method compared to their computer usage types

From table 4.7 it can be inferred that most inmates that used computers, irrespective of purpose, chose the option to use e-learning for instructional purposes. Out of the 56 inmates that have used computers before, 30 (54%) of them only used it to play games, and of these only 5 chose not to use computers for instructional purposes. In total, 79% of inmates that were predisposed to computers, see the benefits of it being used in e-learning for educational instruction.

The next section will discuss all the data received from the interviews with the inmates.

4.3. INTERVIEWS WITH INMATES

The researcher used the Grounded Theory approach (as explained in section 3.6) to analyse the qualitative interview data applying the constant comparison method of analysis. The researcher decided what data needed to be collected and where to find it based on tentative theoretical ideas. The researcher categorized the data collected from the interviews and connected them together to reach the conclusions drawn.

The researcher interviewed 33 inmates, all voluntary participants. The inmates who were interviewed came from a wide variety in backgrounds. The researcher did not discriminate. The only thing they all had in common was that they were in a correctional institution. They all had different levels of education. The researcher even interviewed one inmate that could not even read or write. Thus, the conclusions drawn from the research will be based from a wide spectrum of the population in the correctional institution system.

The researcher collected all the data from the interviews and in each case systematically extracted all the facts that were revealed by each inmate. These facts were then all added to a table to determine the frequency of occurrence for each fact mentioned in all the different interviews. From these frequencies of occurrence the researcher identified the common problems that exist.

One factor that became clear to the researcher early on during the interviews, is that most of the inmates did not have a strong educational background. Most of the inmates did not even finish high school. The reason for this, in most cases, was that money was a problem and the individuals had to work or find a way to get money to survive.

4.3.1. Interest in schooling:

Of the 7 inmates who received tertiary education before coming to a correctional institution, 3 participated in the interview phase. All three of them chose to study further whilst incarcerated. These inmates mostly stated that they would like to use their time behind bars productively.

On the other hand, many of the inmates with poor educational backgrounds that were already busy with some sort of education whilst incarcerated also showed some

interest in getting tertiary education while behind bars. They all said that: “crime did not pay and for them to get better jobs outside they needed better education and skills.” The biggest problem for all of them is funds (see 4.3.3. below).

4.3.2. What have you done in education so far whilst incarcerated?

Many inmates in the interviews explained that they had to start from ABET level 1 when they started to go to school in the correctional institution. Many had no educational records and when they wrote the placement exams their results were so poor that they had to start over. One amazing student only had standard 8 or grade 10 when he got sentenced and is currently busy with his doctoral degree in Computing. Another student could barely read and write when he got incarcerated and now he was finishing his matric and was planning on studying towards a business degree.

4.3.3. Problems and challenges:

Money is the overall problem towards further education. Many inmates come from previously disadvantaged backgrounds, and there is no money for them to spend on education. The only way for most inmates to study further is to get a student loan or a bursary. The bursary option is a difficult one. Because all inmates have criminal records, it is a major challenge to obtain a bursary. There are the exceptions, but most inmates need to get student loans to study further.

All the inmates interviewed that were busy studying through a distance learning institution, complained that using the postal system to hand in assignments and to receive results, was a problem. Every single one of these inmates complained that sometimes they only received feedback after they have already written their exams. Inmates complained that: “it is preposterous to expect inmates to study at their own cost, in their own time, without any face to face help (meaning lecturers or tutors), and expect to pass their subjects without receiving feedback in a timely manner to prepare for exams.” This is the biggest concern for inmates doing tertiary studies.

Another concern of inmates studying through distance learning institutions is the administrative side. All the inmates interviewed in this regard stated that their registration was always late and by the time they received their study material the first

assignments of the subjects should already have been submitted or it was very close to the due date.

“How can it be expected from me to quickly do assignments and then study for the exams without proper feedback and enough time?” This is a huge concern for inmates but apparently not for the correctional institutions. The correctional institutions have been up and running for many years, but these problems have never been solved.

If looking at the problems from the correctional institutions side, it can be said that it is not the correctional institution’s fault that the postage system is so slow. The researcher can fully understand the correctional institutions’ dilemma. They are not responsible for the post, but they should be responsible for ensuring that the inmates get all the possible help with their studies. This should include receiving all the communications from the distance institutions in a timely and secure manner.

This relates to another problem that was identified. Many of the inmates interviewed, and some of the correctional officers too, stated that many communications from the distance learning institutions got lost in the post. For an inmate to find out where documents or study material are, is a nightmare. Inmates do not readily have access to telephones every day to phone the institutions to find out where their communiques are. It then falls to the correctional institution officers to phone the distance learning institutions. This can take a substantial amount of time and effort and wastes time that should be used for teaching other inmates.

Another problem picked up during the interviews was that the inmates felt that distance institutions did not make any special effort towards inmates and their needs. None of the distance institutions had members visit the correctional institutions on a regular basis. The researcher can understand it is not the distance institutions job to come to the correctional institutions. It is the job of the correctional institution educators to facilitate such actions, but at present it is not happening.

Basically inmates feel that much more could be done for them concerning their studies and their desire to educate themselves more.

4.3.4. Motivation:

A big question posed to the inmates was what motivated them to study further whilst incarcerated. Many stated that they would like better jobs when they are released, but one fact that the researcher discovered was that many inmates had families on the outside and kids that looked up to them. These inmates stated that they looked at their children and did not desire the same fate for them. These inmates wanted to create and set a better example for the children and their future. By starting to educate themselves, they could pass the knowledge on to their children and instil in them that education is the way to building a better future.

If the motivation is there, the encouragement should follow. The inmates interviewed stated that they never received any encouragement from the correctional institution officers to continue with their studies. The encouragement came from other inmates and their family and friends from outside the correctional institution.

4.3.5. Knowledge of computers:

Most inmates interviewed stated that they have only rudimentary knowledge of computers. When asked most of them expressed the need to learn more about computers. When posing the question as to why they want to know more, most of them answered that they know that “on the outside most jobs need computer literacy” and where ever one goes, knowledge of computers is needed.

The researcher also realised during the interviews with the inmates that most of them knew very little about the Internet and what it can do. With all that technology has brought to the world, the Internet has transformed the world into a world with no boundaries. Businesses have been transformed, and inmates serving long sentences (meaning 10 years and longer) have completely lost touch with how things work outside. This is a huge concern as the digital divide must in some way be breached. This is especially true for inmates as they already have a black mark against their names.

4.3.6. What would you like to know about computers?

The researcher was surprised by the answers given to the question as to what they would like to learn about computers. Many inmates, who expressed that they did not know very much about computers, certainly knew what they wanted to learn about computers. The wide variety of answers was astonishing. Some inmates expressed their interest in programming, and lots of inmates wanted to learn web design and multimedia related studies like sound engineering and graphic design. Most of the inmates also expressed a need to know more about the hardware side of a computer and how to look for and fix problems.

All inmates expressed a need to become more proficient in the use of computers. The inmates want to learn to use computers whilst they are incarcerated, and become skilful enough that when they get released they qualify for any job that needs computer literacy. Some also stated that they want to be “comfortable in the use of the computer.” This requires lots of practice.

4.3.7. Use of computers in education:

All the inmates interviewed expressed their wish to use computers in education. That is remarkable since only 44 inmates in the questionnaires picked the options of using the Internet and computers for education. The inmates that have used it before as part of their studies stated that the use of computers made learning easier for them and more exciting. The researcher asked a lot about the exciting factor, and the answers received back were that inmates liked to learn new things and the computer offered such a variety of new things that it made learning fun for them. The researcher feels that if education is fun to inmates it should be encouraged and nurtured.

4.3.8. On leaving the correctional institution:

Many inmates stated that upon leaving the correctional institution they would like to start their own business. The researcher asked them what type of business they would like to start and the response was varied. The businesses ranged from import and export businesses to Internet cafes and motor mechanics. The researcher then followed up by asking what qualifications or life skills they had to back up these businesses and most of the inmates had none. The researcher then asked if the

inmates perhaps had family members or friends that they could go into business together with, but most of the inmates replied that they would like to do it on their own. The researcher even asked if they had business plans drawn up and only one interviewee replied that he had.

The researcher asked why they would not like to work for somebody else and most of the inmates replied that “they would like to be their own boss.” This reason and also the fact that the inmates know that with a criminal record it would be difficult to find a job, were their main reasons for wanting to start their own businesses.

