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**THE IMPLEMENTATION OF INFORMATION AND COMMUNICATION
TECHNOLOGY (ICT) INTEGRATED TEACHING AND LEARNING IN
TEXTILES AND CLOTHING PROGRAMMES AT ONE UNIVERSITY OF
SCIENCE AND TECHNOLOGY IN ZIMBABWE**

**A THESIS SUBMITTED IN FULFILMENT FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY (PHD) IN EDUCATION, FACULTY OF
EDUCATION, UNIVERSITY OF FORT HARE**

BY

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JUNE 2016

DECLARATION

I hereby solemnly declare that this thesis titled '**The implementation of ICT integrated teaching and learning in Textiles and Clothing programmes at a selected University of Science and Technology in Zimbabwe**' is exclusively a product of my own work. The thesis has not been submitted to any other institution of higher learning for the award of any qualification. I have acknowledged the sources of published or unpublished work of other scholars which I have made use of both in the text and in the list of references appended to the thesis.

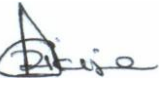
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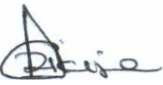
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ABSTRACT

Textiles and Clothing programmes in universities worldwide experience numerous challenges in effectively implementing ICT integrated teaching and learning. The aim of this study was to explore how ICT integrated teaching and learning was implemented in Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe, with a view to developing a suitable model to enhance effective implementation. The study was informed by the Activity theory and triangulated by the Technological pedagogical content knowledge framework (TPACK) and the Functionality framework. The study made use of the interpretive research paradigm, the qualitative approach and intrinsic case study design, to generate the necessary data. The participants of the study were purposively and quota sampled from the Textiles and Clothing department of the selected university of Science and Technology, and consisted of seven lecturers, three administrators, two ICT technicians and thirty-two students. Four methods were used to generate data namely in-depth interviews, focus group interviews, participant observation, and document analysis. After coding, data were analysed for content using thematic analysis.

The study established that there were no specific ICT hardware and software packages acquired by the university for the Textiles and Clothing programmes. Instead, general design related softwares such as CorelDraw, Photoshop, Adobe Illustrator and Mac Paints were used to support the implementation of ICT integrated teaching and learning. The findings of the study further revealed that lecturers lacked thorough technological pedagogical knowledge to apply a variety of ICT in the teaching and learning of students. The study established that there was lack of an effective mechanism for providing monitoring and evaluation as the peer review and evaluation mechanism that was used in the Textiles and Clothing programmes did not identify the specific indicators for the implementation of ICT integrated teaching and learning. Among the conclusions emanating from the findings were that the Textiles and Clothing programmes suffered serious shortage of suitable ICT hardware and subject-specific ICT software applications to facilitate the teaching of practical components thereby compromising the effective implementation of ICT integrated teaching and learning to

foster effective skill acquisition in relation to ICT among students. It was also concluded that lecturers were finding difficulties in implementing ICT integrated teaching and learning as they lacked thorough technological-pedagogical-content knowledge and skills that would enable them to select appropriate technological resources and technological pedagogical strategies to teach students appropriate content. The study recommended that the Textiles and Clothing department, through the support of the university, should acquire subject related educational hardware and software like Gerber or Lectra to teach the practical courses of the programmes. The university should organise professional development programmes focussing on TPACK to assist lecturers to develop competences in ICT necessary for implementing ICT integrated teaching and learning. A model was proposed to enhance the effective implementation of ICT integrated teaching and learning into the Textiles and Clothing programmes at the University.

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The study would not have been possible without the contribution of all participants who agreed to take part in the study. I salute you all in the grace of our Lord.

DEDICATION

This thesis is dedicated to my husband, Maxwell and my children, Tanaka and Tino. It is also dedicated to my father, my mother and my siblings.

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LIST OF ACRONYMS AND MEANING

Acronym	Meaning
2D	2 dimensional
3D	3 dimensional
Ad	Administrators
AT	Activity theory
BECTA	British Education Technology Agency
BWPI	Brooks World Poverty Institute
CAD	Computer aided design
CAD/CAM	Computer aided design and computer aided manufacture
CANs	Campus-area networks
CK	Content knowledge
FGS	Focus group student
HOD	Head of department
ICT	Information and communication technologies
IT	Information communication
LAN	Local area network
LCD	Liquid crystal display
LRPT	Long-Range Plan for Technology
Mac	Mackintosh
MICT	Ministry of Information and Communication Technology

Ms	Microsoft
OECD	Organisation for Economic Cooperation & Development
PCK	Pedagogical Content knowledge
PK	Pedagogical knowledge
PhD	Doctorate degree
SARUA	Southern Africa Regional Universities Association
STaR	School Technology and Readiness
TCL	Textiles and Clothing lecturer
TEC	Technician
TCK	Technological content knowledge
TPK	Technological Pedagogical Knowledge
TPACK	Technological Pedagogical Content Knowledge
TPC	Technological Pedagogical Content
TV	Television
UST	University of science and technology
WAN	Wide area network
Wifi	Wireless network
ZIMDEF	Zimbabwe Manpower Development Fund
ZIMCHE	Zimbabwe council of higher education

CHAPTER ONE

GENERAL OVERVIEW OF THE STUDY

1.1 INTRODUCTION

This chapter provides insights into the implementation of ICT-integrated teaching and learning in universities. This is done by looking at the study background which first focuses on the need for information and communication technology (ICT) in teaching in university education and then gives some background on the concerns raised with regards to the implementation of ICT-integrated teaching and learning in Textiles and Clothing degree programmes. The statement of the problem, research objectives and research questions are then stated. The chapter concludes by providing the significance of study, definition of terms and the organization of the thesis.

1.2 BACKGROUND TO THE STUDY

Globalization and the shift to a knowledge-based economy necessitates that institutions develop in students the ability to transform information into knowledge and apply that knowledge in dynamic cross-cultural contexts. According to Hargreaves (2003), a knowledge-based economy consists of an increasing scientific, technological and educational sphere involving complex ways of processing and circulating information; and also implies basic changes in-cooperate functions to boost constant innovation in products. This means that knowledge is one of the main resources for knowledge society whereby the knowledge worker and work form a large proportion of the society. For individuals to function successfully in such a society, it is not only a question of whether they can access information, but also how well they can process the information (Hargreaves, 2003). Education systems especially universities, are therefore, expected to offer students opportunities to learn to operate in the information age, since the traditional educational environment is ill-equipped to prepare students to function or be productive in the workplace of today's society(Dodds,2007). The implementation of ICT integrated teaching and learning has therefore, been recognised

as an essential factor for the development of competences required in the knowledge society (Pelgrum & Law, 2003). According to Yellend (2001), the effective implementation of ICT integrated teaching has the potential to enhance learners' engagement during the learning process. For instance, using multimedia to present real and ill-structured problems in problem-based learning can motivate and challenge students and develop their problem solving skills (Chou, 2003; Bargert, 2008). ICT can also support various types of interactions like learner-content, learner-learner, learner-teacher, and learner-interface. These types of interactions make teaching and learning processes more interactive, and make learners more active and motivated (British Education Technology Agency, BECTA, 2005).

Many countries worldwide have drafted policies to facilitate the implementation of ICT integrated teaching and learning into their higher education systems including university education. These include Netherlands (Coskum and Kinnisnet, 2009) and the United Kingdom (Deaney, Ruthven and Hennesy, 2005). Sub-Saharan African governments have also attempted to integrate ICT into higher education (Onguko and Hennesy, 2010; Kanuka, 2007). In East Africa for example, ICT policies in higher education began to take shape in the early 2000s (Wamakote, Kiforo, and Onguko, 2010:8). In the context of the present study, the question to ask is; Has Zimbabwe taken a leaf from international and regional initiatives to integrate ICTs in teaching and learning?

The Zimbabwean university education sector has grown significantly in the last two decades. From two public universities in 1990, the Ministry of Higher and Tertiary Education opened the higher education sector to private providers in 1993. This led to the creation of thirteen more universities comprising eight public and five private universities spread across all provinces of the country (Ministry of Higher and Tertiary Education Strategic Plan, 2010-2015). Higher education is one of the priority areas in Zimbabwean ICT policy. The government of Zimbabwe recognises the importance of ICT and has developed several initiatives to guide its integration in university education (Isaacs, 2007). For example, the national ICT policy which was adopted in 2005 emphasizes the need to integrate ICT in the teaching and learning at colleges and universities and to promote e-learning materials in Zimbabwe (National ICT policy,

2005:20).The policy statements also emphasise the acquisition of basic applicable and affordable ICT equipment for educational purposes.

The Ministry of ICT (MICT) in Zimbabwe set up a five-year strategic plan to promote the implementation of a mandatory ICT curriculum at institutions of higher education by January 2011(Ministry of ICT Strategic plan, 2010-2014: 28). In response, there have been several initiatives and projects to support ICT infrastructure and resources in institutions of higher education in Zimbabwe. For example, the President's office launched a campaign to provide universities with ICT equipment (Chingonzo, 2013). The Zimbabwe Ministry of Higher and Tertiary Education formed partnership with other regional projects such as the College Information Technology (IT) Enhancement Project which focused on developing capacity to maintain and manage ICT equipment for effective ICT use in higher institutions of education. The African Virtual University teacher education project aimed at enhancing the capacity of educators in the use of ICT in teaching and learning (Isaacs, 2007). Since 2011, many universities in Zimbabwe have recognised the use of ICT as one of the essential alternative delivery method for training and have consequently developed policies to implement ICT integrated teaching and learning (Ministry of Higher & Tertiary Education Strategic Plan, 2010-2015). As noted by Tsvere, Swamy and Nyaruwata (2013), most universities in Zimbabwe formulated their policies around 2011 hence, they are still in the early phases of implementing ICT integrated teaching and learning. At the university under study, policies to support the implementation of ICT integrated teaching and learning were formulated in 2012(University of Science and Technology Strategic plan 2011-2015).

1.2.1 Textiles and Clothing programmes in universities of Science and Technology in Zimbabwe.

One of the strategies adopted in Zimbabwe for the development of a productive and dynamic society was the introduction of technical degree programmes in universities of Science and Technology (Nziramasanga Commission, 1999). Some of these technical degrees included Metal Technology, Art and Design, Wood Technology and Textiles and Clothing programmes. Zimbabwe's aim in implementing technical degrees in universities after independence was also based on the premise that after graduation,

students would contribute immensely towards the economic growth of the country through the acquired technical skills (Zengeya, 2012). The constantly changing socio-economic global context brought into focus the need for institutions to prepare students for the challenges of an uncertain future through provision of diverse skills.

Textiles and Clothing programmes in universities are technical degree programmes which combine the study of every aspect related to the textiles and apparel industry (Mason, 2012). The comprehensive textile-clothing pipeline encompasses all of the production activities of the textile-apparel complex as well as the functions of distribution and retail operations to the end users. Textiles and Clothing degree programmes are highly needed in Zimbabwe as they play a key role in generating the new technological knowledge needed in the textiles and apparel industry. The degree programmes focus on training designers, marketers, entrepreneurs, as well as teachers. The aim is to produce highly skilled and technologically proficient personnel to meet the demand for a creative and innovative labour force for the applied textiles and clothing industries and enterprises.

Due to the practical nature of the Textiles and Clothing degree programmes, special emphasis is placed on the correct execution of designs and the development of prototypes using appropriate equipment. The demands on the teaching of such programmes in universities, occasioned by globalisation, are that the programmes should not only provide learners with merely the necessary cognitive skills and competencies but also equip students with technical and practical skills for working in a knowledge society. The technical training system is informed by the skills obligatory in the workplace at a time when industry change and skill development are key elements in the makeup of the economic and social context of work in the knowledge society. The learning of technical skills is most often associated with specialist workshops and laboratories, smaller class sizes and, frequently longer blocks of time for practice and rehearsal.

The teaching of technical skills requires the use of skilled people and a range of tools or equipment. However, it is reported by Sintim (2008) that Textiles and Clothing programmes face numerous challenges due to them being practical in nature. The

challenges include shortage of appropriate equipment, workshops and studio rooms. Kean, Nancy and Wilson (2008) observe that the training of highly skilled and technologically proficient graduates in Textiles and Clothing programmes require the effective implementation of ICT integrated teaching and learning into all programmes as technology can be used to complement instruction with emphasis on providing opportunities to practise skills taught and extending learning by working with specific software applications.

Despite the national ICT policy in Zimbabwe and all the strategies developed by government emphasising the implementation of ICT integrated teaching and learning in universities, Nguku (2012), in her study of evaluating Textiles and Clothing programmes universities in Southern Africa, established that the traditional teaching methods like lecturing were still dominant among Textiles and Clothing programmes. Renowned academics have bemoaned the lack of skills and competences the lecturers possess for them to implement ICT integrated teaching and learning effectively in university teaching (Majoni, 2014; Musarurwa, 2011). Due to economic and political uncertainty in Zimbabwe, a large number of trained and well experienced academic staff left Zimbabwe between 2001 and 2008. The exodus of highly experienced professionals left universities with critical shortages of human resources. Though efforts have been made by the Ministry of Higher and Tertiary Education to retain staff through the human resources retention schemes and intellectual home link facility, reports show that the country still continues to experience skill loss to neighbouring countries due to political and economic instability (The Herald, 2015). Given the depressing economic environment, it could be argued that it is unsurprising that the lecturers who were hired to replace the ones who left were either Bachelor degree holders or Master degree holders who were inexperienced to manage and effectively implement ICT integrated teaching and learning in universities (Financial Gazette, 2012; The Herald, 2011; World University News, 2010).

While concerns have been raised about the skills and competence levels of the lecturing staff, the implementation of ICT integrated teaching is a multifaceted, complex process that involves, not only providing the technology to the teaching environment,

but also curriculum restructuring, among other factors (Zaman, Shamim and Clement, 2011). Textiles and Clothing programmes need to be adjusted to equip students with new technologies capable of rapidly adapting to a fast changing work environment and ensuring they are equipped to respond to the unpredictable and ever-changing demands of the sector. The unpredictable nature is due to how globalised the textiles and clothing industry has become. As has been observed by Marshall (2009), today's textiles and clothing designer may be expected to design different brands for different cultures, present work in just one fashion city and sell to stores in other continents. With such a scenario, it is necessary for textiles and clothing designers to be well educated in the nuances of the expanding global markets, sub-cultures and technologies. The textiles and clothing industry's uncertain future, and the complex demands placed on textiles and clothing designers are affecting the teaching and learning of Textiles and Clothing programmes (Faerm, 2012). It follows that universities that prepare students for careers in textiles, clothing and design should provide an environment that not only exposes students to ICT applications, but also integrates ICT into all teaching and learning processes so that students become comfortable in a technological environment. By infusing content with relevant technological information in these areas, programmes aim to prepare Textiles and Clothing students to succeed in the evolving global industry while having the ability to synthesise their practice in order to invent products. The quality of curricula calls for special care in the definition of the objectives of the training provided in relation to the digital society and the needs of the society.

Researchers like Nguku (2012) are however, critical of the irrelevant curriculum content and the teaching and learning approaches adopted in Southern Africa universities, Zimbabwe included; as failing to prepare students for the digital society. It is, however, noted that Nguku's (2012) study was quantitative in nature and only one university in Zimbabwe participated in the study. In addition, the study recommended the alignment of the curriculum which is used in Textiles and Clothing degree programmes in universities with aspects of the information age, but did not examine in detail the aspect of the programmes that needed to be realigned to meet the needs of the technological industry in this era of globalisation. Again another quantitative study by Dzidonu (2010) observed that the teaching approaches remained basically unchanged in Zimbabwean

universities and the technology was poorly implemented and underused in teaching and learning. While in Zimbabwe the number of graduates from universities of Science and Technology has increased since five years ago, this has not translated into positive economic development (Dzidonu, 2010). These graduates are reported to be technologically unrefined resulting in severe technological skill deficiencies in textiles and clothing industries.

Reports suggest that graduates be furnished with knowledge and skills in all software technologies which reflect industry so as to enhance their employability (Jefferson, Power, Jess and Rowe, 2012). Concerns presented by Majoni (2014) and SARUA (2011) show that with the present economic crisis and its repercussions on the academic environments, one of the major hurdles in offering technical degree courses is the complex and costly technological infrastructure needed and the software used in such courses. For the past decade, Zimbabwe has been limping under the effects of an economic recession which critically crippled the education sector. This has made the country to lag behind in massive digital revolution (Brooks World Poverty Institute (BWPI), 2009). Some universities have, however, made noteworthy progress towards harnessing computer technology for the purpose of teaching and learning. This effort has not been the same in all universities and has been characterised by challenges. It has been reported generally, that some departments within universities have failed to harness suitable ICT resources for teaching and learning (SARUA, 2011). The shortage of infrastructure and tools can affect the application of ICT in teaching and learning. There is, however, little or no information to reflect form and nature of ICT infrastructure and resources that have been integrated into the teaching of Textiles and Clothing degree programmes in universities in Zimbabwe.

Quality monitoring and evaluation systems across universities have also become a thorny issue in the sustainability of implementation of ICT integrated teaching and learning. Some researchers internationally have lamented that ICT implementation does not receive proper monitoring (Tezci, 2011; Becta, 2004). Concerns have been raised on the extent and quality of monitoring and evaluation systems being employed by university management in Zimbabwe on the implementation of ICT integrated teaching

and learning (Majoni, 2014). Universities in Zimbabwe have been given the mandate to monitor their quality. This agreement has been welcomed by some universities and it has yielded positive results (SARUA, 2011). However, the situation has not been similar in other universities. According to Kariwo (2007), the situation the world over reveals that universities cannot engage in quality monitoring in teaching and learning without the involvement of a coordinating body. Though in Zimbabwe, the Zimbabwe Council for Higher Education (ZIMCHE) was established in 1990 to monitor quality of all activities in universities, the council has not achieved its intended goals. It has managed to look at areas pertaining to the establishment of new universities but has left monitoring mechanisms regarding implementation activities to individual universities (Kariwo, 2007). While research conducted in different developed countries indicates that the use of ICT in teaching and learning does not receive sufficient monitoring (BECTA, 2004; Tezci, 2011), there is however no information that is clear as to and the nature and extent to which universities in Zimbabwe are monitoring the implementation of ICT integrated teaching and learning in specific disciplines like the Textiles and Clothing, taking into cognisance the practical nature of the programmes.

While some universities in Africa like Cape Town and Cape Peninsula have reported successful implementation of ICT integrated teaching and learning, the status of ICT use remains largely unreported in the case of Zimbabwean universities, especially with regard to Textiles and Clothing programmes. Although globally, some research has been done on ICT in the Textiles and Clothing programmes, the research shows a strong bias towards factors that constrain the integration of ICT in teaching, for example, in America (Daulton, 1997); in New Mexico (Croxall and Cummings, 2000); in Jordan (Jawarneh, Elhersh and Khazaleh, 2007); in Denmark (Skjold, 2008); in Africa, particularly Nigeria (Olaosebikan, 2011; Oko and Omorojie, 2013), and in Ghana (Deardorff, 2006; Johnson, Lenartowicz, and Apud, 2006). These studies established lack of teacher skills and knowledge and inadequate infrastructural resources as the greatest barriers militating against the use of ICT in teaching and learning. The researcher however, notes that these studies did not examine in detail the kind of skills and knowledge that teachers need to possess to effectively implement ICT integrated teaching and learning.

Similar to the global context, there has been limited research on the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes in universities in Zimbabwe. One such study by Dzikite, Chimbindi and Dandira (2013) focused on factors affecting the integration of ICT in Textiles and Clothing programmes in teachers' colleges and not in universities. The study did not examine in detail the issues of teacher competences, ICT infrastructure, curricula content and even monitoring and evaluation issues central to the implementation of ICT integrated teaching. Lack of ICT competences among Textiles and Clothing graduates in Zimbabwe was highlighted by the Zimbabwe Manpower Development Fund (ZIMDEF) (2014), and in Zhangazha's (2014) study who attributed it to poor implementation of ICT integrated teaching and learning during student training. The researcher perceives gaps in the way ICT-integrated teaching and learning is implemented in Textiles and Clothing programmes.

The lack of effective implementation of ICT integrated teaching in Textiles and Clothing programmes is a cause for concern as Textiles and Clothing teaching and learning has no relevance if it does not reflect the current social and technological trends. The field of Textiles and Clothing in the Zimbabwean education system is under-researched. Throughout the researcher's years of teaching in colleges and then in university, the researcher has noticed that research in the area of Textiles and Clothing, especially in relation to the implementation of ICT integrated teaching and learning is very scant in Zimbabwe. As a result, the Textiles and Clothing programmes have been forced, at times, to borrow ideas from studies done in other disciplines, which in many instances have failed to enhance the quality of teaching and learning in the Textiles and Clothing programmes in Zimbabwe. It is through these observations that the researcher is motivated to carry out an in-depth examination of how ICT integrated teaching and learning is implemented in the Textiles and Clothing programmes in one of Zimbabwe's universities of Science and Technology with a view to developing a viable model for effective implementation of ICT integrated teaching and learning specific to the practical nature of the Textiles and Clothing programmes.

1.3 STATEMENT OF THE PROBLEM

The implementation of ICT integrated teaching and learning has become a significant feature of education systems worldwide (UNESCO, 2006). The implementation of ICT integrated teaching and learning in university programmes is essential for providing opportunities for students to develop competences that are crucial to coping with the constantly changing economic and technological environment (Pelgrum and Law, 2003). In response to the National ICT Policy (2005), Zimbabwe's universities have made strides in implementing ICT integrated teaching and learning in all academic programmes (Tsvere, Swamy and Nyaruwata, 2013).

However, there are numerous concerns reported with regards to the effective implementation of ICT integrated teaching and learning in Zimbabwe. Concerns have been raised on the skills the lecturers possess, the nature of the curriculum content and the teaching approaches adopted, the costly ICT infrastructure, and the quality of monitoring and evaluation systems being employed by university management in Zimbabwe to ensure effective implementation of ICT integrated teaching and learning in universities (Majoni, 2014; Musarurwa, 2011; Nguku, 2012). Effectively implementing ICT integrated teaching and learning is a clear departure from traditional forms of education and requires a new mind-set and commitment from all parties involved. Challenges also arise due to the lack of consistent baseline experience and understanding to guide the implementation of ICT integrated teaching and learning in technically-oriented programmes like Textiles and Clothing. In addition, there is growing concern over the quality of Textiles and Clothing graduates especially their lack of appropriate ICT competences (ZIMDEF, 2014; Zhangazha, 2014). The demands for effective implementation of ICT integrated teaching and learning and their impact on the quality of teaching and learning in the Textiles and Clothing programmes in Zimbabwe have received scant attention from researchers. As a result, the Textiles and Clothing programmes have been forced to borrow ideas from studies that have been done in other disciplines of education, which in many instances, have failed to enhance the quality of teaching in Textiles and Clothing programmes in Zimbabwe. There is thus, an urgent need for in-depth investigation into the implementation of ICT integrated teaching

and learning as a strategy towards developing a model that might provide guidance in the implementation of ICT integrated teaching and learning specific to the practical nature of the Textiles and Clothing programmes.

1.4 RESEARCH QUESTIONS

1.4.1 Main research question

How is ICT integrated teaching and learning implemented in the Textiles and Clothing programmes at one University of Science and Technology in Zimbabwe?

1.4.2 Sub-research questions

- What infrastructure and resources are used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?
- To what extent do Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning?
- To what extent has the teaching and learning of Textiles and Clothing programmes changed by the integration of ICT?
- How is the implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes monitored and evaluated?
- Which model can be proposed to enhance effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?

1.5 OBJECTIVES OF THE STUDY

- To examine the infrastructure and resources that are used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.
- To explore the extent to which Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning.
- To establish how the teaching and learning of Textiles and Clothing has been changed by the integration of ICT.

- To examine how the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes is monitored and evaluated.
- To present a model that can be used to enhance effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.

1.6 PURPOSE OF THE STUDY

The purpose of the study was to explore how ICT-integrated teaching and learning was implemented in Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe. This was done by examining the forms and nature of the infrastructure and resources that were used to support effective implementation of ICT integrated teaching and learning.

The study explored the nature of the lecturers' ICT competencies and the monitoring and evaluating measures that supported effective implementation of ICT integrated teaching and learning. This was intended to develop a viable model that could provide guidance to effective implementation of ICT integrated teaching and learning specific to the practical nature of Textiles and Clothing programmes. This would go a long way towards enhancing the teaching and learning in Textiles and Clothing programmes to enable students acquire necessary skills that are required in the dynamic technological society.

1.7 PLAN OF THE RESEARCH

Table 1.1 below provides the description of the plan of the research of which the details are given in the chapter of the study for the research methodology.

Table 1.1 Plan of the research

Main research question			
How is ICT integrated teaching and learning implemented in the Textiles and Clothing programmes at one university of Science and Technology?			
Paradigmatic suppositions			
Epistemological model		Interpretive paradigm	
Methodological model		Qualitative	
Research Design			
Intrinsic case study			
Selection of participants			
Administrators	Lecturers	3	7
Technicians	Students	2	32
Generation of data			
Methods used to generate data		In-depth interviews; Focus group interviews; Document analysis; Observation	
Analysis and interpretation of data			
Methods used to analyse data (Content analysis)		Transcription of data; Coding data; Creation of categories; Data display; Drawing conclusion	
Trustworthiness			
Criteria for trustworthiness applied		Credibility; Transferability, Dependability, Conformability	
Ethical considerations			
Ethical considerations adhered to		Permission to conduct research; Informed consent; Confidentiality; Anonymity, Avoidance of harm.	
Conclusions			
Recommendations			

1.8 SIGNIFICANCE OF THE STUDY

In the context of significant educational change, the need to support the development of more flexible, independent and self-regulating learners to enable them to live and work in a fast changing globalised and technological world has increased the demand for new teaching and learning approaches (Livingston, 2012). Although some research has been done in relation to the implementation of ICT integrated teaching and learning in higher education in Zimbabwe, very few studies if none any, have examined the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes that are offered by the country's universities of Science and Technology. This study sought to contribute towards a comprehensive understanding of the implementation of ICT integrated teaching and learning. The study provides viable model that should provide guidance towards effective implementation of ICT integrated teaching in the Textiles and Clothing programmes. The study establishes implications for programme planning and management in universities as it sheds light on how they could manage the effective implementation of ICT integrated teaching in specific subjects and disciplines. The findings of the research also provide valuable insights to administrators and university management at the university under study on how to develop specific policies for lecturer professional development in ICT and for effective monitoring systems in Textiles and Clothing programmes to best support the implementation of ICT integrated teaching and learning.

1.9 DELIMITATIONS OF THE STUDY

The study was limited to one university of Science and Technology in Zimbabwe to allow for in-depth investigation into the implementation of ICT integrated teaching and learning. The study limited its scope to Textiles and Clothing programmes with a focus on design and development of textiles and clothing fashion products for the researcher has great interest in the field. The participants were lecturers, ICT technicians, administrators and students in the Textiles and Clothing department at this university.

1.10 DEFINITION OF TERMS

1.10.1 Information and communication technology (ICT)

According to Toomey (2002), ICT is described as devices that are used for accessing, gathering, manipulating, presenting, processing and transmitting information by electronic means, and include hardware such as computers, laptops; software applications and connectivity like access to internet and videoconferencing. In this study, ICT refers to the full range of computer hardware, software applications and information systems that enable, not only information processing, but also its transmission for purposes of teaching and learning. These include all types of computer hardware and devices ranging from handheld calculators to mobile phones, digital cameras, digital recording equipment, computer machinery, full range of display and projection devices used to view computer output, computer software, area networks and tele-satellites that allow communication with each other in a teaching and learning environment.

1.10.2 ICT integrated teaching and learning

ICT integrated teaching and learning is defined as practices of using ICT to enhance teaching and learning (Wang and Woo, 2007). Betrus, Branch, Doughty and Molenda (2008) state that ICT integrated teaching and learning is the practice of facilitating and improving performance of students by creating, using and managing appropriate technological processes and resources. In this study ICT integrated teaching and learning refers to using relevant and pedagogically valuable ICTs.

1.10.3 Implementation

According to Fullan (2001), implementation is the process of putting an idea, programme or set of activities new to the people attempting or expected to change. Nyvang (2006:2) defines implementation as the “process leading from one practice to a new practice where the new practice is characterised by the use of an innovation.” Kandiri (2014) views implementation as a deliberate sequential set of activities which are directed towards putting an adoption proposed into effect and making it occur. In this study, implementation refers to the application of ICT integrated teaching and

learning in Textiles and Clothing programmes. Effective implementation therefore refers to the correct application and selection of pedagogically valuable ICTs and integrating them in teaching and learning of Textiles and Clothing programmes.

1.10.4 Textiles and Clothing program

Rutherford (2008) indicates that the Textiles and Clothing programme is concerned with the development of professional knowledge, skills and attitudes that are related to the design, development and production of textiles, clothing and fashion products, and are necessary for a successful career in the Textiles and Clothing industry. In this study, the Textiles and Clothing programme refers to the degree programme offered by universities of Science and Technology to enable individuals to learn the theory and to acquire practical skills for designing and developing textiles, clothing and fashion products that will enable them function at workplaces or to venture into enterprise development.

1.10.5 Pedagogy

Pollard (2010) views pedagogy as the practice of teaching, framed and informed by a shared and structured body of knowledge comprising experience, evidence, understanding, and moral purpose and shared transparent values. In this study, pedagogy refers to the roles of teachers and learners, the relationship between them and the kinds of teaching and learning activities they engage in with ICT in a teaching and learning environment.

1.10.6 Competence

According to the National Education Technology Standards for Teachers (2005:1), competence is defined as ‘the knowledge, skill, ability, or characteristic associated with high performance on a job.’ In this study competence is the capability to apply or use a set of related knowledge, skills and abilities required to successfully teach certain content with a variety of ICT resources and strategies.

1.10.7 Monitoring

Marriot and Goyder (2010:14), describe monitoring as an “ongoing function that employs the systematic collection of data related to specified indicators.” Monitoring provides an early indication of the likelihood that expected results will be attained, as well as an opportunity for validating programme theory and logic, and making the necessary changes in programme activities and approaches. In this study, monitoring is a process of looking at what and how implementation of ICT integrated teaching and learning is being done so as to provide essential inputs for evaluation.

1.10.8 Evaluation

Marriot and Goyder (2010:16) indicate that evaluation is a “systematic and objective assessment of an ongoing or completed policy, programme or project; its design, implementation and results.” In this study, evaluation refers to an ongoing analysis of the immediate or direct effects of an implementation so as to provide timely assessments of the relevance, efficiency, effectiveness, impact and sustainability, and overall progress of using ICT against set objectives.

1.10.9 Technical degrees

According to the Ministry of Higher and tertiary education (2005:6) technical degrees are “programmes designed at university level, to prepare engineers and technologists for higher management positions or entrepreneurs.” In this study, technical degrees refer to degree programmes that offer theoretical, scientific and technical studies and related skills training.

1.10.10 University of Science and Technology

The Science and technology committee (2012:14) describe university of Science and Technology as “an institution which offers graduates skills such as; numeracy, ability to generate, understand, analyse empirical data including critical analysis; an understanding of scientific and mathematical principles; the ability to apply a systematic and critical assessment of complex problems with an emphasis on solving them and applying the theoretical knowledge of the subject to practical problems.” In this study, a university of Science and Technology refers to an institution that offers students skills

and knowledge needed to solve practical problems, create products and generate wealth and economic growth.

1.11 ORGANIZATION OF THE THESIS

1.11.1 Chapter One: Background of the study.

This chapter discussed the background of the study where concerns and issues on the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes in Zimbabwean universities were raised. This section further outlined the statement of the research problem, the purpose of the study and significance of the study. It also presented the research questions as well as objectives of the study. Delimitation of the study and definition of concepts were also outlined in this chapter.

1.11.2 Chapter Two: Theoretical Framework

In this chapter, the main theory and theoretical frameworks which informed the study are outlined. The study was informed by the Activity theory (AT) and two other frameworks called the Technological pedagogical content knowledge (TPACK) and the Functionality framework.

1.11.3 Chapter Three: Literature Review

This chapter examines the literature related to the study. It reviews what other scholars have written regarding the subject of the study including ICT infrastructure for teaching Textiles and Clothing, lecturers' competencies, monitoring and support systems and pedagogical practises necessitated by the integration of ICT.

1.11.4 Chapter Four: Research Methodology

Chapter four presents and justifies the research methodology used in the study. The research paradigm that was selected for the study was the interpretive paradigm whilst the qualitative approach was adopted for the study. The study utilised an intrinsic case study design. Purposive and quota sampling procedures were used to select participants for the study. The research methods that were used to collect data included in-depth interviews, focus group interviews, documents analysis and observation.

Ethical considerations as well as measures to ensure trustworthiness are also provided in this chapter.

1.11.5 Chapter Five: Data presentation and analysis

Chapter five focuses on data presentation, analysis and interpretation. In this chapter, the researcher presents and analyses all the data collected through interviews, focus group discussions, document analysis as well as observations. Data is presented using tables in narrative form and emerging themes.

1.11.6 Chapter Six: Discussion of data

This chapter is where the findings of the study are evaluated in light of the theoretical frameworks and related literature in order to establish the linkages with the lessons learnt from what has been experienced. The comparison of findings with related literature gives insights that fully explain what happens in the teaching and learning situation.

