Chapter 3 – Research Design and Methodology

3.1 Overview

In Chapter 1, the introduction to this study, I dealt with the background to the research, my initial motivation for undertaking it, and the research questions that I devised for this study. In Chapter 2, the literature study, I examined a variety of theoretical frameworks and took into account what previous studies in this field had achieved. This chapter outlines the strategy that I adopted to answer the research questions. Other matters, such as the philosophical framework, research strategies, data sources and the tools that were used, are also described in this section.

3.2 Research Philosophy

This research is based on a functionalist epistemological orientation that includes elements of a deductive approach. The research utilizes a quantitative research strategy. This implies the following:

- Such an approach recognizes that a strategy is required that respects the differences between people and objects (positivism and interpretivism) in the social sciences (Bryman, 2004, p. 13).

- Such an approach is predicated on the assumption that social reality has a meaning for human beings and that human action is therefore meaningful – that is to say, social reality is meaningful to human beings and people act on the basis of the meanings that they attribute to their own acts and to the acts of others (Bryman, 2004, p. 14).

- Social phenomena and categories are not only produced solely through social interaction, but are in constant state of revision (Bryman, 2004, p. 17).

- The use of a deductive approach to the relationship between theory and research results in a valid research strategy (Bryman, 2004, p. 19).

- Education is a process and school is a lived experience (Merriam, 1998, p. 4).

- Understanding the meaning of the process or experience produces the data (knowledge) that is obtained from an inductive, hypothesis or theory-generating mode of inquiry (Merriam, 1998, p. 4).

- Such an approach incorporates elements of action research. This means that its purpose is to produce a solution or suggest an answer to the practical problem implied by the research questions (Krathwohl, 1997, p. 28).

Figure 3. 1 – Positioning of this study in terms of Black's quadrant

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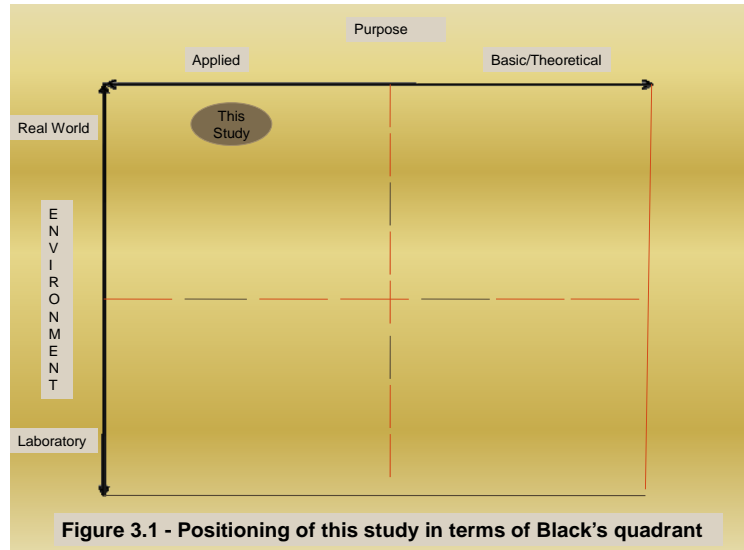
Black (1999, p. 13) divides the world of research into four quadrants according to their degree of real-world orientation and the extent to which the research is either applied or theoretical. This study can be situated in the upper left-hand quadrant because it has emanated from a real-life situation and because it addresses practical issues (Figure 3.2 above).

3.3   Research Design

Research design (which deals with design choices) is covered in section 3.3.1. This is then followed by a description of the methodology (section 3.3.2). Validity and reliability considerations are then covered in section 3.3.3 and 3.3.4 respectively.

3.3.1 Design Choices

The study design choice for this investigation was a case study. It was conducted at the Turfloop campus of the University of Limpopo with a student population who mostly originate from disadvantaged communities. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2003, p. 13). While the investigation reported here took place between early 2004 and September 2008, my intention is to continue to investigate the phenomena described in the study because the research was designed in such a way that larger samples and continuous observation of the relationship between the variables will serve to increase the reliability and the validity of the findings presented here. This study entails the detailed and intensive analysis of a single case – which is how Bryman (2004, p. 48) defines a case study. Bryman adds that a school (or, as in this case, a university) can offer ideal circumstances for the prosecution of a case study.