4.3.9. Are correctional institutions doing enough?

Most inmates felt that the correctional institutions are not doing enough. All the problems and challenges that exist were explained in 4.3.3. The inmates also responded in the interviews that for their life to be made easier, online services would be top of their list. This would include:

- Online registration.
- The sending and receiving of e-mails to communicate with the institutions and lecturers.
- Electronic submission of assignments.
- Receiving results through e-mails.
- The use of the Internet to track parcels of study materials.
- The use of the Internet to purchase text books.

All of these services are already available to non-incarcerated students, specifically if they study through Unisa. Unisa has specifically moved towards online learning and in 2014 almost all contact with Unisa has to be online. This includes registration, submission of assignments (compulsory for some modules, preferred in almost all of the others) and queries. Therefore correctional institutions will have a problem.

The next section explains what was learnt from the interviews with the correctional institution officers.

4.4. INTERVIEWS WITH CORRECTIONAL OFFICERS

The analysis of the interview data of correctional officers was done using the constant comparison method (see section 3.6). This method is part of the Grounded Theory's approach to analyse qualitative data. As data was collected it was analysed and grouped into categories. As more data was collected the new data was constantly compared so that the research questions could be answered efficiently and effectively.

Most of the correctional officers working in the correctional services education department first started to work in the public schooling system. Their reasons for moving to the department of corrections were varied, but all of them felt that education for inmates was a big challenge and very fulfilling for them.

4.4.1. Officers training:

Most of the educators had formal training at a college or university. When asked if the training needed to become a correctional institution officer was in any way helpful in their educational task, the answers were varied. Training in how to deal with inmates is all about instilling discipline and correcting bad behaviour. Education in this regard is also all about discipline of the mind to better oneself. The problem that the educators see is that they need to motivate and uplift the inmates in their minds. Rehabilitation is in the hands of the inmates when it comes to education. An educator cannot force an inmate to learn. It has to come from the inmate.

4.4.2. Support:

Most educators felt that they did not have enough support from the government. The budget that the educational system receives is not enough to properly educate the inmates. All the text books are old. Educators do not have alternatives at their disposal. All the technologies available to educators today are out of reach of the correctional officers in the education department. The money to buy and maintain them is simply not available.

4.4.3. Transportation:

Another big problem for the correctional institution officers is that they need to regularly go to the distance institutions to solve administrative problems. The correctional

institutions need to provide transport for them to do this, but this transport is a problem. Often there simply is no transport available for the educators to use. This means that the problems have to wait to be solved until transport is available. The correctional institutions sometimes take so long to provide transport that the educators use their own personal transport and money to go to the distance institutions. They do this out of the kindness of their hearts, but their own pockets are being abused. The educators all complain about this.

4.4.4. Overcrowding:

Overcrowding in correctional institutions in South Africa is another major problem. Correctional officers have their hands full dealing with all the problems arising out of overcrowding. There simply are not enough educators to educate all the inmates in the correctional institutions. Therefore some inmates have to wait, sometimes years, before they can start to attend school. This is a major problem, as valuable time is wasted for educating inmates. The educators feel that during this time the inmates are up to no good. The inmates get involved in gangsterism and abuse drugs, because there is nothing else for them to do.

4.4.5. Registration:

Most educators also feel that there is a problem when it comes to registering inmates to start studies. All the necessary documentation required is always a problem. Inmates often do not have identification documents and previous school records are hard to come by. Many inmates come from previously disadvantaged backgrounds, and their previous school records are simply impossible to find or do not exist. Pre-assessment is needed in cases like these.

4.4.6. Repetition of work:

The problem with pre-assessment is that inmates claim to have a certain level of education. The results of the assessment disprove this, even when proof of previous schooling is available. The level that the inmates are actually on is much lower than it should be. Therefore education has to cover study material that inmates may have covered before, because their level of competence is not what it should be. The repetition of work already done may frustrate inmates.

4.4.7. Stress:

Educators need to deal on a daily basis with frustrated inmates. The frustration comes from being locked up, and not being able to do what the inmates feel that they want to do. This makes the educators' lives a lot harder and puts them in harm's way.

Violence is a regular occurrence in correctional institutions, and the educators always have to be on the lookout for this. Whether it is directed towards them or other inmates, the educators always need to be very observant. Violence can erupt at the slightest provocation or for no apparent reason and their lives could be in mortal danger. This puts a great deal of stress on the educators.

The correctional educators also have to contend with inmates that do not do homework. The educators have to plead with inmates to do their work. The inmates turn around then and say that in the communal cells there is too much noise for them to study. With overcrowding being a problem, this makes it even harder for inmates to study when they are locked up for the night.

4.4.8. Educators knowledge about e-learning:

When educators were asked what they knew about e-learning the response was mixed. Some understood what e-learning is all about as they have had experience with distance institutions like Unisa that is starting to use it. Others did not have any idea what e-learning is and the researcher had to explain it to them.

All the educators agreed that e-learning could make their lives a whole lot easier. The researcher discussed the use of e-learning by some correctional institutions in America and England and the results these institutions received with the educators. Once the educators understood what e-learning entails and the results it could accomplish, they became excited.

4.4.9. Problems with implementing e-learning:

The only problem the educators could foresee with the implementing of e-learning is the monitoring of the system. The educators felt that they were not IT specialists and inmates with the necessary technological knowhow could possibly abuse the e-learning system for their own purposes. The educators all felt this would be the biggest

hurdle to overcome before e-learning could be implemented in correctional institutions in South Africa. This problem ties in with the security issues and privacy.

The next section discusses and analyses the data that was collected from the survey and the interviews.

4.5. PARALLEL ISSUES RAISED BY BOTH INMATES AND OFFICERS

Out of the 300 questionnaires handed out, 254 were returned for the survey. Section 4.2 explained all the data that was collected from the inmates via the survey. The researcher conducted interviews with 33 inmates. Section 4.3 discussed the data that was collected from the inmates through the interviews. The researcher also conducted interviews with 12 correctional institution officers. Section 4.4 discussed the data that was collected from interviews with the correctional officers.

The data collected from the inmates and correctional institution officers in the interviews seems to correspond on a number of issues.

- It is not only the inmates that are struggling with the communication with the distance institutions. The officials also battle to keep up and communicate with the distance institutions. More and better access to email services should alleviate this problem.

- A huge problem for both sides, as identified by the researcher, is that distance institutions do not make any special effort or concessions towards inmates. It may be accepted that visiting the correctional institutions is not necessarily the responsibility of the distance institution. However, with the correctional institutions being up and running for many years, some form of a solution to this problem should have been made already. The correctional institutions have had years to solve this problem, but little seems to have been done. E-learning could surely solve this problem.

- A major challenge evident from the interviews of both the inmates and the correctional institution officers is financial support. From the correctional institution's side the government does not allow for a big enough budget to keep

up with the latest trends in schooling methods and materials. On the other hand, inmates who wish to study further need to do it at their own cost. As mentioned in paragraph 2.7 when inmates are given enough proper education, better job opportunities could open up to them once they leave the correctional institution. Because inmates have very little, if any, financial means, they will need financial support to attain the necessary skills and to study further.

4.6. SUMMARY

The researcher used questionnaires and interviews to show that inmates as well as correctional institution officers – specifically the officers involved in the education of the inmates – could benefit from the use of e-learning.

The results of the interviews show that the communication between the inmates and the distance institutions as well as the correctional institution officers and the distance institutions is a problem. This can be solved through the use of the Internet to e-mail correspondence and by electronically registering students. Packages sent by mail can also be tracked through the Internet.

The researcher gathered enough data to prove that inmates do actually want to get to know computers better. In the interviews most of the inmates were already familiar with computers, but most of them expressed the need to learn more, especially the inmates that were studying through distance institutions. Most of them could see the benefit that computers provide when it comes to education. Most of them also know how important computers are for the use in the business world.

Most subjects taught at distance institutions these days need some interaction with computers. If this is the case, then computers would be needed in their individual fields of study outside the prison walls when it comes to looking for a job and actually doing the job that they studied and trained for. This proves that computer skills are a necessity in this day and age.

The interviews with the inmates also considered the question of what inmates would like to learn more about computers. The variety of fields of study that surfaced from this question showed that while the skills are lacking, the knowledge of what is out there is and the drive to know more is present in the inmates.

The interviews with the officials also highlighted that the drive to know more about computers is not limited to only the inmates. Even the correctional institution officials wanted to learn more about computers. Some of the officials expressed the hope of continuing their own studies, and computers were one of the main choices for further studies. Even the officials recognized the importance of computers in today's society and the work place.

The results of the survey show that the inmates lack the skills needed in today's society when it comes to computers. To solve this problem the digital divide must be breached. The solution to this problem is e-learning. E-learning can teach beginners all that they need to know about computers and more. Once the basics of end user computing are taught to inmates, the number of educational possibilities that are open to them, is endless.