1.11.7 Chapter Seven: Summary, conclusions, and recommendations

Chapter seven gives the summary of the study. The methods used to reach the findings and how they relate to the research questions are also part of this chapter. The conclusion, recommendations and the suggested model that could provide guidance to effective implementation are presented in this chapter. Areas for further research are also identified in the chapter.

1.12 CHAPTER SUMMARY

This chapter gave an overview of this study. It highlighted the background to the study and contextualised the problem that gave impetus to the study. In addition, the chapter outlined the research statement of the problem, the purpose of the study, research questions and objectives which guided the study, the significance of the study, and the delimitations of the study. Key terms were defined as used in the study. The next chapter discusses the theoretical framework which informed the study.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.0 INTRODUCTION

In this chapter, the theoretical frameworks which informed the study will be outlined. The study was guided by the Activity theory (AT), Technological pedagogical content knowledge (TPACK) and the Functional pedagogical frameworks. Each theoretical framework will be discussed in order to establish its main characteristics and limitations. A description of how the three frameworks were applied to the study will be presented. A conceptual framework developed from the analysis of the three frameworks will be presented towards the end of the chapter.

2.1 THEORETICAL FRAMEWORKS USED

Sitwala (2014: 188) defines a theoretical framework as a “...specific perspective which a given researcher uses to explore, interpret or explain events or behaviour of the subjects or events s/he is studying.” In the same regard, Swanson (2013) opines that a theoretical framework refers to the theory that a researcher chooses in a research to offer a description of an event, or shed some light on a particular observable fact.

In research, a theoretical framework enables the researcher to see clearly the main constructs and concepts in a given study. Corvelec (2013) points out that a theoretical framework assists the researcher to specify key constructs that influence a phenomenon of interest. It also highlights the need to examine how those key constructs might be at variance and under what circumstances. To add more, Jacard and Jacob (2010) assert that a theoretical framework provides the researcher with a general research approach. This means that the framework gives the researcher a basis for research design, target population, research sample and data collection methods. Sitwala (2014) argues further that the use of theoretical framework in a study guides the researcher in the collection, interpretation and explanation of the data. This implies that once data are collected and analysed, a framework is used as a mirror to

check whether the findings agree with the framework or whether there are some discrepancies.

2.1.1 The Activity theory (AT)

The AT was one of the three theoretical frameworks which informed this study. First, I will provide an overview of AT and then illustrate how it was applied to this study.

AT originated from Vygotsky's concept of mediated action. According to Vygotsky (1978), mediated action is a concept used to explain the semiotic process that enables the development of human consciousness through interaction with tools and social others in an environment. In other words, mediated action is viewed as a form of interpersonal communication through the interactions among subject, tool and object where the subject develops and adopts new tools that help them make meaning of the world. Humans use tools to change the world and are themselves transformed through the use of tools. The concept of mediated action was then developed into AT by Leont'ev (1978) and later expanded by Engestrom (1987; 2001) by adding an extended model of activity systems. This study therefore, used and elaborated the basic ideas of the AT as expanded by Engestrom (1987; 2001) that takes the object-oriented and tool mediated collective activity system as its unit of analysis. Engestrom developed the triangular model that elaborates the basic relationships in an activity system as shown in Fig 2.1.1. The elements of the activity system are discussed below.

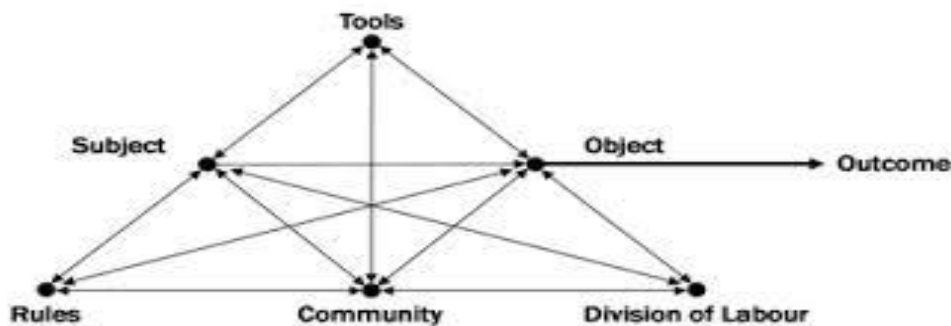


Fig 2.1.1: The structure of an activity system

(Engestrom, 2001)

For a clear understanding of AT, Engestrom firstly elucidated a definition of activity as a “unit of analysis that fulfils the following criteria: it is representative of the complexity of the whole; it is analysable in its contextuality; it is specific to human beings by being tool-mediated; and it is dynamic rather than static” (Engestrom, 1987:78). This means that an activity is a process-as-a-whole rather than a linear sequence of discrete actions.

An activity system refers to a “group of people or community who share a common object and who use tools to act on that object” (Engestrom, 2001:139). In simpler terms, the activity system comprises the subject, the tools, the community, the rules, the division of labour, and the object. The AT therefore, is deeply contextual and oriented at understanding specific local practices, their objects, mediating tools, and social organisation. According to the AT, the activity system is collective and originates within the social realm, (Engestrom, 2001: 136). Engestrom was concerned with collective rather than individual transformation of behaviours in an organisation. Although changes in the collective are initiated by individuals within the community, the transformation that occurs within society is a change in the collective system. Humans act collectively, learn by doing, and communicate in and via their actions.

Object refer to the purpose for which the activity is being done (Engestrom, 2001). The object is not static and is in a state of flux. The object is the central item that distinguishes one activity system from another. The object is transformed into an outcome which can be a material thing or completely intangible, such as an idea.

The AT concept of subject(s) connotes one or more members of a group engaging the object of the activity through a combined action (Engestrom, 2000). The subjects’ orientation toward the object is influenced by their personal experiences and their cultural-historical experience with mediating tools. A subject’s perception of an object is both facilitated and inhibited by accumulated knowledge of the object.

The community refers to other individuals and sub-groups that share the same object with the subject (Jaradat, Qablan, and Barham, 2011). In the community, there is the

continuously negotiated distribution of tasks, powers, and responsibilities among the participants of the activity system.

Division of labour refers to the distribution of activities among the members and sub-groups within the system (Nyvang, 2006). Division of labour may also describes any vertical division of power and status within the activity system. Relationships in the activity system are driven by rules which both afford or restrain the basic relationships in an activity system. Yamagata-Lynch (2010) maintains that rules refer to formal or informal regulations that can, in varying degrees, constrain or liberate the activity and provide to the subject guidance on correct procedures and acceptable interactions to take with other community members.

According to Engestrom (2001), tools refer to internal or external mediating artifacts which help to achieve the outcomes of the activity. On the same note, Engestrom points out those tools are not easily handed to the subject but are invented, adopted, purchased, discarded, or even replaced in the activity. Their development is shaped by the needs of the society in which they are created and used. AT assumes that people are active cognising agents but they act in sites that are not necessarily of their own choosing with tools that afford or constrain their actions. Humans make, employ, and adapt tools of all kinds to mediate their actions. Subjects may discover novel tools across multiple activities and the value of a tool may vary over time as they engage in other activities. Engestrom (2001) adds that the application of tools in an activity system is a means for the accumulation and diffusion of social knowledge, and hence, influences both the agents and the structure.

The AT stresses that activity systems are continuously subject to change and these changes are motivated by contradictions (Engestrom, 2001). According to Engestrom, contradictions are tensions or challenges that arise when the conditions of an activity put the subject in conflicting situations that can preclude achieving the object. New activities introduced in a system can trigger tensions. In some cases, the activity may collapse altogether and the subjects may not be able to attain the object. In other cases, subjects may attain the object but be dissatisfied about how they attained it. Engestrom reiterates that, “for important transformations of organisational practices, people must

learn new forms of activity which are not yet there” (Engestrom, 2010: 6). On this idea, Engestrom is concerned with the learning of new forms of activity as they are created, rather than the mastery of putative stable, well-defined, existing knowledge and skills.

As has been noted earlier, AT is deeply contextual and oriented at understanding specific local practices, their objects, mediating tools, and social organisation. The use of this theory can generate clear understanding on the elements and relationships that underpin the implementation of ICT integrated teaching and learning. The implementation of ICT integrated teaching and learning represents a collective system just like an activity system. In the implementation of ICT integrated teaching and learning, the subjects are the lecturers and the students, the tools refer to the ICT infrastructure and resources used to mediate the teaching and learning, the community comprises the administrators, technicians and the university management, the rules refer to the policies and academic regulations guiding the implementation process, and the object refers to the need for a new teaching practice mediated by ICT. The implementation itself can be regarded as a process that is done collectively by a number of people and tools in the Textiles and Clothing programmes and university at large, not a once off event.

It can be noted from the AT that teaching and learning systems are constantly subject to change and these changes are driven by overarching objectives. The implementation of ICT integrated teaching and learning is driven by its own motive and can thus be regarded as an activity too. The implementation of ICT integrated teaching and learning in Textiles and Clothing was motivated by the need for change in teaching practice so as to offer students opportunities to develop competences required in the knowledge society. The intended outcome would be effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes characterised by practices that are mediated by ICT. Such practices would enable students to acquire skills and knowledge in order to adapt competently in the technological workplace of the dynamic society. This idea encouraged the researcher to take into account; the intricate and multiple relationships and interactions that take place in the process, the mediating and pedagogical impact of ICT in teaching and learning, and the conditions that were

created by the Textiles and Clothing department to ensure implementation and how these conditions would influence eventual development of the implementation of ICT integrated teaching and learning.

Taking the implementation of ICT integrated teaching as an activity which needs to be accomplished, there is need for careful planning which has its focus on elements such as lecturers, ICT infrastructure and resources, rules and regulations by administrators and the object. The lecturers act on the new teaching practice mediated by ICT (object) to enable students to acquire technological skills needed in the knowledge society. The lecturers' orientation toward the new practice mediated by ICT is influenced by both the ICT competences they possess and their professional teaching experience with ICT. Therefore, the lecturers' perception of the new teaching practice is also aided or inhibited by accumulated knowledge of the different forms of the ICT and their pedagogical function in teaching and learning. The lecturers might value the potential of the ICT in improving students' learning experiences and outcomes (Jaradat, Qablan, and Barham, 2011). As lecturers are the ones that are at the core of teaching and develop the curriculum in the degree programmes in the Textiles and Clothing department, they have to be skilled in successful implementation of ICT integrated teaching and learning of students. For them to do this, they need to learn the new forms of activity so as to possess the necessary competences or knowledge to work with all the mediating ICT in the teaching and learning system(Engestrom, 2001). Some resistance or contradictions from the lecturers may, however, be more profound especially during the initial implementation of ICT integrated teaching and learning. For instance, the lecturers may not be certain how they would use the ICT tools to engage their students actively in the teaching and learning process. Whilst the Activity theory hints that the lecturers should learn new forms of knowledge; it however does not give a full account of the knowledge and skills that lecturers need to teach effectively with ICT.

From the AT, it is apparent that activity systems are social processes growing out of joint activities. The implementation of ICT integrated teaching and learning in Textiles and Clothing should be taken as a part of a collective social system and not as an individual decision to implement or not to implement ICT integrated teaching and

learning in isolation. This implies that during the implementation of an activity, the management has to take into consideration the broader and more powerful social, economic, political and dynamic contexts of the university in which ICT is situated (Drenoyianni, 2006). The management has to consider the social processes that ICT supports during the circumstances of use, and how the ICT experience is integrated into the discourse of student learning to widen skills and knowledge for students to adapt capably in the technological society. The complex Textiles and Clothing programme curriculum, pedagogical, assessment and technological issues; academic staff competences; monitoring issues by administrators inherent in the implementation of ICT integrated teaching and learning; reflect the dynamic social system. This further shows that an individual is a social being who is connected to other people thus constituting composite units. Though lecturers are the ones at the core of implementing ICT integrated teaching, studying their actions only is not enough because they also happen to be linked to other people's activities. In the case of teaching and learning of Textiles and Clothing, the administrative staff plays an important role in the implementation of ICT integrated teaching. The monitoring and support measures given by the administrators are an important component that could assist to ensure the effective implementation of ICT integrated teaching in Textiles and Clothing programmes.

In the Textiles and Clothing teaching and learning activity system, the actions of lecturers and students can be mediated by a complex network of tools such as hardware like liquid crystal digital projectors, basic software like Microsoft PowerPoint or Word, and various practical based software like CorelDraw and pattern design softwares. When these ICT tools offer possibilities for teaching and learning, the conditions for practice change. This may lead to contradictions and thus induce a new practice. What this implies is that the integration of a tool, such as ICT, that is invented, adopted and purchased may result in a serious alteration to, or just minor changes within, the internal structure of the teaching and learning system (Kaptelinin and Nardi, 2006). In Textiles and Clothing programmes, this alteration may manifest itself through the reviewing of the existing programme regulations. A wide range of ICT infrastructural support and resources to teach all the Textiles and Clothing courses from the design to prototype development would need to be taken up in the system to mediate the

teaching and learning. These ICT tools should have a functional pedagogical purpose in the teaching and learning of students. According to Demiraslan (2005), a tool's primary purpose is to change how the lecturers and students control the teaching and learning activity for the benefit of the student adapting to changing conditions. Once this alteration is accepted by all the lecturers and the rest of the community members in the teaching environment, the implementation of the ICT integrated teaching and learning in the system is deemed effective.

If however, the implementation of ICT does not result in the new practice that is mediated by ICT with real pedagogical value in the teaching and learning activity but rather in the rejection of the tool, the activity has not been transformed in a way and teaching practices remain unchanged. This implies that that the implementation is deemed ineffective. This illustrates how a new tool implemented to mediate the teaching and learning of students may modify, to some extent, the structure of an established teaching and learning system (Kaptelinin and Nardi, 2006). What tends to influence the effective implementation and its level of transformation is the object and the relationship between the lecturers and students of the teaching and learning system under consideration. Studying the teaching and learning system that is mediated by ICT is critical in Textiles and Clothing programmes as this would reveal how to improve or even modify the ICT that would have a functional purpose in teaching and learning. While the Activity theory does not provide a guide on the forms of ICT that have a functional purpose in teaching, the Functionality framework by Patten, Sanchez and Tangney (2006) was used to triangulate an understanding of the categories of ICT with more pedagogical value in teaching and learning.

The lecturers' pedagogical position, which is mediated by ICT, may be influenced by the rules that may exist during the implementation activity or by the general rules and regulations of the university as well (Hardman, 2005). In the Textiles and Clothing teaching system, rules may encompass the curriculum regulations and the ICT policies that regulate the implementation of ICT integrated teaching and learning. In Textiles and Clothing programmes, the implementation of ICT integrated teaching and learning may trigger some changes to the programme regulations or even to the lecturers and

students as subjects of the system. This influence may manifest itself through the reviewing of the content taught in the various courses or even the assessment of student's progress. The ICT introduced may influence changes in pedagogical practices like having more learning projects that are student-centred or determining if there should be fewer lectures, tutorial support, or occasional small group work. The nature of the activities done by students may also be influenced by the implementation of ICT integrated teaching and learning and in such a case the assessment of such activities may require alteration. Rules can be modified to better support the whole departmental approach towards the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.

The Textiles and Clothing department comprises other members such as the technical staff and administrators who work together in the implementation of ICT integrated teaching and learning. However, members have different roles to play (Foot, 2014). These different roles fall under the division of labour with students expected to engage with ICT and the technical assistants offering assistance to both lecturers and students during the teaching and learning sessions. The administrators are expected to provide the most influential support in form of monitoring to guide the interactions. Contradictions may emerge between the lecturers and the technical staff members. For instance, there may be many complaints by the lecturers against the technical assistants on the performance of the network connection during teaching sessions. The administrators have to acknowledge contradictions, conflict and lack of coordination as inevitable in the functioning of any system. According to Demiraslan and Usluel (2008), the implementation of an activity is not necessarily stable and harmonious. It might be characterized by contradictions within and between the activities in the teaching and learning process. In such a scenario, the effort of administrators is of great importance to ensure the flow of the implementation through a monitoring mechanism, and extra effort would be necessary to pre-empt possible technical glitches in the process. It takes administrators' perseverance, technical knowledge and time for explorations to reconcile contradictions between the lecturers, technical assistants, students and ICT resources.

In the context of this study, the AT enabled the researcher to understand the context in which ICT integrated teaching was implemented. It thus, provided a lens to understand how the different elements within the system influence the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. The AT also provided a framework for understanding the interaction among the lecturers, managers, technicians and students in the system. AT enabled rich and useful description of how practice is culturally mediated aiding the researcher in developing new ideas about how to improve future practices that are collectively and tool-mediated.

Although teaching and learning system as a unit of analysis captures the activities mediated by ICT as tools, one of the limitations of AT is that it fails to give a detailed account of the sort of ICT competences the lecturers should possess to effectively implement ICT integrated teaching and learning. The TPACK framework was used as a tool for analysing the sort of ICT competences the lecturers possessed. The next section discusses the TPACK framework.

2.1.2 Technological pedagogical content knowledge framework

The Technological pedagogical content knowledge framework (TPACK) was introduced by Mishra and Koehler (2006) as a framework to analyse and describe the body of knowledge and skills teaching staff need to effectively use technology in their teaching. TPACK framework consists of seven different knowledge areas which are Technology knowledge (TK), Content knowledge (CK), Pedagogical knowledge (PK), Pedagogical Content knowledge (PCK), Technological content knowledge (TCK), and Technological Pedagogical Knowledge (TPK). As described by Koehler, Mishra, Akcaoglu and Rosenberg (2013), TK refers to an understanding of the way technologies are used in a specific content whereas CK may be defined as a thorough grounding in subject matter or command of the subject. PK includes “generic knowledge about teaching approaches, methods of assessment and knowledge of different theories about learning” (Mishra and Koehler, 2006:1026). According to Archambault and Crippen (2009), PCK is knowledge about how to combine pedagogy and content effectively. Qualman (2013) describes TCK as the knowledge about how technology may be used to provide new ways of teaching content. TPK is made up of generic knowledge

regarding how technology can be used for general pedagogic aims (Koehler et al, 2013). These six components come together to form the seventh component which is the TPACK from which the name of the framework was derived. TPACK, therefore, synthesizes knowledge of each of the bodies of knowledge described above with a focus on how technology can be uniquely crafted to meet pedagogical needs of certain content in specific contexts (Koehler, Shin and Mishra, 2011). It includes an understanding of the intricacy of relationships between students, teachers, content, practices and technologies. All the knowledge areas of TPACK described above are considered within a particular contextual framework and are thus interrelated as shown by Figure 2.1.2 below. However, for the sake of analysis, I will explain each knowledge area separately.

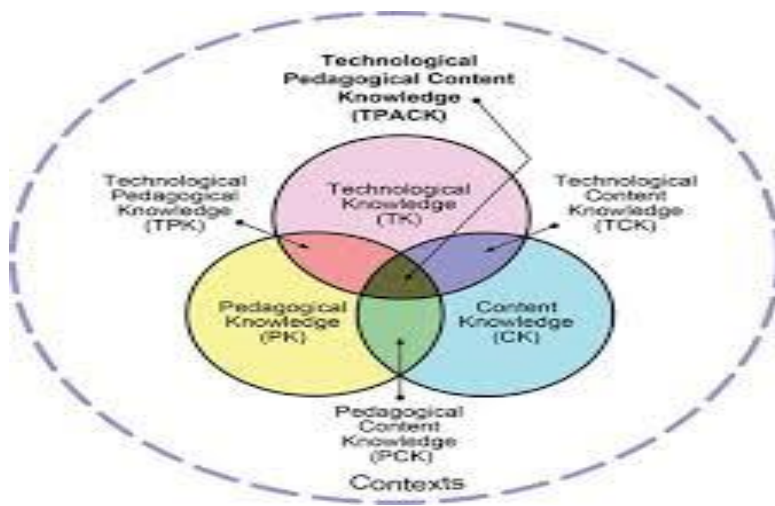


Fig 2.1.2 TPACK framework (Adapted from Colvin and Tomayko, 2015).

As stated above, the first knowledge component of the TPACK is the TK. Within the context of ICT integrated teaching and learning in Textiles and Clothing programmes, teaching staff need to have an understanding of the range of technologies that are used in teaching all the textiles and clothing processes from initial concept development of a design to product development. TK includes knowledge and skills to operate digital technologies such as laptops, the internet, and software applications like drawing software, pattern design, and product development software. TK involves the knowledge required by teaching staff to be able to adapt the range of technologies for

teaching. It is important to note that TK exists in a state of flux due to the fast pace of change in technology (Koehler and Mishra, 2008). For instance, modern computer hardware and software become quickly outdated, and computers can be used for a range of pedagogical tasks such as research, communication, media consumption and creation of virtual prototypes. This therefore, means that teaching staff should have the technological knowledge that goes beyond digital literacy and includes knowledge of how to change the purpose of existing technologies like wikis so that they can be used for teaching and learning.

Archambault and Crippen (2009) observe that CK includes knowledge of concepts, theories, and conceptual frameworks as well as knowledge about accepted ways of developing knowledge. Academic teaching staff should be specialists in the content of the subject area. In the context of Textiles and Clothing teaching, academic teaching staff should know the aspects related to clothing design, textiles material analysis, and fashion merchandising. This enables them to determine the discipline-specific modes of thinking and skills unique to the field that can be imparted to students.

The third component of the TPACK is the PK. According to Mishra and Koehler (2006:1026), PK is that “deep knowledge about the processes, practices or methods of teaching and learning and how it encompasses, among other things, overall educational purposes, values and aims.” Thus, in Textiles and Clothing programmes, teaching staff should have the generic knowledge about teaching approaches, methods of assessment and knowledge of different theories about learning. The teaching staff should have an expanded set of skills in order to manage and organize teaching and learning activities for intended learning outcomes. In addition, PK includes an understanding of classroom management activities. The PCK as another knowledge component refers to the knowledge about how to make the subject understandable to learners (Koehler, et al. 2013). PCK includes knowledge of what makes a subject difficult or easy to learn, as well as knowledge of common misconceptions and likely preconceptions students bring with them to the classroom. In Textiles and Clothing programmes, teaching staff is required to have the knowledge of the curricula, of teaching and of assessment methods that are most likely to achieve the learning

outcomes of specific Textiles and Clothing courses. Teaching staff has to acknowledge that different content lends itself to different methods of teaching. As an example, the teaching of a course in Textiles and Clothing like Creative Cultural Design requires teaching methods such as project based activities. Through such a teaching method, students could engage in meaningful design tasks as the course require students to research and get ideas for unique designs (University of Science and Technology UST Academic Bulletin, (2012-2014). In contrast to this, teaching a Textiles Material Analysis course may require group experimental based strategies to enable each student to view and understand the composition of the fibre materials. In this sense, teaching staff should have the knowledge that goes beyond content expertise or just knowing general pedagogic guidelines, to understanding the unique interplay between content and pedagogy.

The fifth knowledge component is the TCK. This is the knowledge of the reciprocal relationship between technology and content. Technology impacts what teaching staff and students may know, and introduces new affordances as to how they can represent certain content in new ways that were not possible before. For example, today the use of pattern design software can allow teaching staff and students to design and create fashion designs on the screens of their laptops. In addition, the use of 3-dimensional(3D) technological software like Lectra-3D-Modaris enables lecturers and students to virtually create, develop and model their fashion design prototypes and view these on the screens of computer devices other than making physical prototypes that are time consuming and costly(Jefferson etal,2012).

The sixth component of the TPACK is the TPK. This knowledge makes it possible to understand what technology can do for certain pedagogic goals, and for teaching staff to select the most appropriate tool based on its appropriateness for the specific pedagogical approach. Technology can also afford new methods and avenues for teaching thereby easing the way certain classroom activities are implemented. For example, the advent of online learning and open online courses require teachers to develop new pedagogical approaches that are appropriate for the tools at hand. Additionally, the emergency of internet based technologies as well as computer aided

design (CAD) design software can necessitate teaching staff to make use of pedagogical strategies such as project based learning in practical based courses where student can work independently to produce a design product. Furthermore, Textiles and Clothing teaching staff can make use of blogs as a group work tool for sharing course related resources, and to enable students to submit their assignments online.

Lastly, TPACK refers to teachers' ability to plan lessons and select appropriate technological resources and pedagogical strategies with technology to teach students relevant content. This means that ICT that is introduced into teaching contexts causes "the representation of new concepts and requires developing sensitivity to the dynamic, transactional relationship between all three components; content, technology and pedagogy" (Koehler and Mishra, 2009: 63). Additionally, when the teacher is skilled with TPACK, students would have the chance to gain knowledge of how to use ICT resources appropriate to the content while also acquiring ICT skills and concepts that may be transferred to other areas and used in their professional and everyday life. Effective implementation of ICT integrated teaching and learning therefore, cannot be achieved by simply put up a new piece of technology upon existing structures. It requires a shift in existing pedagogical and content domains. In other words, the TPACK component could be taken as a valuable organisational composition for defining what it is that needs to be integrated with technology effectively (Archambault and Crippen, 2009; Cox and Graham, 2009).

In the context of this study, the TPACK framework implies that effective implementation of ICT integrated teaching and learning requires that teaching staff and students responsible for implementing ICT integrated teaching develop competences in mediating the complex relationships between technology, content and pedagogy. This understanding aids in developing appropriate programmes and specific strategies for teaching Textiles and Clothing degree programmes. The complex nature of teaching with ICT leads to the idea that teaching staff need to be continuously engaged in the active adjustment of their programmes to meet the dynamic society. As informed by the AT, teaching and learning systems are social processes rising out of combined activity and are not static. This implies that Textiles and Clothing programmes, like any other

university programmes, comprise pieces that act in cohesion, rather than of a collection of teaching practices in isolation. Ineffective implementation of ICT integrated teaching and learning therefore, emanates from the failure to create successful programmes which incorporate technology. The failure might stem from overlooking this idea of cohesion and collective transformation and trying to pull together unrelated sets of items (Mishra and Koehler, 2006; Engestrom, 2001). This therefore, entails that the creators of such an intricate programme can only be the teaching staff and the rest of the community members of the Textiles and Clothing activity system who know, understand and can synthesize the interrelated pieces namely; technology, content and pedagogy into a meaningful whole. The constant process of negotiating among existing elements of the system causes the programmes to go through repetitive cycles of change and refinement to create optimal teaching and learning experiences with ICT.

The AT and the TPACK do not provide in detail, the nature of the ICT that have to be integrated in teaching and learning. The Functionality framework was, therefore, incorporated to assist in further examining the pedagogical underpinning of different ICT software and applications. The next section discusses the Functionality framework.

2.1.3 Functionality framework

The Functionality framework was the third theoretical framework which informed this study. This framework was developed by Patten, Sanchez and Tangney (2006) as a framework for categorizing ICT software applications that are used for educational purposes. The Functionality framework categorizes technological software applications into seven groups namely; administrative, referential, interactive, location aware, data collection, collaborative, and microworlds. According to the Functionality framework, administrative applications are those that are mostly used for storing and retrieving information. It has been noted by Patten, et al. (2006) that administrative applications concentrate on scheduling, calendars and grading. Applications in the administrative category simply replicate for convenience sake, those tools already available on traditional platforms. As has been observed by Smordal and Gregory (2003), those administrative applications have little pedagogical philosophy underpinning their use. Textiles and Clothing lecturers can just use these to track student progress on specific

skills. It is important to note that administrative applications do not encourage knowledge construction among students and therefore, could be used for time management by learners.

Referential applications are applications that enable students to access content. As described by Chen (2008), referential applications such as Microsoft office tools, dictionaries and e-books such as Microsoft Reader and Adobe Reader enable teaching staff and students to access content for teaching and learning activities. Such applications can allow lecturers and students to access and store documents in various formats. In the teaching and learning of Textiles and Clothing, these may be used to make recordings of a lecture. Students can repeat the lectures anytime; anywhere and this can even assist students to listen to the lectures they have missed. In this way, students would be in a position to listen again to lectures and tutorials as a way of encouraging critical and investigative approaches. Lecturers could as well use these applications to listen to their own lectures to improve their presentations. Though referential applications are widely available, Patten, et al. (2006) emphasise that referential tools are not particularly educationally inspired and tend to replicate traditional applications.

Another category of the Functionality framework consists of interactive applications. Interactive applications provide students with a series of exercises based entirely on question and answer activities with supporting information and images. Naismith, Lonsdale, Vavoula, and Sharples, (2005) comment that the interactive applications are built on the idea that learning is enabled by creating an association between a particular stimulus and a response. As indicated by Patten et al. (2006), many of the interactive applications are of the drill and test type aimed at encouraging memorization of information for individual learners through multiple choice quizzes. In Textiles and Clothing, interactive applications can provide students with different sets of information for different locations by using rich media. Students can display the works and hear the information about the works of other Textiles and Clothing designers. Though these applications are creative and enable user interaction, they however, encourage memorization of information.

Location aware applications seek to contextualize learning activities by enabling the students to interact appropriately with their environment (Patten et al. 2006). The location aware applications make use of the unique attributes of handhelds for collection of environmental data. The applications allow the device to interact with the students in a context-aware manner encouraging the users to explore their environment.

Data collection applications focus on encouraging participants to learn more about their context through recording relevant information and providing immediate feedback through on-the-spot analysis (Patten et al. 2006:298). In Textiles and Clothing teaching and learning, data collection applications may be used creatively in a variety of courses. As elaborated by Patten et al. (2006), three sub-categories are identified within the data collection category namely; scientific, reflective and multimedia. Scientific data collection focuses on encouraging participants to learn more about their context through recording relevant information and providing immediate feedback through on-the-spot analysis. In the teaching of Textiles and Clothing courses, students can be encouraged to use such applications to help them check for right colour choices for a product. Such applications can be installed safely in mobile devices. Through these applications, students can make a series of choices, then click the submit button to find out whether their choices are correct. This results in more accurate and safer outcomes in terms of working with chemicals and colouring process.

Another sub-category of data collection is the reflective applications that expand on the administrative and referential themes. These applications encourage reflective social practice by focusing on storing information in the learning context for later evaluation and reflections (Mueller, Wood, Pasquale and Cruikshank, 2012). In Textiles and Clothing, individual portable assistant devices (iPads), smart phones and digital cameras can be used to record student interviews with field informants at fashion events. The information can later be used for analysis or reflections in lectures. Students can also browse the internet from their laptops or desktop computers to look for the latest fashion trends. This information on latest fashion trends can be used by lecturers to encourage collaboration by enabling learners to share their reflections with a wider community through utilizing a variety of applications like facebook and pinterest.

The other sub-category of data collection looks at the multimedia applications. These applications are capable of capturing videos. Son, Lee and Park (2004) maintain that handheld devices such as iPads can be used by students to store, transfer, import, archive and display photographs and large files for presentation and multimedia projects or assignments. It has been stressed by McGreen and Sanchez (2005) that multimedia applications tend to adopt a constructivist pedagogy requiring students to generate new ideas based on their current and previous knowledge. Multimedia application such as cameras found on smart phones can be very helpful to Textiles and Clothing students as they can make photo albums of various photographs. The photographs can be transferred to desktop computers where the images can be edited and later used to design and create collages, mood boards and storyboard for fashion designs. Students can take videos of themselves as they carry out consultations on design projects. The recorded videos can then be played back to the members of the group for peer review and assessment.

According to Chen, Kinshuk and Yang (2008), collaborative applications undertake to establish a learning environment of knowledge sharing. In Textiles and Clothing programmes, collaborative applications undertake to establish a learning environment of knowledge sharing by utilizing the features of hand-held devices as well as desktop computers (Chen, Kinshuk and Yang, 2008). The connectivity possibilities of the hand-held devices facilitate sharing and collaboration of information. In Textiles and Clothing programmes, lecturers and students can collaborate through facebook on project supervisions and discussions. Applications on hand-held devices like Mo-chat can be used to exchange information on creative design among students and their teaching staff. Students can also collaborate on a graphic organizer to edit their designs and work. Students can browse the internet for pictures to create mood boards using software applications such as Polaris, photo-editor or Photoshop. Students can then beam documents to each other, print their work, or synchronise their handheld devices to a laptop computer for further editing and designing. All these features provide the creative lecturers with options that are essential for a student-centred and active learning in the classroom.

The last category of applications that was propounded by Patten et al. (2006) is that of educational microworlds. These applications allow learners to construct their own knowledge through experimentation in constrained models of real world domains. These applications are more consistently informed by pedagogical principles and tend to adopt a constructionist approach to learning. However, it has been pointed out that the insufficient processing power of hand-held devices makes microworlds very difficult to use as the sound of each beat maybe be slightly out of step with its visual representation (Junco and Cotton, 2011). In Textiles and Clothing programmes, microworlds software applications can be used beneficially on laptops and desktop computers. Lecturers can use 3D software applications like educational Lectra-3D-Modaris fit and Gerber technology to enable students to construct their own artifacts and prototypes through experimentation in virtual constrained environments of real world domains. Through such software, students can start designing from scratch, develop templates of their designs and test their designs by constructing virtual prototypes. This encourages students to create, manipulate, edit and save original pieces of their designs through a virtual interface that can be retrieved anytime when the need to construct a physical product arises.

It can be noted from the above discussion that there are many ways that teaching staff and students can use ICT tools in Textiles and Clothing programmes. Patten et al. (2006) indicate that the potential of the ICT software and applications for encouraging knowledge construction can only be realized if the technology is used in a manner that matches the pedagogical underpinnings of collaborative data collection and microworlds software applications.