The case study falls into the category of what Bryman (2004, p. 51) calls "an exemplifying case". Such a case is chosen because it provides answers to certain research questions rather than because it is able to fit certain extreme conditions. Such a case allows key social processes to be examined. Bryman (2004, p. 51) offers an example of case study research which, in many ways, is similar to this study. His chosen example involves a researcher who seeks access to an organization because it is known to have implemented a new technology and because the researcher wants to know what kind of impact the

new technology is making. Because such a researcher may have been influenced by various theories about the relationship between technology and work and by the considerable research literature on the topic, he or she might, as the result, seek to examine the implications of some these theoretical and empirical deliberations in a particular research situation (Bryman, 2004, p. 51). In the case of the present study, the University of Limpopo, which came into existence as result of a merger process in January 2005, already had a long history of being associated with historically disadvantaged students. I have already assembled evidence to support this description of the institution and of its students in Chapter one. It had been my responsibility to provide ICT facilities and tools for the students of the university for a number of years prior to the commencement of the study. I have always been intrigued by the interest in technology displayed by the university's students, and have often wondered how, why and where this particular interest in technology originated. It was my curiosity about these imponderables that led to this study.

3.3.2 Validity

Validity is concerned with the integrity of the conclusions that are generated in a particular piece of research (Bryman, 2004, p. 28). Internal validity in particular is concerned with the question of whether a conclusion that posits a causal relationship between two or more variables is valid (Bryman, 2004, p. 28). The validity of the results of this project is supported by the fact that numerous studies by the research community have already established a causal relationship between the extent of ICT use and the motivational levels of students and the quality of academic performance. What has not yet been established by such research is the extent to which this causal relationship is demonstrable in students who originate from disadvantaged communities. It is undeniable that if this study had been extended over a longer period and had utilized a much larger sample, its conclusions would have demonstrated a much higher degree of validity. It is for this reason that I intend to extrapolate the research reported here for a number of years into the future. This process will be facilitated by the

university's routine practice of measuring the effectiveness of various forms of ICT and correlating such measurements with the support offered by the academic community.

With regard to the validity of data collected by means of the MSLQ (Motivated Strategy Learning Questionnaire), it should be noted that the questionnaire was originally developed by a team of researchers from the National Centre for Research to Improve Post-secondary Teaching and Learning and the School of Education at the University of Michigan (Pintrich, Smith, Garcia, and McKeachie, 1991, p. 2). Pintrich et al. (1991) have the following to say about the early years of its development:

These early instruments were subjected to the usual statistical and psychometric analyses, including internal reliability coefficient computation, factor analyses, and correlations with academic performance and aptitude measures. We continually revised items on the basis of these results. The correlational studies were carried out on over 2,000 students during the 5 years of funding for the National Center for Research to Improve Post-secondary Teaching and Learning have shown fairly consistent results (Pintrich et al., 1991).

Locke (1996, p. 118) emphasizes the legitimacy and reliability of the process when he says: "Introspective reports provide (in principle) useful and valid data for formulating psychological concepts and measuring psychological phenomena (e.g., purpose, goal commitment, self-efficacy, etc.)". It is clear from these quotations that reputable academics regard the MSLQ as being able to deliver a high level of validity.

3.3.3 Reliability

Reliability is concerned with the question of whether it is possible to repeat the empirical work involved in the study under comparable circumstances. The term

is used to denote consistency of the measures that are devised for concepts in the social sciences (Bryman, 2004, p. 28). I have used as many individuals as possible in this study so as to reduce, as far as possible, the margins of error that may be present in the findings. One of the weaknesses of self-reporting questionnaires is the probability that the data they provide is highly subjective and, in some cases, not even stable. While self-reports can be used effectively to measure student perceptions of motivation and cognitive engagement, the results need to be replicated by means of other measures such as think-aloud protocols, stimulated recall procedures, structured interviews, and other forms of behavioural measurement (Pintrich and De Groot, 1990, p. 38).

The ideal scenario would have been to have combined the data from self-reporting in certain areas with data obtained from structured interviews. The use of a self-reporting technique makes the researcher dependent on what student thinks of himself or herself. The reliability of the study when it comes to motivation depends on the chosen instrument. This is reassuring because the MSLQ has been used extensively in research throughout the world and its reliability has therefore stood the test of time. The reliability of the MSLQ is confirmed by Lynch and Dembo (2004, p. 7) in the following statement: "It was validated through factor analyses, reliability analyses, and correlations with measures of achievement".

Duncan and McKeachie (2005, p.117) are of the opinion that the MSLQ has proven its reliability and use as a tool that can be adapted for a number of different purposes for researchers, instructors, and students. Its main focus – the interplay between motivation and cognition – is a central theme of Paul Pintrich's work. Duncan and McKeachie (2005, p.120) provide a table of what they refer to as "a small sample" of the research that has used MSLQ between 2000 and 2004. This "small sample" was sourced from 56 mostly undergraduate academic institutions which use many different languages as the medium of instruction in many different parts of the world.