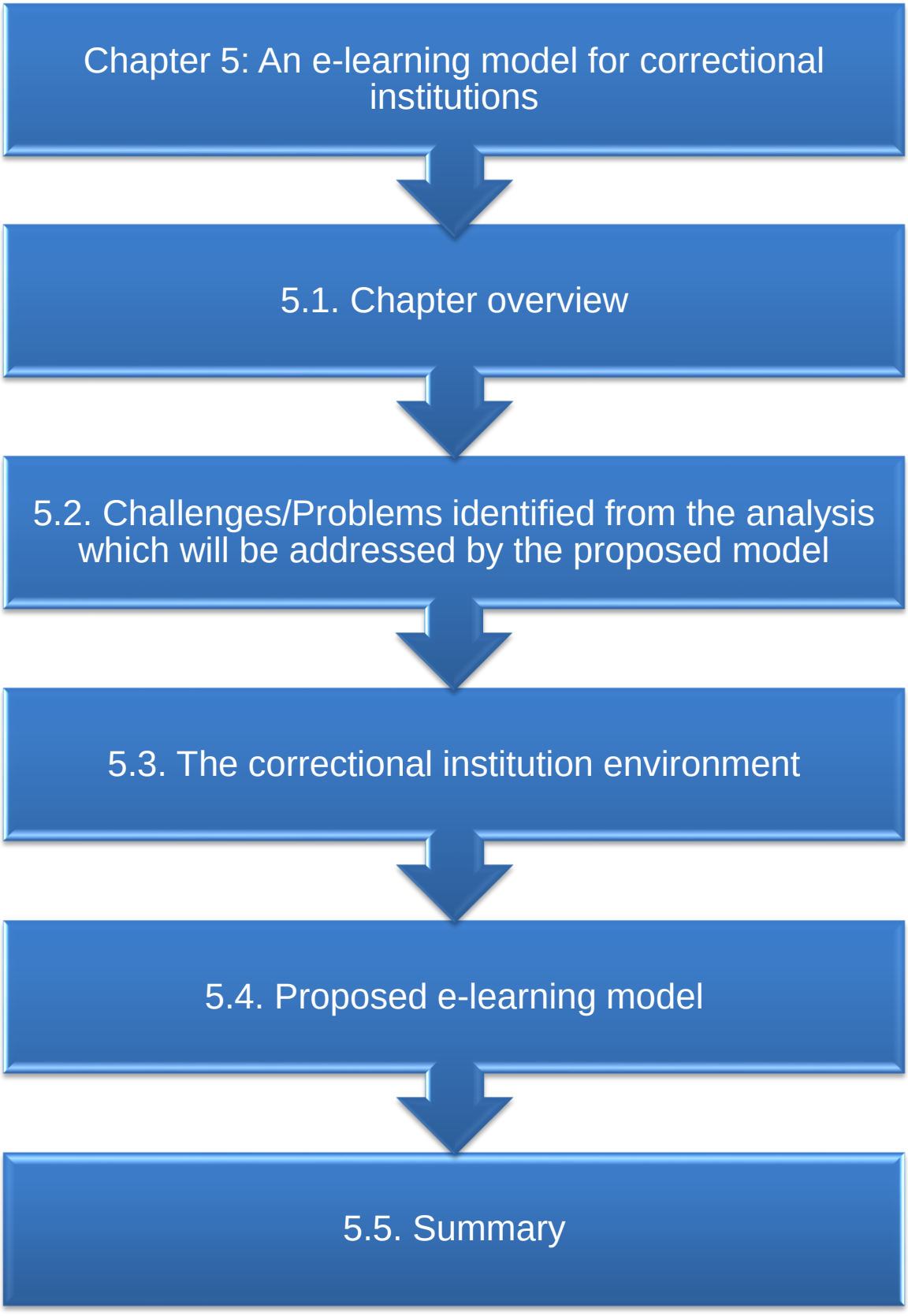
4.7. CONCLUSION

In chapter 4 the researcher analysed and discussed all the data that was collected from the questionnaires completed by the inmates. Qualitative data collected through interviews with inmates and the correctional institution officers were also discussed. Various issues and problems were identified.

The survey results clearly indicated the need for computer skills training. These results also indicated that the digital divide is very much a factor when it comes to inmates. A solution to bridge the divide is definitely needed. E-learning could possibly provide this solution.

The next chapter presents a possible solution to implementing e-learning in the correctional institution environment.

5. AN E-LEARNING MODEL FOR CORRECTIONAL INSTITUTIONS



5.1. CHAPTER OVERVIEW

Chapter 4 analysed all the data received through the literature review, survey and interviews with correctional institute officers and inmates. This data is used to discuss and motivate why e-learning should be used in correctional institutions in South Africa.

This chapter aims to reach the main objective of this research namely to develop a feasible model for the implementation of e-learning, and ICT-usage by inmates without compromising the correctional institution's security or the public's safety. It suggests a model for e-learning to be implemented in a safe and secure manner in the correctional institutions in South Africa. The hardware and software needed is explained as well as all the security precautions that must be taken to ensure that the security of the correctional institutions is not compromised.

All the previous chapters feed into this chapter by providing the necessary theoretical background and the results that show the motivation for and necessity to use e-learning. Although it seems as though inmates still prefer face-to-face teaching by a teacher, the researcher has motivated why this data may be distorted by the effect of the digital divide. The large problem of too many inmates and not enough teachers also make face-to-face teaching an almost unattainable solution. Some kind of "mixed mode"/blended learning offering may offer a more appropriate and possibly attainable option. This model represents one possible way that the researcher believes could be an effective way to implement e-learning in correctional institutions in South Africa. It may be implemented in phases and/or run parallel with the current educational offerings.

This chapter links up with chapter 6 that concludes the dissertation. Chapter 6 provides conclusions reached through this research, revisits the research questions stated in question 1, and provides recommendations for future research.

5.2. CHALLENGES/PROBLEMS IDENTIFIED FROM THE ANALYSIS WHICH WILL BE ADDRESSED BY THE PROPOSED MODEL

Table 5.1 summarizes the problems and challenges identified by the researcher through the questionnaires and the interviews with the inmates and the correctional

institution officers. These problems and challenges will be used in the development of the proposed e-learning model section 5.4.

Challenges/Problems identified		
Questionnaires	**Interviews with inmates**	**Interviews with correctional officers**
6.3% of inmates had no education before coming to a correctional institution.	Want further education and skills to ensure that they find jobs on the outside and not commit crimes again.	Officers themselves do not even have training in computers themselves.
Only 2.8% of inmates had any tertiary education before they came to a correctional institution.	Most inmates do not have the necessary funds for tertiary education whilst incarcerated.	Not enough support from the government concerning supplies that are relevant and up-to-date to teach inmates with.
48% of inmates received no education whilst incarcerated.	Most of the communication with distance learning institutions are by post and this is very slow and lots of the time the post goes missing.	Educators all complained that there is no transport available for them to go to distance institutions to solve problems on the behalf of inmates.
78% of inmates have never used a computer before.	Registration by post is a nightmare as there are always problems and when these are solved too much time has elapsed and the inmates are already behind in their studies.	Educators all identified overcrowding as a problem to educating inmates as there are simply not enough teachers to go around.
Only 4.7% of inmates have used the internet before.	Feedback concerning assignments are always late and in some instances too late as the exams need to be prepared for.	Frustrated inmates endanger the correctional staff's lives and this makes their jobs in all areas more difficult.
	No motivation to study further as the correctional institutions do not motivate inmates or offer any rewards for further education.	Educators want to benefit from using ICTs to educate, but it is not available to them.
	Many inmates expressed the wish to learn more about computers and how to operate them. The opportunities simply do not exist for them.	Educators feel that they are not qualified to detect or prevent the illegal use of the very technologies that might help them.
	Many inmates feel that they are out of touch with the world outside and when they leave the correctional institution they are lost in a digital world that has surpassed them.	

	Many inmates feel the correctional institution does not help them enough when it comes to education.	

Table 5.1: Challenges and problems identified

5.3. THE CORRECTIONAL INSTITUTION ENVIRONMENT

The correctional institution environment is a unique one. Where normal businesses would like unauthorized entry or access to their resources and information protected from outside interference, the correctional institution is the reverse. The correctional institution needs to keep inmates from gaining illegal access to the outside world. There are legal controlled means of communication to the outside world with their friends and family in place. This is in the mode of access to telephones at certain times and letters that must be censored going in and out of the correctional institution. Contact and non-contact visits are allowed in a controlled environment and visitors as well as inmates are searched before and after the visit to prevent the smuggling of illegal items.