The researcher thought it valuable to include this framework in the study as it merges two perspectives of functionality and pedagogy into one framework. Though the framework was developed by Patten, Sanchez and Tangney (2006) as a framework for categorizing educational applications found on mobile hand-held devices, this study used the framework to analyse the ICT software and applications that were used in the teaching and learning of Textiles and Clothing programmes.

Based on the understanding that effective implementation of ICT integrated teaching and learning has to be construed in the activity system, pedagogical, technological and organisational context, this study therefore proposes conceptual framework that was guided by the Activity Theory, the TPACK model, the Functionality framework. The following section presents the framework.

2.2 CONCEPTUAL FRAMEWORK ADOPTED TO GUIDE THE STUDY

According to Kandiri (2014), a conceptual framework is used in research to outline possible courses of action or to present a preferred approach to an idea or thought. In this study, the conceptual framework presented the constructs that guided the study in the analysis of the implementation of ICT integrated teaching and learning, and acted as the backbone to emerging themes which are clarified further in the next chapters. From the ideas emerging from the Activity Theory, TPACK and the Functionality framework, it was possible to uncover some of the key constructs that relate to effective implementation of ICT-integrated teaching and learning. The conceptual framework gave the researcher an overview of how various issues and their relationships were conceived in the research study. The conceptual framework is illustrated in Figure 2.2 below.

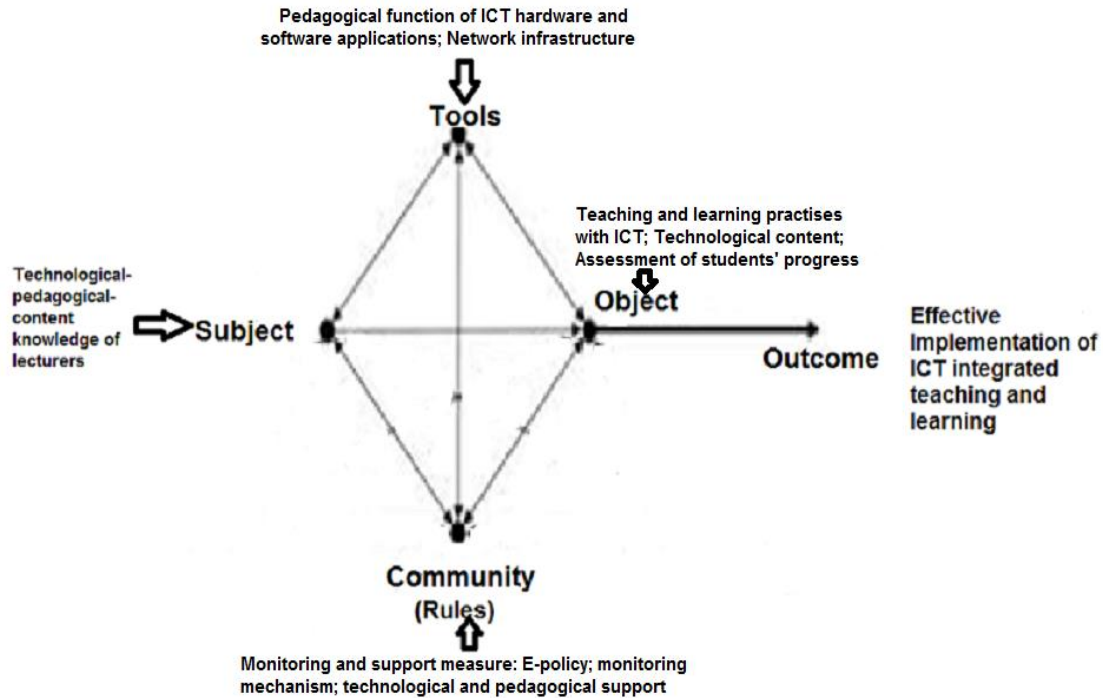


Fig: 2.2: Conceptual framework that guide the study on implementation of ICT integrated teaching and learning

2.3 CHAPTER SUMMARY

This chapter discussed the theoretical frameworks that guided the study. The study was informed by the AT, the TPACK and the Functionality framework. From the AT, it was revealed that for effective implementation of ICT integrated teaching to be accomplished, there is need for careful planning which has its focus on elements such as subjects, tools, community, rules and regulations and the object. The TPACK was analysed as a framework that explained the body of knowledge and skills teaching staff needed to effectively employ technology in their teaching.

The Functionality framework was developed as a framework that categorised ICT software applications that are used for teaching and learning purposes into seven groups namely; administrative, referential, interactive, location aware, data collection, collaborative and microworlds. A description of why each of the frameworks was

regarded as relevant for the topic under study was presented. The chapter provided a conceptual framework based on the AT, the TPACK, and the Functionality framework that guided the research study. The next chapter reviews some of the empirical studies that have been carried out in relation to implementation of ICT integrated teaching and learning.

CHAPTER THREE

LITERATURE REVIEW

3.1 INTRODUCTION

This chapter critically reviews the empirical literature related to effective implementation of ICT integrated teaching and learning. It reviews ICT infrastructure and resources and considers the gaps related to their suitability to teaching and learning in Textiles and Clothing. It delves into ICT competencies for teaching staff and monitoring and support issues that merit consideration. It then considers gaps related to teaching staff's role with regards to the effective implementation of ICT integrated teaching and learning.

3.2 ICT INFRASTRUCTURE AND RESOURCES FOR EFFECTIVE USE IN TEACHING AND LEARNING IN TEXTILES AND CLOTHING PROGRAMMES

This section reviews empirical studies related to ICT infrastructure and resources for use in teaching and learning of Textiles and Clothing programmes in colleges and universities. Studies conducted by Plump, Anderson, Law and Quale (2009) show that access to ICT resources is necessary to the effective implementation of ICT integrated teaching and learning. ICT resources include computers hardware such as hand-held mobile phones, digital cameras, computerised sewing machinery, and projection devices; computer software such as Microsoft word and CorelDraw and area networks that allow communication and processing of information in a teaching and learning environment (Toomey, 2002). Effective implementation of ICT integrated teaching and learning depends on the availability and appropriateness of the ICT such as hardware and software applications.

3.2.1 ICT Hardware

ICT hardware is the collection of physical elements that constitutes a computer system and includes physical parts or components of a computer such as the monitor, mouse,

keyboard, hard disk drive, sound card and all of which are tangible physical objects (Microsoft, 2015). Co-Claire (2008) indicates that adequate and exceptional hardware is an essential prerequisite for teaching and learning the practical coursework components in Textiles and Clothing programmes. According to Lectra (2010), the computer hardware for designing and product development of textiles and clothing garments basically consists of powerful micro-computers, high resolution colour graphic displays, input and output devices, communication devices, and special equipment for laying and cutting. Interactive input devices include digitizer, video cameras and digital scanners. Computer controlled output devices include plotters, colour hardcopy devices, printers, automated spreading and labelling machines, and automated cutting machines (Lectra, 2010). These aforementioned technologies equip students with new knowledge and skills thereby helping them to adapt to a fast changing work environment and in the process responding to the ever-changing demands of their chosen professions.

Studies have been carried out on the suitability of ICT hardware for the teaching and learning of Textiles and Clothing programmes. One such study by Knoll (1990) focused on determining the best computer hardware for use in Textiles and Clothing degree programmes. It reported that specific hardware was required for teaching technical-oriented aspects of the programmes. Knoll (1990) found that Apple Macintosh computers were very suitable for use in the teaching and learning of Textiles and Clothing programmes. The Apple Macintosh hardware was found to be user friendly which enabled users to maximize the time spent utilizing it. Van-De-Borgart (1990) discovered that Apple Macintosh computers had superb graphics and a number of software programs that could be easily adapted to textiles and clothing processes. These studies were, however, carried out in the early 1990s when computers were still novel. The Apple Macintosh computers can, however, soon be outdated considering the rate at which technology is evolving.

Another study by Shin (2012) which focused on work-integrated education in Fashion Design programmes at Hong Kong University found that successful fashion design programmes made use of new technology such as audio devices, audio-cassette recorder, laserdisc, digital camera, and television for teaching and learning. Shin also

reports that both satellite and terrestrial television sets offered Fashion Design students cheap access to contemporary, authentic fashion programmes thereby providing them with exposure to fashion trends that are up-to-date and embedded in the real textiles and clothing world. Another study by Boorady and Hawley (2008) conducted among various universities in Columbia in South America showed that most universities in the country used videos as a tool to teach large classes of Fashion Design students. This research revealed that lecturers video-recorded their lectures for students to review and students could rewind the videos to find parts they were interested in viewing. It was noted, however, that practical processes such as the actual demonstration of patternmaking were difficult to record which rendered video recording irrelevant.

An example of a study that was conducted at an African university is that by Wambau-Kamau (2012) which aimed to establish whether the use of textiles and clothing CAD hardware in public universities in Kenya adequately addressed the changing labour requirements in the country's apparel market. This study found that providing an appropriate learning environment which facilitates effective and efficient skill acquisition in relation to the use of ICT hardware presented a considerable challenge for academic staff. The study also revealed that classroom instruction in the Textiles and Clothing programmes relied greatly on the traditional approaches to practical demonstrations, which was costly in terms of instructor and student time. Wambau-Kamau's (2012) study corroborates those of Nguku's (2012) earlier findings on the challenges Textiles and Clothing programmes in African universities experienced in implementing ICT integrated teaching and learning. Although the two studies above were carried out at universities in Africa, they both employed quantitative techniques to collect their data and did not examine in detail the nature of the ICT hardware that had been integrated into the teaching and learning of Textiles and Clothing programmes.

3.2.2 ICT Software

According to Smither (2013), ICT software is a machine readable instruction that directs a computer's processor to carry out precise operations. In other words, software refers to computer programmes which address the user's particular requirements such as word-processing. In teaching and learning of Textiles and Clothing programmes, ICT

software satisfy a particular need such as presentation, clothing designing, illustrating, pattern making, grading, spreading, cutting and virtual prototyping(Wambau-Kamau, 2012). According to Watson, Guerin, and Ginthner (2003), ICT software for use in Textiles and Clothing teaching and learning can be grouped into three groups namely; basic Microsoft software applications, general design related software, and specific textiles and clothing computer aided design and manufacture software packages.

3.2.2.1 Basic Microsoft software

Adwoa-Oppong, Biney-Aidoo and Antiaye (2013), note that Textiles and Clothing courses require appropriate software for teaching and learning. Brock and Joglekar (2011) found that basic Microsoft software like PowerPoint and Excel were used for presentation of teaching and learning material. In one of the studies where Brock and Joglekar (2011:87) examined the effectiveness of using PowerPoint slides as a teaching aid among seventeen instructors teaching at two New York universities, it was established that:

The use of presentation software such as PowerPoint varies depending on instructors' teaching styles. The connection between the number of PowerPoint slides used in class and perceived teaching effectiveness was not shown to be very robust, rather the character and use of slides was the main focus in student feedback.

In another study by Jones (2003), it was observed that the use of PowerPoint in Material Science was often limited to information transmission. The author concluded that such use embody a very restricted pedagogical use of a very powerful and flexible teaching and learning support tool. Very few research studies have examined the use of the basic Microsoft software like Excel or even Word processors in the teaching and learning of Textiles and Clothing programmes. This study explored how these basic Microsoft softwares are used and it also determined the pedagogical value of such software in the teaching and learning of Textiles and Clothing programmes.

3.2.2.2 General design related software

Burke (2006) advises that the accepted general design computer software which can be effectively integrated into teaching and learning of Textiles and Clothing courses includes Adobe Photoshop, Mac paints, Adobe Illustrator, and CorelDraw.

Shin (2012) postulates that Adobe Photoshop is the most popular image editing programme that can be used for editing in fashion designs. In the same vein, Al-Mousa (2013) acknowledges that Adobe Photoshop is a pixel-based editing programme developed by Adobe systems. The same author adds that it can be used to create designs for wall artefacts, t-shirts, to make basic patterns, silhouettes, and garment features, with the aid of grids and guides. In Textiles and Clothing programmes, it can be used to adjust colour changes in natural fabric such as denims, and develop realistic shadows without loss of texture detail. Intricate patterns can also be scanned to create colour modifications, as well as forming repeats and colour-ways from scratch (Shin, 2012).

The second general design related software that is recommended by Burke (2006) is Mac paint. Koch (1990) notes that Mac paints are software applications that can generate images by positioning individual pixel points on screen. This software is suitable for editing drawings by deleting or adding individual points, allowing for the clear design presentation. Furthermore, Koch (1990:7) asserts that “Mac paint is the first software application that can be used in a Textiles and Clothing design courses for it is easy to learn and students with limited exposure to the computer are quickly stimulated to construct designs”. In Textiles and Clothing programmes, the Mac paint software is very suitable for wardrobe library, garment line presentation, pattern drawing and figure drawing (Knoll, 1990).

Shin (2012:15) maintains that “Adobe illustrator remains the most preferred line drawing programme amongst all computer graphic programmes in fashion drawing”. On the same note, Centner and Vereker (2008) indicates that Adobe Illustrator can scale and print a range of artworks to any size and resolution while maintaining full detail and clarity. Similarly, according to Centner and Vereker (2008), the capability of Adobe

illustrator to scale artworks makes the software ideal for producing fashion flat sketches, fashion illustrations and other images that are commonly resized and rearranged for various presentation purposes. The Adobe illustrator software application allows the use of symbols and brush stroke libraries to create and store different silhouettes, basic garment shapes, useful accessories, stitches and trims (Shin, 2012). This shows that the software can handle many image formats that allow production of high quality images to be used for a variety of presentation drawings in Textiles and Clothing.

The fourth general design software application recommended by Burke (2006) as being suitable for teaching in Textiles and Clothing courses is CorelDraw. CorelDraw is Canadian computer software, with a vector-based illustration programme developed to bundle with desktop publishing systems (Crel, 2008). It was the first software to combine vector graphics software with a photo editing software application. CorelDraw has a full range of editing tools that allow users to adjust contrast and colour balance in textiles and clothing designs. Crel (2008) states that CorelDraw is capable of handling multiple masters' layers from within the main programme and can be used to make simple technical drawing, create figures and garment features with the aid of grids and guides. It can also be used to create embroidery, mood boards and collage for textiles and clothing designs.

3.2.2.3 Specific textiles and clothing computer-aided design and manufacturing software packages

Watson, Guerin, and Ginthner' s (2003) study recommended that courses in Textiles and Clothing programmes should not be limited to generally accepted design computer software but ought to include other modern computer-aided design and manufacture (CAD/CAM) software packages that are specifically for Textiles and Clothing designing and manufacturing. According to Cheng (2009), CAD is a growing area which can bring many benefits to the design and product development area within the teaching and learning of Textiles and Clothing programmes. As indicated by Bis (2011), students who have the appreciation of the benefits of CAD, and are furnished with CAD skills have increased employability.

Adwoa-Oppong, et al. (2013) identify some examples of modern CAD software packages found in the fashion industries that need to be incorporated into the teaching and learning of Textiles and Clothing programmes which are AutoCAD, OptiTex, Lectra and Gerber. Such software packages are needed in Textiles and Clothing teaching and learning to perform tasks and activities required throughout the different stages of the design process such as conceptual design, preparation of design documents and cost projections.

According to Al-Mousa (2013), AutoCAD is a type of computer-aided design (CAD) program used for 2-Dimensional (2D) and 3-Dimensional (3D) design, drafting and construction of Textiles and Clothing designs and artefacts. Ding (2008:5) also indicates that “AutoCAD is effective software that can be used by design students to shape design creations because it can generate shapes and forms beyond the designer’s ability”. In Textiles and Clothing programmes, AutoCAD software can also be used by lecturers and students to determine the most efficient cut of fabrics and to adjust the scale of the pattern for different sizes. Johnson (2005:613) studied undergraduate Design students and Design practitioners in the domains of fashion, architecture, graphic, product, and general design and established that “AutoCAD is not only a drafting tool, but also conceptual tool capable of assisting design students to develop new means of conceiving design ideas”. This is also endorsed by Yazıcıoglu (2011) who notes that AutoCAD can document the design progress and allow independent assessment of the different stages of the design process. These studies have further strengthened the argument that AutoCAD software can be used in the teaching of design concepts in the Textiles and Clothing programmes.

The second CAD/CAM software package that has been recommended by Adwoa-Oppong et al. (2013) that needs to be included into the teaching and learning of Textiles and Clothing is OptiTex software. According to Goshal (1997), OptiTex software provides both two dimensional pattern design and three-dimensional design and manufacture. The software features 3D models and virtual prototyping as well as pattern design option. Optitex has been recognized as a leading provider of 3D Virtual prototyping and 2D CAD/CAM software solutions for the textiles and clothing industry

(Park and Lee, 2011). It also creates an avatar according to one's exact sizes and can be tried on different clothing and to determine the clothes that fit one best. OptiTex also allows the user to digitalize curves, create a personal working environment, and design a variety of patterns easily. Since designers sometimes conduct runway shows, OptiTex 3Drunway allows users to create a virtual runway show.

The other CAD/CAM software package that has been recommended by Adwoa-Oppong et al (2013) that needs to be integrated into the teaching and learning of Textiles and Clothing is Lectra. According to Lectra (2010), the Lectra software packages feature 2D and 3D programmes for design, drafting and virtual construction. Park and Lee (2011) indicate that Lectra software enables Textiles and Clothing students to create technical drawings of fashion designs. Wambau-Kamau (2012) adds that through Lectra, one can digitalises paper patterns, modify designs, create and apply grade rules. The same author emphasises that the 3D component of the software package allows for texture mapping and sample garment visualization. This gives students and lecturers the opportunity to experiment and test their designs several times through 3D/2D simulation. However, van der Merwe & van Ryneveld (2012) assert that high end fashion specific software packages such as Lectra are not for use by individuals due to cost factors and limited to departmental teaching computer laboratories owing to licensing restrictions.

The last CAD/CAM software package that has been recommended by Adwoa-Oppong et al. (2013) specifically for use in teaching and learning of Textiles and Clothing programmes is Gerber. Wambau-Kamau (2012), mentions that Gerber technology is available in software packages such as Acc works studio, Acc mark 8000, Acc mark silhouette and Pattern Design 2000. The same author adds that the Gerber software packages are used for making textiles and clothing design sketches, line drawings, colour ways and fashion illustrations. It has been acknowledged by van der Merwe & van Ryneveld (2012) that Gerber software packages are excellent for pattern making, grading and marker making, and plotting.

Some studies have been carried out on the use and level of adoption of CAD/CAM in Textiles and Clothing programmes in universities and colleges. It has been reported that

some universities have incorporated 2D CAD garment realisation, and 3D garment virtualisation in their Textiles and Clothing courses and programmes (London College of Fashion, 2009; Nottingham Trent University, 2009). In an action research study by Hardaker and Rushun (2012:2) at De Montfort University in United Kingdom, it was shown that an archive of screen cast material developed on a virtual learning environment by lecturers enabled students to access demonstrations of key CAD techniques. According to the researchers, the screen casts were incorporated into the teaching and learning of Textiles and Clothing courses as they provided a time efficient and low budget approach for teaching CAD concepts.

Another study that was conducted by Jefferson et al (2012) in India compared the use of 2D and 3D CAD technologies in Textiles and Fashion studies. The study concluded that graduates were not furnished with knowledge of 3D software technologies which reflect industry so as to enhance their employability skills. Jefferson, et al. (2012) recommend the integration of modern CAD/CAM software packages in teaching and learning of Textiles and Clothing courses so as to develop new sets of skills in students, which are industry informed and are at the cutting edge of technology. The studies reviewed above were conducted in the United Kingdom and Indian universities with advanced technologies, hence their incorporation of some 2D technologies in their Textiles and Clothing courses.

Studies that have been conducted in Africa like the one by Wambau-Kamau (2012) found that appropriate software for teaching and learning was very limited in its use in Kenya's public universities. Wambau-Kamau (2012) credited the restricted use to the fact that the software packages are expensive to purchase which limits lecturers' and students' access to them. Another study by Adwoa-Oppong et al. (2013) found that insufficient computers and inadequate finances to purchase the requisite software packages were challenges confronting the Textiles and Clothing departments in Ghana universities and colleges. However, Shabani (1997) maintains that most universities experience conflict over ICT resource allocation between administrative and academic purposes. The same findings were revealed by the World Bank (2000) which noted that the decision-makers in universities consider demands for improved administrative

functions as imperative and end up allocating less ICT to academic instructional needs resulting in some teaching and learning programmes in universities being under resourced.

While studies reviewed above show a wide-range of ICT software that has been integrated in the teaching and learning of Textiles and Clothing programmes in universities, it is however apparent that not a single study has been conducted to establish the nature of the subject specific ICT software that have been integrated into the teaching and learning of Textiles and Clothing programmes in universities in Zimbabwe.

3.2.3 Mobile, Hand-held devices and software applications

Mobile devices are gadgets that use mobile and wireless technologies and can be carried and used everywhere to enable students to access knowledge anytime and anywhere (Sarrab, Elgamel and Aldabbas, 2012). Examples of mobile and hand-held devices include laptops, individual portable assistant devices (iPads), tablet computers and smart phones (Sarrab, et al. 2012).

3.2.3.1 Laptops

In recent years, many studies have acknowledged the integration of mobile ICT hardware like laptops in university teaching and learning. Some studies have investigated the impact of mobile technologies like laptops in teaching and learning while other studies have focused on the benefits that accrue to students and lecturers as a results of using laptops (Davies and Prigg 2013; Keengwe, Schnellert and Mills 2011). For example, Davies and Prigg (2013) found that the benefits associated from using laptops stem partly from the skills developed by the students from exposure to technology as well as from specific software and applications related to the subject matter involved. They found that there were potentially significant gains made in student engagement and active learning, student directed learning, and in collaborative and group learning. Other research on the implementation of laptop programmes has reported significant positive influences on both student learning and teaching practices. One such study by Keengwe, Schnellert and Mills (2011) revealed a positive impact on

student learning and engagement through the improvement of student motivation and autonomy. Another research by Lim and Khine (2006) proved that through the use of laptops in teaching and learning, students were more empowered in their learning and engaged in higher-order thinking.

3.2.3.2 Hand-held devices and software applications

With technology evolving time and again, hand-held devices like smart phones have become widespread in developed countries as teaching and learning tools (Alyahya and Gall, 2012). The impact of fixed desktop computers in schools has been disappointing to many, as students have very limited time of 15 minutes or less per week to use the computers (Clarke and Svanaes, 2014). As such, the constant and consistent access to hand-held devices by students can have several positive effects on their learning. Clarke and Svanaes (2014) argue that hand-held devices offer unparalleled access to communication and information. On the same note, the increased affordability and functionality of hand-held devices means that they can support learning in new ways.

Case studies of mobile technology use in education that were conducted by Kearney & Schuck (2012) found personalisation to be one of the benefits of mobile devices. Mobile technology facilitates access to personalized learning content. According to Kearney and Schuck, (2012:20), “personalisation occurs as a result of being able to adapt learning content and activities to suit the individual learner’s needs and of the sense of agency and independence the student feels from being able to customize his or her own learning”. These findings were similar to a study by Alyahya and Gall (2012) of twelve university students who described the hand-held tablet as having ‘everything in one device’ which was felt made it easier to manage their learning. This implies that learning can be contextualized in ways that make the lessons relevant to the student. Wong (2012) found that along with the ability to learn outside traditional classroom settings, mobile hand-held technologies support the development of meta-cognitive skills. These studies confirm that access to mobile technology allows students to design their own learning contexts in terms of when, where and how they feel they learn best. This shows that through the use of mobile technologies, learning becomes increasingly self-directed. However, in another study by Rossing and Miller (2012) on the perceptions

regarding tablet use among 209 university students in United States of America, individual differences between students in using the devices were observed. The researchers reported that while some students found the devices very helpful, others found them to be a distraction or difficult to work with. This study highlighted the role of the lecturer in supporting students in the use of hand-held technologies.

Collaboration was found to be another benefit of mobile learning. As described by Kearney and Schuck (2012), collaboration is the ability to engage in discussions about learning which are supported by technology, as well as the ability to transmit and collaborate on content. This degree of collaboration is aided by a personalized approach to learning where all students have access to mobile hand-held devices and same software applications. The same observations were noted by Clarke and Svanaes (2014) who elaborated that the mobility, small factor and portability of hand-held devices encourage collaboration as the software application within the devices enable students to create, access, display and share information in various modes like text, video, audio or graphics.

Mueller, Wood, Pasquale and Cruikshank (2012) investigated the introduction of smartphones like BlackBerry into a graduate level business program and documented students' use of this technology up to the end of the term of their study. The study showed that students found the BlackBerry device easy to use and were self-directed in their use of these devices. However, it was also found that the classroom instructional use of the devices was less than student-directed use in and outside the classroom.

In another study, Finn and Vandeham (2004) observed a tertiary classroom project that sought to explore lecturers' use of hand-held computers to enhance existing teaching methods as well as generate new teaching activities. Finn and Vandeham (2004:27) found that "the device was used primarily as a data-capturing device with all students assessments kept back in one software application in such a way that all the data could be accessed almost instantaneously". Such use of the hand-held devices allows the lecturer to provide in depth information on the progress of individual students whenever the need arose. In another study by West (2013), it was confirmed that ongoing digital assessment can give students opportunities to reflect on their learning progress. This

showed that mobile communication and feedback can result in greater student motivation and greater understanding of the learning process.

Additional studies (Rodriquez, Sousa and Torre, 2012; Daher, 2010) see the potential of mobile hand-held devices to achieve large-scale impact on teaching and learning because of portability, low cost, and communications features. However, Patten et al. (2006) advise that the proper uses of mobile hand-held technology that gives pedagogical foundation are based on those software applications that are collaborative, contextual, and imbibe constructivist learning principles.

Most of the studies reviewed above showed that there are positive benefits associated with the use of ICT resources such as mobile and hand-held devices in teaching and learning. It was unfortunate that most of the studies reviewed in this section have been conducted in disciplines such as humanities and business studies and there are hardly any such studies that have focused on hand-held devices in the Textiles and Clothing programmes in Africa and Zimbabwe in particular. This study therefore, explored in depth, the nature of the mobile and hand-held technologies that have been incorporated in teaching and learning of Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe.

3.2.4 Social media applications in teaching and learning

According to Hung and Yuen (2010), social media application is a social space that connects and supports social interaction among individuals and makes it easy for them to share information in one form or another. Kai-Wai Chu and Kennedy (2011:581) identify examples of social media applications as “blogs, wikis, facebook, YouTube, Google Docs, LinkedIn, Twitter, MySpace, SlideShare, and Flickr”. These applications allowed for the exchange of thoughts via the web without limitations of time or place. Lwoga's (2012) study of twenty-five African countries revealed that the use of social media platforms to support learning and teaching activities was very low in Africa. However, in South Africa, it is largely developing on the fringes of institutional education programmes, through experimentation by individual university staff, small research and pilot projects. Boyinbode, Bagula and Ng'ambi (2012) observe that social media

technologies have the potential of activating teaching and learning from a formal, classroom-based and teacher-centred approach towards an interactive and learner-centred approach where learning happens anywhere and anytime.

Hung and Yuen (2010) studied the use of social media at two public universities of Science and Technology in Taiwan and discovered that social media unlock opportunities for students to interact beyond the walls of the classroom and such extended interaction led to improved participation in the face-to-face classroom. The same study demonstrated that “the students’ positive learning experiences with the use of social media were highly related to the information-sharing feature and the interactional function of technology” (Hung and Yuen, 2010:703).

Kai-Wai Chu and Kennedy (2011) mention blogs as one of the examples of social media applications. According to Duffy and Bruns (2006) a blog is an online journal with one or many contributors. Besides straight text and hyperlinks, many blogs incorporate other forms of media such as images and video. Blogs enable a degree of interaction through the use of comments, pingbacks and track backs. In their study of social media in education, Duffy and Bruns (2006) discovered that within the structure of a blog, students can display critical thinking, take creative risks, and make sophisticated use of design elements. In doing so, the students acquire creative, critical, communicative, and collaborative skills that may be useful to them in both scholarly and professional contexts. Lujan-Mora (2006) studied the use of blogs in design courses and found that blogs were used to share knowledge, provide instructions for students, publish a list of annotated links, and check students’ work.

Another example of social media application that was mentioned by Kai-Wai Chu and Kennedy (2011) is a wiki. Kalelioglu and Gulbahar (2010) postulate that wikis is a group of web pages that allows users to add and edit content. What distinguishes wikis from blogs is that there is no inherent structure hard-coded into wiki technology. Wiki pages can be interconnected and organized as required, and are not presented by default in a reverse-chronological, taxonomic-hierarchical, or any other predetermined order. According to Liaw, Chen and Huang (2008), the characteristics of a wiki as a shared tool fit well with the processes associated with collaborative learning and knowledge

management as they can be used for joint problem solving, knowledge building, and sharing where learners practice, collaborate, negotiate and reflect critically. Such explanation is endorsed by Kai-Wai Chu and Kennedy's (2011) study that explored the use of Wikis for groups to co-construct knowledge among instructor and students in the Faculty of Education at Hong Kong University. The results of the study indicated that some of the students had positive experiences using the tool for online collaboration in group projects. Earlier on, a study by Pearce (2006) on using wikis in teaching also proved that Wikis offered an online space for collaborative authorship and writing. However, empirical evidence of the impact on the implementation of wikis in Textiles and Clothing teaching and learning is scant.

Another social media application that was mentioned by Kai-Wai Chu and Kennedy (2011) is Google Docs. As postulated by Thompson, (2007) Google Docs combines a suite of tools such as web-based word processor, PowerPoint, spreadsheet, and online forms that allows its users to work on collaborative projects by importing existing documents or creating new documents effectively and flexibly. Multiple authors can create and edit documents, spreadsheets and PowerPoint presentations in real time using this tool, with all changes saved automatically on Google. In a study by Kai-Wai Chu and Kennedy (2011) that explored the use of Google Docs for groups to co-construct knowledge among instructor and students in a Faculty of Education at Hong Kong university, it was reported that Google Docs serve as potentially effective tools in managing and monitoring students' collaborative group projects. The platform gave the lecturers the facility to closely monitor student progress and provide effective feedback that assisted students on the report writing process. However, empirical evidence for the impact on the implementation of Google docs is scant in Textiles and Clothing teaching and learning.

Facebook is another social media application that has found its way in education. Downes (2007) argues that Facebook is distinct from other social media sites because it has stronger roots in the academic area. The same author proposes that Facebook's diverse and distinctive functions allow it to offer an exceptionally different model of how online tools can be used in educational contexts. A qualitative study by Bosch (2009) at

the University of Cape Town revealed that Facebook was one of the many social media tools listed as having potential applications for teaching and learning. The study, however, noted that “while there were potential positive benefits to using Facebook in teaching and learning, particularly for the development of educational micro-communities, certain challenges, including ICT literacy and uneven access, remained pertinent” (Bosch, 2009:185).

Literature related to the use of LinkedIn, Twitter, Flickr, SlideShare and MySpace in teaching and learning is very limited. A study by Moran, Seaman and Tinti-Kane (2011) that examined the use of social media in institutions of higher education in United States of America showed that the use of LinkedIn, Twitter, Flickr, SlideShare and MySpace was very minimal as compared to other social media like Facebook, google docs and wikis.

It has been argued that social media makes it possible to provide e-learning opportunities to African learners who are either without infrastructure for access or are continually on the move. However, Bernstein (2000:194) argues that

Social uses of technology involve everyday knowledge and practices that differ from academic knowledge and practices... everyday knowledge (horizontal discourse) is distinct from academic knowledge (vertical discourse) both in form and mode of acquisition. Everyday knowledge is context dependent and segmentally organised whereas academic knowledge is context independent and hierarchically organised and is acquired socially through interaction and engagement with family.

From Bernstein’s (2000) analysis, it is clear that the way students use ICT tools in the classroom differs from their practices outside the classroom. In agreement with Bernstein, Lohnes and Kinzer (2007) advise that teaching staff should develop good class management skills so as to be able to use social media effectively for teaching and for encouraging students to acquire knowledge constructively during learning.

Most of the studies conducted on the use of social media technologies during teaching and learning have been conducted in faculties of education and humanities. Literature

that reports on the use of social media in teaching and learning in Textiles and Clothing programmes is very limited, especially that conducted at universities in Zimbabwe.

3.2.5 Network bandwidth

According to Beal (2015), a network is a group of two or more computer systems linked together. There are many types of computer networks such as local area networks (LANs), wide area networks (WANs) and campus area networks (CANs). The LANs are computers that are geographically close together and maybe in the same building. The WANs are computers that are further apart and are connected by telephone lines or radio waves (Beal, 2015). The CANs are computers that are within a limited geographic area such as a campus or military base. Bandwidth is defined as the amount of data that can be transmitted in a fixed amount of time (Adam, 2003).

Njagi and Oboko (2013) argue that ICT infrastructure should be connected through networks in order to allow for sharing and distribution of data and information among teaching staff and students. Yilmaz (2011) concurs with Neyland (2011) in that institutions should increasingly employ high network bandwidth to stimulate teaching and provide exciting learning opportunities for students. Adam (2003) reports that bandwidth is the scarcest ICT resource in African universities mainly due to prohibitions imposed on academic institutions in accessing international circuits, and the high licensing fees for connection to advanced circuits. A survey by Jensen (2002) found that almost sixty percent of African countries have bandwidth that is less than that of a typical institution in the developed world.