3.4   Research Methodology

Research methodology refers to a particular approach to the collection of data (Bryman, 2004, p. 27). It was mentioned earlier that this study uses quantitative research. Quantitative research is "deductively pre-planned and designed around one hypotheses with data that are numbers representing quantities of whatever was measured" (Krathwohl, 1997, p. 26).

I have also tried in the study to find evidence for the remedial role that ICT might exert in the improvement of the academic performance of disadvantaged students. Krathwohl, (1997, p. 22) asserts that such an attempt could be defined as quantitative research. He maintains that, in quantitative research, the explanation guides the development of the study whereas, in qualitative research, the explanation grows out of the assembled data. He also notes that the quantitative researcher is committed to the epistemological assumption that there is an objective reality that is "out there to be discovered" (Krathwohl, 1997, p. 23).

There are two other distinctive characteristics of a quantitative research methodology. One is that quantitative research measures observations by means of scales (Krathwohl, 1997, p. 24). The scales in this case study are represented by grades. The second characteristic is that a quantitative study focuses on a direct cause-and-effect relationship between two variables (Krathwohl, 1997, p. 24). The academic puzzle at the root of this study is the relationship that is hypothesized to exist between a student's ICTs use and the motivational orientation of students on one hand and an improvement in academic performance on the other. This is the basic hypothesis that drives this research. The following quotation by Bentz and Shapiro (1998, p. 121) serves to confirm the quantitative nature of this research: "Inquiry in the quantitative (and behavioural) tradition is most broadly characterized by a concern with explanation, and explanation is conceptualized in a manner similar to the natural

science model. That is, researchers look for general law-like relationship among phenomenon as the key to casual relationship. At this point it is important to take note of the long debated argument that "correlation is not causation" (Holland, 1986, p. 945). That is, with so many possible factors effecting students' academic performance, even if there might exist a statistical correlation between various variables of this study and the academic performance, it does not necessary imply that they are the cause of it. One needs to look at the particular case to arrive at such a conclusion.

I used two main tools to obtain the necessary data. The first tool was a questionnaire that was designed to provide the required data about student computer access, computer use, and motivational orientation. The second tool collected information about the academic performance of students from the University of Limpopo's student database.
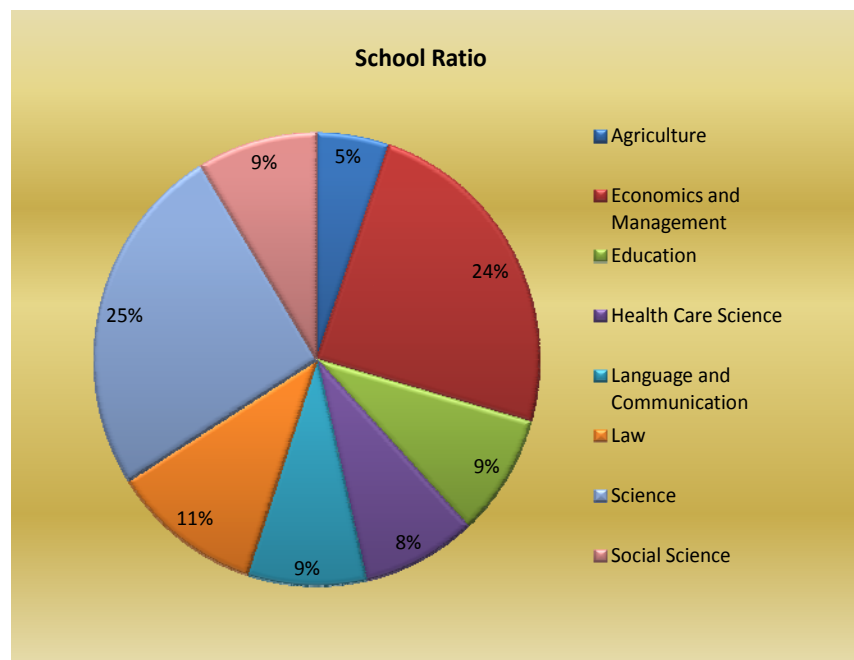
3.4.1 Participants

This section provides a brief analysis of the students who participated in the study. Special attention is given to the number of participants from each school and faculty and to the gender composition of the sample. A more comprehensive analysis with appropriate findings can be found in the findings and discussions sections of Chapter 4.