With this in place the communication to anybody outside is strenuous and very slow. In the educational environment, if the inmates are not using the courses provided by the correctional institution, then all of their communication with the institute that they are studying with has to occur by post or telephone. The post is very slow and the telephone is only available at certain times and limited to a certain amount of time per inmate. This all contributes to making it very hard for inmates to do any DE.

At the moment many of the correctional institutions in South Africa have small computer centres that are used as part of the ABET education for the inmates. Some inmates also use the computers for DE studies. A common course that inmates do in the correction institutions is International Computer Driver's License (ICDL). This course teaches inmates Microsoft Office and some basic computer background and how to use the Internet.

Some inmates are also allowed their own computers from outside. This is for the ones that are studying computer related courses and need a computer. There are restrictions as to what is allowed and what not. Here are some of the rules and regulations:

1. No computer with a built in modem is allowed.
2. No computer with a web cam is allowed.
3. No USB memory sticks (USB flash drives), micro SD cards, or SD cards are allowed.
4. No external hard drives are allowed.
5. All computers are searched before they are allowed from outside. No music or any type of videos is allowed on the computers.
6. Only software that must be used for studies are allowed on the computer.
7. No games are allowed on the computer.
8. No wireless modems are allowed.
9. All computers are checked periodically by the IT specialist of the correctional institution to check for unauthorized data or actions being performed.
10. A very strict policy on no pornographic materials. Offenders can face disciplinary actions if caught.

In most correctional institutions in South African the inmates' personal computers are either in a secure room where they have access to them during daytime when inmates are not locked up, or inmates are put in single cells with their computers inside the cell with them. There are strict rules and regulations that the inmates must adhere to and if they are caught doing anything that they are not supposed to, the privilege of using their own computer can be taken away for a period of time or permanently.

This is the situation for inmates who are doing DE studies. Some correctional institutions also offer short courses to teach inmates how to use computers. These courses are usually for inmates that do not know anything about computers. It basically just teaches them how to operate computers and do not offer them any advanced knowledge. It is not a vocation that the correctional institution teaches, but merely a skill. Inmates who choose to do further computer studies for a specific career path have to do it at their own cost.

5.4. PROPOSED E-LEARNING MODEL

There are a number of factors and challenges that can influence the decision when implement e-learning. The first of these will be finance. The first consideration is the size of the budget that correctional services will supply to correctional institutions to implement e-learning. Not only for the initial outlay of the hardware and software that must be bought, but also for the training of the correctional institute officers that need to teach the inmates. Then there will also be running costs each month that need to be paid as well as the upkeep of the hardware and regular servicing. Technical support will also have to be on standby when problems occur, otherwise if computers or services are down then the inmates will not be able to study. This is a very important factor.

First the facilitator's requirements will be discussed and then the different hardware and software requirements. All the advantages and disadvantages of the different choices will be explained so that correctional institutions in South Africa can make informed decisions if they would like to.

5.3.1. Facilitator requirements:

The facilitators/teachers will be at hand to help inmates to gain access to the necessary hardware and software resources. They do not necessarily have to be teachers in the sense of a qualified teacher. Their role is to help the inmates to start the e-learning resources on the computers and then to guide them in using the applications. They can even be inmates with the necessary training and background in working with computers that act as tutors. In the current correctional institution environment in the ABET curriculum there are paid tutors to tutor inmates. The same can be done in this computer laboratory setting.

The facilitators will need the following skills:

1. Basic computer literacy.
2. Basic knowledge how to work with networks.

3. The necessary characteristics and people skills (like a tutor) to help those that are struggling.
4. The necessary background knowledge in the specific subject area that are being taught.

5.3.2 Coordinator:

One important point that has to be stressed is that there has to be an overall coordinator who is an official of the correctional services. This coordinator will have to be the one that is responsible for the lab itself and to ensure that the safety and security of the correctional institution is not compromised. This coordinator will have to be qualified in the IT field with extensive knowledge in computer networks and security. This official will be responsible for monitoring the network to ensure that no breaches occur or any illegal activities are taking place.

This coordinator's responsibilities will entail:

1. Making sure the computers are up and running. If problems exist either fixing it himself/herself, or coordinating with the correctional services IT department to fix it.
2. Maintaining the computers and software applications necessary to operate the necessary applications.
3. Monitoring and ensuring the network is secure from illegal access and intrusions.
4. Maintaining a network that is virus free and if problems occurs, to fix it.
5. Create and maintain a schedule for the different classes and liaising with the facilitators to organise it.
6. Organizing and liaising with the external institutions to acquire and install the institution specific applications for the different courses offered.

The coordinator's job will not involve teaching per say, but more of an overseer's role in being responsible for access to the computer laboratory. The necessary skills in handling inmates will have to be part of the coordinators skills. Training in this regard may have to be provided to the coordinator. This is to ensure this person's safety.

STEP 1: Location

5.3.3.Hardware requirements:

The first step when setting up a laboratory with computers would be to find a safe and secure the location. The location in a correctional institution would have to be secure and safe that no unauthorized inmates can gain access to the centre to damage or steal the equipment, or use it for unauthorised purposes.

The room for the computers also needs adequate ventilation. The heat generated from the computers need to be controlled, especially in parts of South Africa were it can get very hot in the summer months, in some places 35^{o}C and more. Either air conditioning is needed or cooling fans. The more computers in a room, the higher the heat that will be generated and the more the ventilation and cooling will be a problem. This problem is easily controllable and must just be taken into account from the beginning.

The size of the computer laboratory will depend on the capacity of the correctional institution and the size of the location if an existing room is going to be used. Another consideration will also be the amount of money that will be allocated for the setting up of a computer laboratory. This will determine the number of computers in the proposed laboratory.

The computer laboratory will also need adequate lighting. The room cannot be too bright and create reflections off the computer screens making it difficult to see what is on the screen.

There also needs to be enough power outlets so that all the computers can be plugged in. If an existing room is going to be used for a computer laboratory at a correctional institution then extra power outlets must be added. It does not mean that walls need to be broken into. External conduits can be used against the walls or even through the ceiling. It would all depends on the current structure. Special attention needs to be paid to ensure that the power grid that is going to be created can actually handle all the power that is going to be needed. Frequent power interruptions because of faulty

wiring or poor planning and implementing of the power distribution will be very undesirable.

All this information is needed when considering a specific room or considering the building of a new one.

STEP 2: Networking equipment

The next step would entail the installation of the communication equipment. This will consist of putting up a Local Area Network (LAN) so that all the computers are connected and can be monitored by the administrator. This can be done with network cables or a wireless solution.

There are three types of networking cables: coaxial, twisted-pair, and optical fibres. Flexible coaxial cables are used mainly for television in South Africa. Voice-grade twisted-pair cables are used by telephone companies from homes to the local switching station in the public switched telephone network (PSTN) ("Telecommunications media", 2010). Data-grade twisted pair cable (Category 5 (CAT 5) or higher) or optical fibre is used for LANs ("Telecommunications media", 2010).

There is a difference between using coaxial or twisted-pair wires and using optical fibres. When using coaxial or twisted-pair cables wire transmission is happening. Wire transmission is the use of an electromagnetic wave to transfer information through a copper conductor to a receiver ("Telecommunications media", 2010). This is an electrical current.

When using optical fibre a beam of modulated monochromatic light is used to transfer information to a receiver ("Telecommunications media", 2010). Unlike wire transmissions that use electrical current, optical fibres consist of non-conducting dielectric fibres that an electromagnetic (optical) field propagates through ("Telecommunications media", 2010).

In a wireless solution Wireless Fidelity (Wi-Fi) is used. Wi-Fi is a wireless networking technology that uses radio waves to transfer data over short distances at a high speed ("Wi-Fi", 2010).

The advantages and disadvantage of using wire transmission, optical transmission and a wireless solution is in table 5.1.

	Advantages:	Disadvantages
Wire transmission	• Low electrical resistance. • High tensile strength. • High resistance to corrosion. • Low sensitivity to faraway interference sources such as lightning. • Light weight • Low cost	• Loss of electromagnetic wave strength as distance increases. • Needs repeaters if signal is sent over long distances
Wi-Fi	• No cabling. • No wiring. • High speed.	• Short distances (30-metre (100-foot) wireless range). • Atmospheric wave propagation. • Surface wave propagation. • Reflected wave propagation.