The bulk of the literature discussed in this section indicates that Textiles and Clothing programmes in American and European universities (Shin, 2012; Co-Claire, 2008; Park and Lee, 2011), and in other disciplines such as engineering, humanities and business (Mueller, et al. 2012; Rossing and Miller 2012) make use of a variety of ICT resources to support ICT integrated teaching and learning. However, research that focuses on the analysis of ICT resources in Textiles and Clothing programmes in African universities, particularly in Zimbabwe is scarce. Little or no research has been done to understand the type of ICT infrastructure, hardware and software or even mobile devices that could

be integrated effectively in Textiles and Clothing teaching in Zimbabwe. The next section reviews literature related to ICT competences needed by teaching staff to effectively use ICT resources in teaching and learning of students.

3.3 COMPETENCIES FOR EFFECTIVE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING

Competency entails knowing the type of pedagogy one has to use as a teaching staff member in a learning situation and this enables one to determine the fundamental concepts and skills needed for the mastery of the subject (Langer, 2001). Such competence helps teaching staff to link technology to the content as well as to real life situations which enhances better understanding of the content by the students. For effective implementation of ICT integrated teaching and learning, there should be adequate personnel that have the necessary competences (Eid-Al-harbi, 2014). Similarly, Yusuf and Balogun (2011) strongly note that successful implementation of ICT integrated teaching and learning depends largely on the competence of teaching staff. Research shows that the ICT competence of teaching staff is essential to the improvement of the learning outcome of students (Organisation of Economic Cooperation and Development, OECD, 2010; UNESCO, 2011; Kennisnet, 2012).

According to Wenglinsky (2002), teaching staff with sound content knowledge enjoy the subject they teach which makes it easy for them to integrate the technology in a manner which makes it easier for students to understand. Where such skills are missing, it would be difficult to fully use ICT in teaching and learning (Hennessy, 2010). Research studies indicate that one of the key determinants of whether ICT implementation is successful or not is the teacher (Kennisnet, 2012; Tezci, 2011). While some researchers like Kozma (2003) report that the presence of ICT in the classroom leads to effective use, other research results indicate that effective use is also linked to teachers' beliefs and levels of knowledge (Zhang, 2007; Lim and Khine, 2006). To understand how to achieve effective implementation of ICT integrated teaching and learning, it is imperative that literature that reveal some of the key issues related to the competences of teaching staff be reviewed. The UNESCO ICT Competency Standards for Teachers

(2008) identifies four core competencies essential for successful ICT integrated teaching namely; pedagogy, collaboration and networking, social issues and technical issues. Pedagogy is focused on teachers' instructional practices and knowledge of the curriculum and requires that they develop applications within their disciplines that make effective use of ICTs to support and extend teaching and learning. Collaboration and networking acknowledges the communicative potential of ICTs to extend learning beyond the classroom walls and the implications for teachers' development of new knowledge and skills (UNESCO, 2008). Social issues show that technology brings with it new rights and responsibilities including equitable access to technology resources, care for individual health, and respect for intellectual property. Technical issues include aspects of the lifelong learning theme through which teachers update skills with hardware and software as new generations of technology emerge (UNESCO, 2008). Though these competencies are necessary for a supportive environment and successful self-sustaining implementation of ICT integrated teaching and learning, the guidelines are not specific on the aspects that are essential for implementation of ICT integrated teaching and learning like the relationship between content and technology.

Sabaliauskas, Bukantaite and Pukelis (2006:153) define seven competencies which are needed to integrate ICT into education thus:

Basic ICT competencies, technological competencies, ICT policy competencies, competencies in the ethical area of ICT use, competencies of ICT integration into the teaching subject, competencies of didactical methods based on the use of ICT, and competencies of managing teaching/learning process working with ICT.

In the Dutch Act on Professions in Education, a teacher has to be a professional with respect to the content and pedagogy of the subject area. The Dutch Act stipulates that "the teacher knows the process of designing teaching strategies, teaching materials and learning tasks adapted to the students using modern materials and tools like ICT. It is further stated in the act that the teacher has to use an electronic learning environment which enables time and place-independent learning and which supports effective communication about the learning from different locations (Zwaneveld and Bastiaens,

2011: 3). Though the pedagogical competencies are noted, the technological skills are, however, not explicit.

Some researchers have studied some of the important factors, knowledge and skills needed to integrate ICT into teaching and learning like the beliefs of teaching staff (Loveless, 2003; Virtic, 2009), technological knowledge (Hew and Brush, 2007), technological content knowledge (BECTA, 2004), technology pedagogy knowledge (Ottenbreit-Leftwich, 2010) and technological pedagogical content knowledge (Koehler and Mishra, 2009).

3.3.1 Beliefs of teaching staff

The beliefs of teaching staff about learning and teaching are critical factors on how ICT is actualized in teaching. Loveless (2003) found that teachers' perceptions of ICT are fashioned by their identity and participation in wider cultural and social spheres. This, then, influences the professional arenas and settings in which they practice. The author suggests that these perceptions reflect ongoing negotiations of the meanings of ICT and its importance in teaching and learning. Virtic (2009) concurs with Loveless (2003) that the teachers' beliefs about the nature of a given subject and the associated pedagogical practices greatly influenced their use of ICT. This aligns with the framework of Technological Pedagogical Content Knowledge (TPCK) provided by Mishra and Koehler (2006) who posit that the way ICT is taken and applied by the teaching staff may change content domains of a discipline.

Researchers like Yuen, Fox and Law, (2004) assert that the decisive factor for a successful implementation of ICT integrated teaching and learning is the teacher's belief in the transformative nature of new technologies. One study where Yuen, et al. (2004) examined the impact of implementing ICT on the changes in pedagogical beliefs among teachers, found that the teacher's role changed from that of primary source of information to that of one who creates structure and provides advice for students, monitors their progress, assesses their accomplishments, and works as a coach. They also observed that the teacher was working as a guide to ensure that even weak students were able to deal in depth with a difficult topic. What this implies is that if the

teaching staff holds positive beliefs towards ICT, she will make positive initiatives to the implementation of ICT integrated teaching and learning.

Another study by Cil and Pakdil (2007) explored instructors' perceptions and evaluations of computers in architectural teaching by interviewing participants who taught in design studios. The researchers found that the majority of instructors believed that the use of computers limited creativity and concluded that it was perhaps the main reason for instructors' reluctance to implement computer technology in the design process. Meneely (2007), however, posits that using CAD effectively relies on a designer's skills and techniques in both hand-based and computer-based skills. In support, Keengwe, Onchwari and Wachira's (2008) study indicated that CAD can foster creativity if one knows how to use it effectively. Pektas and Erkip (2006) observed that even if design educators have no expertise in using CAD software, they should understand the potentials of ICT in design and be aware of its growing importance in the industry.

In a further study by Norton, McRobbie and Cooper (2000), it was revealed that teaching staff did not use ICT in teaching because of a teacher-centred view of teaching as transmission. Because the non-use of ICT was essentially based on such beliefs, teachers did not take any actions to increase their ICT related expertise or access. Adria and Rose (2004) note that teaching staff also feel insecure about controlling teaching and learning practices when using technology as they viewed ICT as a threat to their professional identity and autonomy and were therefore, reluctant to incorporate ICT in their classrooms. Teachers' consternation centred on the idea that they would have to discard many conservative practices, relationships and perhaps find new ways to identify themselves and what they do, which, for them, was difficult.

The studies above reveal that the beliefs of teaching staff on the role of ICT in enhancing teaching and learning influences the way ICT will be used in teaching and learning. It is apparent that with the inevitable incorporation of ICT in teaching and learning, the beliefs of teaching staff regarding their role in teaching have to change. This is so because ICT causes certain teaching resources to become obsolete (Eze and Olusola, 2013). For example, the use of overhead projectors and chalkboards may no

longer be necessary if all learners have access to the same networked resource on which the teaching staff is presenting information. This view is shared by Davidson, Richardson and Jones (2014) who say that the role of the teaching staff has to change in the sense that it will no longer be sufficient to merely impart content knowledge but to encourage critical thinking skills, promote information literacy, and nurture collaborative working practices to prepare students for a new world in which no job is guaranteed for life, and where people switch careers several times. Technology can support constructivist learning environments when it is used as a tool for learning, rather than as the object of instruction. It can assist the teaching staff to discover students' prior knowledge and base instruction on problem solving.

The reviewed literature highlights the importance of considering teaching staffs' beliefs with respect to implementing ICT integrated teaching and learning. Administrators have to play a very crucial role to influence lecturers to take a positive stance towards implementation of ICT integrated teaching. However, other researchers lament that teaching staffs' beliefs are not positive enough and their knowledge is not adequate enough to ensure effective implementation of ICT-integrated teaching and learning hence the recommended technological knowledge (Hew and Brush 2007).

3.3.2 Technological skills

Technological knowledge and skills have been considered as an important requirement for teaching staff to achieve successful implementation of ICT integrated teaching and learning. Previous research studies have shown that a large proportion of teaching staff lack knowledge and skills about ICT and this remains main barrier towards effective use of ICT in teaching and learning of students. For example, Hew and Brush (2007) reviewed literature from both the United States of America as well as other countries in Europe to identify the general barriers preventing teaching staff from using technology for teaching. These researchers reported that technological knowledge and skills were the most prevalent factors preventing teaching staff from integrating ICT into their teaching. Albirini (2006) asserts that, irrespective of the availability of technological equipment, it will not be used unless teaching staff has sufficient knowledge and skills to use ICT in teaching and learning. Literature also shows that relationships exist between

teaching staffs' knowledge and skills and other teacher-related factors. According to Albirini (2006), when teaching staff lack technical skills, they are likely to be anxious about possible technical problems, as they would have little understanding of how to avoid or solve such problems independently.

Other research studies, however, opposed the need for teaching staff to get technological skills arguing that this would not necessarily enable them to implement ICT integrated teaching and learning effectively. These researchers emphasized the importance of other types of knowledge and skills like technological content knowledge (BECTA, 2004). For example, teaching staff need to have specific subject content knowledge allowing them to know how to organize the content relevant to a particular technological context.

3.3.3 Technological Content knowledge

BECTA (2004: 21) notes that

The way ICT is used in a lesson is influenced by the teachers' knowledge about their subject and how ICT is related to it... choose ICT resources that relate to a particular topic, while others use ICT to present the pupils' work in an innovative way, without any direct application to the topic.

The statement above shows that when teaching staff uses their knowledge of both the subject and the way students understand the subject; their use of ICT has a more direct effect on students' attainment. The effect on attainment is greatest when students are challenged to think and to question their own understanding either through them using topic-focused software on their own, in pairs or through a whole-class presentation.

It can be seen from the literature above that the process of implementing ICT integrated teaching requires both pedagogical and technological knowledge with much emphasis put on pedagogy. Implementing ICT integrated teaching and learning has to be underpinned by sound pedagogical principles. In fact, pedagogy tends to be placed over technology and this aligns with the framework of TPACK provided by Mishra and Koehler (2009) who advocates technological-pedagogical integration. This implies that merely mastering the hardware and software skills by teaching staff is not enough. In

the implementation of ICT integrated teaching and learning, teaching staff therefore, need to learn how to organize the classroom to structure the learning tasks so that ICT resources become automatic and a natural response to the requirements for learning environments in the same way markers and whiteboards are used in the classroom.

3.3.4 Technological pedagogical knowledge

Ochieng-Ondhoro (2013) notes that before an institution can successfully integrate ICT, it needs to ensure that teaching staff acquire appropriate ICT and pedagogical skills. Such skills enable the teachers to have the self-drive and enthusiasm to integrate ICT in teaching and learning. The teaching staff's own pedagogical knowledge plays an important part in shaping ICT-mediated learning opportunities (Ottenbreit-Leftwich, 2010). Though the technological pedagogical knowledge refers to teaching staff's understanding of the connection between the technology being used and teaching and learning strategies, some researchers argue that it is not enough to make her an effective implementer of ICT integrated teaching and learning hence the addition of content knowledge resulting in technological pedagogical and content knowledge (Koehler and Mishra, 2009). This leads to an understanding of using technology to support pedagogical techniques in teaching specific content subject.

Mostert and Quinn (2009) postulates that the implementation of ICT integrated teaching and learning requires balancing different sets of competences to include technological, pedagogical and content knowledge. Much of the earlier research and theories about the use of technology in teaching and learning involved viewing technology as being separate from both content and pedagogy. As described by Colvin and Tomayko (2015), effective implementation of ICT integrated teaching and learning requires developing a thorough understanding of the complex relationships between technology, content and pedagogy, and using this understanding to develop suitable context-specific teaching and learning strategies. This is in line with the TPACK framework which highlights technological-pedagogical-content knowledge as encompassing the ability of teaching staff to plan lessons and choose correct technological resources and pedagogical strategies to teach students relevant content. This type of knowledge and competence is likely to help teaching staff to develop the kinds of curricula, teaching,

and assessment methodologies that will ensure that their students engage in the kind of learning suitable for their technological environment.

The complex nature of teaching with ICT leads to the idea that lecturers in universities need to be constantly engaged in the active revision of their academic programmes to meet the dynamic society. Mishra and Koehler (2006:1034) advise that ineffective implementation of ICT integrated teaching might stem from ignoring this idea of cohesion that exist among technology, content and pedagogy. This necessitates that lecturers have the dynamic competences as reflected on TPACK if effective implementation of ICT integrated teaching and learning is to be achieved in subject teaching and learning. Schneckenberg (2009) found out that a critical mass of teaching staff lacks the competence requisite for them to know and to judge why, when and how to use ICT in teaching.

It is a commonly held belief that lecturers in universities come with some basic level of technological skills. They should, for example, be able to work with ICT hardware and software, networks, understand operating systems, and subject specific computerized machinery, in the same way that they are able to work with books, pens, and overhead projectors. The researcher is, however, not aware if this is reflected in the current reality of the Textiles and Clothing department at the university under study. Since all seven parts of TPACK are necessarily integrated and should not be viewed in isolation, the researcher will thus explore in detail to determine the extent to which lecturers in the study have developed competences as indicated on the TPACK that are required for implementing ICT integrated teaching and learning.

Most studies done on lecturers' competences based their ideas on UNESCO (2008) teacher competences standards that, from the researcher's point of view, are not clear and specific on the aspects that are essential for implementation of ICT integrated teaching and learning. An example is the relationship between content and technology which is not explicitly spelt out. To add more, most studies that examined the competences of lecturing staff in relation to ICT use in teaching were conducted outside Zimbabwe. In fact, very few studies, if any, have focused on ICT competences among lecturing staff in practically oriented degree programmes like Textiles and Clothing in

Zimbabwean universities (Tsvere et al. 2013). Gaining a detailed understanding of lecturers' perceived ICT competences may provide useful insight into the future of implementing ICT integrated teaching and learning in Textiles and Clothing degree programmes in Zimbabwean universities and other developing countries. The next section reviews literature related to changes to teaching and learning due to the integration of ICT,

3.4 CHANGES TO TEACHING AND LEARNING PRACTICES DUE TO THE INTEGRATION OF ICT.

It has been argued by Mishra and Koehler (2006) that when ICT is introduced into teaching and learning contexts, it requires developing sensitivity to the dynamic, transactional relationship between content, technology and pedagogy components. Mbae (1995:164) asserts that:

All practices at universities needed to be constantly questioned, reviewed and justified. If such a review reveals the practice to be sound and justified, it should be maintained and strengthened but, if the practice turns out to be outdated, ineffective or unjustified, it should be modified or thrown out to be replaced with a better one.

The implication of this view is that effective implementation of ICT integrated teaching and learning cannot be achieved by simply adding a new piece of technology upon existing structures, but requires a review in existing pedagogical and content domains.

3.4.1 Innovative pedagogical practices

It is reported by Chu, Cheung, Ma, and Leung (2008) that through the emergence of ICT, education has been undergoing a shift from teacher-centred and instruction-based curriculum implementation to student-centred and inquiry-based learning. Pedagogical innovations requiring collaboration and communication among students and instructors have been emerging and implemented in teaching and learning. Collaborative learning refers to tasks that require joint intellectual effort among students or between students and teachers. It emphasises social and intellectual interaction in the learning process such that the differences in knowledge, skills, and attitudes among collaborators

become strengths rather than weaknesses. In their study, Chu,etal. (2008) found some collaborative teaching and learning activities such as group projects, presentations, group discussions, and peer evaluations. They noted that these pedagogical practices, in most instances, had been facilitated by social media involving students working in groups to co-construct an artefact like a presentation for assessment. In support of the research above, studies carried by Ravenscroft (2009) and Trentin (2009) reported that the emergence of social media platforms have shown much promise in promoting communication, collaborative authoring, and information sharing in teaching and learning environments.

Studies carried by Deaney, Ruthven and Hennessy (2005) and Voogt and Pelgrum (2005) that examined the impact of implementing ICT on the pedagogical practices found out that learning projects became student-centred. The projects were longer, had more prolonged processes, and a lot of the ICT-based innovations involved collaborative projects such as project-based learning as well as independent inquiry. The authors observed that the proportion of authentic activities increased and students worked on topics meaningful to them because of the connection to real life. In a further study by Yuen, Fox and Law (2004) that investigated the changes in pedagogical practices brought by ICT, it was noted that the pedagogical role of the teacher changed from that of primary source of information to one who creates structure and provides advice for students. Lakkala, Ilomaki and Palonen' s(2007) study that looked at the impact of ICT on student learning revealed that students' role changed as they were engaged in productive learning which developed their sense of capability and collective cognitive responsibility.

Other studies have examined the pedagogical styles that come with the use of ICT. A number of these studies conducted in institutions of higher learning have reported on lectures that were delivered through PowerPoint. Some of the studies, however, have levelled criticisms against the use of PowerPoint. Tufte (2003) argues that teaching styles aided by PowerPoint lead to over-reliance on a hierarchy of ideas, over-simplification, and linear thinking on the part of the presenter and audience. In surveys of lectures that were conducted with and without PowerPoint, Cyphert (2004) and

Kunkel (2004) discovered that there was no significant difference in student performance or understanding of material. Further, these studies argued that PowerPoint usage stifled pedagogical creativity and led to poorer audience engagement. On the contrary, Brock and Joglekar's (2011) study noted that instructors used PowerPoint slides to communicate learning points and to provide pacing for classroom time. The study concluded that visual learning supplemented the spoken word and improved student retention

Whilst most of the research reviewed above was conducted in different disciplines of education, one study by Marcketti (2011) that explored effective, learner-centred strategies in Textile and Clothing courses found that lectures aided by PowerPoint provided a delivery method that emphasized the strengths and minimized the weaknesses of a traditional lecture format delivery. This pedagogical style was viewed as providing an energetic, participatory and challenging learning environment. Another study by Faerm (2012) recommends the inclusion of pedagogical practises such as ICT design theory and student mentorship in the teaching and learning of Textiles and Clothing programmes. The same author stresses that such pedagogy was necessary in order to increase students' awareness of innovations occurring in the professional practice and help strengthen failing systems.

The pedagogical activities noted by the authors above are supported by Jaffer (2010) who illustrates aspects of teaching and learning in online learning environments and the interactions that occur in the process. Jaffer (2010) indicates that interactions exist among student, teacher and content. When these three components interact, six forms of interactions are observed to include student-student, student-teacher, student-content, teacher-teacher, teacher-content, and content-content. In such pedagogic processes, the teacher plays an important guiding role to avail content which students can engage with through discovery in order to build their own knowledge.

It can be deduced from the studies above that there are certainly pedagogical changes that are brought through the incorporation of ICT into teaching and learning. Jaffer (2010:273) contends that "these changes in pedagogies are attributed to strong movements within changes in education as well as technological developments". Some

authors like Ravenscroft (2009) give the impression that ICT pedagogy has transformed from instructivism, cognitive constructivism to social constructivism. However, some scholars like Czerniewicz (2007) observe that two positions exist concurrently in the educational technology pedagogy to include the proponents of pedagogy underpinned by theories from behavioural psychology on one end, and the proponents of pedagogy inspired by constructivism on the other end. From Bernstein's (2000) analysis, the two forms of pedagogy can be characterised as performance and competence modes of pedagogy respectively. Performance pedagogies stress deficits in students' knowledge in such a way that students are classified according to performance as they are graded by the teaching staff (Bernstein, 2003). Performance pedagogies are not concerned with the specific nature of individual students and are explicit about what students are expected to know. Additionally, the role of the teaching staff tends to be explicit and has more control over the selection, sequence, and pace of learning (Jansen 2009). The same author emphasises that performance pedagogy which focuses on the presentation, memorization and recalling of content has been criticised as outdated given the sudden increase of information. The claim points out that it is no longer feasible for individuals to memorise all the available information within a particular disciplinary domain.

In contrast to performance pedagogies, the nature of the individual student is essential to competence pedagogies. In this type of pedagogy, individual differences are emphasised. In other words, competence pedagogy is personalized and process-oriented (Jansen, 2009). All learners are regarded as essentially competent, and able to arrive at a certain outcome. These students may express the outcome in different ways and the time it takes them to arrive at the outcome will vary from student to student. The role of the teaching staff in competence pedagogy is that of manager of the learning context. Jaffer (2010) argues that through the use of ICT, the teaching staff needs to take into account the social context of learning and teaching.

From the studies reviewed in this section, it can be noted that if ICT is to be implemented effectively, there are many decisions to be made within the programme pertaining the pedagogical issues central to the implementation of ICT in teaching and

learning. This may mean that when ICT is integrated within planning, enactment and assessment of both teaching and learning activities, a change of pedagogy may be necessary as well. This is so because, as noted on the TPACK framework, there is an emerging consensus that the implementation of ICT integrated teaching and learning requires balancing technology and pedagogy. This technology-pedagogy fusion must suit the technological content selected.

However, the successful implementation of ICT integrated teaching depends on the ability of teaching staff to structure their teaching and learning environments in non-traditional ways, merging technology with new pedagogies. Though, as noted from the AT, contradictions may be more profound especially during implementation where lecturers may not be certain how to structure the ICT tools to engage their students actively in the teaching and learning process. This requires that the lecturers develop a different set of classroom management skills, together with innovative ways of using technology to enhance learning. Kaffash, Kargiban, Kargiban and Ramezani (2010) add that teaching approaches that are selected by teachers should focus on the development of higher order skills and should emphasize significant pupil autonomy in the selection of tools and resources.

3.4.2 Nature of the curriculum content

Quinn, Thomas, Slack, Casey, Thexton and Noble (2005) assert that an inappropriate curriculum leads to the production of graduates whose skills and specializations do not mirror the technological needs of those required in the workplace. On the same note, Crosling, Edwards and Schroder (2008), contend that the curriculum ought to be culturally and technologically relevant to prepare graduates for living and working in a diverse society. Similar observations are noted by McLaren, (2008) in his study exploring perceptions and attitudes towards teaching and learning manual technical courses in a digital age, who found that the majority of Textiles and Clothing institutions did not devote enough course content that encompass ICT to meet the level of competence expected by industry. The studies seem to argue that programmes in universities need to be constantly questioned, reviewed and adapted to ensure that they are technologically relevant to the demands of the society. On this idea Wilson and

Parrott (2011) recommend that ICT could be used to revolutionise the course content of the Textiles and Clothing programmes especially in the design and development areas in order to relate them to the changing technological environment.

Furthermore, in a survey carried by Nguku (2012) that analysed Textiles and Clothing programmes among institutions in East and Southern Africa, it was noted that some courses were viewed as out-of-date, of poor quality and course content taught lack technological aspects of textiles and applications in novel textiles and clothing production. In another study by Garraway (2013) on developing a curriculum for degrees in Apparel and Textiles in a South African university, it was suggested that degree programmes need to be adapted to equip students on two levels that is epistemologically as well as ontologically. Epistemological preparation refers to the 'know-why' and the 'know-how' while ontological preparation would enable students to be prepared on a personal level for the new technological workplace and their broader social roles in a changing, uncertain world. Wheelahan (2010) and Winberg, Engel-Hills, Garraway and Jacobs (2013) support the above idea maintaining that programmes in Textiles and Clothing should offer students disciplinary knowledge informing professional practice as well as enabling them to obtain certain skills and situated knowledge in order to be able to practice proficiently in the workplace of the technological society. In order to do this, Winberg, et al. (2013) suggest that the content of the curriculum needs to be carefully selected, adapted and sequenced from both disciplinary and situated knowledge. Winberg, et al. (2013) recommend that the Textiles and Clothing degree programmes could encompass three main content areas that is apparel, textiles and management with each area incorporating new technologies and innovation pertinent to it. This emphasizes a perceived need to increase the scientific and technological content of degrees so that students are better able to adapt to increasingly complex technological workplaces (Blass and Woods, 2012).

The above studies reveal that aligning the programme of study with the needs of the students in the society in relation to ICT is necessary to the implementation of ICT integrated teaching and learning. This factor was noted by Hadfield and Jopling (2014) as having the greatest influence on whether an implementation developed or stalled in

its early stages. The technology being implemented into teaching needed to meet a significant number of individuals' needs in their contexts (Santhi and Arthi, 2012; Wang and Woo, 2007). As informed by the Activity theory, an implementation is driven by its own motives. This shows that the motivation behind the implementation of ICT into teaching and learning emanates from the need to offer students with knowledge informing professional practice as well as enabling them to acquire skills that would enable them to live and work in the technological and dynamic society.

Taking into consideration the issues in the above studies, it can be noted that effective implementation of ICT requires Textiles and Clothing departments to consider aligning relevant content and programme delivery modes to cater for new and emerging ICT and the job performance trends. These studies suggest that effective implementation of ICT integrated teaching could be achieved in subject teaching if the content domains are shifted. This implies that there is need to review and align the content of the programmes that addresses the emerging needs of technological society in order to enable the learners to acquire and develop the desired knowledge, skills, values and attitudes for life in the emerging knowledge society. The TPACK framework argues that effective technology integration for teaching specific content or subject matter requires understanding and negotiating the relationships between the technology and content. This means that technology has to be incorporated into technological subject matter not outdated subject content.

3.4.3 Assessment methods.

Eze and Olusola (2013) found out that the implementation of ICT integrated teaching and learning may also make some assessment methods redundant. Low level knowledge, for example, has been traditionally tested by the use of multiple choice questions. In an ICT environment, the assessment often reflects both the process and the product (Eid-Al-harbi, 2014). Assessment on the process examines how the students complete the learning activities or tasks, work together to complete the final product, or construct knowledge collaboratively by using the ICT. Methods used for the process assessment may include writing online reflection journals, peer evaluation, or e-portfolios (Barret, 2006). Assessment on the product aims at investigating the quality of

the final outcome, such as solutions to the problem, or the software programs developed. Comparisons of previous scores and dates of assessment, for example, will indicate a child's progress and each student can be allocated an individual action plan database stored in electronic format into which each successive test's results can be entered automatically.

The literature reviewed in this section reflects that effective implementation of ICT integrated teaching and learning requires that the curricula of a programme be aligned with the technological needs of the society for which students are being prepared. This requires a complete disruption of the existing teaching and learning practices in a particular context if this change of practice is to be effective. This curriculum change should encompass the content, teaching practices and assessment methods. The curriculum of a programme is an important mediating tool that contains what is to be taught and learnt, and implementation of ICT integration happens within this curriculum. There is, however, scant literature that has explored issues related to the extent to which the teaching and learning of Textiles and Clothing programmes have been modified by the integration of ICT. The limited research done in the field of Textiles and Clothing just touched on the subject matter but did not explore in detail the innovative practices that emerge as a result of implementing ICT integrated teaching and learning. Most of the studies were conducted in OECD countries and in education in general (Voogt and Pelgrum, 2005; Eze and Olusola, 2013). Very few, if any, were conducted in Africa and rarely in Textiles and Clothing teaching in Zimbabwe. These studies represent the particular circumstances and concerns of researchers and practitioners in these developed countries. Furthermore, the research results they obtained were impact results that are not static, especially in the fast changing area of ICT.

Most of the studies relied on correlation analyses that are open to multiple conclusions. In depth studies may provide more detail about how ICT integrated teaching and learning has been implemented in specific subjects like Textiles and Clothing in Africa, Zimbabwe in particular. They can also provide lecturers with information to use when implementing ICT integrated teaching hence the impetus for this in-depth study. This study therefore, explored in-depth, the extent to which the teaching and learning of

Textiles and Clothing programmes has been modified by the integration of ICT. The next section reviews literature related to monitoring and evaluation of implementation projects on the integration of ICT in teaching and learning.

3.5 MONITORING AND EVALUATING THE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING.

Rodriguez, Nussbaum, Lopez and Sepulveda (2010) assert that ICT was introduced in American and European education systems two decades ago with the general perception that they would increase levels of educational attainment by inducing changes in teaching and learning processes. During the nineties, investments in ICT grew in response to the rapid rise of the internet and the World Wide Web (www) (Warschauer, 2003). These investments in educational ICT have been justified based on four accepted rationales namely; advancement of educational reform, support for educational management, support for economic growth, and promotion of social development through improved educational attainment (Kozma, 2008). According to Cox and Marshall (2007), these rationales, however, are still not backed by strong evidence of ICTs' impact on student attainment. The reason for the dearth of evidence is that monitoring and evaluation of implementation activities on the use of ICT in teaching and learning and its impact on student attainment are not receiving the attention they deserve (Trucano, 2005). It has been indicated by Rodriguez et al. (2010) that monitoring and evaluation of ICT in teaching and learning had been characterised by a mismatch between the methods used to measure the effects and the type of learning promoted as well as the absence of information regarding the specific types of ICT used.

It was noted by Montgomery and Zint (2010) that the success rate for ICT implementation projects with high levels of quality monitoring was ninety-three percent compared to a three percent success rate for those with low levels of quality monitoring and evaluation. They observed that effective monitoring is necessary for the success of implementation activities involving ICT in teaching and learning as it allows actors to specify the determinants of success and failures thereby providing points of unity for

adjustments. If properly done, monitoring and evaluation measure the development of the skills of all actors involved in the implementation activity in order to correctly establish the degree to which ICT implementation has been successfully adopted. This makes it necessary to conceptualize the ICT beforehand in order to determine clearly what is important or critical for teaching staff to enact in their teaching rooms and develop measures for determining whether and how those features are being performed in real teaching and learning of students (Penuel, 2005).

According to Njagi and Oboko (2013), monitoring is an ongoing function that employs the systematic collection of data related to specified indicators. Oldfield (2010) posits that a monitoring and evaluation plan can be used during all the implementation phases to assess the activity, process, progress and impact of the implementation to provide information for decision making during the process of implementation. Rodriguez (2008) asserts that activity monitoring assesses the extent to which the planned activities are being implemented. It provides management with indications of the extent of progress with respect to the use of allocated funds and achievement of expected results (Oldfield, 2010). Process monitoring generates a large amount of vital information that allows administrators to identify the major problems, constraints and successes encountered during implementation process through analysis of the data collected (Rodriguez, 2008). This would enable them to adjust the implementation activities, plans and budgets according to data generated and provide information for accountability and advocacy to the organization.

Progress monitoring shows the progress made in achieving the desired outcomes (Light, 2008). In this sense, monitoring can help administrators develop clear, attainable outcomes and goals for transformation of teaching and learning. It enables the development of flexible strategies for achieving the goals and promoting high levels of engagement by all the subjects through on ongoing communication about roles, expectations, progress and performance. Unwin (2005) points that impact evaluation assesses the impact of the project on its beneficiaries.

Unwin and Day(2005) advise that besides administrators monitoring how teaching staff are progressing, the teaching staff themselves should be encouraged to both monitor

their progress and think of ways in which they could improve what they have been doing in a system of repetitive self-evaluation and quality enhancement. There should then be opportunities for this to be fed back into systemic aspects of teaching and learning through regular evaluation. As an example, in the state of Texas, the Long-Range Plan for Technology (LRPT) 2006-2020, in combination with the School Technology and Readiness (STaR) Chart were designed to help teaching staff plan for ICT integration and to assess their own progress based on LRPT goals (Texas Education Agency, 2006). According to the LRPT (2006-2020:53), the total rating within the monitoring chart was a combined score based on “how technology is used, when it is used, how often it is used, student mastery, online learning availability, and technology application”. Despite such a strong monitoring and evaluation plan, Davidson, Richardson and Jones (2014), however, report that teachers in the state still failed to implement ICT integrated teaching in their classrooms. Such feedback can enable management to plan and implement a proper capacity building for the teaching staff.

Another study that presented a monitoring and evaluation scheme for a specific ICT program that supports teaching and learning using mobile computer supported collaborative learning was conducted by Rodriguez et al. (2010:166) who noted that “a monitoring and evaluation scheme supports the intervention process by providing real-time information for decision making through the application of assessment instruments according to a monitoring plan”. This enables intervention activities to be adjusted so as to ensure a satisfactory level of adoption.

Oldfield (2010) argues that a monitoring and evaluation plan should be built in from the beginning and such a plan would describe the components of the implementation, the role of ICT and how it is integrated into the content, the pedagogy, and assessment. It must also describe the required infrastructure such as the equipment, software and networks that would be required to effectively implement the ICT. In other words Rodriguez et al. (2010) assert that a monitoring and evaluation plan used for teaching and learning should be defined from the beginning of implementation specifying the elements constituting the plan to include input, process, outcome and assessment instruments. According to Wagner, Day, James, Kozma, Miller, and Unwin (2005), input

indicators measure the basic conditions for implementing ICT, for example computers per student ratio, software type and bandwidth access. All of these must be assessed at the beginning of an implementation to evaluate whether the requirements for ensuring process sustainability over time are in place.