This study is specifically focused on students from a disadvantaged background. The University of Limpopo is one of the higher education institutions that was historically disadvantaged by the social, economic and political circumstances that prevailed prior to 1994. Much of the historical culture of the university has remained the same as it was under the old regime, even though it has been gradually changing since 1994. For the purposes of this study, the term "disadvantaged" refers to a student who, because of economic and social conditions, received an inadequate academic education prior to registration at

the university and who therefore requires special attention and remedial assistance in order to meet the standards of the university. The question that this study undertakes to answer is whether technology (ICTs) can play a role in providing such remedial assistance. The data elicited by the study serves to quantify the amount of computer access that a typical student had prior to his/her registration for undergraduate study. The figure below shows the distribution of participants according to their school attendance.

In August 2008, the total student population of University of Limpopo in Turfloop campus was 12,227. All these students were distributed among 11 schools. Figure 3.2, below, depicts school distribution in terms of the data collected from the questionnaire. This data is presented in table form in Table 3.1 below. Figure 3.1 and Table 3.1 below reveal that the largest number of respondents were enrolled in the Sciences School (67 participants or 25.3 %). The second largest number were enrolled in the Economics and Management School (64 participants or 24.2 %). The lowest number of participants were enrolled in the Agriculture School (14 or 5.3%).

Figure 3. 2 - The distribution of the participants according to school attendance.

	#	%
Agriculture	14	5.3
Economics and Management	64	24.2
Education	23	8.7
Health Care Science	22	8.3
Language and Communication	23	8.7
Law	29	10.9
Science	67	25.3
Social Science	23	8.7
Total number and percentages of participants	265	100.0

Table 3.1 – The distribution of the participants according to school attendance.

The participating respondents were enrolled in all three of the faculties that operate on the Turfloop campus. Figure 3.3 (below) graphically depicts the distribution of student participation among the faculties, and Table 3.2 (below) provides the same information in terms of numbers and percentages.

Figure 3.3 - Distribution of students among the faculties
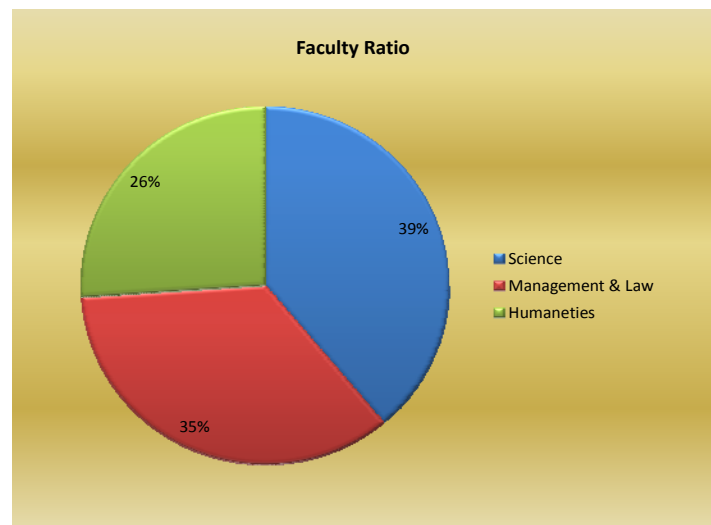
Faculty	#	%
Science	103	38.9
Management and Law	93	35.1
Humanities	69	26.0
	265	100.0

Table 3.2 – Distribution of students among the faculties in terms of numbers of participants and the corresponding percentages.

Table 3.2 reveals that Science faculty students constituted the highest number of participants (103 participants or 38.9% of the total). Management Sciences and Law faculty students accounted for 93 students or 35.1% of the total, and the Humanities faculty accounted for 69 students or 26.0% of the total number of participants.

Even though 52.8 % of the total Turfloop student population is female, only 33.2% of the total number of respondents were female. Figure 3.3 and Table 3.4 (below) set out this information in figural and table format below.

Figure 3. 4 - Percentages of participants according to gender participation.
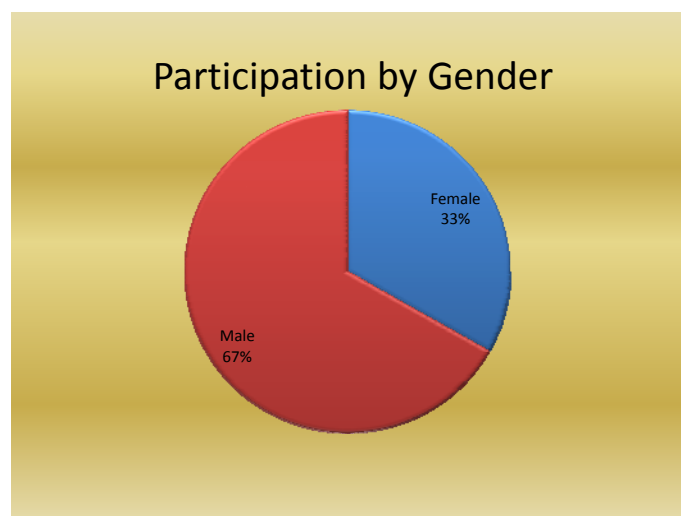
	#	%
Female	88	33.2
Male	177	66.8
	265	100.0

Table 3.3 - Gender participation in terms of actual numbers and percentages.