Optical transmission	• Higher bandwidth • High speed • Long distances • Low signal attenuation. • Interference immunity. • Low material cost. • High transmission capacity. • Chemical stability. • Light weight. • Greater data capacity. • Immunity to electro-magnetic interference. • No risk of starting electrical fires. • Improved security of communications and data.	• Signals are degraded by beam divergence. • Signals are degraded by atmospheric absorption. • Signals are degraded by atmospheric scattering.

Table 5.2: Advantages and disadvantages of using cabling and wireless solutions ("Telecommunications media", 2010)

The decision to use wire transmission or a wireless solution has to be made by the correctional institution. The researcher can provide some guidelines and recommendations.

1. The first guideline is that because a single computer laboratory will be used at each correctional institution, the problem of distance will not be an issue. Both wire transmission and a wireless solution is an option.

2. Putting in either twisted-pair cabling or optical fibre will mean conduits for the wiring either against the wall or in the ceiling. This will take some effort to accomplish right. A wireless solution is a good deal easier in this regard, no wires needed.

3. When it comes to using either twisted-pair cabling or optical fibre, there will always be the chance of cables being damaged. This can happen either through human error or sometimes rodents that can chew on the cables.

4. When choosing between twisted-pair or optical fibre one thing that needs to be taken into account is that with twisted-pair it is very easy for an unscrupulous individual to illegally tap into the line. With fibre optics it is much more difficult.

5. From a security point of view wire transmission is easier to physically protect from unscrupulous individuals gaining access to the LAN. With a wireless solution an unscrupulous individual only needs to be in the area that is covered called a “hot spot”. There is a software solution though to prevent illegal access.

6. From a maintenance point of view a wireless solution is very easy to maintain. A problem can be easily identified as the hardware is a great deal less. With wire transmission there are much more places and hardware where problems can occur.

Irrespective of the type of LAN chosen, a connection to an Internet Service Provider (ISP) is needed. There are many types of connections these days. They are:

1. A connection through a normal telephone line (PSTN) with a modem.
2. A digital subscriber line (DSL) through the PSTN using a DSL modem.
3. A wireless connection using a wireless modem.

In the correctional institution environment a wireless connection to the ISP is not practical. The computer laboratory will not be moving so mobility will not be a problem. A wireless connection to the ISP is also very expensive and therefore a landline solution would be best. The normal modem that connects through the PSTN is too slow for the correctional institution needs. The amount of data that would be downloaded and uploaded would make it impractical. A DSL would be the best option with a high data transfer rate and more than one computer can access the Internet at the same time without causing problems or causing interference. This is called multiplexing by combining many signals (from all the computers in the laboratory) into one signal that goes to the outside world.

STEP 3: Computers

The next step after the networking hardware choice has been made is to choose the computers and servers. The amount of computers is not an issue when the choice of computers is being made. It might be an issue if discount on a group purchase is asked for, but the technical specifications will be the same for 10 or 30 computers.

First there is a choice between getting normal personal computers (PCs) that can be networked or getting "dumb" terminals. "Dumb" terminals are computers that do not have their own processing capabilities, and have to connect to a mainframe or midrange computer to access information and services using a program that is stored on the PC itself ("Online system", 2010). With all of today's different types of computers the choice is huge. There are also a lot of newer types of PCs like tablets, laptops, notebooks, netbooks and pocket PCs. With the prices varying all according to their processing capabilities, the choice will depend on what is needed and at what price.

For a basic computer the requirements for e-learning are:

1. Keyboard.
2. Mouse.
3. Computer screen.
4. Tower (Chassis).
5. Hard drive (does not need to be big).
6. Memory (1 gigabyte (GB) minimum).
7. CPU (Do not need the fastest in the market)
8. Motherboard.
9. Network interface card (NIC) for wire transmission or a Wireless PCI card for a wireless network.
10. Headphones (not to bother other people).

Optional:

11. Web cam (if needed for video conferencing with lecturers).

12. A DVD drive to read CDs and DVDs (optional because all software can be loaded from the administrator computer – an added security measure to prevent unauthorized data to be loaded onto the computers).

These are all the basic components needed for the individual computers that the inmates will be using. The administrator would need a more powerful computer to keep track of what is happening on all of the other computers. This tracking would be done through special software that will be discussed in the software requirements.

A proxy server will be needed. A proxy server according to Wikipedia (*See* Wikipedia*, Proxy server*, http://en.wikipedia/wiki/Proxy_server (describing proxy server that acts as an intermediary for requests) (as of November 22, 2013, 06:48GMT)) basically takes requests from clients on a network and forwards them to other servers. These requests can be anything from files to web pages. What makes it essential is that it can filter what goes out and in and prohibit clients from doing things or visiting websites that they are not supposed to. It also keeps a log of what clients are doing and what they are trying to do unsuccessfully. The type of proxy that would be needed in a correctional institution is a forwarding proxy that retrieves from an extensive array of sources (any place on the WWW) and it is called an Internet-facing proxy (*See* Wikipedia*, Proxy server*, http://en.wikipedia/wiki/Proxy_server (describing proxy server that acts as an intermediary for requests) (as of November 22, 2013, 06:48GMT)).

Another server is needed for data storage. If a central storage point is used then there is only one place to check for unauthorized items that inmates might want to store. Each individual computer can be prohibited from storing anything on their individual hard drives through a software application. This will be discussed in the software requirements section. Optionally the administrator's computer can be used as a file server, all that is needed is a big enough hard drive or just an extra one. As there would not be a great deal of data that needs to be stored by the individual inmates the second option is better and more economical.

STEP 4: Additional equipment

The last step for the hardware requirements involves all the extras needed to run a computer laboratory. A networked printer is needed. One laser printer can be connected to the network to enable all the computers to print. If a wireless solution is used the printer must either be a wireless enabled printer or it must be connected to the administrator computer and then enabled as a networked printer.

An uninterruptible power supply (UPS) is needed for power failures to keep the computers running so that all work can be saved and work can continue until the power is restored. Hard work lost due to a power failure can result in a volatile situation where inmates are involved! An on-line UPS where there is no delay if the power is lost, is needed. The power will be continuous for a certain amount of time depending on the size of the UPS.

Figure 5.1 shows how the computer laboratory should look like.

Figure 5.1 shows how a proposed computer laboratory would look like using wire transmission like twisted-pair or optical fibre. If a wireless solution is chosen then all the different computers would have wireless PCI cards and an indoor wireless router connected to the administrator computer to allow the computers to connect. Next the software requirements will be discussed.