Process indicators track the evolution of ICT implementation (Rodriguez et al. 2010). There are two types of process indicators that are intervention indicators and adoption indicators. Intervention indicators evaluate the extent of compliance with the intervention plan while the adoption indicators determine whether the skills for implementing the ICT have been acquired by its subjects. In other words, adoption indicators monitor the critical features that teaching staff must enact in teaching and learning as it is these factors which determine the outcomes of the implementation, especially those concerning student achievement (Penuel, 2005). Outcome indicators reflect the direct impact of ICT like teachers' skills acquired through training and their implementation in improving students' attainment. Valdivia and Nussbaum (2009) describe assessment instruments as constituting the tools for measuring input, process and outcomes indicators such as performance tests, observation protocols and surveys. These instruments can be quantitative or qualitative depending on what is being assessed. The monitoring plan determines when the assessment instruments are applied, thus implementing process evaluation (Rodriguez, Nussbaum and Dombrovskaja, 2012).

The choice of core indicators in the implementation of ICT integrated teaching and learning is the key to determining the process and even the impact of ICT on student and teacher knowledge, skills and attitudes. As an example, the InfoDev Monitoring and Evaluation Framework of ICT in education initiatives takes into account a variety of context issues that relate to ICTs for teaching and learning (Kozma and Wagner, 2005). The framework involves specifying a plan to determine implementation fidelity which lays the foundation for integrating ICT into teaching and learning and specifies what is supposed to be achieved. The plan also places a measure that will determine moderating factors that are likely to influence the success of the integration process. This helps to determine their possible effects so that measures can be put in place to mitigate negative effects. Cost indicators are also measured where recurrent, fixed and

variable costs are determined to establish the worthiness of the implementation (Kozma and Wagner, 2005). The framework therefore, helps to determine effectiveness and efficiency of the ICT integration in teaching and learning in terms of its outcomes.

The ICT model for pedagogical approaches for ICT integration was found to be commonly used in monitoring and evaluating ICT in teaching and learning of mathematics and English in Singapore. Lim, Cher and Joyce(2012) used the model in reporting and analysing how ICTs have been used in teaching English and found that more passive behaviours such as listening and reading are associated with learning from ICT while more active behaviours such as writing, creating and updating are associated with learning with ICT. Though the framework has been used to monitor and evaluate the integration of ICT into teaching and learning, Oldfield (2010) argues that it failed in the sense that it was not able to determine moderating factors in the implementation process.

Research conducted in various European countries indicates that ICT implementation in teaching and learning does not receive sufficient monitoring (Tezci, 2011; Penuel, 2005). Monitoring and evaluation by management plays an important role in ICT implementation. Teaching staff and students need sufficient support and this is provided only if there is effective monitoring and evaluation mechanisms in place. This enables management to identify the important external requirements that need to be established in order to achieve effective implementation of ICT integrated teaching and learning. As an example, numerous studies have shown that teachers' lack of knowledge and skills about ICT is the main barrier to effective use of ICT (Hew and Brush, 2007). In such cases, a well-developed monitoring and evaluation scheme would be necessary to provide feedback to management regarding the specific aspects that need to be addressed and the appropriate professional development that has to be provided.

Most of the implementation activities focusing on ICT into teaching and learning have not been effective and have ended up not attaining the expected objectives (Tezci, 2011). Part of the failure has been attributed to the lack of an effective monitoring and evaluation system to support the implementation activities. The absence of acceptable standard methodologies and indicators to assess the process of implementation of ICT

has also contributed to ineffective implementation of ICT in the teaching and learning process (Wagner et al.2005).

Literature on the extent to which monitoring and evaluation of implementation projects on the integration of ICT in teaching and learning is very scant in Zimbabwe. Considering the importance of monitoring and evaluation for the success of ICT implementation as highlighted by different authors (Rodriguez et al. 2010; Oldfield, 2010), this research therefore examined the extent to which the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes at one university of science and technology was monitored and evaluated. The next section reviews literature related to general models developed in relation to implementation of ICT.

3.6 GENERAL MODELS DEVELOPED FOR THE IMPLEMENTATION OF ICT.

This section reviews literature on models that have been developed by other researchers to guide the implementation of ICT in various projects. These reviews are meant to analyse the usefulness of the models and their applicability to Textiles and Clothing teaching and learning situations.

Klein, Conn and Sorra (2001) studied the use of computerized technology in manufacturing companies in United States of America and proposed an ICT implementation model. The model incorporates aspects such as financial resources, management support, implementation climate, and implementation policies and practices. However, this model was developed from ICT innovation in manufacturing firms and is therefore, not appropriate for teaching and learning systems.

Cooper and Zmud (1990) developed a model called The Model of the Information Technology Implementation Process. The model was based on the organizational change, innovation, and technological diffusion literature. The model comprises six stages namely; initiation, organizational adoption, adaptation, acceptance and adoption, routinization, and infusion. Thus, the model covers an implementation process from the scanning of organizational needs to a full and effective use of the technology in daily

practice. However, this model is specific to business contexts and does not address pertinent ICT implementation issues that occur in teaching and learning environments.

Hadfield and Jopling (2014) developed an implementation model for ICT in education. This implementation model is based on three sets of overlapping interdependent factors that are important in determining the success of ICT-based curriculum innovations. These factors are capacity for innovation, alignment with needs and aims, and status of the technology. Although this model was basically developed in education, it does not provide clear guidelines on the aspects that are necessary for actual teaching and learning with ICT. These aspects of monitoring and evaluation were also not included in the model.

In conclusion, literature contains implementation models that have been put forward by researchers to guide the implementation of ICT projects. In as far as models that are targeted at the implementation of ICT integrated teaching and learning in specific disciplines like Textiles and Clothing programmes are concerned, the researcher has not found any. It was through these observations that the researcher was motivated to conduct the study with a view to developing a model to enhance the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

3.7 CHAPTER SUMMARY

This chapter reviewed literature related to ICT infrastructure and resources, ICT competences of teaching staff, innovative ICT pedagogical practices, monitoring and evaluation of ICT implementation projects. The literature review has revealed that ICT software for use in Textiles and Clothing teaching and learning can be grouped into basic Microsoft software applications, general design related software and specific textiles and clothing computer aided design and manufacture software packages. The literature has revealed that there are mobile hand-held devices and social media software applications that have been integrated in the teaching and learning in disciplines such as business studies and humanities.

The literature provides an understanding of the competencies that are needed by teaching staff for effective implementation of ICT into teaching and learning. These competences include the beliefs of teaching staff, technological skills, technological content knowledge, and technological pedagogical knowledge. The literature revealed some of the pedagogical practices that are brought out as a result of integrating ICT into teaching and learning. The monitoring and evaluation measures provided to the subjects were discussed as was their importance to the success of implementation programmes. The next chapter gives an insight on the methodology that was used in this study.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter provides an overview of the research methodology that was adopted in this study. It begins with an outline of the study's research paradigm, followed by a discussion of the research approach that was used to generate the data needed to answer the study's research questions. The chapter rationalizes as well as describes the study's research design and describes the context of the study in detail. The methods that were used for sampling and for generating the data are described and justified. The chapter further explains the data analysis techniques which were used in the study. The chapter ends with a discussion of issues related to the study's trustworthiness and ethical considerations.

According to Robson (2011: 528) research methodology refers to the "theoretical, political and philosophical background to research and their implications for research practice and for the use of particular research methods". In other words methodology in research refers to the strategy or plan of action that links methods to outcomes and governs the choice and use of methods.

Fig 4.1 below captures the research methodology adopted in the study as will be described in the rest of the chapter.

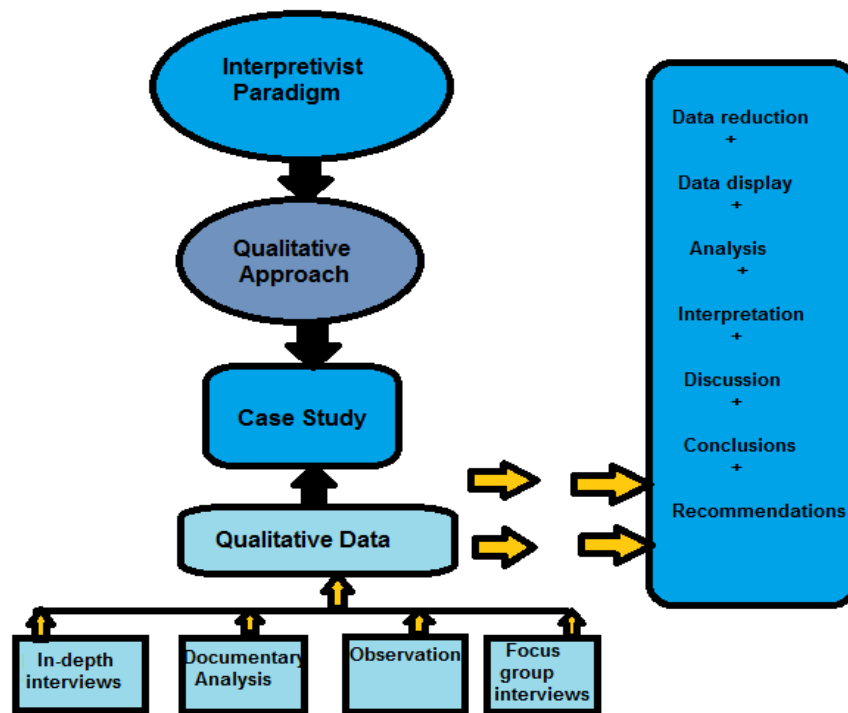


Fig 4.1: Research methodology adopted in the study

4.2 RESEARCH PARADIGM

Tracy (2013:38) defines a paradigm as a “preferred way of understanding reality, building knowledge and gathering information about the world”. Sekeran and Bougie (2009) define research paradigm as a perspective about research alleged by a community of researchers that is based on a set of shared assumptions, concepts, values and practices. In other words, research paradigms may be viewed as beliefs and practices that regulate inquiry within a discipline by providing lenses and procedures with which the investigation is conducted. As Tracy (2013:38) further elaborates “a researcher’s paradigm can differ on the basis of ontology (the nature of reality), epistemology (the nature of knowledge), axiology (the values associated with areas of research and theorizing), or methodology (strategies for gathering, collecting, and analysing data)”.

4.2.1 The interpretive paradigm

The research paradigm adopted for the study was an interpretive paradigm. The interpretive paradigm recognises that reality is socially constructed as people's experiences occur within social, cultural, historical or personal contexts (Denzin, 2010). This study adopted the view that individuals construct their own knowledge within their social-cultural contexts, and are influenced by their prior knowledge, background and values. The interpretive paradigm places strong emphasis on the importance of interpretation and observation in understanding the social world (Hennink, Hutter and Bailey, 2011). Thus, in interpretive studies, the researcher seeks to interpret the meanings and motivations that participants themselves give to the way they experience a phenomenon.

4.2.1.1 Justification for the use of interpretive paradigm

Most of the research conducted on the use of ICT in teaching and learning has been based on the positivist paradigm. These include Gulivani and Joshi (2014), Zhe (2013), Vaid (2013), Fillion and Booto-Ekionea (2012), and Chitanana (2012). The researcher, however, rejected the use of positivism for this study on the grounds that positivism assumes the existence of a priori fixed relationships within phenomena, hence axiological maintaining separation of the researcher from the researched, thereby taking the etic approach or the outsider perspective to research (Wahyuni, 2012). This, however, was not the intention of this study for the researcher sought to take the emic approach to understanding the implementation of ICT integrated teaching and learning among participants in Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe. The researcher wanted to study the subjective meanings that participants attach to their experiences. Positivists apply a rather nomothetic approach to their research, aiming to find universal law-like facts that can be generalised beyond the investigated case by controlling factors of context and time (Yin, 2009; Basden, 2011). Such a paradigm would not fit in with this study, for the institution under study was too complex to be reduced to a set of observable laws. In addition, generalisability in this study was a less important issue than understanding the

implementation of ICT integrated teaching and learning at this particular institution (Gray, 2014). In this study, the main goal of the researcher was to understand how ICT integrated teaching and learning was being implemented from the point of view of those who experience it. The researcher wanted to understand and interpret the process of implementation and the meanings embodied in participants' actions, and then construct shared meanings (model) based on the actions and experiences of the participants and interpretations of the researcher. This was intended to serve the overall purpose of the research which was not to prove but to describe how ICT integrated teaching and learning was implemented in Textiles and Clothing programmes and help to enhance effective implementation. The interpretive paradigm was therefore, opted for.

This study adopted the view that individuals construct their own knowledge within their social-cultural contexts and are influenced by their prior knowledge, background and values. The researcher recognised that data generated to help enhance the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes could be interpreted through the meanings that the research participants gave to their experiences. The researcher, therefore, positioned herself within the parameters of an interpretive epistemological discourse. The researcher acknowledged that the perspectives of the study participants reflected their subjective views of the implementation process and that the researcher also brought her subjective influences to the research process particularly during data collection and interpretation (Denzin, 2010). The coming together of the researcher and the study participants during the data collection process contributed to the co-construction of knowledge. This enabled participants to bring out their own views that led to the construction of a multiplicity of strategies that may assist them in ICT integrated teaching and learning. The researcher then got insight into the meanings and interpretations that the participants gave to their experiences and was able to produce an understanding of the context and finally construct a model of the strategies for effective implementation of ICT integrated teaching. Through observing and interviewing the participants and by analysing the documents that guided their teaching and those produced by students during learning, the researcher was able to gather and document participants' experiences and views

that helped to reveal the underlying experiences on how the Textiles and Clothing department implement ICT integrated teaching and learning. This provided an opportunity for the voices, concerns and practices of research participants to be heard (Hennink et al. 2011). As a result, the researcher was able to uncover and interpret deeper meaning in discourse that is represented in a collection of personal narratives, observed behaviours and activities about the implementation of ICT integrated teaching in the Textiles and Clothing academic programmes.

4.2.1.1 Criticisms levelled against the interpretive paradigm

Interpretive research has often been censured for producing a vast amount of material concerning a small number of settings (Yin, 2009). However, this study regards these attributes as strengths which attest to the richness of data to be obtained from research. Another criticism levelled against interpretive research is that its ontological assumption is subjective rather than objective (Tracy, 2013). Being subjective means that there can be multiple perspectives on reality whereas, objectivity (as in positivism) means that only a single truth is accepted. For the purposes of this study, there was no intention of generalising the findings to get the single truth. What is critical is the selection of the appropriate research paradigm for the inquiry at hand (Tuli, 2010). Similarly, Merriam (2009) argues that getting started on a research begins with examining one's own orientation to basic tenets about the nature of reality, the purpose of doing research, and the type of knowledge that can be produced. As previously noted, interpretive research seeks to understand phenomena in their natural settings, which in this case would be the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes at one university of Science and Technology.

4.3 RESEARCH APPROACH

4.3.1 The Qualitative Approach

According to Grosseohme (2014:109) qualitative research is “the systematic collection, organization, and interpretation of textual material derived from talk, conversation,

observation or documents”. To add to that, Nkwi, Nyamongo and Ryan (2001) define qualitative research as any research that uses data that do not indicate ordinal values. Denzin and Lincoln (2011:3) propose that in spite of the inherent diversity within qualitative approach, it can be described as:

A set of interpretive material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to self ...qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them.

This implies that qualitative research involves collecting or working with text, images, or sounds. Qualitative research implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured in terms of quantity, amount, intensity, or frequency (Anderson, 2010).

4.3.1.2 Justification for the use of qualitative approach

It can be noted that qualitative research studies participants in their natural settings. This was well suited to the study where there was intimate relationship between the researcher and what was being studied (Neuman, 2011). This was possible for the researcher resided and worked at the research site. The researcher was in a position to understand how the participants’ use of ICT was shaped by the context and circumstances in which they found themselves. Data collection methods like in-depth interviews and observations, which involved close contact between the researcher and the research participants, were used. As a result, rather than merely asking about what participants said they do, researching in natural setting provided an opportunity to see and hear what participants actually did. Again, rather than relying on participants’ espoused values, the researcher came to understand what participants valued through implementing ICT integrated teaching and learning (Tracy 2013). The more the researcher became immersed in the study scene, the more she was able to understand

how participants acted especially on issues regarding the lecturers' competences and the forms and nature of the ICT resources they used for teaching or learning.

The qualitative approach was suitable to classify textual data that was obtained from human experiences (Anderson 2010). The qualitative approach enabled the researcher to look for patterns in the data. These patterns helped to provide more realistic view of how ICT integrated teaching was being implemented; a view that could not be understood or expressed through numerical and statistical analysis (Parkinson and Drislane, 2011). Rather than focussing on facts and numbers, the study sought to understand, describe and interpret the implementation of ICT integrated teaching and learning from the perspective of the participants using their own words and concepts (Snape and Spencer, 2008). These patterns yielded results that helped in pioneering new ways of understanding the effective implementation of ICT integrated teaching.

Another reason why the qualitative approach was utilised was because the researcher wanted to get in-depth understanding of the implementation of ICT integrated teaching and learning with a view to improving the quality of the Textiles and Clothing academic programmes (Hennink, Hutter and Bailey, 2011). Through a variety of data collection methods that were used, the researcher was able to explore and examine in depth, issues related to implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes. The data collection methods allowed the researcher to study in depth the hidden meanings emanating from the practices of lecturers and the opinions and perceptions of the students taking part in the study. The qualitative nature of the study enabled the researcher to ask probing questions such as 'why' and 'how' where necessary. Data yielded from the probing allowed for thick narrative descriptions to be made of all the issues that were investigated (Tracy, 2013).

Since the purpose of this study was to achieve depth of information, the qualitative approach, which thrives on a small number of study participants, was seen fit. The researcher chose to study one Textiles and Clothing department at one institution with a small number of teaching staff and students. The small number of participants meant that the researcher had enough time to deeply engage with each participant to explore

their experiences and views regarding the implementation of ICT integrated teaching and learning. This gave the researcher opportunity to take into account the words and views of the participants (Tracy, 2013). This led to the data that were obtained being very detailed, information rich and extensive; which would have been lost if quantitative or experimental strategies were applied. In-depth insights were also gained into the mechanisms used by the administrators to monitor the implementation of ICT integrated teaching and learning.

4.3.1.1 Criticisms levelled against qualitative approach

One of the criticisms levelled against qualitative approach centres on the ability of research to obtain correct answers or correct impressions of the phenomenon under study (Hennink et al. 2011). In this study, the researcher addressed this in several ways so as to ensure information required was obtained. Purposive sampling, based on reviews of the literature and knowledge of the subject area, was used to select cases under study, rather than as an attempt to observe or collect data from all respondents who were affected by the phenomena under study (Petty, Thompson and Stew, 2012). The researcher conducted pilot testing of the research instruments to ensure similar and relevant data was obtained across all respondents. Another criticism levelled against qualitative research is that the researcher could be biased and not observe all factors that might influence the situation under study (Anderson, 2010). In this study, individual bias was addressed by using peer researchers to read interview transcripts and observations.

4.4 RESEARCH DESIGN

Research design can be thought of as the logic or master plan of a research that throws light on how the study is to be conducted (Yin, 2012). It shows how all the major parts of the research study work together in an attempt to address the research questions. Given the interpretive stance adopted in this study, and the nature of the research questions, the researcher selected the case study design as the most appropriate research design for this study.

4.4.1 Case study

Yin (2009:18) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined”. Creswell (2007:73) asserts that a case study involves “an exploration of a bounded system (bounded by time, context and or place), or a single ... over a period of time through detailed in-depth data collection involving multiple sources of information”.

According to Fouche and Schurink (2011), there are different types of case studies namely descriptive, instrumental and collective case studies. As defined by Yin (2003), a descriptive case study, also called the intrinsic case study, strives to describe and analyse a particular phenomenon with a view to get an improved understanding. An instrumental case study is used for explaining a phenomenon for the purposes of producing new knowledge which may inform policy development whilst a collective case study comprises multiple cases that are chosen so that comparisons can be made between cases and concepts (Fouche and Schurink 2011). This study adopted the intrinsic case study. The case for the purposes of this study was one selected university of Science and Technology in Zimbabwe offering degree programmes in Textiles and Clothing. The choice of this particular department was informed by the fact that it was the only department that offered Textiles, Clothing and Design programmes, the research focus of the study.

4.4.1.1 Justification for the use of the case study research design

In a case study, the researcher has direct contact with, and gets close to, the participants and the phenomenon under study (Marshall and Rossman, 2009). To add more, Yin (2009) notes that in a case study, no control is required over behavioural events being studied and the study focuses on contemporary events. In this study, the researcher examined the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes from the perspectives of participants in their working environment. The implementation of ICT integrated teaching and learning is a contemporary event hence the instrumental case study would retain the holistic and

meaningful characteristics of real life events. The case study enabled the researcher to use different methods of collecting data such as in-depth interviews, participant observation, document analysis and focus group interviews; which contributed to the generation of thick narrative descriptions regarding the implementation of ICT integrated teaching and learning.

To add more, the case study was seen as a very important research design for implementation of ICT integrated teaching and learning, as ICT in teaching cannot be separated from the context in which it is being implemented (Keutel, Michalik and Richter, 2014). The researcher wanted to study the implementation of ICT integrated teaching and learning in the Textiles and Clothing degree programmes without imposing preconceived notions (Labaree, 2010). The implementation of ICT integration teaching and learning in the Textiles and Clothing degree programmes was understood as a complex system that was more than the sum of its parts. The researcher placed more emphasis on complex interdependencies and system dynamics in exploring issues related to monitoring the implementation of ICT integrated teaching and learning in the department as a unit of the university. These issues could not be reduced in any meaningful way to a few discrete variables and linear cause and effect relationships (Swanborn, 2010).

Lastly, the case study design offers substantial flexibility in terms of what data are collected and how (Neuman, 2011). The multiple methods of data collection that were used offered thick descriptions of the phenomena under study (Hossain, 2011). The case study adopts multiple perspectives, in the sense that the researcher does not consider the voice and perspective of one group of participants only. In this study, not only were the views of lecturers sought, but also those of other participants, who interact with the main target group such as administrators, ICT technicians and students (Neuman, 2011). The study afforded voice to the powerless, who in this particular situation where the students, and not only lecturers and administrators in authority and control of the teaching and learning. This enabled the researcher to fully understand the implementation of ICT integration by hearing all the participants then determining the related needs. The use of these multiple methods and the deliberate redirections within

data collection enhanced the study's quality (Piekkari, Welch and Paavilanene, 2009). The thick descriptions also gave the researcher access to the subtleties of changing and multiple interpretations. The personal experiences the researcher obtained were an important part of the inquiry and critical to generating new knowledge that would assist the researcher, the participants and the department in implementing ICT integrated teaching and learning. Apart from the rich descriptions which case studies naturally offer, they produce clear descriptions of situations which allow them to be understood with a high degree of precision which would not be possible if other research methods were employed. Such details, which would otherwise be lost in large-scale data, are presented.

4.4.1.2 Limitations of case study research design

Tsang (2013) notes that case studies have been subject to criticisms on the grounds of non-representativeness and lack of statistical generalisability. Although they are geared to provide detailed information about social units, Tuli (2010) asserts that case studies are often criticized for being quite limited in scope and insufficient for meaningful generalizations to be made to larger aggregates. The basic principle of this single intrinsic case study was 'not to prove but to improve' (Stufflebeam, Madaus and Kellaghan, 2000: 283). This study sought to improve the implementation of ICT integrated teaching and learning of Textiles and Clothing programmes through the development of a model of strategies that would enhance the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes at one selected university of Science and Technology (UST). This model would be applicable to other institutions operating under similar situations. To ensure replicability of the study in similar contexts, the researcher described in detail the steps involved in case selection, data collection and the reasons for the particular methods chosen.

4.5 DESCRIPTION OF THE CONTEXT OF THE STUDY

Zimbabwe has a total of fifteen universities, three of which are recognised as universities of science and technology. The study was conducted at one university of science and technology that offered degree programmes in Textiles and Clothing. This

University of Science and Technology is located in the Mashonaland West province which is found in the northern part of Zimbabwe. It was established in 2004 with the aim of producing innovative graduates, creating new knowledge, enhancing entrepreneurship and providing community service through quality teaching, training and technologically oriented research (University of Science and Technology Strategic Plan 2011-2015:3). The University of Science and Technology has six different schools namely; the Schools of Engineering Science and Technology, Agricultural Sciences and Technology, Business Sciences and Technology, Natural Sciences and Mathematics, Hospitality and Tourism, Art and Design, and the Institute of Life Long Learning (University of Science and Technology Strategic Plan 2011-2015). The University of Science and Technology's ICT policy was formulated in 2011 and made reference to the creation of an electronic-based environment to ensure the achievement of excellence in the integration of ICT in teaching and learning (University of Science and Technology Annual Report, 2012: 27).

The School of Art and Design has two departments namely; the Department of Creative Art and the Department of Textiles and Clothing Technology which was the unit of analysis for this study. The School of Art and Design was set up with the singular aim of developing creative artists, textiles and clothing designers, and teachers.

4.5.1 The Department of Textiles and Clothing

The Department of Textiles and Clothing offers a Bachelor of Science Honours Degree in Clothing Fashion Design, Bachelor of Science in Textiles Design and Technology, and a Master of Science in Fashion Design. The Bachelor programme is a four year programme designed to produce highly skilled and technologically proficient personnel to meet the ever increasing demand for creative, innovative and multifaceted personnel in the applied textiles and clothing industries and enterprises, (University of Science and Technology Academic Bulletin, 2012-2014). The programme encompasses courses such as Design Studies, Pattern Development, Fashion Marketing, Product Development and Fashion Quality Management. These courses basically provide students with in-depth knowledge and understanding of the principles of design, clothing

fashion, textiles and management. In the second year of the Bachelor programmes, students select optional courses that allow them to specialise in textiles and clothing teaching or as fashion entrepreneurship. All students enrolled for Textiles and Clothing Bachelor programmes have Advanced (A) level background and have their study expenses met by their guardians. In 2015, the department accommodated one hundred and twenty students of whom one hundred and twelve were undergraduate students while the rest were Master students. The Masters degree programme is a research based programme that is covered in a period of one and half years on full time basis or two years on part time basis and provides further study in textiles and clothing areas. During the period of this study, the Textile and Clothing department had two workshop rooms, two lecture rooms, and one small computer laboratory. However, the two lecture rooms and one small computer laboratory were shared with another department within the School of Art and Design. There were eight academic staff members including lecturers and the Head of the Department (HOD). There were also two ICT technicians employed to assist the Textiles and Clothing department. The administrative staff consisted of the Dean and Deputy Dean of the School who were the middle managers to which all the affairs of the department were reported.

4.6 SELECTION OF PARTICIPANTS

4.6.1 Population

Population refers to “the entire group of people, events or things of interest that the researcher wishes to investigate” (Sekeran and Bougie, 2009: 262). Thus, a population comprises all those potential participants that can make up a study group. In this study, the population that the researcher was interested in studying consisted of the lecturers, administrators, technicians and students of the Textiles and Clothing department.

4.6.2 Sample and Sampling method

A sample is a selection of participants from a population one is interested to study (Karavakas, 2008). Sampling is a “process of selecting subjects to take part in a research investigation on the grounds that they provide information considered relevant to the research problem” (Oppong, 2013: 203). In the same vein, Karavakas (2008)

observes that the advantages of using sampling are that it makes the research practical and enables the researcher to organise the research with ease. The same author further states that sampling reduces the costs of research and saves on time.

Ishak and Bakar (2014) strongly feel that the main purpose of sampling for qualitative researchers is to select informative cases or units that can widen the researchers understanding about the phenomenon under study. The same idea is noted by Strydom and Delport (2011) who postulate that sampling in qualitative research is done to assist the researcher to collect the richest data. The main concern of qualitative researchers therefore, would be to find cases or units of analysis that would enhance what the researcher wishes to learn about a particular a phenomenon. For this reason, the researcher used non-probability sampling to select the research participants. Sekeran and Bougie(2009),state that non-probability sampling deliberately avoids representing the wider population. There are different types of non-probability sampling which include quota sampling, convenience sampling, dimensional sampling, purposive sampling, and snowball sampling (Cohen, Manion and Morrison, 2007). Purposive sampling and quota sampling techniques were used because of their relevance to this study and are thus discussed below.

4.6.1.1 Purposive sampling

According to Johnson and Christensen (2012), purposive sampling is a non-probability form of sampling where the researcher specifies the characteristics of a population of interest. Purposive sampling was used to select participants for in-depth interviews as well as for observations. In this study, the researcher purposively selected seven lecturers, two ICT technicians, one head of the Textiles and Clothing department and two administrators.By virtue of their professional roles, the above mentioned participants were purposively selected as they were believed to possess rich information as they were the ones who craft programme regulations, review programmes and implement ICT integrated teaching and learning (Somekh and Lewin, 2005). In this study, typical and divergent data that addressed the research questions were generated.

4.6.1.2 Quota sampling

According to Battaglia (2011), in quota sampling, the researcher specifies the minimum number of sampled units required in each category depending on a criteria set by the researcher. Quota sampling was used to select Textiles and Clothing students for four focus group interviews. For each focus group, the students were selected according to their academic year and level at the university. To select the participants, the researcher explained the purpose of the research to the students that were in each academic year and had to let students voluntarily join each focus group. For the first academic year, the researcher had to get eight students. The focus group for second academic year had seven students. The focus group for third academic year had eight students. The focus group for fourth academic year had nine students. The researcher was not concerned with having a proportional number of males to females but instead, was worried about having enough participants to ensure that the discussions flow smoothly to cover all the issues.

4.7 METHODS AND PROCESSES USED FOR GENERATING DATA

Data generating is the process of gathering information concerning variables of interest in an orderly way (Johnson and Christensen, 2012). The process of gathering information enables a researcher to answer stated research questions and evaluate the findings of the study. Employing a qualitative approach allowed the use of several different kinds of methods to generate data, such as in-depth interviews, document analysis, observations and focus group interviews. These methods are discussed in the paragraphs below.

4.7.1 In-depth interviews

As defined by Gray (2014), an in-depth interview is “a one to one method of generating data that involves an interviewer and an interviewee discussing a specific topic in-depth”. Sekeran and Bougie (2009) assert that an in-depth interview is a set of open-ended questions and probes that yield responses about people’s experiences,

perceptions, opinions, feelings and knowledge. This indicates that an in-depth interview is a special kind of knowledge producing conversation. This type of interview provides a more relaxed atmosphere in which the interviewer and interviewee co-create knowledge and meanings in the interview setting thereby co-constructing reality (Hesse-Biber and Leavy, 2006: 128). The form of the in-depth interviews was semi-structured, with the specific aim of eliciting as broad a range of information with respect to the areas of concern delineated by the research questions. The in-depth interviews were conducted with lecturers, administrators and technicians.

In this study, three sets of in-depth interviews were conducted. The first set of in-depth interviews was conducted with seven lecturers teaching in the Textile and Clothing department. This set of interviews was conducted to explore lecturers' views and experiences regarding the implementation of ICT integrated teaching in the Textiles and Clothing department. An in-depth interview schedule for lecturers is appended in Appendix III.

The second set of in-depth interviews was conducted with the two administrators and the Head of the Textiles and Clothing department. Refer to Appendix IV for the in-depth interview schedule for administrators. This was done to gain insight into how ICT integrated teaching in the Textiles and Clothing programmes was being implemented, supported and evaluated.

The third set of in-depth interviews was conducted with two ICT technicians working in the Textiles and Clothing department. Refer to Appendix V for the in-depth interview schedule for ICT technicians. This interview was conducted to get in-depth information on the infrastructure and resources available to support the implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes.

During the interviews, participants were addressed using codes instead of their real names to ensure anonymity. Lecturers were allocated codes such as TCL1 to TCL 7. TCL1 represents Textiles and Clothing lecturer one. The technicians were allocated

codes as Tec 1 and Tec 2 meaning technician one. The administrators were given codes such as Ad 1, Ad 2 and HOD1. Ad 1 represents administrator one while HOD1 represents head of the department one. Field notes were taken and conversations recorded by a voice recorder, after asking for permission from each participant. All participants were interviewed in their own offices at a time that was convenient to them. Most of the interviews took no longer than one hour. Kelly (2006) commends that an interview should not be too long and should last for one hour and half at most so that the respondents' listening span is not be affected.

4.7.1.1 Justification for using in-depth interviews

In-depth interviews were used in this study because of their flexibility and adaptability (Babbie and Mouton, 2006). The same observations noted by Sekeran and Bougie (2009) who explains that the researcher can adapt the questions as necessary to ensure that questions and responses are properly understood by the interviewees. In this study, the researcher was able to vary the order of questioning depending on the flow of the conversation. The researcher exercised patience and allowed the respondents to speak freely, while guiding the conversation to cover important issues, or gently re-focusing the conversation when it wandered off track. This assisted the participants to get clarity on the information the researcher needed to obtain. The dynamic nature of the in-depth interview engages interviewees more actively, thus enabling the researcher to probe deeply on some responses given by the participants (Rowley, 2012). This aspect was very valuable in this study because it allowed detailed information about thoughts, experiences and behaviours regarding the implementation of ICT integrated teaching and learning to be captured. This led to increased insights into participants' thoughts and experiences enabling the researcher to reach beyond initial responses and articulate what could lead to effective implementation of ICT integrated teaching and learning.