Of the total of 265 participants, 88 or 33.2% were female. The balance (177 or 66.8%) were male. This means that there were approximately twice as many males as females who participated in the study.

3.4.2 Instruments

The instrument that was used for collecting data was a questionnaire that was made available to the participants in both online and printed format. A copy of this questionnaire may be found in Appendix A.

The questionnaire had to find answers to three sets of questions: technology use, motivational and cultural orientations. Measuring motivation had its own challenges since it had to be a tool that is reliable with a proven track record in the academic world. Motivated Strategies for Learning Questionnaire (MSLQ) provided the solution. It measures motivational variables such as intrinsic, extrinsic and self-efficacy. It is used extensively throughout the world particularly in institutions of higher learning. The MSLQ was developed using a social-cognitive view of motivation and learning strategies, with the student represented as an active processor of information whose beliefs and cognitions mediated important instructional input and task characteristics. The social-cognitive theoretical framework on which the MSLQ was founded assumes that motivation and learning strategies are not traits of the learner, but rather that motivation is dynamic and contextually bound and that learning strategies can be learned and brought under the control of the student (Duncan and McKeachie, 2005, p. 117).

The technology component had to have a number of characteristics. It was supposed to measure technology use, its level of integration in teaching and

learning and expressed a general sort of opinion about ICTs. An existing questionnaire produced by C. Brown and L Czemiewicz of the University of Cape Town provided the missing link. To ensure the instrument is not too long I decided to be content with some of the existing questions in the same questionnaire that addressed the cultural aspects.

The questionnaire was divided into the following four parts:

Part A investigated student access to ICTs, and consisted of 27 headings and measures:

- How students use ICTs and the respective frequency of their usage

- The extent of ICT usage for academic purposes

- The nature of ICT use

- Physical access to ICT, and the ease or otherwise of accessing ICT facilities by students

- The level of skill with which students manipulate ICTs, and the extent of their familiarity with the ICT tools concerned

- Sources for obtaining assistance

- The level of user (student) satisfaction with ICT services

Part A sought in particular to ascertain the students' responses to ICT as a tool in education.

Part B investigated the extent to which students used ICTs, and consisted of 19 headings and measures:

- The extent to which students used ICT tools such as email, Internet, etc.

- The extent to which ICTs were integrated with academic programmes such as learning, teaching, and assessment

- The expectations of students with regard to ICT facilities and tools

Part C sought information about student gender, the school or faculty in which students were enrolled, and the ethnic group to which students belonged. Part C was arranged under 11 different headings.

Part D presented the Motivated Strategies for Learning Questionnaire (MSLQ). It has already been noted that the MSLQ was originally developed by a team of researchers from the National Center for Research to Improve Post-secondary Teaching and Learning and the School of Education at the University of Michigan (Pintrich, Smith, Garcia, and McKeachie, 1991, p. 2). It is a self-reporting instrument that was specifically designed to assess how motivated university students are to achieve their academic objectives. According to Pintrich (2004, p. 401) self-report questionnaires, such as the MSLQ can provide information about student motivation in the college classroom as well as general capabilities for self regulation.

The MSLQ consists of two main sections – the motivation section and the learning strategies section. The motivation section consists of 31 items. It assesses students' goals, value assumptions and beliefs about their courses, their estimation of how adequate their skills might be for the attainment of success in their courses, and their levels of anxiety about the tests that are a component of the courses of their choice (Pintrich, Smith, Garcia, and McKeachie, 1991, p. 3). This section is the only part of the MSLQ that is used in this study. The second part that deals with learning strategies is excluded from this study.

The motivational component consists of 31 questions and the measures used to assess these factors. The motivational component seeks to elucidate and measure the following factors:

- Intrinsic and extrinsic motivations

- Task values

- Self-efficacy for learning and performance

Not all the questions are used in the analysis. Where the findings are not significant or not related to the main objectives of the study are excluded from the analysis in this research. This is applicable to all four parts of the questionnaire. Although student participation in the research was conducted on a purely voluntary basis, I felt that it was appropriate to encourage students to participate by offering a prize. The questionnaire itself was rather daunting because it was long (it was arranged under 88 headings), and it was administered at a time when the students were busy with their examinations. Because of these difficulties, it was felt that the offering of a suitable prize might function to motivate students to participate in the study.