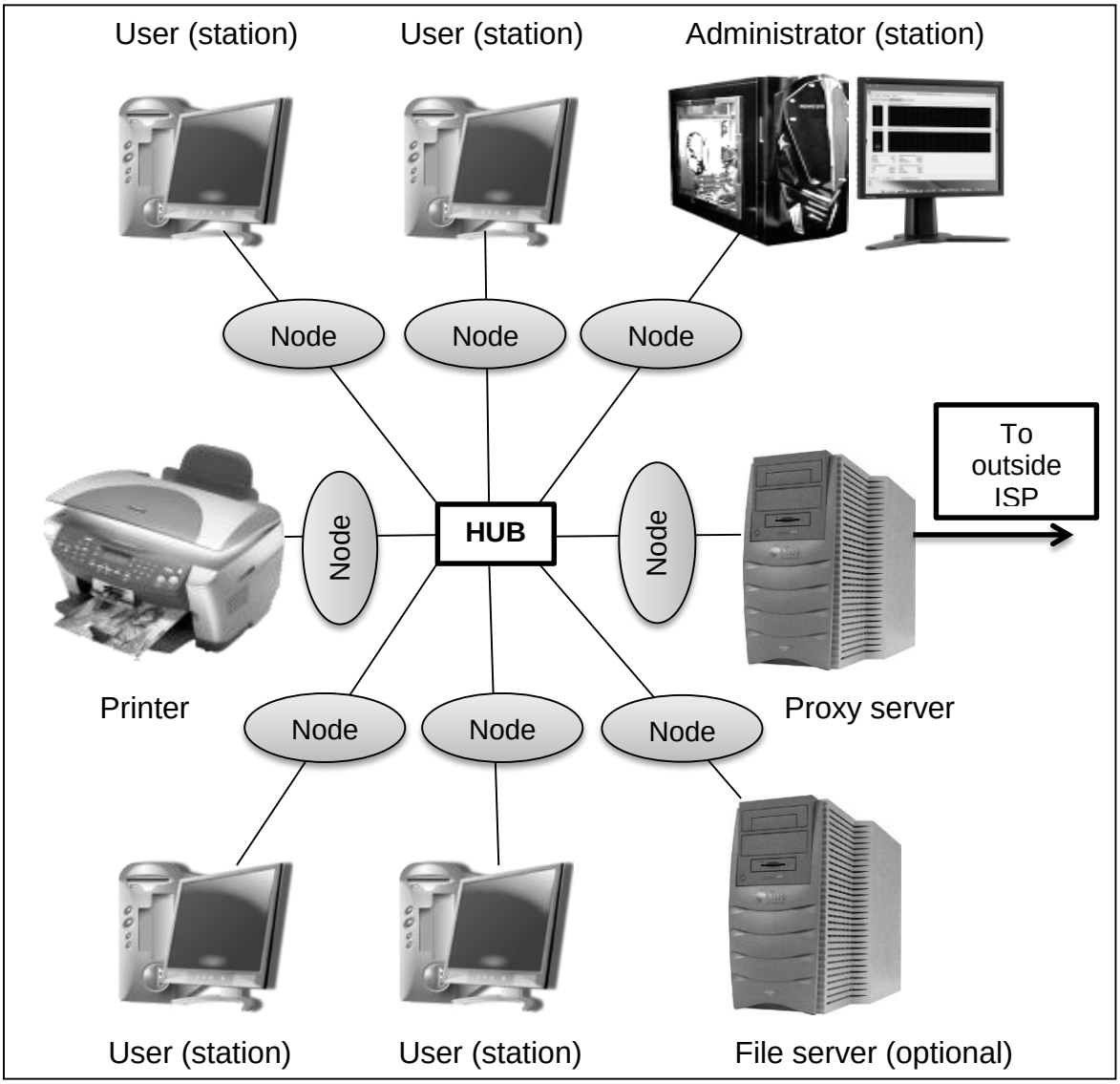


Figure 5.1: Computer laboratory (using wire transmission)

5.3.4. Software requirements:

STEP 1: Operating system

The first piece of software needed by every computer is an operating system (OS). There are three choices:

1. Windows OS by Microsoft.
2. Linux open source OS.
3. Mac OS by Apple.

Linux is an open source OS meaning anybody can see its source code and change it as they like. Linux is not as user friendly as the Mac OS or the Windows OS. Windows by Microsoft is the most popular OS for PCs and is also the most well-known. Mac OS are for Apple's Macintosh PCs only so this choice will only be taken if Macintosh PCs are bought for the computer laboratory. The choice is up to the correctional institution but the main point that must be remembered is that each computer using the OS must have its own license. This is very important as any institution can be penalized with a huge fine if caught running pirated OS software or not having a license for each individual PC using the OS.

Windows may be the best option as it is the most common one and the one that inmates are most likely to encounter outside the prison walls. There may also be more software available that runs under Windows.

STEP 2: Application software

The next step in the software requirements is the basic application software needed.

There are many types of application software, but the correctional institution only needs some for the work the inmates would be doing. Here are some:

1. Word processing software (for writing assignments).
2. Spreadsheet software (for creating spreadsheets and doing computations).
3. Database management software (if it is needed).
4. Antivirus software (for detecting of viruses and malware).
5. Specialized software unique to the e-learning environment or a specified course (this may be provided by the institution the studies will be done at).
6. Web browser (to view information on the Internet).
7. E-mail service program (to send and receive e-mails).

These are all the basic application software that is needed. The word processing, spreadsheets, and database management software can be bought in a package like Microsoft Office or it can be obtained for free like OpenOffice by Sun Microsystems, Inc.

There are a wide variety of antivirus software products on the market. Some examples are AVG, Avast, Norton, and Kaspersky. They range from free products to ones for businesses. The best option would be one that is bought and are specifically for businesses as they have added layers of protection.

A web browser like Microsoft's Internet Explorer or Google Chrome is needed to surf and search on the web. If Microsoft's Windows OS is used Internet Explorer is included in it. Mozilla Firefox is a free web browser available if correctional institutions want to use it.

An e-mail service program is a software application that allows a user to send, receive and store e-mails. Microsoft's Outlook is one that is included in the Microsoft Office suite. E-mail accounts can be set up for free at many companies on the Internet. Some examples are: Google's Gmail, Hotmail, and Yahoo! Mail. Some companies also provide their own e-mail service programs.

STEP 3: Security issues

This step is all about security. First the individual PCs need attention. Each PC except the administrator's needs the following done to prevent unauthorized activities:

1. Each PC's USB ports need to be disabled. This can be done in the BIOS of the computer and an administrator password put on the BIOS so that only the administrator has access to change the settings. The reason is that nobody should be allowed to insert a USB memory stick or any other external storage or access device into the computer to copy or access unauthorized information or access it without permission. Only the administrator's computer would be used to load anything that is needed.

2. Software should also be used to prevent any copying and saving onto the hard drive of the computer. Software applications like Deepfreeze from Faronics can be installed on a computer. This application allows a user to create a freeze point on the hard drive and anything that is saved on the hard drive after that point will automatically be erased every time the computer is restarted. The user can disable

this function but only with a password. If the administrator is the only one with the password, nothing can be saved on the computer thereby preventing the unauthorized saving of data. This forces the inmates to save all their work done on the file server where the administrator can keep a watchful eye on all data.

3. A firewall is needed to protect the inside network from unauthorized access from the outside (Internet). It can be hardware or a software solution. In this instance a dedicated hardware solution is chosen: the proxy server. The proxy server must be properly configured by only allowing certain data from coming into the network from the Internet and allowing only certain places to be visited by inmates. This must all be specified and configured by the administrator. An example is that inmates can only access the Unisa website or the institution that they are studying through. The administrator can then block all other outgoing and incoming data from sources not specifically allowed. Of course some inmates might try to subvert these precautions and instructions; therefore the next step is to monitor them.

4. Spyware is a type of malicious software called malware that can gather information about a user without them knowing it. In some cases in can be used for a good purpose. In this instance a correctional institution can install a keystroke logger on every computer to track what inmates are doing. Keystroke logging secretly records every key that the user presses on the keyboard. This can be viewed by the person that installed it or it can be sent secretly to that person.

   Keystroke logging can do a great deal more as well. It can take screen shots around where a mouse clicked, basically recording all the files, folders and websites visited. A complete history of everything done on the computer is recorded and the user cannot do anything about it. The only possibility is to remove the program, but in this instance the administrator is the only one that can do it, but will not.

   The administrator can from a central point monitor all the PCs in the computer laboratory and thereby find if and where unauthorized actions were performed or attempted.

5. There are some software applications that can monitor the amount of traffic going to and from the network. If there are some unusual fluctuations the application can notify the administrator that something out of the ordinary is happening and investigations can follow. For instance, if the centre is closed at night time and suddenly there are huge amounts of data being downloaded then the administrator can be notified by e-mail and can take appropriate actions.

6. Another software solution is that each inmate must log on with a password onto the PC before using it. This is nothing new, but passwords can be stolen and then somebody's identity used for unauthorized actions. To prevent this, a finger print scanner or even an eye recognition scanner can be used to log on. This is much harder to fake or steal at little extra cost.

The suitability and applicability of this model will have to be tested in future by implementing it in at least one correctional institution in South Africa.

5.5. SUMMARY

This chapter explained how a correctional institution can create a computer laboratory for inmates to utilize e-learning. All the necessary hardware and software that would be needed was explained. All the security precautions that need to be in place to prevent inmates from doing unauthorized actions were also explained. If all the precautions are in place and regularly checked and monitored then the security of the correctional institution could not be penetrated from outside of the correctional institution or from the inmates from the inside.

This is just one proposal. There are many other possible solutions out there that could work just as effectively. For instance some examples of other proposals of methods of e-learning for educational purposes are the <e-UCM> group that developed the <e-Adventure> platform to develop educational games (Torrente, del Blanco, Marchiori, Moreno-Ger, & Fernández-Manjón, 2010) and the SuperStella project that studied the use of e-learning in small and medium sized organisation (SME) and the L-Change project that studied e-learning providers (Stephenson, 2003). The intention was to show that there is a way for a correctional institution to set up a computer laboratory that could benefit all the inmates through the use of e-learning but still prevent them

from doing prohibited activities and compromising the security of the correctional institution environment.

Chapter 6 is the conclusion of the dissertation and provides some recommendations and challenges for the future and some pointers for future research.

6. RESEARCH SUMMARY AND CONCLUSION

6.1. INTRODUCTION

With the world being in the information age today, most kids grow up using technological devices for recreation and education. The problem is the group in the population that do not have these privileges. These people are separated from the rest of the world through the digital divide. One part of this group is inmates.

This dissertation is all about the correctional institution environment and the type of education that is available to inmates. Through a literature study it was shown that in the normal educational system outside of the correctional institution, computers have been brought into the equation. Most schools do use computers for instruction and they also have specific computer subjects as part of the curriculum.