Through the use of in-depth interviews, the researcher was able to establish good rapport with the participants and to motivate them to tell their stories (Sekeran and Bougie 2009: 212). Establishing good rapport with the interviewees is an extremely

important factor in the success of an interview (Rowley, 2012). It assisted the researcher to obtain information that the participants probably would not reveal through other data collection methods like observation. In the interviews, the researcher also had the opportunity to observe and interpret non-verbal communications as part of the participants' feedback. These non-verbal communications were very valuable during discussions and analysis of the findings and contributed to rich and insightful results (Duncombe and Jessop 2013:7).

Kvale and Brinkmann (2008:1) establish that responses given during interviewing may not be accurate, and may not reflect real behaviour. Because of the presence of the researcher, participants may tell lies or they may not have the relevant information the researcher is looking for. In addition, the interview is influenced by the level of awareness and the emotional state of the interviewee. As a result, possible distortion to data may occur as a result of the interviewee giving misleading data by providing information that the interviewer wants to hear (Rowley, 2012). In this study, the researcher was very attentive to all information that was given and did not force respondents to give information that they did not want to (Maree, 2007). The researcher avoided gestures that were suggestive such as nodding of one's head or giving remarks such as 'yes' or 'no,' to authenticate or reject the participants' responses during the interview session. The pilot study that was done helped the researcher to address most of the limitations associated with bias issues because it allowed the researcher the opportunity to practise administering the questions before the main study.

4.7.2 Document analysis

Document analysis was the second method that was used for generating data in this study. According to Ritchie and Lewis (2003:35), document analysis involves 'the study of existing documents to understand their substantive content or illuminate their deeper meanings which may be revealed by their style or coverage'. Borg, Gall and Gall (2006) state that documents are standardised artefacts in various formats such as notes and case reports, or which serve as institutional traces of activities that take place in an institution. In research, documents can be described as primary or secondary sources

of data (Cohen, Manion and Morrison, 2007). Primary sources of data are unpublished, for example, company reports or minutes of meetings which the researcher has obtained from the participants or organisations directly. Secondary sources refer to any materials that are based on previously published works like books or articles (Hennink, etal.2011). The primary sources of data that were examined in this study were the Department of Textiles and Clothing ICT policy document, prospectus, programme regulations, course outlines, course evaluation reports, lecturers' portfolios, and students' portfolios.

To conduct the document analysis, the researcher secured access to the documents from the participants after the interview sessions. The researcher grouped the documents into two sets. The first set comprised the documents that were related to policies on ICT implementation and monitoring. Such documents were the E-policy document and the peer review and evaluation document. The researcher used this set of documents to obtain information about the implementation of ICT integrated teaching and learning in relation to the ICT goals that were stated, aspects on how ICT was integrated in teaching, milestones reached, monitoring that was done and how feedback was provided.

The second set consisted of those documents that were related to the actual teaching and learning using ICT by lecturers and students and included Textiles and Clothing programme regulations, course outlines, lecturers and students' portfolios. From these documents, the researcher obtained information about the nature of subject content taught in the Textiles and Clothing programmes, assessment methods used by the lecturers and the nature of the work produced by students through the use of the ICT. Where the researcher found a need, she talked to the participants who had in-depth information about the documents to better understand the purpose for which they were developed and used. All the data that were obtained from the documents were recorded in note form. Refer to Appendix VII for document analysis schedule.

4.7.2.1 Justification for use of documents analysis

Analysing the documents enabled the researcher to obtain a deeper understanding of how ICT integrated teaching and learning was being implemented, especially in monitoring and evaluation and the ICT resources used. This is because documents are a non-reactive where the information given in a document is not subject to possible distortion as a result of the interaction between the researcher and the respondent as may happen during interviews (Gray, 2014). Hence, document analysis complemented interviews in the data collection process and provided more insight into those aspects that focused on monitoring and evaluation of the implementation of ICT integrated teaching and learning. The researcher was in a position to identify and probe any contradiction in the evidence emerging as a result of the inconsistencies between the data generated from the documents and the in-depth interviews with the participants. In addition, analysis of the documents helped the researcher to understand the history, philosophy, organisational structure, and principles under which the Textiles and Clothing department operated.

It has, however, been noted that the data generated from documents might be outdated and might give a completely wrong picture of what currently happening on the ground (Patton, 2002). In this study, the researcher cross-checked the date when the documents were developed and utilised only those documents that were written from 2010 onwards. The researcher selected only those documents that had a direct bearing on the implementation of ICT integrated teaching and learning in the Textiles and Clothing department.

4.7.3 Observation

Observation was the third method that was used to generate data for the study. In this study, the researcher used participant observation. According to Strydom (2011:330) participant observation is “a systematic description of the everyday and natural experiences of the respondents to gain feelings, impressions and circumstances of the real world of the participants by watching what they do and how they do it and sharing

their activities”. This implies that during participant observation, the researcher watches, sees, inquires and listens to events directly. In other words, all the senses are used in participant observation and the researcher becomes an instrument that absorbs all sources of information (Strydom, 2011). In this study, the researcher used an observation schedule to record how lecturers, students and ICT technicians interacted with ICT interfaces, hardware and software during teaching and learning. Refer to Appendix VIII for the observation schedule. The observation schedule focused on the following aspects; form of ICT tools used by lecturer, form of ICT tools used by students, how ICT is used, ratio of student to hardware, teaching and learning strategies, nature of subject matter taught/ learnt and nature of the tasks. The researcher was able to observe all lecturers and the students they taught twice during on the course of one semester.

4.7.3.1 Justification for use of participant observation

Participant observation was used in this study for several reasons. It makes the researcher less obtrusive and in so doing reduces the likelihood of the researcher influencing the participants’ behaviour. Observing the given participants in their natural context without any manipulation makes the behaviours they exhibit more credible since they are occur in a real situation (Bernard and Ryn, 2010). Through participant observation, the researcher was able to understand and capture the contexts under which ICT integrated teaching and learning took place, and the interactions that took place between the participants and the ICT tools. In addition, the researcher had the opportunity to observe and identify ICT-related behaviour the participants were unable or reluctant to talk about in the interviews (Petty, Thomson and Stew, 2012). The participant observation method enabled the researcher to generate thick descriptions of the interactions and relationships between the lecturers, HOD, ICT technicians, administrators and students and how these influenced the implementation of ICT integrated teaching and learning.

Criticisms have been raised over the use of participant observation as a research method. Strydom (2011) claims that the data from participant observation may be

distorted because participants' behaviour may be subject to change when they feel that they are being observed. To address this criticism, since the researcher resided at the participating university, she was able to prolong the field research which enabled the participants in the study to become more relaxed and to behave normally as the study progressed. Bernard and Ryn (2010) note that the information collected through participant observation might not be representative of the phenomena as much of the data collected by the researchers is observed based on the researcher's individual interest in a setting. To alleviate this problem in this study, the researcher made use of systematic observation schedule to record all behaviours and that kept the researcher from neglecting certain aspects of the implementation of ICT integrated teaching and learning.

4.7.4 Focus group interviews

The last research method that was used in the study was focus group interviews. Focus group interviews are group discussions comprising six to eight people and arranged to examine a specific set of issues (Silverman, 2010). Silverman further asserts that the primary aim of a focus group interview is to describe and understand meanings and interpretations of a select group of people so as to gain deeper insight into a specific issue from the perspective of the members of the focus group. All the focus group interviews involved students and were conducted in order to shed more light on the ICT resources they use for learning purposes in the Textiles and Clothing programmes. A total of four focus group interviews were conducted during the study, with each focus group comprising eight students.

During the focus group interviews, students were allocated codes according to their level of academic year as this was used to form the focus group. The codes for the students ranged from FGS1:1; FGS2:1; FGS3:2 to FGS4:8. As an example FGS1:1 representing focus group for level one student number one whilst FGS4:8 represents focus group for level four student number eight. The focus group interviews were conducted in one of the Textiles and Clothing lecture rooms at a time that was agreed upon by all the students in each group. A focus group interview schedule was used to

guide the discussions. The data from the focus group interviews were recorded through a voice recorder and in note form. Refer to Appendix VI for the focus group interview schedule.

4.7.4.1 Justification for use of focus group interviews

Focus group interviews encouraged a range of responses which provided a greater understanding of the attitudes, behaviour, opinions or perceptions of the students regarding how ICT was applied in the teaching and learning of Textiles and Clothing programmes (Hennink 2007). Focus group interviews also enabled the researcher 'to get closer to the data' (King and Horrocks, 2010). Since focus groups function within a social context, the researcher was able to explore individuals' diverse perspectives and gain further insight into how the use of ICT was articulated, opposed, and even changed through social interaction (Kitzinger 2005). As a result, the researcher was able to understand group processes by observing how the implementation of ICT integrated teaching and learning was discussed and viewed by the students. As such, focus groups offered possibilities for the researcher to explore the gap between what students said and what they did (Conradson, 2005).

It has, however, been noted by Krueger and Casey (2009) and Bryman (2008) that in focus groups, certain personalities of the participants may bias the group discussion. In the same vein, Hopkins (2007: 530) notes that the social context of focus groups has a significant influence on "issues of disclosure, social conformity and desirability". Thus, in focus groups, due to the presence of some group members, the participants may feel intimidated to speak and may simply conform to the dominant ideas present in the group. To address these challenges in this study, the researcher outlined at the beginning of the focus group interview, its purpose, mode of operation and expected outcomes. The researcher encouraged all participants to feel comfortable about expressing their views without feeling intimidated by more articulate or dominant participants. This was enhanced by seating all group members around a table so as to provide maximum opportunity for eye contact with both the researcher and other group members (Stewart, Shamdasani and Rook, 2013). The researcher also encouraged a

dynamic conversation rather than making students take turns, and all contributions were equally welcomed and recorded. Table 4.7 below summarises alignment of methods of collecting data to the research questions

Table 4.7. Alignment of methods for generating data to the research questions.

Sub-Research focusQuestion	Unit ofAnalysis	Method of collecting data	Participants	Nature of the data collected
What infrastructure and resources are used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?	Infrastructure and ICT resources	In-depth interviews Focus group interviews Documents analysis Participant observation	Lecturers HOD Administrators ICT-technicians Students	Qualitative Data
To what extent do Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning?	Lecturers' ICT competencies	Indepth interviews, Participant observation, Document analysis	Lecturers HOD	Qualitative data
To what extent has the teaching and learning of Textiles and Clothing programme changed by the integration of ICT?	Changes to teaching and learning	In-depth interviews Documents analysis Participant observation Focus group interviews	Lecturers HOD Administrators Students	Qualitative Data
How is the implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes monitored and evaluated?	Monitoring and Evaluation measures	In-depth interviews Documents analysis Participant Observation	Administrators HOD Lecturers	Qualitative Data
What model can be proposed to enhance effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes?	Model	All	All	Diagramatic

4.8 DATA ANALYSIS

Data from the study were analysed following the content analysis method. In this method, data analysis was determined deductively using the research questions and inductively through multiple readings and interpretations of raw data (Creswell, 2013). Thus, the findings were derived from both the research objectives outlined by the researcher and findings arising directly from the analysis of the raw data. It should be noted, however, that the process of content analysis is not a linear and sequential process as it appears in the discussion below. Rather, analysis involved continual movement across all the stages discussed below. Content analysis was used as it aids in understanding of meaning in complex data through the development of summary themes or categories from the raw data (Hesse-Biber and Leavy, 2006). The researcher believed that its use in this study was suitable and beneficial for all the views of the participants were captured. The process allowed research findings to emerge from the frequent and dominant themes inherent in the raw data. The researcher was as well able to condense the extensive and varied raw textual data into a brief and summary format. This facilitated the establishment of clear links between the research questions and the summary findings derived from the raw data. Above all, the researcher was able to develop a model related to the implementation of ICT integrated teaching and learning which were evident in the raw data.

The content analysis procedure that was followed by the researcher to analyse the data consisted of data reduction, data display and drawing of conclusions (Sekeran and Bougie, 2009).

4.8.1 Data reduction

Data reduction is viewed by Sekeran and Bougie, (2009:370) as the “process of selecting, coding and categorising the data”. As suggested by Sekeran and Bougie (2009) reduction of data included preparation of raw data, coding and creation of categories.

4.8.1.1 Preparation of raw data

The researcher made verbatim transcriptions of the in-depth interviews and focus group interviews (Gray, 2014). The transcriptions were done as soon as each interview with each participant was completed. This allowed the researcher to identify new issues that needed to be explored further in subsequent interviews. The researcher arranged all the data orderly, interspersing observation notes, interviews, and documents by their date of collection (Saldana, 2009). The researcher found chronological organization of the data beneficial for it showed the trajectory of the analysis, illustrating how the data were collected and interpreted over time. All interview transcript data from participant observation and document analysis were read over and over again so as to capture the meanings of the words spoken by the participants and interviewer. The notes from the observation and documentary analysis were then interwoven with the transcripts from the interviews, often using different fonts so that the researcher's voice could be clearly distinguished from participants' voice in the data. The researcher printed and made a backup of each raw data file. The text for each research question was read separately in detail so that the researcher could get the whole picture of the studied phenomenon (Fouche and Schurink, 2011). Obvious redundancies, repetitions, and unimportant digressions were omitted.

4.8.1.2 Coding the data

According to Tracy (2013), coding refers to labelling and systematizing of data. On the same note Johnson and Christensen (2012) view coding as a process of marking segments of textual data with symbols, descriptive words or category names. Coding is the analytic process through which the qualitative data that have been gathered are reduced, rearranged and integrated to form a theory. This was done to help the researcher to draw meaningful conclusions from the data (Sekeran and Bougie, 2009).

Coding of the data involved creating open codes (Saldana, 2011) where the researcher began with an examination of the data and assigned words or phrases that capture their essence. The codes were written in the margin. The codes were then compared across the whole data set to identify variations, similarities, patterns and relationships. The

researcher wrote reflections and ideas related to sections of data to abstract the data and deepen analysis.

4.8.1.3 Creation of categories

Categorisation is the process of organising, arranging and classifying coding units. Tracy (2013:194) termed this process “the secondary cycle coding or closed coding”. During this process, the researcher critically examines the codes identified in open coding and organised, synthesised, and categorised them into interpretive concepts. This process moved beyond first-level open descriptive codes to analytic and interpretive closed codes. Rather than simply mirroring the data, the codes served to explain, theorize, and synthesize the data. The researcher read the data several times so as to interpret and identify patterns, rules, or cause and effect progressions. The researcher selected appropriate quotes that convey the essence of each category. The general categories were changed and refined during the process of data analysis as the new themes emerged inductively. The specific themes were inductively derived from multiple readings of the raw data. The researcher inductively searched for sub-themes including contradictory points of view and new insights. The researcher finally defined the themes that emerged.

4.8.2. Data Display

Data display involves taking the reduced data and displaying them in an organised, condensed manner (Sekeran and Bougie, 2009). The authors assert that codebooks, charts, matrices, diagrams, graphs, phrases may help to organise the data and to discover patterns and relationships in the data so that drawing of conclusions is eventually facilitated. Tracy (2013) supports the use of a systematic codebook as a data display method that best organises and lists key categories, definitions, and examples. Bernard and Ryan (2010: 99) assert that a detailed example of a codebook may include:

*Short description of code; detailed description of code; inclusion criteria
(features that must be present to include data with this code); exclusion*

criteria ... typical exemplars (obvious examples of this code); atypical exemplars (surprising examples of this code); “close but no” exemplars (examples that may seem like the code but are not).

In this study, a detailed codebook was used to display the data. The codebook was by and large, descriptive in nature as it showed the quotes from the participants, the open codes, closed codes and the themes that emerged. This was selected as the most appropriate way to illustrate the themes in the data (Sekeran and Bougie, 2009). This helped the researcher to understand the data even more.

4.8.3 Drawing conclusions

According to Sekeran and Bougie (2009), conclusion drawing is the final analytical activity in the process of qualitative data analysis. This was the point where the researcher answered the research questions by determining what identified themes stood for by thinking about explanations for the observed patterns and relationships.

4.9 MEASURES TO ENSURE TRUSTWORTHINESS.

Trustworthiness refers to the confidence or trust one can have of a study and its findings and is determined by those assessing a study (Robson, 2011). The aim of trustworthiness in a qualitative inquiry is to support the argument that the inquiry's findings are worth paying attention to. This is quite different from the conventional experimental precedent of attempting to show validity, soundness, and significance. Creswell (2009) asserts that in any qualitative research, aspects of trustworthiness need to be addressed through credibility, confirmability, transferability and dependability. In this study, these four aspects of trustworthiness were enhanced through a variety of strategies detailed below.

4.9.1 Credibility

Credibility deals with the accuracy of data to reflect the observed social phenomena (Wahyuni, 2012:77). In simple terms, credibility is concerned with whether the study actually measures or tests what is intended. This involves establishing that the results of qualitative research are believable from the perspective of the participants in the

research. To address credibility, the researcher employed four techniques. The first technique the researcher employed was to enlist the help of a competent peer debriefer (Lincoln & Guba, 1985). Peer debriefing assisted the researcher, at the data analysis stage, to check the consistency of data coding as well as identifying other perspectives on the study which may have been overlooked by the researcher. For peer debriefing, the researcher relied on competent peer selected from one of the universities in Zimbabwe. The peer researcher was a practicing professional in the field of Textiles and Clothing with vast experience in qualitative research studies. The peer researcher met with the researcher as she refined her data collection procedure via pilot study, after collecting data, and periodically during the process of data analysis. During the meetings with the peer debriefer, the researcher gave regular progress reports of the study and the peer debriefer posed questions regarding the research question, methodology, ethics, trustworthiness, and other research issues. For example, one of the question the peer debriefer posed was on what the researcher intended to achieve by including a research question which was phrased as “ How has the Textiles and Clothing curriculum been aligned to support ICT integrated teaching and learning. After discussing in-depth with the peer debriefer, the researcher had to restructure the research question as “How has the teaching and learning of Textiles and Clothing been changed by the integration of ICT which became the third research question for she discovered that the term curriculum was too broad to be covered in one research question. In addition, the researcher regularly met her supervisors to discuss the research issues. The fresh perspective, questions and observations they brought enabled the researcher to refine her methods, develop a greater explanation of the research design, and strengthen her arguments in light of the comments given.

Secondly, the researcher conducted a pilot study as a procedure for testing the quality of the interview protocol and for identifying potential researcher biases (Clark and Creswell, 2014). Pilot testing the research instruments was essential to establish if the ways in which participants understood questions were quite similar across the group and to determine whether the research instrument enabled the relevant data to be obtained from participants. After pilot testing, the researcher met the peer debriefer and her supervisors

to discuss all the questions the researcher had identified to be ambiguous particularly those question from the lecturers' in-depth interview schedule such as 'which ICT hardware and software do you use for teaching in your course'. This question was split into two for the question did not provide room for the participants to give detailed information and participants gave answers that were mixed. The other question which was discarded was 'which changes have you made to the course you teach to accommodate ICT in teaching.' It was found that this question confused the participants through the use of the term course for they gave a variety of answers that were not related to ICT integrated teaching. The question was rephrased to formulate three questions to cover aspects of content, teaching strategies and technology.

Thirdly, since the purpose of qualitative research is to understand a phenomenon from the participant's eyes, the participants are the only ones who can legitimately judge the credibility of the results (Trochim, 2006). Member checking was used to validate the truthfulness of the findings. This was done by feeding the findings of the analysis back to the participants and assessing how far they consider them to reflect the issues from their perspective. In the process of member checking, each of the research participants reviewed the data analysis procedure and the summary of the final results of the inquiry. The members selected offered comments on whether the data were interpreted in a manner congruent with their own experiences (Wahyuni, 2012). Fourthly, credibility was ensured through prolonged engagement with participants. The researcher resided and worked at the site of the study and was able to engage the participants for quite a long period of time and within their flexible time. This provided the researcher with the opportunity to establish good rapport and trust with participants (Saldana, 2009). Persistent observation allowed the researcher to identify the characteristics and elements in the study that were most relevant to the implementation of ICT integrated teaching and learning.

4.9.2 Dependability

Gray (2014) views dependability as the assessment of the quality of the integrated processes of data collection, data analysis, and theory generation. Dependability is

concerned with the stability of data over time. Dependability deals with the core issue that the way in which a study is conducted should be consistent across time, researchers, and analysis techniques (Flick, 2007). Thus, the process through which findings are derived should be explicit and repeatable as much as possible. It is perhaps on the issue of dependability that interpretive studies differ most from their positivist equivalent of reliability. Guba and Lincoln (1989: 242) point out that:

Methodological changes and shifts in construction are the very life-blood of interpretive inquiries, and ...In interpretive inquiries, these changes are seen as an integral part of the inquiry process and, rather than representing flawed methodology, indicate increasing maturation of the inquiry.

This implies that what is critical in qualitative studies, is that the changes and shifts in thinking be clearly identified and fully described hence they should be tracked and traceable. In this study, this was accomplished through keeping an audit trail, that is, a detailed chronology of research activities, processes, influences on the data collection and analysis and emerging themes. The audit trail was also examined by the peer researcher who was selected by the researcher.

4.9.3 Confirmability

Confirmability refers to the degree through which the results could be confirmed or corroborated by others (Shenton, 2004). Confirmability is a measure of how well the inquiry's findings are supported by the data collected. In this study, confirmability was accomplished by triangulation of methods and keeping an audit trail as mentioned earlier on. Triangulation of methods involved comparing data collected from in-depth interviews, focus group interviews, observation and document analysis. This was useful so as to improve the consistence and accuracy of data by providing more complete picture of the phenomena under investigation.

For the audit trail, the researcher relied on the peer researcher as mentioned earlier on. The researcher employed the peer researcher after the pilot study, after completing

data analysis, presentation and discussion of data. The peer researcher assessed the consistence of the data by comparing the original transcripts, data analysis documents, comments from member checking, and the text of the dissertation itself.

4.9.4 Transferability

Transferability refers to the degree to which the results of qualitative research are applicable to other settings or transferrable to other contexts or settings (Trochim, 2006). In the same vein, Merriam (2009) suggests that the nature of interpretive studies is such that the researcher describes the context of the inquiry and provides detailed descriptions of methodology and interpretation and it is then up to the reader to decide if the findings are relevant or pertinent to their own situation. Thus, in this study, to enhance a deep understanding of the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes, purposive sampling was used to ensure the data provided a range of perspectives. In addition, detailed and thick descriptive data were collected on the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes to enable others to determine the degree to which the findings might be applied to their own settings. The responsibility for determining transferability is with those who may apply the findings to their own settings (Robson, 2011). The researcher kept a record of all the data analysis documents used to generate answers to the research questions which would be availed only to those researchers who would want to replicate the procedures of this study to their own settings.

4.10 ETHICAL CONSIDERATIONS

Drewstudy (2009) postulates that ethics in research generally means that an investigator has a moral obligation to protect the participants from harm, unnecessary invasion of their privacy, and the promotion of their well-being. This definition highlights the researcher's utmost duty of keeping participants safe at all times. It picks on two key issues that researchers must be responsible for and shows that incompetence has no place in a profession where millions of people could be affected by what a single

researcher writes. Secondly, it calls for researchers to eliminate injury be it emotional or physical. Cohen et al. (2007:105) posit that “ethics embody individual or communal codes of conduct based upon adherence to principles which may be explicit and codified or implicit and may be abstract and impersonal or concrete and personal”.It should be noted that research is a public trust that must be ethically conducted, trustworthy, and socially responsible if the results are to be valuable (Hennink et al. 2011). This statement warns that all parts of a research project have to be right in order to be considered ethical. Where even one part of a research project is questionable or conducted unethically, the integrity of the entire project is called into question. Gray (2014) therefore, cautions that it is of paramount importance that educational researchers respect the rights, privacy, dignity, and sensitivities of their research participants and also the integrity of the institutions within which the research occurs. The following ethical considerations were noted and considered in this study:

4.10.1 Right to privacy and participation

In this study, the right to privacy and participation were ensured in a number of ways. In line with the right to privacy and participation, is the idea of gaining entry into the university where the data were collected. In this study, to get permission to conduct the research, the researcher acquired an introductory letter and ethical clearance certificate from the University of Fort Hare to confirm the intention of the researcher to conduct the study at the university of Science and Technology in Zimbabwe (refer to Appendix XI).After the clearance letter from the university has been issued the researcher negotiated with gatekeepers for permission to access participants at the research site. In this case, the gate keepers were the Human Resources management headed by the Deputy Registrar from the university under study. Hennick et al. (2011) highlight that researchers need to respect research sites so that the sites are left undisturbed after the research study. This, as well, displayed respect to the social hierarchy of the study as well as the cultural norms of the institution. The researcher’s task was to ensure that participants had complete understanding of the purpose and methods to be used in the study, the risks involved, and the demands placed upon them as participants (Best and Kahn, 2006; Jones and Kottler, 2006). All participants were well informed about what participation entailed and

were reassured that declining would not affect any services they received from the institution. The researcher then asked participants for their informed consent before the research began to avoid deception (Trochim, 2006). This was then reinforced by the use of the consent forms. Creswell (2009) elucidates that participants have the right to participate voluntarily or to withdraw from the study at any time. Those who agreed to participate freely were asked to sign the consent form. The researcher sought permission to use a voice recorder during both the focus group interviews and the in-depth interviews.

4.10.2 Right to confidentiality and anonymity

In research, the right to confidentiality and the right to anonymity put the respondents at ease when giving information which might otherwise be regarded as sensitive. Bernard and Ryn (2010) state that confidentiality is about not disclosing information from participants or identifying respondents using information they have provided, while anonymity deals with disguising the identity of the respondents. Assurance was given to all participants that no personal prerogative would be used in any way to obtain information beyond that which was needed for professional research purposes and that the information would be kept confidential. As a result, in this study, no names of respondents were taken or recorded. This was meant to protect the respondents' identities and to give them opportunity to give their honest opinion without the fear of victimisation.

For the sake of confidentiality and anonymity, the university under study was identified as university of Science and Technology (UST). Pseudo-names and codes were used in this study to ensure anonymity and safety of all participants. Even during interviews and focus group discussions, the researcher allowed each member of the group to introduce her/himself using the codes provided as highlighted earlier on in the data collection methods section. Lecturers, administrators and technicians were allocated codes such as TCL1, Ad 1 and Tec 1 respectively. The codes for the students ranged from FGS1:1 to FGS4:8. This provided a basis for building greater rapport among group members. The researcher used the codes to direct questions at group members with immediate

and simultaneous eye contact. Cohen et al. (2007) state that it is the fundamental responsibility of the researcher to ensure that all records have no real names of the participants. It was for these reasons that all data obtained for the study were not associated with an individual. The use of group data rather than individual data facilitated the retention of participants' anonymity since no individual response could be traced back to the individual or the university under study.

4.10.3 Avoiding harm to participants

Flick, Von-Kardorff and Steinke (2004) warn that in any study, if the researcher is not careful, it is possible to harm informants not only by exposing information about individuals but also by discussing them as a group or in a publication in a way which they may find harmful or which actually disadvantages them. In the context of research ethics, harm may be broadly defined to include not only extreme physical pain or death, but also such factors as psychological stress, personal embarrassment, humiliation, or myriad influences that may adversely affect the participants in a significant way (Strydom, 2011:115). Harm can as well refer to anger, irritation, physical and emotional stress, loss of respect from others, negative labelling, invasion of privacy and damage to personal dignity. Since the university under study was a public institution competing for academic excellence and very protective of its credentials, the university under study was simply termed university of Science and Technology instead of indicating its full name. The department under study was referred to as the department of Textiles and Clothing. During the course of carrying out the study the likelihood of physical, emotional or psychological harm was thoroughly examined and guarded against. Necessary preparations during conducting the study were taken by the researcher that included clarifying various issues on the voluntary nature of participation. This assisted the participants to make a decision on how much they wished to say and they were informed that they were free to withdraw from participating at any time without fear of repercussions of any sort. The researcher would be responsible for keeping safely all the information given by participants so that it would not be found and used to label the participants in any way.

4.11 CHAPTER SUMMARY

This chapter presented the research methodology that guided the study. The chapter outlined and justified the use of the interpretive paradigm for the study. A discussion of the research approach that was used to generate the data necessary to answer the study's research questions was given. The chapter rationalized as well as described the study's research design which was the intrinsic case study. A detailed description of the study's research context was given in the chapter. The methods that were used for sampling and for generating the data were explained and justified. The chapter elucidated the different ways that were used to ensure trustworthiness of the study's findings. Ethical considerations that were adhered to in the study were illustrated. The chapter sets the stage for the next chapter which discusses the data analysis methods that were adopted for the study.

CHAPTER FIVE

DATA PRESENTATION AND ANALYSIS

5.1. INTRODUCTION

The previous chapter outlined the methodology utilised in the study. The main aim of this chapter is to combine the data collected through in-depth interviews, observations, documents analysis and focus groups interviews and present it in a manner that is in line with the research questions of the study. Included in the chapter is the analysis of the data that were obtained under each section. As mentioned in Chapter one, the study endeavoured to respond to the following sub-research questions:

- What infrastructure and resources are used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?
- To what extent do Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning?
- To what extent has the teaching and learning of Textiles and Clothing programme changed by the integration of ICT?
- How is the implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes monitored and evaluated?
- What model can be proposed to enhance effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?

The data obtained are presented according to sections that include biographical data, infrastructure and resources to support the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes, lecturers' competencies in ICT, the extent to which teaching and learning of Textiles and Clothing programmes has been changed by the integration of ICT, monitoring and support measures provided for the implementation of ICT integrated teaching and learning.

5.2. BIOGRAPHICAL PROFILE

This section presents the biographical profiles of the participants. The participants consisted of seven lecturers, two ICT technicians and three administrators of which one was the Head of the Textiles and Clothing department. In addition, there were thirty-two students who made up four focus groups with each focus group consisting of eight students. The biographical profiles of the participants are used in the discussion chapter to interpret findings related to the competences of lecturers. The biographic profiles were used to obtain insight into the educational and professional experiences of the participants. For instance, professional qualifications and ICT training of lecturers were used as an indicator for whether or not the lecturers were competent enough to implement ICT integrated teaching and learning in the Textiles and Clothing programmes at the university Science and technology under study. Biographical profile also provided a picture of the level to which these participants were likely to understand the importance of the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. Details of the biographical profiles of the study's participants are provided in the Tables 5.2.1 to 5.2.4.

Table 5.2.1 below shows the profiles of lecturers who participated in the study based on their gender, age, academic qualification, area of specialisation, teaching experience and ICT-related training. As stated in Chapter three, the lecturers were allocated codes from 1 to 7. Seven lecturers, five female and two male, were interviewed in the study. There were no lecturers below the age of twenty years. The table showed that six of the lecturers were holders of Master's degrees while one had a PhD degree. Most universities in Zimbabwe introduced post graduate studies in higher education to enable higher education teaching staff to get upgrading skills on teaching and learning. It was, however, noted that no lecturer possessed a post graduate certificate in higher education. One lecturer had five years teaching experience in the area of Textiles and Clothing. It was reported by the HOD that for one to qualify as a lecturer at university, the minimum professional entry qualification was a Master's degree qualification. It was clear from the lecturers that they had the minimum entry requirement of a Master's qualification for university teaching.

Table 5.2.1: Biographical profiles of lecturers

Participant Code	Gender	Age in years	Qualification	Area of specialisation	Post-graduate certificate in higher education	Teaching experience in years	ICT training
TCL1	Male	35	Master's degree	Textiles Technology	No	5	Computer Aided Design course as part of Masters qualification
TCL2	Female	51	Master's degree	Nutrition	No	29	2-day workshop on Ms PowerPoint and Excel
TCL3	Female	42	Master's degree	Textiles and Clothing	No	27	Master course covering Microsoft Excel, Word, PowerPoint, Publisher and access
TCL4	Female	39	PhD	Textiles and Clothing	No	16	Master course covering Microsoft excel, word, PowerPoint, publisher and Access
TCL5	Female	54	Master's degree	Textiles and Clothing	No	29	2day workshop on Ms PowerPoint and Excel
TCL6	Male	46	Bachelor's degree	Art and Design	No	16	Master course covering Microsoft excel, word, PowerPoint, Publisher and Access
TCL7	Female	39	Master	Textiles and Clothing	No	16	Masters course covering Microsoft Excel, Word, PowerPoint, Publisher and Access

Four lecturers indicated that they had ICT skills which they obtained during their Master degree studies, focussing mostly on basic ICT skills like Microsoft word, Excel, PowerPoint and Publisher. These participants also indicated that these basic skills were just general and not related to the teaching of the Textile and Clothing programmes. Two of the lecturers said that during the course of their teaching they had attended a two-day training workshop that focused on the use of ICT for research purposes, but were never exposed to ICT related to teaching and learning of Textiles and Clothing. All the six lecturers indicated that when they trained at undergraduate level there were neither ICT nor computerised machinery during that time. One lecturer indicated that he had done a course on computer aided design during his Master's degree training programme. The data above showed that lecturers had never come across ICT training related- teaching with a range of ICT in Textiles and Clothing programmes.

Table 5.2.2 below shows the biographical profiles of administrators working in the Textiles and Clothing department. Three administrators were interviewed. One female administrator was the Head of the Textile and Clothing department (HOD1) with more than ten years of administrative experience. The HOD1 had a Masters' degree qualification; however, she had only acquired skills in ICT through a two-day workshop held by the university. The male administrators were all PhD holders with ICT training certificates such as Multimedia and Computer Aided Design. The male administrators, however, had less than five years of administrative experience. All the administrators had no post-graduate certificate in higher education. Getting information related to post graduate studies in higher education was necessary for this had a bearing on how the administrators monitored the implementation of ICT integrated teaching and learning. The biographical profile would be used in the discussion of the data in the next chapter.