Before I distributed the questionnaire to the whole sample, I conducted a pilot study that involved distributing the questionnaire to a random number of students so that I would be in a position to observe their reactions and evaluate the suitability of the questionnaire and the circumstances in which it had to be answered. Because the results of the pilot study indicated that the length of the questionnaire was too long, I decided to omit some of the questions that were not critical to the process of finding answers to the main research questions. I was then left with a new version of the questionnaire, and used that version for all the participants. (Only a few questions, such as the ones relating to cellular phones in parts A to C, were deleted from the online version.)

Because MSLQ is a well-tested and proven assessment tool for acquiring information about the motivation and learning strategies of students, it is ideal diagnostic tool for faculties who wish to understand how best to improve student learning (Duncan and McKeachie, 2005, p. 117). Since the MSLQ was based on a social-cognitive view of motivation and learning strategies, it conceptualizes students as active processors of information whose beliefs and cognitions mediate important instructional input and task characteristics. Because the

social-cognitive theoretical framework on which the MSLQ is based assumes that motivation and learning strategies are not inherent traits that the learner possesses, it makes the assumption that motivation is dynamic and context-dependent and that effective learning strategies can therefore be learned by students (McKeachie, 2005, p.117).

MSLQ has been extensively tested in numerous research studies since the early 1990s when it was first devised. It has been validated by means of factor analyses, reliability analyses, and correlations with measures of achievement (Lynch and Dembo, 2004, p. 8, Pintrich, Smith, Garcia, and McKeachie, 1991). It was especially designed and developed for measuring the motivational orientation of college (i.e. university) students.

It should be noted that MSLQ is typically used to evaluate students' motivational and cognitive orientations towards a particular course. In this study, I have extended the scope of what MSLQ measures and broadened it so that it includes the entire educational experience of a student at university. I have accomplished this by interpreting the questions that relate to a particular subject as being relevant to the whole degree course for which a student has registered. The limitation inherent in this approach is that a student might well have one set of orientations towards one subject while having a very different set towards another subject.

Parts A-C were developed by C. Brown and L Czemiewicz of the University of Cape Town as part of a national initiative to measure access and use of ICT for teaching and learning in higher education in South Africa.   This questionnaire, with the exception a few questions, that would have made the process too long and irrelevant, was used in its entirety. Research question were focused on four different categories- culture, motivation, technology and institutional changes. The research questions in terms of technology and institutional change were adequately covered.   Cultural related questions were a few but enough for

otherwise it would have made the process much too long.   Motivation related questions were absent which I had to look elsewhere for a suitable set of questions which let to the discovery of MSLQ which was explained earlier in this section.

3.4.3 Procedures

The research question which this study sets out to answer relates to the reasons why certain students are attracted to technology and whether this evident passion can be correlated with improvements in academic performance. It was necessary to use as large a sample as possible in order to draw valid conclusions about the measured variables and to determine whether a pattern exists between the variables in question.

The quantitative method was deemed suitable because the size of the sample made the detection of a possible correlation between the use of ICT and motivational orientation to academic performance feasible. A questionnaire had to be developed that required responses to these two sets of questions, the first relating to patterns of ICT usage, and the second relating to motivational orientation. It was noted earlier how a similar development at UCT resulted in the creation of a questionnaire that, in terms of ICT use in its manifold aspects, adequately covered all the areas. The motivational component had to be added from a different source (MSLQ) as was explained earlier. Once the questionnaire had been developed, a decision was made to make it available online as well as in printed (paper) format.

I therefore developed an online version and linked it to each student's database. Initial versions were modified to maximise user friendliness and ease of access and navigation. The University's Academic Computing Unit plans to use this tool in the long term in order to continue to measure students' responses to their various services. Once all the features of the questionnaire had been developed and once it had been ascertained that it conformed to acceptable standards, it

was necessary to test it so that the accuracy and integrity of the programs involved could be checked. This process took a great deal of time because the first series of tests revealed a number of "bugs" that had to be corrected and eliminated. The final version therefore only became available early in April 2008. A team from the ICT's Academic Support Unit accepted responsibility for introducing the questionnaire to the students and for encouraging them to respond to it. A special icon was displayed on-screen on all the university's computer laboratories (several hundred computers in all), and thus the existence of the questionnaire was made both visible and accessible to all students. This enabled students who wished to participate to access the questionnaire and to respond to it if they wished.