The results from the survey showed that over three quarters of the inmates have never even used a computer. This already separates them from the rest of the world. The thirst for knowledge when it comes to computers is there, but the opportunities are not. One problem, with the educational system in the correctional institution environment is that it is too outdated. There simply are not enough opportunities for inmates to learn all about computers.

The biggest problem is financing. Most inmates do not have the funds to study further, and many of the inmates study with loans. The support that is needed for inmates is simply not available.

Through the interviews with the correctional institution officers and the inmates a picture was painted of all the daily struggles when it comes to education. All the affairs that prevented and hindered the inmates to study were highlighted. This data collected showed the problems that exist and that they have been around for a quite a while. The researcher is of the opinion that a possible solution to these problems is e-learning.

6.2. RESEARCH QUESTIONS REVISITED

This section will discuss all the research questions posed and their results and conclusions drawn from the research.

Sub-question 1: Which challenges and obstacles prevent the use of ICTs to develop inmates and bridge the digital divide?

From the interviews with the correctional institution officers it can be seen that the first hurdle that will have to be overcome is to teach the necessary computer skills to the correctional institution officers. Many of the educators indicated they have not received any training in computers and this would be a hurdle for them. Therefore the digital divide also affects the correctional institution officers.

Next the inmates need to be taught how to use computers. According to figure 4.7, 78% of the inmates that participated in the survey have never used a computer. Once computer literacy is taught to inmates, only then can ICTs be used to develop inmates.

One challenge that the correctional institution officers indicated was that the financial means to buy the necessary ICT equipment and set up the necessary lab for inmates to be taught in was simply not available. To bring around change, the upper management of the correctional services will have to be convinced of the benefits of using ICTs to develop inmates. Only then could such a project have a hope of being successful. One possible solution could be to source equipment from companies that upgrade their systems and would be willing to donate the old computers to the institution.

Sub-question 2: What types of e-learning can be used to provide learning opportunities for inmates?

Intelligent Tutoring Systems (ITS) – as indicated in section 2.4 – can be used to simulate real life and help to teach inmates. Web-based Intelligent Tutoring System is a variant of ITS that uses the internet to connect learners with real life tutors to help in the case where problems occur. Course Management System (CMS) is a much broader package that offers many more services to learners and has a much broader scope. Collaborative Learning Systems (CLS) take advantage of computer-supported environments to make it easier for collaborative learning to take place. Groupware applications is used to connect learners, and by using teamwork and interactive communication, learners interact together to learn from each other and to provide encouragement. All of these could be used to teach inmates.

Sub-question 3: How can inmates and the correctional institution teachers benefit from e-learning?

During the interviews with the correctional institution officers, when e-learning and its benefits was explained to the educators, all of them indicated that this would make their lives a good deal easier. The biggest attraction for the educators was that they would not have to travel so much anymore to the different educational institutions for enquiries and registration.

For inmates and educators alike, if communication with the institutions could be facilitated online, all the unnecessary time and frustration with the postal system could be completely eradicated. Registration, enquiries, and the tracking of study material could all be done online. In some instances study material could also be accessed online, eliminating the need for the postal service.

One huge benefit for correctional officers and inmates alike is that many more inmates will get the chance to actually study and improve themselves. With all the free resources available online, many inmates who does not have the necessary resources to study will get the chance to access the free education that is available on the internet.

Sub-question 4: Do inmates want to use e-learning to better themselves and change their behaviour?

According to table 4.8 80% of inmates that have used computers before indicated that they want to use a form of e-learning to be taught in. Out of the 56 inmates that indicated they have used computers before, irrespective for what purpose, only 11 chose not to be taught using a form of e-learning. It would be interesting to find out why? This could be part of future research on this topic.

Sub-question 5: Will inmates have the necessary skills to use e-learning facilities, and if not, can the correctional institution authorities provide the necessary facilitation to develop these skills?

Out of 254 inmates who participated in the survey, 56 (22%) indicated that they have used computers before. 80% of these indicated that they want to be taught using e-

learning. Of the inmates that have computer skills, 80% of them want to use these skills and improve on them. The data indicates that at this stage inmates probably do not yet have the necessary skills to do e-learning independently.

From the interviews with the correctional institution officers, it was said that if they could have the necessary computer skills it would be of a huge benefit to them to teach using e-learning. Surely this enthusiasm for new methods of teaching could be used to teach inmates computer skills and further their education using e-learning. Many inmates with the necessary computer skills could also be used as tutors to help teach these skills to fellow inmates.

Sub-question 6: How will correctional institutions be able to provide e-learning without compromising the security of the correctional institutions or the safety of the public?

Chapter 5 explained a proposed model of a computer laboratory that could be set up to provide e-learning facilities for inmates. It must be stressed that this is only one example. Many other solutions exist to overcome the fear of compromising the security of the correctional institutions. Other examples was given, like for instance the <e-Adventure> platform to develop educational games (Torrente, et al., 2010). This example was not chosen as a solution to the problem as many of the inmates have not even used a computer before and to introduce games would have to involve a pilot study. This could be used in future research to make learning fun for inmates.

With the right planning and control systems in place a secure computer laboratory could be set up that would allow inmates to securely communicate over the internet with institutions that are authorized beforehand. Resources that are online could be filtered so that no unauthorized digital material is accessed and whatever is accessed could be monitored to ensure that it is not unauthorized. This could open a whole new world to inmates that, because of the digital divide, have not benefited from the information age.

Main-question: How can e-learning be used in South African correctional institutions to provide educational opportunities for inmates?

From the above 6 sub questions and their answers, it can be shown e-learning is a viable option when it comes to educating inmates. The results from the interviews and the survey clearly indicate that inmates do want to learn more. It illustrates a lack of knowledge under inmates as to the possible uses of computers and their benefits. If inmates could be educated on the usage of computers and how to utilize them, a whole new world of opportunities could be shown to them.

6.3. AUTHORS' CONTRIBUTION

After answering a number of research questions, the researcher proposed a possible e-learning model to solve several problems that were identified during this research. Although other models may exist, this one was developed for the unique South African Correctional Services situation.

According to the researcher's knowledge this study is the first time that an inmate investigated the educational systems in correctional institutions. Most studies concerning education and the lack thereof is done by outside researchers that don't necessarily have an insider view like inmates themselves do. To try and explain to an outsider the daily struggle and frustration an inmate goes through is very difficult and complex. This is especially true for inmates that have been incarcerated for many years. The researcher believes this will give this research project more credence.

Furthermore, because an inmate did all the interviews with correctional institution officers, a more intimate knowledge of the workings of correctional institutions was known and used. The researcher believes that this background knowledge and experiences allowed him to have an advantage over researchers from outside the correctional institution environment. This also enabled the interviews with inmates to be more intuitive because the researcher (himself an inmate) could relate to the inmates.

The researcher is of the opinion that due to the fact that he is an inmate he has a good idea of what exactly is needed in the correctional institution environment for educational purposes. The whole reason behind the research is to try and improve the educational opportunities for all inmates, including the researcher himself. To write

something out of one's own experience is more valid than hearing from it from somebody else. Other research subjects lend support and supply affirmation of the problems.

Lastly, the researcher believes that the contribution of the proposed e-learning model is unique in the fact that usually research by outside researchers only highlights the problems. This research shows a solution from an inmate's perspective knowing full well how other inmates might try to corrupt or circumvent the system that would be put in place to ensure the security and safety of the correctional institution. The insider knowledge of how inmates think and act gives more credence to the proposed e-learning model.

The researcher believes these contributions to be beneficial in making the general public, the correctional institution officers, educators, and the broader academic community more aware of the educational wants and needs of inmates.

6.4. RECOMMENDATIONS

The researcher recommends that correctional institutions in South Africa should start using e-learning to better educate inmates. Inmates could be prepared for the world outside the gates of the correctional institution through computers.

With the technology available today inmates could be shown relevant aspects of the world through access to the Internet. Skills that are lacking could be taught through computers. Education could be made a great deal more accessible and fun for inmates. If inmates were exposed to wider access to information and what is available and the various opportunities that exist for them, this could surely motivate them not to commit crime again.

The researcher recommends that correctional institutions in South Africa follow in the footsteps of correctional institutions in countries like England, Australia and the United States of America. E-learning has been successfully implemented in correctional institutions in these countries and the results showed that inmates benefitted from it.

The results from the interviews with the inmates and the correctional institution officers confirmed all the current problems that could be solved with e-learning. The survey results supported the notion that inmates would like to learn more about computers

and this is a big plus point. For an inmate to be motivated to do anything constructive is in itself a big breakthrough when it comes to rehabilitation.