Table 5.2.2: Biographical profiles of administrators

Participant Code	Gender	Age in years	Qualification	Area of specialisation	Post graduate certificate in higher education	Administrative experience in years	ICT training
HOD1	Female	55	Master	Textiles and Clothing	No	More than ten years	2 days-workshop on Microsoft office packages
Ad 2	Male	43	PhD	Art and Design	No	Less than five years	Certificate in Multi-media, Computer Aided Design
Ad 3	Male	46	PhD	Art and Design	No	Less than five years	Certificate in Graphic and Web design

From the data obtained from the administrators, it was clear that though the male administrators held doctoral degrees, they had less than five years' experience in terms of administrative issues to effectively provide monitoring and evaluation measures to the implementation of ICT integrated teaching and learning.

Table 5.2.3 below represent the biographical profile of technicians who participated in the study

Table 5.2.3: Biographical profiles of the ICT technicians

Participant Code	Gender	Age in years	Qualification	Teaching qualification	Technical experience	ICT training
Tec 1	Male	39	Diploma in Art and Design	No	More than five years	Diploma in Graphic Design(Computer aided design)
Tec 2	Male	37	Bachelor 's Degree in Information, Communication Systems	No	Less than five years	Bachelor Degree in Information, Communication systems

Two male technicians were interviewed. Tec2 had a Bachelor's degree in Information and Communication Systems and was responsible for maintenance of all ICT hardware and software and other technical issues related to networks within the department. Tec1 had a Diploma in Graphic design and computer aided design and was responsible for assisting lecturers and students on minor technical issues during teaching and learning sessions.

Form the data above, it is clear that there was no technician who had specialised in the area of Textiles and Clothing. This potentially compromised their ability to give better assistance to Textiles and Clothing lecturers and students when it came to teaching and learning.

Biographical information was also obtained from the thirty-two students who participated in the study's focus group interviews, of whom six were males and twenty-six were females. Students possessed different types of ICT devices such as Lenovo, HP and Dell laptops and a variety of digital mobile phones such as Samsung, Nokia, Sony Huawei and Android mobicel. Table 5.2.4 below represent the biographical profile of students who participated in the study.

Table 5.2.4: Biographical profile of the students

Participant code	Gender	ICT device owned	Participant Code	Gender	ICT device owned
FGS1.1	Female	Samsung mobile phone	FGS3.2	Male	Lenovo Laptop Sony Expria phone
FGS1.2	Male	Lenovo Laptop Nokia 210	FGS3.3	Female	Dell Laptop Nokia Phone
FGS1.3	Female	ZTE mobile phone	FGS3.4	Female	Hp Laptop Nokia phone
FGS1.4	Female	Hp laptop Sony Expria phone	FGS3.5	Female	Hp laptop Sony Expria phone
FGS1.5	Female	ZTE phone	FGS3.6	Female	Lenovo Laptop Vodaphone smart phone
FGS1.6	Female	Lenovo Laptop Sony Expria	FGS3.7	Female	Lenovo Laptop ZTE phone
FGS1.7	Male	Android Mobicel iPad	FGS3.8	Female	Hp laptop Sony Expria phone
FGS1.8	Female	Huawei Smart phone	FGS4.1	Female	Android Mobicel iPad
FGS2.1	Female	Nokia Smart phone	FGS4.2	Female	Hp laptop Nokia Smart phone
FGS2.2	Female	Hp Laptop ZTE phone	FGS4.3	Female	Hp laptop Android Mobicel iPad
FGS2.3	Female	Android Mobicel iPad	FGS4.4	Female	Lenovo Laptop Huawei smart phone
FGS2.4	Female	Lenovo laptop Sony Expria phone	FGS4.5	Male	Lenovo laptop ZTE Smart phone
FGS2.5	Male	ZTE phone	FGS4.6	Female	Hp Laptop Samsung Galaxy phone
FGS2.6	Female	Hp laptop Samsung galaxy 6	FGS4.7	Female	Dell laptop Samsung Ipad4
FGS2.7	Female	Huawei smart phone	FGS4.8	Female	Android mobicel iPad Lenovo Laptop
FGS3.1	Female	Sony Expria	FGS4.9	Male	Lenovo Laptop Huawei Phone

During the course of their training, students had done one general course on information and communication technologies. Knowing the IT-related courses students had done had a bearing on the way students used the ICT available in the Textiles and Clothing department and at the university.

This section presented the biographical profiles of participants. The participants consisted of seven lecturers, two technicians and three administrators, one of whom was the Head of the Textiles and Clothing department. In addition, there were thirty-two students who made up four focus groups, with each focus group consisting of eight students. The next section presents and analyses findings on infrastructure and resources that were available to support the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.

5.3 INFRASTRUCTURE AND RESOURCES USED TO SUPPORT THE EFFECTIVE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING.

This section presents and analyses findings on the infrastructure and resources that were used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes. There were seven themes that emerged namely; ICT hardware used, use of basic Microsoft(Ms) software programs, use of general design related software, use of hand-held software applications, use of social media applications, network infrastructure used, physical infrastructure available. A summary of the themes and sub-themes is given in Table 5.3 below and presented in detail in the paragraphs that follow.

Table 5.3: Themes and sub-themes for infrastructure and resources used

Theme	Sub-themes	Issues raised
ICT hardware used	Hp type desktop computers	Most of the Hps were desktop computers that were installed in the main university research laboratories and used for research purposes by all the students at the university. Lecturers had desktop computers in their offices.
	Mackintosh (Mac) Computer	The Mac computers were available for teaching and were installed in a small computer laboratory and shared between two departments within the School of Art and Design.
	LCD projectors	There were portable LCD projectors that were used for beaming content on the screen. Lecturers shared one projector in the whole department.
	Digital television set	The digital television was used to view fashion channels. There was one digital television in the department.
	Mobile handheld devices	Lecturers and students used personally owned laptops and hand-held devices like smart phones during teaching and learning.
Use of Basic Microsoft(Ms) software programs	Ms PowerPoint	PowerPoint was used for presenting and delivery of lecture notes and instructions during theoretical and practical lectures.
	Ms Excel	Ms Excel for recording students' marks and making cost sheets of designs by students.
	Ms Word	Ms word was used for processing and typing of notes and assignments.
Use of general design related software	CorelDraw	CorelDraw was used for designing and drawing of fashion designs.
	Photoshop	Photoshop was used for editing photos when constructing fashion boards.
	Adobe Illustrator	Adobe illustrator was used for making fashion illustrations.
	Mac Paint	Mac paint was used for creating diagrams, drawing, adding and editing colour.
Use of Hand held software Applications	Digital camera	Digital cameras we used for taking photographs that were used for constructing fashion boards.
	Photoeditor	Photoeditor was used for editing photographs that were used for making fashion boards.
	Fashion design	Fashion design was installed on iPad and smart phones and used for sketching, drawing fashion designs.
	Video and	Video and voice recorders were used for recording fashion events and

	voice recorder	some lectures.
Use of social media applications	WhatsApp	WhatsApp was used by lecturers and students to collaborate on tutorial questions and communicate especially on project supervision.
	Facebook	Facebook was used to post information to fashion students and discuss design ideas.
	E-mails	E-mails were used by lecturers to communicate with students on project supervision.
	YouTube	YouTube was used by lecturers and students to download working methods and learn from them without seeking information from anyone.
	Skype	Skype was used by lecturers to clarify academic issues to students and give them guidelines.
Network infrastructure used	Wireless (Wi-Fi) Local area network (LAN)	Wifi network was mostly used by students while LAN was used on desktop computers in the computer laboratories.
	My learning space	My learning space was an electronic platform where lecturers discussed with their students but not very efficient as network was very limited most of the time
Physical infrastructure available	Inadequate workshops and lecture rooms	Two workshop rooms were available for use and lecture rooms were shared between two departments but fitted with only very few internet data port
	No specific computer laboratory	One small computer laboratory with Mac computer was used but that was shared between two departments.

5.3.1 ICT hardware used

In order to examine the hardware that was used in the implementation of ICT integrated teaching and learning, data were collected through in-depth interviews, focus group interviews, observation and documents analysis. The data obtained revealed different types of ICT hardware used for teaching and learning in the Textiles and Clothing programme.

5.3.1.1 Desktop Hp computers

There were Hp desktop computers available for use by the Textiles and Clothing students. Lecturers indicated that these Hp desktop computers were installed at the main university laboratory. Lecturers lamented that when the Textiles and Clothing students wanted to research, they used these desktop computers that were meant for research purposes for all students at the university. At this main university laboratory, there were over one hundred and fifty Hp desktop computers. However, lecturers indicated that all the Hp desktop computers were used for research purposes as indicated by one of the participants:

I would say students use the desktop computers that are at the main university computer laboratory for research purposes and the computers do not have the design related software (TCL 1).

On the same note, one of the technicians commented that Hp desktop computers were not favorable at all as they had no design software. The technician asserted that:

So far, we do not have the required hardware here in the department as our students use the Hp computers at the main campus if they want to do their research. These Hp computers do not have the design software needed by our students (Tec1).

Concurring with the idea above, one of the students echoed that:

I do not use the computers in the main laboratory for they do not have anything that allows me to design (FGS2:1).

One of the administrators corroborated the above statement that the Hp desktop computers were used for research purposes only as they had no design-related software which was required by Textiles and Clothing students. The administrator stated that:

We can't talk of the desktop computers which are used by all students at the university. Those are not for design students but just for research purposes if students are doing their assignments (AD3).

Observations made by the researcher indicated that lecturers had desktop computers in their offices. However the Hp desktop computers were of the old Hp Compaq model. During one of the observations made at the main university computer laboratory, it was found that Textiles and Clothing students used the Hp desktop computers only if they were researching for information to answer theoretical assignments or for justifying their research projects.

It is clear from the participants' responses and observations made that there were old models of Hp Compaq desktop computers that were available for use by Textiles and Clothing students. These Hp desktop computers were shared by all students at the university and used for research purposes only. They were not available for teaching purposes by lecturers. Nevertheless, each lecturer in the department had an Hp desktop computer in the office. It was worth taking note of this category of hardware that was available for the students' use as that had an effect on effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

5.3.1.2. Mackintosh (Mac) Computers

There were Mac computers available for teaching and learning in the Textiles and Clothing programme. Observation revealed that the Mac computers were installed in a small computer laboratory that was located at the centre of the School of Art and Design in which the Textiles and Clothing department was housed. It was revealed by the lecturers that the Mac computers were used for teaching purposes. The lecturers revealed that the Mac computers were inadequate especially during practical lectures session. One of the lecturers teaching the practical courses lamented that:

The Mac computers are the ones that we use for teaching especially all aspects related to computer aided design, but look, we only have got very few of these computers (TCL 1).

It was also observed that there were only eight Mac computers which were very few for a class of even twenty students. During practical lecture session, it was observed that students would sit in pairs at each Mac Computer so that they would take turns to repeat the processes the lecturers would be demonstrating. It was observed that these eight Mac computers were the ones that were used for teaching and were shared by two other departments within the School of Art and Design. One of the technicians commented that no student was allowed to use the computers during their own study time for they were reserved for use by lecturers and students during teaching and learning sessions only. The technician said:

So far we do not have the enough and required hardware... we only have these eight Mac computers which are used by lecturers for teaching the practical aspects related to designing on the screen (Tec1).

Concurring with the idea raised by the technician above, one of the students echoed that:

There are the Mac Computers in the laboratory which are good for us but they are not adequate. We only use the computers in pairs when we are doing our practical lessons with the lecturers. (FGS2:1).

On the issue of the Mac Computers, one of the administrators corroborated the above statement indicating that the department did not have enough computers and was sharing the Mac Computers with other departments within the school. The administrator stated that:

For the meantime, the Textiles and Clothing department share the few Mac Computers in the computer laboratory with the other department. If funds permit we will continue to add to the ones that we have (Ad 3).

From the data above, it was apparent that there were Mac computers available for teaching and learning in the Textiles and Clothing programme. However, it was observed that the Mac computers were too few to cater for the whole class during

teaching and learning. This could compromise the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

5.3.1.3 Liquid Crystal Display (LCD) projectors

The other type of hardware in use in the Textiles and Clothing programmes were the portable LCD projectors. Information the researcher got from analysis of the policy document revealed that lesson delivery should be conducted through the use of ICT like LCDs and computers. Interviews with lecturers and administrators confirmed this as the LCD projectors were used for beaming content onto a screen, and thus were used for lecture delivery and student presentations. One of the lecturers acknowledged that:

Mostly, I use projector to beam content, graphs or tables I would have prepared for students to understand (TCL1).

In confirming the use of projectors other lecturers said that projectors were useful for slow learners to read at their pace and synthesise the information as it is beamed. Another lecturer was quoted saying:

The use of the projector catches the students' attentiveness and encourages interest level of the students since they would want to look at the assets used during lecture delivery. It helps the teacher to keep the content so that one can revisit the same content with students especially those that are slow learners. It can be retrieved unlike if it is written on the board (TCL 7).

In support of the use of LCD projectors the HOD1 commented that:

The use of the LCD projectors, to me it's an ICT tool which make life easier for the lecturers and students where you prepare your presentation and beam on the screen. It's easier for slow learners to read at their pace, synthesize the information from the PowerPoint (HOD 1).

Observations made by the researcher, however, indicated that there were two projectors available for use during teaching, in the Textile and Clothing programmes of which the second one was shared with another department. This was confirmed by one of the lecturers who said that projectors were not easily accessible as the department had two portable projectors shared by all teaching staff saying:

As to those other projectors, I am not used to them because they are not easily accessible as two portable ones are in the department (TCL 3).

The views obtained above revealed that the LCD projector was one of the ICT hardware that was used by lecturers during lecture delivery. It was clear however, that the projectors were not adequate to accommodate all lecturers at any particular teaching session hence lecturers could not use the projectors as and when they wished. The inadequacy of these projectors could compromise the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

5.3.1.4 Digital television set

Lecturers revealed that Digital Television (TV) set was also used during teaching sessions. Lecturers explained that the television was used when teaching about fashion shows as they helped students to get inspirational ideas. One of the participants indicated that:

I find the TV quite useful especially when teaching about fashion shows. Students are assisted to find inspiration ideas (TCL 5).

Substantiating this opinion, another lecturer said that she has used TV during practical lectures related to grooming. She had this to say:

I have introduced the use of TV especially when students are dealing with practical lectures like grooming and modelling where students would want to get make-up techniques(TCL 2).

Observations made, however, showed that there was only a forty-two inches digital flat screen Phillips television set for the Textiles and Clothing department. The TV set was mounted on the wall in one of the workshop rooms making it a challenge for lecturers to use it at a different setting. This observation was corroborated by one of the lecturers who lamented that it was tiresome to use the TV for one has to book to use such gadgets for there was only one set. The lecturer remarked that:

Even to show students something on TV you have to book for we only have one set. It's tiresome and frustrating because you might fail to use the TV at the time you have prepared to use it with students (TCL 4).

From the participants' responses, it was revealed that though the digital TV set was useful for teaching purposes in the Textiles and Clothing programmes, one set was not adequate for the different levels of students revealing the shortages of ICT resources for effective implementation of ICT integrated teaching and learning.

5.3.1.5 Mobile handheld devices

Another type of ICT hardware that was used in the Textiles and Clothing programmes were the mobile hand-held devices. There were two sub-categories namely; laptops and hand-held devices.

5.3.1.5.1 Laptops

Data gathered from in-depth interviews and focus group interviews revealed that Textiles and Clothing lecturers and students used personally owned laptops for teaching and learning. Lecturers and students had different types of laptops such as Lenovo, Hp and Dell. Lecturers indicated that the department was incapacitated to run all the teaching and learning sessions by booking the teaching laboratory each session which made it necessary to use their own laptops. One lecturer commented that:

The department does not have the capacity or to say it has enough ICT gadgets to run the department...as evidenced by my case. I use my own laptop (TCL 1).

In support of the above sentiments, other lecturers maintained that:

A-a-a... we use our own laptops because there are no computers that are mounted in the lecture and seminar rooms (TCL 8).

Hhh ... students use their laptops (TCL 5).

Concurring with the above statement, one of the students said that using personally owned laptops was an advantage to them as they can use them anytime. The participant said:

I use my Lenovo laptop to edit my work anytime (FGS4: 3).

Observation done by the researcher during teaching and learning sessions confirmed the above statement as lecturers and students were found using their personally owned laptops when they were using the lecture rooms. It was, however, observed that not all students personally owned laptops. While all third and fourth level students had laptops, few first level and second level students had laptops.

The responses given by the participants revealed that lecturers and students had resorted to using their personal laptops due to shortage of suitable and adequate ICT hardware provided by the university. Owning laptops was an advantage to students as they could use the laptop anytime and as they wished, however, not all students had personally owned laptops. The types of laptops the students possessed determined the software that would be installed and used by the students as will be presented in the theme of use of hand-held software application.

5.3.1.5.2 Hand-held devices

Observations made by the researcher were that, during teaching and learning sessions, Textiles and Clothing students used a variety of mobile hand-held devices. The mobile digital phone devices included Samsung, Nokia, Huawei, Sony Expria, Android ZTE, Vodafone and iPads like Android Mobicel. Data that surfaced from interviews and focus group interviews showed that through the use of the smart phones, students became connected all the time and they could get the information they wanted anytime from the lecturers. Showing the wide acceptance and use of the smart phones during lecture time, one of the lecturers admitted that:

I normally ask students to use their phones especially when doing group discussions and I encourage them to refer to the internet so that they get the points (TCL 7).

The use of handheld devices like smart phones was corroborated by HOD1 who held the view that:

Half of the times when doing my lecture, I ask students to google something on the phone and it's immediate.... Also with smart phone like Samsung iPad4 students can draw, type on the phone and make notes instead of carrying books (HOD1).

Another administrator acknowledged the use of smart phones by students saying:

Our students here spend many hours on the mobile phone and students are connected all the time (Ad 2).

From the focus group interviews with students, it was disclosed that students used their smart phones during lectures and even for research purposes. One of the students had this to say:

With this android mobicel phone, I can access e-books and use a variety of applications on it (FGS4: 7)

Another student claimed:

I use my Samsung phone for everything I want to do for my assignments (FGS1: 1)

However, one of the lecturers intimated that during lecture delivery, some students tend to disturb others with their smart phones. She narrated that:

During lecture delivery, some of the students disturb the lecture where you want to analyse any issue some just got carried away on the phones (TCL 7).

Data from the participants revealed that hand-held devices like smart phones and iPads were the most common ICT hardware that were used in the teaching and learning of Textiles and Clothing programmes as they were portable and students were open to discussion with the lecturers anytime. This implied that hand-held devices could support the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

5.3.1.6 Heavy duty electric sewing machines

Data that surfaced from the in-depth interviews with the lecturers showed that the department relied on heavy duty industrial machines for product development of their artifacts. The HOD disclosed that:

For product development, we use these ordinary heavy duty industrial machines, but we need high powered technologies where we can mass produce garments and do processes like buttonholes quickly. Look, how many minutes do I need to make a buttonhole manually compared to computerized machines? (HOD1).

Confirming this response, observations made by the researcher noted that during practical sessions, lecturers and students used the traditional industrial machines. It was also observed that decorative processes that could be done by computerized machines were still being done using the traditional electric sewing machines that had to be manually controlled.

From the data above, it was apparent that there were no computerised sewing machines in the department that could be used by students to make decorative processes on their designs. The use of these ordinary electric sewing machines could compromise the effective acquisition of skills related to ICT needed in the workplace, among students.

5.3.2 Use of basic Microsoft office software programs

It emerged from the data that there were basic Microsoft software programs that were used for teaching and learning in the Textiles and Clothing programme. These were Microsoft office, PowerPoint, Excel and Word. These sub-themes are presented below.

5.3.2.1 PowerPoint

Through in-depth interviews with lecturers and administrators, it emerged that PowerPoint was the most common software application that was used by lecturers especially for lecture delivery. Observation made by the researcher during lecture time showed that lecturers used PowerPoint slides to present the content they wanted to deliver to students. Lecturers expressed that PowerPoint enabled students to get the information on the screen unlike dictating notes from a paper. Where there were images, students could see and follow instructions clearly. One of the lecturers noted that:

I do PowerPoint presentations when I deliver my lectures to students. It's very beneficial at least all students can view, unlike when you read from a paper and sometimes if there are images; students can be able to see. Students can follow instructions when dealing with practical lessons like

grooming and modelling whereby students will be following instructions as they appear on the PowerPoint (TCL 2).

Another lecturer reiterated that ICT has changed his teaching through the use of PowerPoint. He indicated that:

Yes, through these technologies, my teaching has changed, because for now I can say I can no longer write on the board with chalk but I use PowerPoint presentations (TCL 1).

The HOD1 validated the use of PowerPoint in the teaching and learning of Textiles and Clothing programmes by claiming that the use of PowerPoint was an effective method of stimulating students' attention. The HOD1 noted that:

When you use PowerPoint and you beam something on the screen, there is the issue of light. Light is a stimulant, it stimulates attention. Secondly, the use of colour, PowerPoint gives the object initial colour you have modelled...It allows the students to see the spellings, the wording, and sentence construction. It builds the students in a holistic way, more than lecturing (HOD1).

It is clear that lecturers were of the view that PowerPoint was a software program that was used in both theoretical and practical courses of Textiles and Clothing programmes for presenting content when delivering lectures to students. PowerPoint was available on both lecturers and students laptops hence could be used widely.

5.3.2.2 Microsoft Word and Excel

In-depth interviews with lecturers brought out two software applications that were in common use among lecturers and students; Microsoft Word and Excel. Lecturers revealed that word was commonly used for preparing and typing teaching notes while Excel was used for recording and analysing students' assessment progress. Lecturers reported that:

Word, that one is common for typing, Excel, I use it for planning and recording marks (TCL 4).

Another lecturer acknowledged using the software programmes by saying:

I use Excel for analysis of marks, Word for typing teaching notes and other information (TCL 3).

Observations made among the student during their lecture and study period showed that students had the Microsoft Word software on their laptops. Students noted that Microsoft Word was common and basically used for processing their assignment whether theoretical or making a written component of practical projects. Some of the students were quoted saying:

I use my laptop to type using Word and everything. I want to do for my assignment (FGS1: 2);

I process all my assignments using Word (FGS3: 2).

From the participants' responses, it was clear that Microsoft Word and Excel were software programmes that were used by both lecturers and students for processing teaching notes and assignments as well as recording students' marks. These two software programs were available on the Hp desktop computers and laptops for use by both lecturers and students.

5.3.3. Use of general design related software programmes

Data that surfaced from in-depth interviews with lecturers and technicians, and focus group interviews with students revealed that there were general design related software that had been incorporated in the teaching and learning of Textiles and Clothing programmes. This theme generated four sub-themes showing these software program types like CorelDraw, Photoshop, Adobe Illustrator and Mac Paints. These are presented in the paragraphs that follow.

5.3.3.1 CorelDraw

From the data that was collected from the lecturers, technicians, students and through observation, it was revealed that CorelDraw was one of the general design related software programs that was used for teaching and learning in the Textiles and Clothing department. The CorelDraw was found in the Mac Computers that were installed in the small computer laboratory at the School of Art And Design campus. It was observed that lecturers and students had CorelDraw installed on their laptops as well. Lecturers noted that the technician downloaded the software and installed it on lecturers' and students' laptops. One of the lecturers noted that:

There are no specific Textiles and Clothing software provided by the university, but we use the general design related software ... like CorelDraw, that's for teaching (TCL 1).

Another lecturer added that CorelDraw is used by students to create their designs. The lecturer remarked that:

CorelDraw enables students to make sketches, working drawings and even some patterns (TCL 7).

In agreement with the above views, participants from the focus group interviews disclosed that:

I use... CorelDraw on my laptop to create my designs and edit my drawings (FGS3: 4);

I use CorelDraw on my laptop, which was installed by the technician, to create my designs (FGS4: 3).

Confirming the use of CorelDraw, one of the technicians observed that:

Softwares like CorelDraw are basic. Through the use of CorelDraw one can portray her ideas therefore; our students can design and illustrate their designs (Tec 1).

Observations made by the researcher corroborated the above views for it was noted that students had their laptops installed with CorelDraw which they used to sketch designs and construct technical drawings of those designs. It was also observed, however, that first level students had none of their laptops installed with CorelDraw whereas the second and third level students had CorelDraw on their laptops. The technicians explained that CorelDraw that was installed on laptops was pirated.

The views of the lecturers, students and technicians showed that CorelDraw was a general design related software program that was used during teaching and learning in Textiles and Clothing programmes. It was used to create fashion designs and construct technical drawings of those designs. However, some of the lecturers were not able to teach using CorelDraw. Though CorelDraw was said a general design related software program, its use in the Textiles and Clothing programmes by students and lecturers cannot be overemphasized.

5.3.3.2 Photoshop

Data gathered from in-depth interviews with lecturers, technicians and focus group interviews with students confirmed that Photoshop was a general design related software program that was used for teaching and learning in Textiles and Clothing programmes. The lecturers and students indicated that the Photoshop software was installed on their laptops by the technician. It was observed that first level students had none of their laptops installed with Photoshop. Students who were in their second, third and fourth year of study had the Photoshop software program on their laptops. The lecturers, technician and students indicated that Photoshop was used for editing photographs in preparation for constructing fashion storyboards. One of the lecturers remarked that:

I teach students to edit their designs using Photoshop (TCL 6).

Authenticating the response above, students acknowledged that they used Photoshop to edit designs and photographs. Some of the students were quoted saying:

On my laptop there is Photoshop which I use to edit my photos when constructing fashion boards (FGS2: 3);

I mostly use Photoshop to edit my designs or even different photographs. It's however challenging when adding colour and change style details (FGS3:2).

The above views were corroborated by one of the technicians who noted that:

Photoshop is software which is found on these Mac computers and I have also installed the software on laptops of students. It can be used to edit designs and even photographs (Tec 1).

Considering the above responses, it was noted that Photoshop was general design related software that was used during teaching and learning in Textiles and Clothing programmes. It was used to edit designs or even different photographs in preparation for constructing fashion boards. The use of Photoshop in the Textiles and Clothing programmes was valued by students and lecturers.

5.3.3.3 Adobe Illustrator

In-depth interviews with lecturers revealed that Adobe illustrator, the third general design related software program, was used in the teaching of Textiles and Clothing programmes. Lecturers disclosed that they used Adobe illustrators because the university has not acquired software that was specifically for Textiles and Clothing like Gerber, Lectra or OptiTex. One of the lecturers remarked that:

I use Adobe illustrator if I want to do any fashion illustrations which I would show students (TCL1).

From the observation the researcher made while students were doing their practical projects in one of the courses called Fashion illustration, it was discovered that not even

one student had Adobe illustrators installed on their laptops hence no student was found using the software. It was observed that Adobe illustrator was installed on lecturers' laptops only. In order to affirm this observation, one of the technicians clarified that:

Lecturers are the ones who use this software. Students preferred CorelDraw than Adobe illustrator (Tec 2).

Emanating from the data was the idea that Adobe illustrator was a general design related software program that was used for making fashion illustrations by lecturers only. This software program was not common as Photoshop and CorelDraw among the Textiles and Clothing students hence was not used widely.

5.3.3.4 Mac Paint

Data collected from interviews with lecturers and focus group interviews with students showed that the Mac Paint was the fourth general design related software program that was used in the teaching and learning of Textiles and Clothing programmes. As explained by students, the Mac paints were used for editing and making geometrical drawings. Some of the students reported that:

I use Mac paint on my laptop to create and edit my drawings (FGS2:4);

I only use Mac paint when drawing shapes to form patterns or other geometrical drawings (FGS1: 4).

To confirm the above, observation made by the researcher indicated that first and second level students preferred to use the Mac paint to create geometrical drawings. Clarification given by one of the lecturers teaching computer-aided design commented that first level students used more of Mac paints to learn the basic skills of creating shapes, drawings and adding colour. The lecturer had this to say:

You see I encourage the first year students to use Mac-Paint so that they learn the basic skills of creating shapes, drawings and adding colour for them to be able to use other design softwares (TCL 1).

It is clear from the lecturers and students that that Mac-paint was a general design related software program that was useful to first and second level students hence; it is assumed that the software was used to develop skills needed for the next level courses.

5.3.4 Use of hand-held software applications

From the data obtained from lecturers, students, technicians and administrators interviewed in the study, it was apparent that hand-held software applications were also incorporated to support the implementation of ICT integrated teaching and learning of Textiles and Clothing programmes. This theme reveals five sub-themes showing kinds of software applications such as multimedia camera, photo-editor, fashion design, voice and video recorders.

5.3.4.1 Digital camera

Data was solicited from students and lecturers on the nature of hand-held software applications that were being used in the teaching and learning of Textiles and Clothing programmes. Focus group participants noted that digital cameras found on smart phones were of high use especially in courses like Photograph, Fashion illustration and Specialisation project. These participants added that these were used to photo shoot different designs and environment surroundings. The photographs would later be edited and used to create fashion boards. Some of the focus group participants reported that:

With this Android mobicel smart phone...I use my camera to photo shoot, and photoeditor to edit pictures for my fashion boards (FGS2: 3).

In the same vein, another fourth level student reiterated that:

For Fashion Photograph, I used the camera on my mobicel smart phone to take photographs and even edit my photographs on the phone (FGS4:7).

Evidence from the interviews with lecturers corroborated the above views indicating that most students used their phone cameras to make photo albums which they used to create fashion boards like inspirational boards. One of the lecturers confirmed that:

These students are very creative. They use their phone cameras to take a variety of images which they use later (TCL 6).

From the response of the participants, it was shown that digital cameras were used by students and lecturers. Students used the cameras to take photographs which were combined into albums which would then be applied to different design collections to create fashion boards. The use of digital cameras in the Textiles and Clothing programmes was appreciated by students and lecturers.

5.3.4.2 Photoeditor

It also emerged that software applications such as photoeditor, found on smart phones, were manipulated by students to suit their situation. Lecturers noted that students were using applications on smart phones like photoeditor in a creative way to edit photos they had taken from the environment to create a variety of boards for their design connections. One of the lecturers remarked that:

lji, some of these students are very creative, they are using applications on their phone to edit photos and combine images into mini-boards which they use for their practical assignments (TCL 7).

Students authenticated the above claim by lecturers. One of the students said:

I use ...this application called photoeditor on my Vodafone smart phone to edit my photos which I use for my assignments (FGS3:5).

In addition, another student clarified the use of the photoeditor application by saying:

It's easier with this Samsung smart phone to use the photoeditor application to edit images. I then use the images to make collages, inspirational or even story boards (FGS4: 6).

Observations made by the researcher of fourth academic level students authenticated the above views as it was noted that during one of their practical projects, most students worked on their phones to edit and create mini-boards on the phone which were later transferred to the laptops for further editing with Photoshop.

From the data above, it is clear that photoeditor as a hand-held software application was used by students to edit photographs into a mini board on the phone. The mini-board would then be used to create usable fashion board. The photoeditor as a hand-held software application was manipulated by students into a learning tool, hence, was seen valuable by students.

5.3.4.3 Fashion design

Evidence from the data obtained from students revealed another software application that was installed on smart phones like Samsung iPad4, Sony and Android Mobicel called Fashion design. Students mentioned that the fashion design application was very useful as it enabled the students to sketch, design, add colour and edit several times on the phone until the desired look was achieved. One of the students reported that:

Most of the time I use the Fashion design application on my phone for idea formation and send to my supervisor for consideration (FGS4:6).

Similarly, another student reiterated that:

On my phone, the Fashion design application assists me to sketch design and even add colour to the designs (FGS3:1).

Of interest was that these focus group participants helped each other to install these applications on their phones as they indicated that the applications were very useful to their design studies. Another participant acknowledged that:

A friend of mine in part four installed this Fashion design application on this Sony Experia phone of mine and its very good when I want to create even sketches of textile designs(FGS2:4).

In reaction to the views of students, lecturers stated that they have never tried the fashion design application but have seen students formulating ideas about their designs on the phone. One of the lecturers admitted that:

These students are very cunning they try everything using these applications on the phone to make their life easier (TCL7).

As a follow up to the use of the fashion design application, one of the administrators authenticated the views of using design software application like fashion design on smart phone and iPad saying:

If using the Samsung iPad4, you can install these design applications like fashion design. One can do drawings on the phone. Students can sketch and send their sketches to lecturers ... especially on idea formation. They can do that on the phone and send it for consideration (Ad 3).

Observation made among students showed that very few students had the fashion design application on their phone. Students who had the Samsung and Sony Expria mobile devices were the ones who had the Fashion design software application.

Considering the above responses, the Fashion design application was used in the learning of Textiles and Clothing programmes as it assisted students to formulate their ideas and sketches of designs. The Fashion design application was used well by students who had iPads and smart phones like Samsung iPad4 and Sony Expria. Its use could have been more widespread if all students had iPads.