The online version was much easier for students to manipulate because it eliminated the data entry step which, in the printed paper version, was more cumbersome and would therefore increase the possibility of introducing errors during the data entry process. The online version did, however, have one major drawback: it effectively excluded students who made little or no use of the university's ICT facilities. The data would have been more representative if it had included those few who do not habitually make use the computer laboratories. I decided therefore to obtain permission from the student residences to approach students directly in their residences. When this permission had been granted, a set of paper-based questionnaires were distributed among the residences and a specific deadline for the completion of the questionnaire was clearly indicated to participants.

When the deadline for participation arrived, 56 paper-based questionnaires had been completed. It was found that in the case of 12 of the completed questionnaires were handed in with a missing last page. These questionnaires were removed from the total sample because they would have affected the accuracy of the results relating to the motivational section. It was also found that a further 6 questionnaires had been filled in incorrectly because these students

had responded with either all 7s or all 1s in the motivational section. This meant that a separate database had to be created which excluded these records for calculations that related to motivation orientation analysis.

In total, 276 students responded to the questionnaire. These responses were carefully examined for correctness and adherence to the protocol. It was found that 8 records contained mostly zeroes (revealing that the respondents concerned had not answered the questions), and that two records contained test data. These were excluded from the database. This meant that there were 266 records that could be used in the study because they conformed to all the requirements of the study design.

MSLQ has a prescribed way of calculating its results. It is available from Pintrich, Smith, Garcia and McKeachie (1991).   Accordingly, an average value for each motivational variable was calculated.   In this way each student ends up with a value for each motivational variable of intrinsic, extrinsic and self-efficacy that lies between 1 and 7.

In the same document the alpha values are also provided.   The alpha coefficient reliability value for Intrinsic motivation is given as 0.74 (p.13), for extrinsic is 0.62 (p. 14) and for self-efficacy is 0.93(p. 17).   With assistance from the statistician for this study the alpha coefficients for the data set was produced with 0.732 for intrinsic motivation 0.829 for extrinsic and 0.910 for self-efficacy.

For the remaining section of the questionnaire i.e. the non motivational part it was not possible to arrive at a reliability coefficient due to the type of questions. The data by this time was in UL's Oracle database.   A tool called Discoverer 2000 was used to extract the information. Many of the straight forward calculations such as the pie charts and tables were obtained directly using Discoverer.   The data had to be exported to SPSS which is recently referred to as Predictive Analysis Software or (PASW) for statistical analysis.   The advice of

an experienced statistician that is available from the University of Limpopo for such projects was requested to assist with the process. Descriptive statistics like frequency and percentage tables, graphs, means and standard deviation were used to illustrate the results. In cases where two groups had to be compared, in terms of their mean differences, a t test was used and ANOVA (Analysis of Variance) when there were more than two groups. In cases where two categorical variables had to be compared chi-square was used. In very few cases when n was too small the non-parametric Kruskul Wallis test was used. It should be mentioned that in both paper and online versions student number which uniquely identifies each student was used to link the data from the questionnaire to the University's database where academic data is stored. However, in order to protect anonymity no individual student details were reflected in any of the findings or reports.

3.4.4 Data Sources

The main sources of data were a student questionnaire and the university's student database.

Table 3.4 below, summarizes the topics that were dealt with by the research questions and the sources from which the relevant data was obtained.

Research Questions	Q	UL DB
How do students use ICTs on campus and off campus?		
How often are the students on campus?	✔	
What percentage of the ICTs' usage is used for academic purposes?	✔	
Where is the most likely venue that ICT activities take place on campus?	✔	
Is the usage limited to the duration of an academic activity, like a lecture, or is it based on students' own initiative?	✔	
With regard to access and environment, how easy or difficult is it to use ICTs?	✔	
Is the Internet accessible off campus? How?	✔	
How easy is the ICTs access off campus?	✔	
How extensive is the students' ICT experience?		
How long have students been using computers?	✔	
How did they first learn how to use a computer?	✔	
What portion of their usage is for academic purposes?	✔	
To what extent are ICT tools, such as email, the Internet, Skype, are used by the students?	✔	
How extensive is ICTs' integration with Teaching and Learning practices at the University?		
Are there courses where ICTs are used as part of teaching and learning?	✔	
Do these activities account towards students' academic performance?	✔	
How extensive are ICT tools, such as presentation, application,	✔	