The only way for e-learning to have any chance of succeeding in South African correctional institutions is if government is an advocate thereof. If the government is serious about bridging the digital divide in South Africa, then inmates is a perfect place to start.

It is a closed environment that can be controlled. The correctional institution environment is already being monitored daily, so to add another system (e-learning in this instance) to be monitored would not be too big of a disruption. Inmates can go nowhere, so use them to test if e-learning is a viable option in bridging the digital divide.

The researcher would like to see e-learning being implemented in the next five years in a South African correctional institution. It does not have to happen at every single correctional institution, but at least five institutions so that comparisons could be made. This should be enough to show that e-learning could change the way education is perceived in correctional institutions.

6.5. CHALLENGES OF THE FUTURE

One of the main challenges of implementing e-learning in correctional institutions in South Africa would be to change the mind of the government to implement it.

The biggest concern would always be security. With the knowledge today to break in or in this case out of a system will be a major problem. With newer and newer technologies coming out every year a major challenge would be for the correctional institution authorities to keep up with what is happening in the sphere of the technologies that could potentially be a security risk for their e-learning systems. One thing that can always be counted on would be that inmates will always try to circumvent any security that is put in place. This will either be for personal gain, or just to mess with the correctional institution authorities. Most inmates are incarcerated because they could not follow the rules of society, so correctional institute authorities shouldn't expect them to follow the rules and regulations of the correctional institutions. Inmates will always test the boundaries of the correctional institution environment.

Cell phones are becoming more and more important in today's society. It is taking over the place of people's diaries and appointment books. Its functions now are:

1. A complete PDA.
2. Functions for writing and receiving e-mails.
3. Surfing the web.
4. Used in video phoning.
5. Applications that can be downloaded and installed and used.
6. Connecting to a cloud service provider and acting as a computer.
7. Watching and downloading of movies and music.
8. Playing and downloading games.

Because of all of these functions, inmates are smuggling cell phones into correctional institutions. This is a major problem, and correctional institutions can offer e-learning systems to inmates to try and curb the smuggling.

6.6. FUTURE RESEARCH

A pilot study needs to be done in South African correctional institutions. Two or more correctional institutions should implement e-learning on a small scale. The results of these two or more correctional institutions can then be compared to institutions where it has not been implemented. This will lend support either way if e-learning is a viable option to educate inmates.

A pilot study will also iron out any problems that are unforeseen or not clear. Researchers would also then be able to study all the ways that the security of the correctional institutions could be compromised. If live subjects are studied by observing them while they are studying, the data that they generate could later be studied and potential pitfalls could be identified.

Another option could also be to get testers (perhaps some really clever hackers) in and see if the system that would be in place could be breached from outside as well as inside the correctional institution.

Another possible future research project is to monitor the inmates that participated in the proposed pilot project to determine if the recidivism improves. A case study could be used with sample groups that would comprise of the following groups:

Group:	**Participants:**
Group 1	Inmates that did not participate in any educational activities while they were incarcerated.
Group 2	Inmates that participated in the normal ABET curriculum to get educational schooling
Group 3	Inmates that participated in the e-learning pilot project

Table 6.1: Proposed groups for a case study

These three groups of inmates could then be used to measure if the recidivism is the same or different. This potential data could either confirm that e-learning is a viable option or not.

6.7. CONCLUSION

In this chapter the researcher revisited the research questions as stated in section 1.5 to provide answers that surfaced from the research. The researcher's contribution to the body of knowledge was also discussed. Some recommendations were made and some future challenges highlighted. The researcher also briefly discussed a few future research projects relevant to the research in this dissertation.

The dissertation investigated the possible use of e-learning in correctional institutions in South Africa. Various challenges and problems were identified and possible solutions offered. A model to implement a possible e-learning solution was proposed.

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APPENDIX A – QUESTIONNAIRE

This study focuses on how e-learning can be implemented in South African correctional institutions to benefit the inmates and the teachers. This questionnaire is anonymous and all information collected will be kept in strict confidence. The aim is to get an idea of what the inmate population's statistics of educational level is and what their needs might be. Please answer honestly and thank you for your participation.

Instructions:

Please circle one correct answer for each question unless the question specifically states that you can have more than one answer.

1. What is your age?
    a) 21 – 25
    b) 26 – 30
    c) 31 – 35
    d) 36 – 40
    e) 41 – 50
    f) 50 and above
2. What is your race?
    a) Indian
    b) Colored
    c) Black
    d) Asian
    e) Caucasian
    f) Other
3. How long is your prison sentence?
    a) 1 – 5 years
    b) 6 – 10 years
    c) 11 – 15 years
    d) 16 – 20 years
    e) 21 years and above
    f) Life sentence
4. How long have you served in your sentence?

a) 0 – 3 years
b) 4 – 6 years
c) 7 – 10 years
d) 11 – 15 years
e) 16 – 20 years
f) 21 years and above

5. What educational level did you achieve outside of prison?
   a) Grade 1-7
   b) Grade 8-10
   c) Grade 11-12
   d) Tertiary education
   e) No education
6. What educational level did you achieve inside of prison?
   a) ABET level 1
   b) ABET level 2
   c) ABET level 3
   d) ABET level 4
   e) Grade 10
   f) Grade 12
   g) Tertiary education
   h) No education
7. Have you ever worked with a computer?
   a) Yes
   b) No
8. Indicate which of the following you have done on a computer (You may indicate more than one or none):
   a) Played computer games
   b) Used email facility
   c) Used the Internet
   d) Did word processing
   e) Used spreadsheets
   f) Wrote my own computer programs
9. How would you rate yourself in using a computer?

Novice Expert

1 2 3 4 5

10. Have you ever done any studies over the Internet?
    a) Yes
    b) No
11. What type of medium would you like to be taught with? (more than one can be indicated)
    a) Lecturer in a physical classroom
    b) Audio tapes
    c) Video tapes /DVD
    d) Lecturer over the Internet in a virtual classroom
    e) Computers using multimedia (audio, video and graphical pictures and cartoons)
    f) Correspondence through the post (self-study)

Thank you for your participation.

APPENDIX B – LETTER OF CONSENT

M.SC. Information Systems
Researcher: Karl Gustav Greyvensteyn (082 457 6728)
Supervisor: Ms EJ Naude (0763062963)

PARTICIPANT CONCENT FORM

Dear Participant

Thank you for showing interest to participate in this study. The objective of the study is to do research into the possibility of using e-learning to enhance education in correctional institutions in South Africa. The study is conducted by Karl Gustav Greyvensteyn under the supervision of Ms EJ Naude from the University of South Africa. Your participation is completely voluntary and the results will be treated confidentially and anonymously. The results will be used for research purposes only. The duration of the completion of the questionnaire will take less than 20 minutes.

Declaration

I, _____ hereby voluntary grant my permission for participating in the research project as explained to me by the researcher Karl Gustav Greyvensteyn. The inputs derived from my participation will be interpreted and presented so that my identity will be kept confidential and anonymity will be preserved. I understand my right to choose whether to participate in the project and that the information completed will be handled confidentially and anonymously. I am aware that the results of eth investigation may be used for publication purposes. I also understand that I have the right to withdraw my participation at any time.

Date _____

_____ _____

Participant Researcher: K.G. Greyvensteyn

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APPENDIX C – SAMPLE OF QUESTIONS FOR INTERVIEWS WITH INMATES

First I gave a questionnaire to each interviewee to get the background information.

1. Are you interested in any schooling while you are incarcerated?
2. What exactly have you done so far in connection with education in the correctional institution?
3. What problems have you occurred with studying while incarcerated?
4. What motivates you to study further while you are incarcerated?
5. What do you know about computers?
6. Would you like to know more of computers and what exactly?
7. Would you like to use computers in your education in the correctional institution?
8. What do you see yourself doing when leaving the correctional institution?
9. Do you feel the correctional institution is doing all that they can for your education?

APPENDIX D – SAMPLE OF QUESTIONS FOR INTERVIEWS WITH CORRECTIONAL OFFICERS

1. How long have you worked for the department of corrections?
2. How long have you worked in the education department?
3. What qualifications do you have?
4. What problems can you see from your side concerning education in correctional institutions?
5. What motivates you to teach in correctional institutions and motivations do you give inmates?
6. Have you done any studies online?
7. Do you want to study further, and in what direction?
8. What do you understand of e-learning?
9. Do you think e-learning can be implemented in correctional institutions?
10. What problems do you foresee for e-learning to be implemented?
11. Any suggestions towards bridging the digital divide and preparing inmates for the world outside?