Research Questions	Q	UL DB
and other specialized software, being used by the academic community during the teaching process?		
Are students encouraged to use ICT tools such as email and the Internet, as part of the academic experience?	✓	
To what extent has the association with technology been beneficial in academic achievements?	✓	✓
Institutional Performance Based Research Questions		
How important is the role of infrastructure in providing an effective learning environment?	✓	
What institutional changes are necessary to produce a learning environment that is conducive to accelerated learning?	✓	
Cultural Orientation Research Question		
Does culture influence motivation and academic performance?	✓	✓
Do family and friends play a role in motivating ICT use and thereby influence academic results?	✓	✓
If so, what is the implication for ICT service delivery in an educational environment?	✓	
Motivation Orientation Research Questions		
Why are students interested in technology?		
Are there evidences for self-directed learning, and, if so, how do they affect ICT use and academic performance?	✓	✓
How does intrinsic motivation play a role in ICT use and academic achievement?	✓	✓
How does extrinsic motivation affect ICT use and academic achievement?	✓	✓
What is the role of self-efficacy in the level of ICT use and academic achievement?	✓	✓

Table 3. 4 – Topics dealt with by the research questions and the sources from which the relevant data was obtained

Students' performance records are available in the University of Limpopo's central administration database**.** This database is a reasonably reliable source of information and provides information about name, age, gender, first registration date and other academic related-information such as academic results.

3.5   Research Question

The title of the research reflects the major focus areas of the project that is being investigated.

> ***The role of Information and Communication Technology (ICT) in a higher education institution: with specific reference to disadvantaged students, cultural aspects and motivation***

In order to find answers to this main research question, I had to divide it into four main focus areas. The first category deals with ICTs and the manner in which they are used by students. They include **ICT**s' extent of use, their integration into teaching and learning and whether their use contributes towards students' academic performance. The second category explores the effect of students' **cultural** background on ICT use and academic performance. The third category deals with influences based on **motivational** orientation and whether there is correlation with ICT use and academic performance. The forth category looks at areas of institutional performance that need improvement.

3.5.1 Technology Based Research Questions

The questions that dealt with these topics sought to answer the following questions:

How do students access ICTs on campus and off campus?

In order to find this question the following sub-questions had to be addressed.

- How often are the students on campus?
- What percentage of the academic time is spent with ICTs?
- Where is the most likely venue for ICT use on campus?
- Is the usage limited to the duration of an academic activity, like a lecture, or is it based on students' own initiative?
- How easy or difficult is it to use ICTs in terms of ICT access and environment?
- Is there access to ICTs (computer or Internet) off campus? How?
- How easy is the ICTs access off campus?

How extensive is the students' ICT experience?

Under this general heading I attempt to find answers to the following questions:

- How long have students been using computers?
- How did they first learn how to use a computer?
- What portion of their usage is for academic purposes?
- To what extent are ICT tools, such as email, the Internet, Skype, are used by the students?

How extensive is ICTs' integration with teaching and learning?

Under this general heading, I attempt to find answers to the following questions:

- Are there courses where ICTs are used as part of teaching and learning?
- Do these activities account towards students' academic performance?

- How extensive are ICT tools, such as presentation, application, and other specialized software, being used by the academic community during the teaching process?

- Are students asked to use ICT tools such as email and the Internet, as part of the academic experience?

- To what extent has the association with technology been beneficial in academic achievements?

3.5.2 Cultural Orientation Research Question

Under this general heading I aim to find answers to the following questions:

- Does culture influence motivation and academic performance?

- Do family and friends play a role in motivating ICT use and thereby influence academic results?

- If so, what is the implication for ICT service delivery in an educational environment?

3.5.3 Motivation Orientation Research Questions

Under this general heading I aim to find answers to the following questions:

- Why are students interested in technology?

- Are there evidences for self-directed learning, and, if so, how do they affect ICT use and academic performance?

- How does intrinsic motivation play a role in ICT use and academic achievement?

- How does extrinsic motivation affect ICT use and academic achievement?

- What is the role of self-efficacy in the level of ICT use and academic achievement?

3.5.4 Institutional Performance Based Research Questions

Under this general heading, I attempt to find answers to the following questions.

● How important is the role of **infrastructure** in providing an effective learning environment?

● What institutional changes are necessary to produce a learning environment that is conducive to accelerated learning as the result of cultural and motivational findings?

3.6 Summary

In this chapter, I described and explained the design and methodology that I used in this study. It was noted that this project can be categorised within the top left-hand square of Black's (1999, p. 13) quadrant because it is based on applied, real-world data. I described how the research philosophy that scaffolds the study is more aligned with interpretivism than positivism. This was followed by a description of the case study design characteristics that were chosen and the quantitative strategy that was adopted for the study. I explained the features of the questionnaire that was used to gather the research data and detailed the procedure that was used during the process of collecting the data. In the following chapter, I describe the findings from this research.