5.3.4.4 Voice and video recorders

Emanating from the hand-held software applications was the use of voice and video recorder during teaching and learning sessions. Students revealed that through the fashion events they attended during their course, they were forced to use voice and video recorders to capture fashion or exhibition events. They clarified that these

recordings were used as inspirational sources to get ideas on how to organize and manage events which they would be asked to do as assessment projects. One of the participants stated that:

I use applications on my Sony Experia phone like voice and video recorder to record fashion events like the Zimfashion so that I use them later to get inspirational ideas(FGS1: 6).

On the same note, other students pointed out that they used voice recorders to record even lectures so that they would replay them later. One of the participants mentioned that:

I use the voice recorder on my phone to record even lectures or presentations so that I replay them later (FGS2: 7).

As a follow up to the students' sentiments on the use of voice recorders, lecturers gave totally different views that the lazy students were the ones who recorded lectures because they did not want to take down notes.

It is clear from the data given above that the use of voice and video recorders was not welcomed by lecturers, though students had valid reasons for recording lectures. Therefore, the use of voice recorders was discouraged by the attitude of lecturers.

5.3.5 Use of social media applications

From the findings it emerged that social media applications were also incorporated into the teaching and learning of Textiles and Clothing programmes. This theme revealed four sub-themes of the forms of social media platforms such as WhatsApp, YouTube, facebook, Skype and Emails. These sub-themes are discussed below.

5.3.5.1 WhatsApp

From the data that was solicited from lecturers, administrators and students, it was shown that WhatsApp was used in the teaching and learning of Textiles and Clothing programmes. Administrators revealed that WhatsApp was the most common social

media platform that was manipulated by both lecturers and students into a teaching and learning tool to conduct group or tutorial discussions. One of the lecturers noted that:

In terms of these social networks, we usually use WhatsApp to do group discussions with the students (TCL 7);

In the same vein, another lecturer disclosed that he usually chats with students on any academic issues students may need clarification. The lecturer said:

I have used WhatsApp... to chat with students on academic issues (TCL 6).

The views of lecturers were validated by students who also admitted that they used WhatsApp as a group to discuss questions they were given by their lecturers. One of the students intimated that:

Our group send even presentation questions on WhatsApp to discuss and give each other some idea (FGS2:1).

One of the administrators corroborated the views of lecturers and students above indicating that:

I communicate with students on WhatsApp and chat with them on academic issues they are not clear on. This platform is very useful especially for students on workplace learning. I discuss with most of the students when they are out on industrial attachment(Ad

As a follow up to the sentiments above, another administrator commented that social network platforms were commonly used in teaching as compared to platforms on desktop computers because one does not need to do a lot in terms of logging on but simply to wait for a message to come on the phone and respond. The administrator remarked:

These WhatsApp platforms are commonly used and taking the lead because you do not need to do a lot but just waiting for a message to

come on the phone and you do not log on to anything as compared to these other platforms on desktops computers (Ad 2).

Data from the participants above revealed that WhatsApp as a social network platform was manipulated by both lecturers and students into a teaching and learning tool. The responses showed that WhatsApp was used for conducting group discussions as well as clarifying academic issues to students, hence supporting the teaching and learning with ICT.

5.3.5.2 YouTube

From the data obtained from lecturers and administrators, it was noted that YouTube was another social media application that was applied in the teaching and learning of Textiles and Clothing courses. Lecturers and administrators agreed to the idea that they downloaded working methods of processes from YouTube and used these without seeking assistance from someone. One of the lecturers admitted that:

When am focussing on the courses I teach like Grooming and Modelling or Social Psychology, I found YouTube very helpful like when I am teaching about corrective make-up. I download the method then I use this to show student how to apply make-u

Substantiating this opinion, one of the administrators maintained that:

Students download working methods on YouTube, and learn from that without even going to seek information from someone (Ad 3).

Of interest to note were the responses from the students who supported the use of YouTube especially for getting practically related information. One of the students acknowledged that:

When I face challenges in doing some of the practical activities, I search on Youtube where I get some instruction for making up the process.

From the data above, it was noted that YouTube was an application used by both students and lecturers to download working methods of any process they might not be knowledgeable of and work on it by simply following instructions.

5.3.5.3 Facebook

Interviews with lecturers and focus group discussion with students revealed that Facebook was another social media platform that was used to conduct discussions with students. Lecturers indicated that they used Facebook to discuss and evaluate designs generated by students. One of the lecturers acknowledged that:

I have used facebook to discuss design ideas of students. Students post their designs and other students post comments about the designs (TCL6);

Confirming the sentiments raised by lecturers, students pointed out that they had used Facebook to discuss their design ideas with other students and lecturers as well as quoted below:

We discuss some of our designs on Facebook and send some to our fashions friends for comments (FGS4:4)

I send my sketches through social media like Facebook for consideration to some of the lecturers and some of my fashion friends to critique my designs(FGS3:8)

The views of lecturers and students were corroborated by one of the administrators who acknowledged using Facebook as well by saying:

Facebook, as another platform used by lecturers to post information to students and discuss various issues, I also chat with students on issues they are not clear on (Ad 3).

Unfolding from the participants' views is the idea that though Facebook is a social media platform, it has been manipulated as a teaching and learning platform where students discuss and post design ideas for evaluation by other students and lecturers.

5.3.5.4 E-mails

Data solicited from in-depth interviews with lecturers indicated that lecturers used e-mails to communicate as well as for marking students' work and projects. Lecturers emphasized that emails were very useful and preferred for discussing and classifying issues with third level students who would be on workplace learning. These lecturers explained that emails were found very useful when supervising research projects among students enabling students to get in contact with their lecturers anytime. One of the lecturers remarked:

I have used yahoo to communicate with students and mark students' projects even when they are out on industrial attachment (TCL 6);

In a similar vein, another lecturer conceded that:

Marking students' projects has been made easier through the e-mails especially for those students who are on industrial attachment (TCL 3).

Concurring with the same observation, another lecturer said:

I mark students' projects on the soft copy and send through e-mails and students are even using the emails to respond. Emails are mostly in two parts, when marking research projects for undergraduate students and when we discuss certain issues with regards to the projects. When it comes to assignments during the semester I do not accept using the e-mail because they may not be delivered (TCL 1).

Surfacing from the responses above was the point that the use of emails had facilitated the marking of students' research even if students were out of the university campus. E-

mails served as another useful ICT platform supporting the implementation of ICT integrated teaching and learning.

5.3.5.5 Skype

It also emerged from the interview with lecturers and administrators that Skype was also being gradually used in the department. Lecturers maintained that they started using Skype when they were allocated third level students who were doing workplace learning outside Zimbabwe. The lecturers indicated that they used Skype to discuss research project issues with the students which they were supposed to undertake when they were on workplace learning. One of the lecturers was quoted saying:

I have been using Skype to discuss the research with one of my students who has been in South Africa for workplace learning. I have assisted the student very well because we could hear each other talking (TCL 7).

However, one of the administrators lamented that the high cost of using Skype was affecting a number of lecturers from using this effectively hence, it was limited to project supervision only. The administrator stated that:

At times I have asked students to Skype if they think they need to speak to me especially if they need clarification on academic issues like research projects and even giving them guidelines, but, you see not all lecturers are using Skype, it's because Skype is costly to maintain(Ad 3).

Though the School of Art and Design E-policy document that was analysed, supported the use of Skype in section 4.5 of the document which stated that a member of staff in the school is encouraged to supervise students' research activities using internet based approach like Skype whenever necessary, it was noted that there were no measures put in place to ensure its effective use. Skype was, therefore, not fully utilized by lecturers in the department.

5.3.5 Network infrastructure used

From the data obtained from lecturers, students, technicians and administrators interviewed in the study, it was revealed that there was a network infrastructure supporting the use of various ICT resources that were used in the teaching and learning of Textiles and Clothing programmes. This theme revealed three sub-themes showing the type of network that included the wireless, local area network (LAN) and the e-learning platform called my learning space. These subcategories are presented below.

5.3.6.1 Wireless and Local Area Network

Data solicited from in-depth interviews with lecturers, technicians and focus group interviews with students showed that wireless and local area network were the two types of networks supporting the teaching and learning in the Textiles and Clothing programmes.

We use the internet most of the time to search for content. I give students some websites for finding content pertaining some topics and students use a variety of websites like Wikipedia, internet explorer (TCL7).

Focus group interviews with students showed that they preferred to use wireless and had all the laptops connected to wireless as it was faster than the cable network. One of the students was quoted saying:

I use the Wi-Fi this is the best for us here, the network in the computer laboratory is very bad (FGS4: 3).

Confirming the responses above, observations made by the researcher indicated that most students in the department used the wireless network as they were seen most of the time studying whilst in their seminar rooms using their laptops. Lecturers, however, lamented that bandwidth was very poor that they usually resorted to working during the evening if they wanted to research and upload documents to students. One of the lecturers disclosed that:

The network is very bad. You can't even access google during the day due to limited access to proper net. That's the limiting factor (TCL 4).

From the responses above, it was clear that wireless and local area network were the two types of networks supporting teaching and learning in the Textiles and Clothing programmes. However, it was noted that the bandwidth was very low as lecturers admitted to working during the evening if at all they required using the internet.

5.3.6.3 My learning space

Evidence from the data obtained from in-depth interviews with lecturers, administrators and technicians showed that an e-learning platform called my learning space was developed for use by all students and lecturers. However, participants indicated that the platform was not user-friendly at all compounded by limited bandwidth. One of the lecturers had this to say:

Yes, the e-learning platform but I tell you that even if you try to log on to the platform, you cannot do that; the process is just too long and you end up not using it (TCL 1).

Substantiating this opinion, the head of the Textiles and Clothing department commented that she once tried to encourage a discussion on the e-learning platform but did not receive any response from students reflecting technical problems. The HOD1 had this to say:

At one time, I tried to encourage a discussion on the e-portal but I did not receive any response from the students, not even one of them responded...that's how it died a natural death (HOD 1).

Corroborating the sentiments above, another administrator admitted that:

We have got a problem in terms of our university-wide platform which is my learning space that is used by UST. It's not user friendly at all and the

last thing a reluctant person does is to feel like it's not working and that becomes a good excuse for not doing it (Ad 2).

In order to affirm the claim made by the participants above, one of the technicians who had specialized in ICT commented that the issue centre on the availability of bandwidth to cater for the growing university student and lecturer body. The technician observed that:

You know what we try by all means but financial backup is limiting us from having enough bandwidth that covers more than five thousand users to at a time to enable the e-learning platform to work efficiently (Tec2).

Emanating from the data above is the point that the e-learning platform called my learning space was developed to support the implementation of ICT integrated teaching and learning. However, it was revealed that the platform was not user-friendly at all as it was limited with poor bandwidth to cater for all students and lecturers.

5.3.7 Physical infrastructure available.

Unfolding from the data was the nature of the physical infrastructure supporting the implementation of ICT integrated teaching and learning in the Textiles and Clothing department. This theme generated two sub-themes which included no specific computer laboratory for the department and inadequate workshops and lecture rooms which were not spacious. The sub-themes are discussed in the paragraph below.

5.3.7.1 No computer laboratory specifically for the Textiles and Clothing department

Of concern in this study were the data obtained from the lecturers, administrators and documents analysed which showed that there was no computer laboratory specific to the Textiles and Clothing department. Lecturers reported that whenever they wanted to teach specific skills related to the use of computers, they had to use the small computer laboratory that was shared with another department in the School of Art and Design. It was also explained that for any internet-based research, work students needed to do,

they had to use the main university research laboratory or to use the library. The HOD1 lamented that:

We do not have our own computer laboratory as the Textiles and Clothing department. Look, we share this small laboratory with the department of Visual communication and Multimedia design (HOD1).

This view was corroborated by one of the administrators who disclosed that:

I can say the Textiles and Clothing department almost has nothing here. I can't talk of this small laboratory which is shared with another department that we use for practical purposes. Our students, most of the time, use the main computer laboratory if they want to do their research work (Ad 3).

Confirming the responses above were the quotations from one of the lecturers' internal report expressing challenges faced during the course due to lack of suitable computer laboratory. The lecturer stated that:

Students, however, showed great challenges...This contributed to the average performance noted by most students in the course for there is no computer laboratory specifically for our department to enable students to have hands on practise at any time they wish to work with the computers (Document 1).

Observations made by the researcher affirmed that there was no computer laboratory available for the Textiles and Clothing department during the period of the study. Observation showed that there was only a small computer laboratory with very few Mac desktop computers that were shared by another department. Students in the department were using the main university computer laboratory with desktop computers that were generally used by all students of the university.

Data collected in this section revealed that there was no computer laboratory specifically for the Textiles and Clothing department to facilitate the implementation of ICT integrated teaching and learning.

5.3.7.2 Workshops and lecture rooms not spacious and inadequate.

Data that was obtained from lecturers, students and documents analysis revealed that the workshops and seminar rooms used by Textiles and Clothing department were not spacious and were inadequate to allow effective implementation of ICT integrated teaching. Observations made by the researcher showed that the department had two workshops rooms and two seminar rooms that were available for teaching and learning of Textiles and Clothing programmes. To make the matters worse, it was observed that the two seminar rooms were also shared by another department within the School of Art and Design. Data cables were connected in all seminar rooms but the internet ports were too few to accommodate the use of local area networks for all students in a class.

One of the lecturers' reports of the teaching and learning situation in one of the workshops highlighted that:

The workshop is too small to accommodate big groups of say twenty-nine students per level and sharing the workshop among all academic levels proved to be a great challenge. Students complained that they were unable to work in the workshop and to use the internet ports during their spare time for it was ever used by the fourth level students who ever turned the first level students out of the rooms (Document 2).

Considering the data above, it is clear that there were inadequate workshops and lecture rooms. There were few and poorly connected data cables and ports to allow teaching and learning with ICT thereby posing a great challenge to the department and university to effectively implement ICT integrated teaching and learning.

5.3.8 Summary of findings on the infrastructure and resources

This section presented and analysed findings on the infrastructure and resources that were used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes. There were seven themes that emerged namely; ICT hardware used, use of basic Microsoft software programs, use of general design related software programs, use of hand-held software applications, use of social

media applications, network infrastructure used, and physical infrastructure available. The data revealed that the ICT hardware that were used consisted of HP type desktop computers, Mac computers, laptops, LCD projectors, digital television, hand-held devices, heavy duty industrial sewing machines. The findings showed that basic Microsoft software programs like PowerPoint, Excel and Word were also used in the teaching and learning in Textiles and Clothing programmes. The data revealed that general design related software programs such as CorelDraw, Adobe Illustrator and Mac Paints and hand-held software applications were used in the teaching and learning of Textiles and Clothing programmes.

From the findings, it emerged that social network applications to include WhatsApp, Facebook and YouTube were used to support the implementation of ICT integrated teaching and learning. The network infrastructures that were found in use were wireless and local area network and the e-learning platform called Mylearning space. It was discovered that there was no computer laboratory specific for the Textiles and Clothing department as the one available was shared with another department with the School of Art and Design. The next section presents findings on the extent to which Textiles and Clothing lecturers' competencies in ICT supported effective implementation of ICT integrated teaching and learning.

5.4 THE EXTENT TO WHICH TEXTILES AND CLOTHING LECTURERS' COMPETENCIES IN ICT SUPPORT EFFECTIVE IMPLEMENTATION OF ICT INTEGRATED TEACHING.

This section presents findings on the extent to which Textiles and Clothing lecturers' competencies in ICT supported the implementation of ICT-integrated teaching and learning. One theme emerged from the responses given by a participant which focused on the nature of the competences lecturers possessed to support effective implementation of ICT integrated teaching. There were four sub-themes that came out from the theme which include beliefs of lecturers, basic technological skills, technological content knowledge and technological pedagogical knowledge. Table 5.4

below presents the theme and sub-themes for Textiles and Clothing lecturers' competences in ICT

Table 5.4 Theme and sub-themes for Textiles and Clothing lecturers' competencies in ICT.

Theme	Sub-themes	Issues raised
ICT Competences of lecturers	Beliefs of lecturers	Lecturer indicated that they had positive feeling towards ICT for they felt that the courses are best handled by ICT but the ICT is not adequately provided.
	Basic technological skills	Lecturers have basic skill in using word, PowerPoint and searching on the internet.
	Technological content knowledge	Lecturers displayed mastery of disciplinary concepts but alluded to the fact that so much has changed since the time they trained from colleges and universities and the content they learnt was now outdated.
	Technological pedagogical knowledge	Lecturers were incapacitated to manipulate and teach using ICT design related software programs.

5.4.1 Beliefs of lecturers

In-order to solicit the beliefs lecturers held towards implementation of ICT integrated teaching, in-depth interviews were used. It was revealed that lecturers had positive feelings towards implementing ICT integrated learning. Lecturers felt that their courses were best handled using ICT but the tools were not readily available. The lecturers expressed that:

I have got a positive feeling towards using it but the facilities are barring us from using them effectively. They are very useful but we can't use them effectively for they are not adequate (TCL3).

ICT is very essential in the study of Textiles and Clothing but they are not readily available for use (TCL 6).

In expressing their beliefs, some lecturers took the views that courses such as Fashion Illustration and Pattern Development limited students as they were still done by manual methods like pen and pencils since the ICT for use in such courses was not provided by the university. One of the lecturers bemoaned that:

ICTs are very useful especially in such as Fashion Illustration and Pattern Development courses that are best handled with ICT but there is no full utilisation of the ICT in these courses like in Fashion illustration (TCL2).

Considering the above responses, it can be noted that all lecturers had positive feeling towards implementing ICT-integrated teaching and learning as they indicated that the ICT were beneficial to Textiles and Clothing teaching and learning. However, the tools available limited them from expressing their positive feelings into a new practice effectively mediated by ICT.

5.4.2 Basic technological skills

Data from lecturers revealed that they had basic technological skills. Most of the participants acknowledged that they were able to use the basic Microsoft Office package like Word processor, using spreadsheets and PowerPoint of which they were mostly for administrative purposes and teaching reflectively. Lecturers admitted that:

We have the basic skills to use these ICTs but then there is need for these staff development so that we can apply these in the area of teaching Textiles and Clothing programmes so that the application of ICT is direct to the focused area. When we get exposed to these ICT it was just general and not specific to the teaching of Textiles and Clothing area (TCL 7).

Another lecturer acknowledged that she could use Excel to a limited extent. She was quoted saying:

I can type using Word and use Excel to a limited extent (TCL3)

Concurring with the sentiments above was the biographical data obtained from the participants where most lecturers except one indicated that they came across the basic skills of operating computers when they were doing their first degrees and Masters in the late years of 2003 and 2005 respectively. Lecturers indicated that it was during this time computers were firstly adopted in their training and since then they had never done any other relevant upgrading course. They said:

When I was doing first degree, focus was on being able to operate the computer and the basic skills on the use of the computer (TCL 3).

On the same note, another lecturer disclosed that:

When I was doing my Masters that's when I started to do Word processing, Microsoft Publisher, use Power Point and Excel (TCL 4).

Similarly, another lecturer reiterated that:

During my Master studies, there was a three month course focusing on PowerPoint, Word, Excel and Publisher only. It was not advanced, it was just general (TCL 6).

On the contrary, only one lecturer who completed his Master's degree around 2008 had done CAD/CAM and this lecturer had a vast knowledge on the use of these ICT and was able to manipulate some of the ICT for teaching. The lecturer confirmed that:

I have no problems with ICT, I can do anything, I can design, I can use CorelDraw, Adobe, everything. In the knowledge of software, I have no problems even to operate Gerber software (TCL 1).

From the data above, it was noted that most lecturers possessed basic technological skills like using Word, preparing PowerPoint presentation and searching on the internet. For teaching, most lecturers were able to use PowerPoint for presentation only.

5.4.3 Technological content knowledge

Data was sought from lecturers to examine their understanding on how content can be changed by the application of technology. It was obtained that there were mixed responses from the lecturers. There were mixed feelings as some participants alluded to the fact that so much has changed since the time they trained from colleges and universities and the content they learnt was now out-dated. One of the lecturers reported that:

When I got training from college and then university, the machinery we were using was mainly manual and there were neither computerised machinery nor ICT in practical courses during our days. The content was even related to the use of manual machinery. Due to technological advancement, the machinery being used have since changed and this makes me incapacitated to manipulate the different content and teach with the various technology. I need some upgrading courses (TCL2).

With regards to the content aspect, lecturers reported that some of the practical processes they learnt during training were no longer applicable nowadays for there are so many technologies that are being used to even draw or show the content. This was as a result of new and dynamic fashion trends, hence the need for further training. There was also evidence from the observations made by the researcher that besides being qualified, lecturers lacked some experience to handle practical skills in Textiles and Clothing for most of the skills were done manually as was evidenced in Fashion Illustration and Pattern Development courses.

From other lecturers' responses, it was contended that issues that came up with the emergence of information and communication technology were added to the courses to enable students to acquire the required skills. One of the lecturers highlighted that:

Due to advances in technology you may find one or two new issues coming up... For example in the course I teach, there are new technologies like Robotics which can now do more functions in the cutting

room. Other functions which were done manually are now being done by computers, so I had to include such content in the course I teach (TCL1).

On the same note, another lecturer contended that she had to adjust the content to add ICT issues to the course she was teaching. The lecturer indicated that:

I teach Fashion Marketing and Fashion quality management and there is more of using ICT. There are technologies that are used to market and promote a product so I am teaching the use of those ICT that are used as a way of marketing fashion products (TCL3).

Another lecturer and the head of the Textiles and Clothing department claimed that content does not change but teaching styles tend to change with technological changes. These two had this to say:

Yes, I did make adjustment to assignments, I give projects. I did not change any content (TCL5);

Content does not change, for if you are looking at the stone age, it's that but how you deliver that content is what changes through these technologies because I can use the modern technologies to teach that content...As an example where I would say to my students I want you to illustrate the Victorian era and how it influence current trends using the different ICT (HOD1).

Evidence from documents analysed comparing the course plans of core course of the programmes between 2011 and 2015 showed that in courses such as Pattern Development and Fashion Illustration, content related to manual methods of developing patterns and illustrating composed the major component of the content respectively. It was noted that there were very limited if none technological issues that had been included in such courses. It was observed that in the same courses mentioned above, there were no ICT that were used being used by the lecturers to create patterns or fashion illustration.

Data generated in this section revealed that most lecturers had limited technological content knowledge that enable them to understand how the content they teach can be changed by the application of technology or to present the content in various ways through the ICT. Lecturers indicated that some of the practical knowledge and skills they learnt during training were no longer applicable implying lecturers had limited technological content knowledge to support the effective implementation of ICT integrated teaching in Textiles and Clothing programmes.

5.4.4 Technological pedagogical knowledge

Data that surfaced from interviews with lecturers and observations showed that lecturers were not comfortable to incorporate a variety of ICT as pedagogical tools. Lecturers indicated that they needed assistance for preparing and editing the content they wanted to teach with specific ICT. One of the lecturers uncomfortably conceded that:

Myself, a...a I need some assistance I wouldn't say am very comfortable otherwise it would come out to be something else. Normally what I do is that I take from other programmes like YouTube if there is something like fashion modelling, so I tape the whole programme and then I take it to someone else who can assist either an ICT technician just to remove what is not necessary. With other ICTs like even the e-learning platform, I find it difficult to use it for teaching (TCL 2).

The same sentiments were shared by another lecturer:

I am not saying I am perfect but at least I can do it, so far I can deliver using some of these technologies like PowerPoint but like at times, I get assistance form colleagues who are well versed when I want to use other ICTs (TCL 4).

Another lecturer admitted that she was not very competent to apply a number of the ICT like blogs for the purposes of teaching and learning of students. The lecturer admitted:

To be honest, I am not very competent because there are many softwares that I cannot even manipulate for the purposes of teaching and learning like those for social media platform such as blogs, I still need to learn some of these (TCL 3).

In order to affirm the sentiments above a follow up with the head of the department was done on the how she described the lecturers' use of the software that were available in the department. She admitted that:

I have observed that not many of our lecturers can utilise these ICT especially as pedagogical tools. It's like the lecturers are afraid of these. It's because of our age for when we went to school these things were not there and we are not very much acquainted into these technologies. But I think as a department we need to encourage each other to use these ICT (HOD I).

Observations made by the researcher showed that most lecturers could not manipulate and use some of the ICT software programs that were used at the department like the general design software such as CorelDraw. Other lecturers were not even competent to use the e-portal that was available for lecturers and students. A visit to the e-portal by the researcher, being assisted by the HOD1, showed that only one lecturer had uploaded her course plans and teaching notes on the portal.

From the responses it was clear that most lecturers were not very competent to manipulate and use a variety of ICT in teaching showing that lecturers had limited technological pedagogical knowledge. This implies that lecturers had little technological pedagogical knowledge to support the effective implementation of ICT integrated teaching and learning.

5.4.5 Summary of finding for lecturers' competencies in ICT

This section presented one theme that focused on the nature of lecturers' competencies in ICT and four sub-themes that emerged from participants' responses. On one of the sub-themes that centred on the beliefs of lecturers towards ICT, it was revealed that all

lecturers that the ICT had positive benefits of applied effectively in the teaching and learning of Textiles and Clothing programmes and learning. From the data, it emerged that most lecturers possessed basic technological skills like using Word, preparing PowerPoint presentation and searching on the internet. For teaching, most lecturers were able to use PowerPoint for presentations only. It was also revealed that most lecturers had limited technological content knowledge. It was established that lecturers were not very competent to incorporate a variety of ICT software programs in teaching, showing that lecturers had limited technological pedagogical knowledge. The next section presents findings on the extent to which the teaching and learning of textiles and clothing programmes had been changed by the integration of ICT.

5.5 THE EXTENT TO WHICH THE TEACHING AND LEARNING IN TEXTILES AND CLOTHING PROGRAMMES HAS BEEN CHANGED BY THE INTEGRATION OF ICT

This section presents findings on the extent to which the teaching and learning of Textiles and Clothing programmes had been changed by the integration of ICT. There were five main themes that emerged during the in-depth interviews that were held with lecturers teaching Textiles and Clothing programmes, focus group interviews with students, document analysis and observations. The themes were changes to the teaching and learning styles, adjustments to the content taught in the Textiles and Clothing programme, changes to assessment methods, changes to modes of communication between lecturers and students, changes to supervision of research projects. The main theme and sub-themes are summarised in Table 5.5 and presented in detail in the paragraphs that follow.

Table 5.5 Themes and sub-themes on the extent to which the teaching and learning of Textiles and Clothing programmes had been changed by the integration of ICT.

Themes	Sub-themes	Issues raised
Changes to teaching and learning styles	Lecture delivery and presentation	PowerPoint is very effective for delivering and presentation of lectures as it catches students attentiveness and concentration span of students.
	Research work done by the students	Most of the research work done by students is internet centred where students get current information.
	Tutorial discussion between lecturers and students through social media applications	Lecturers and students conduct tutorial and group discussions through social network sites.
	Role of the lecturer in the teaching environment	Lecturers guide the students to do research work for presentations.
	Role of the students during learning	Students were taking an active role in their learning.
Changes to assessment of students' progress	Nature of the tasks given	Assignments and examination were in form of projects and presentations
	E-marking of student's work	Marking of students' work was done as soft copy but limited to project only.
Adjustments to the content taught in the Textiles and Clothing programme	Content adjusted in courses such as Fashion Marketing and Quality Management to include technological marketing issues	Content related to method of marketing and management of fashion through soft methods have been included in the courses.
Changes to modes of Communication	Communication between lecturers and students	Communication with students has been made easier through e-mails, WhatsApp and Facebook.
Changes to supervision of research projects	Supervision of research projects for students during workplace learning	Supervision of students' research projects when they are on industrial attachment through the use of phones and internet.

5.5.1 Changes to teaching and learning styles

This theme generated five sub-themes such as nature of lecture delivery and presentation, research work, tutorial discussion between lecturers and students, role of the lecturer during teaching, and role of the students.

5.5.1.1 Lecture delivery and presentation

It emerged from the in-depth interviews with the lecturers and administrators that there were some changes to the way the lecturers delivered and presented their lectures. The lecturers indicated that lecture delivery was mostly done through PowerPoint presentations. Lecturers explained that they no longer use the chalk to write on the board. One of the lecturers remarked that:

Yes, these ICT have changed my teaching, because for now I can say I can no longer write on the board with chalk but I use PowerPoint presentations (TCL1).

In clarifying the use of PowerPoint for lecture delivery and presentation, lecturers added that during contact lectures, students made presentations whereby they used PowerPoint to present their work. One of the lecturers narrated:

I also do the PowerPoint when I deliver my lectures to students when dealing with practical like grooming and modelling and also when we also use PowerPoint presentations whereby students will be following instructions as they appear on the PowerPoint slides. Students as well prepare PowerPoint slides to present their information when they are doing individual or class presentations (TCL2).

In a similar vein, other lecturers indicated that ICT like PowerPoint and projectors have changed their teaching by commenting that lecture delivery through PowerPoint presentations was an effective method as it assisted in catching students' attention. This was acknowledged by one of the lecturers who said:

Lecture delivery especially through the use of PowerPoint and projector is very effective. We used to write on the board and it's time consuming and

subject to spelling mistakes. The use of the projector catches the student's attentiveness and encourages the interest level of the students since they would want to look at the aspects that are used during lecture delivery. It also simplifies the idea of illustrations and these can be done effectively during the lecture and show the relevant features one would want to show to students (TCL 7).

The views of lecturers were corroborated by the HOD1 who strongly emphasised that delivering lectures through PowerPoint slides and presentations was a holistic approach to learning of students as it caters for all learning styles of students. The HOD1 emphasised that:

The uses of the PowerPoint together with LCD projectors are the two ICT that have changed the teaching and learning in our programmes. I say so because these make life easier for the lecturers and students where the content is beamed on the screen. It's easier for slow learners to read at their pace, synthesize the information from the PowerPoint. Students here what the lectures say, they see what is beamed and to them that concretize the information, so by that the lecturers have catered for the audio learner, visual learner and kinaesthetic learner when they give them the activities to do. So it's a holistic approach to learning which I hope can be fully utilised (HOD1).

Substantiating the views above, observations made by the researcher confirmed that lecturers conducted their lectures through PowerPoint. Even during practical sessions, instructions were demonstrated through PowerPoint slides and beamed on screen by projectors. However, course documents analysed showed that lecturers' course plans stated general strategies such as lecture demonstration, peer presentation, inquiry discovery and did not specify whether these were mediated by ICT. It was as well observed that lecturers at times used the traditional lecture method of dictating notes to students as the projectors were limited to cater for all lectures at any particular teaching session.

From the data above, it was apparent that lecture delivery through the use of PowerPoint and projectors was one of the common teaching styles that were practised by lecturers. In both theoretical and practical courses, PowerPoint was used. In practical courses it was used to show step by step instructions of working processes. Lecturers found the delivery of lectures through PowerPoint to be a holistic approach to learning as it catered for the audio learner, visual learner and kinaesthetic learner.

5.5.1.2 Research work done by the students

It emerged from in-depth interviews with the lecturers and administrators that there were some changes to the way research work was done by the students in the Textiles and Clothing programmes. Most of the lecturers interviewed mentioned that with the availability of internet, they were resorting to guided internet-based research work. Rather than giving students notes and handouts, lecturers indicated that they simply guided students to research and find required information on their own. Lecturers welcomed the internet as a relief to their work. Some of the reasons that were advanced for using guided research work were that the Textiles and Clothing area was constrained by lack of hard copy resources hence it was becoming easier for students to get current information. One of the lecturers indicated that:

I discovered that most of the research done by students is internet centred. The reason why is that students indicate that they got current information, its quick than opening a book whereby you spend a lot of time tackling your head to get any answer, but with internet you just log on and you get an array of responses. Even if you give students one topic which they go and research, they bring back a variety of answers which are correct (TCL 2).

Confirming the use of guided internet-based research work, another lecturer conceded that:

There is the internet laboratory at the main campus where students the computers or use these laptops through Wi-Fi to do their research work

which will be guided. Students then come with feedback and present to the class during contact lecture time (TCL 3).

On the same note, other lecturers felt that through the use of the internet for research purposes, students were learning better as they get current information for their class presentations, assignments and projects. Another lecturer was quoted saying:

Through the use of the internet for research purposes, students are learning better. Some information that is not found in textbooks is shallow, but if they go to the internet they get a lot of information that is current (TCL 4).

In order to affirm the views of the lecturers, students expressed that during the course of each semester they did class presentation where they were given topics by their lecturers to research on. The students then gave feedback to the class in form of live presentation. One of the students had this to say:

We are given topics by the lecturers to research on and then present to the class. So it should be a good presentation, you know, for me to get a good mark. So we use the internet to get the information which answers the topic. At times the lecturers give us websites for finding the content (FGS4:5)

The HOD1 corroborated the views of the lecturers and students on the need for getting current information and the lack of hard copy resources as major drivers for lecturers initiating the use of guided internet based research work. The HOD1 clarified that:

As I mentioned the Textiles and Clothing area was limited in hardcopy resources, the textbooks, lecturers encourage research on the internet for I think that where the students and even lecturers themselves get most updated information regarding our textiles, clothing, fashion and design (HOD 1).

Substantiating the views above, observations made by the researcher during students' study periods revealed that students use internet mostly to search for information pertaining to topics they would have been given by their lecturers. In the documents that were analysed (lecturers' portfolios and students' assignments), it was evident that the reference lists comprised references that were taken from a variety of websites.

From the responses of the participants above, and data gathered from observation and documents, it could be noted that guided research work was another teaching and learning style that was initiated as a result of the introduction of ICT in Textiles and Clothing programmes. The guided research work was necessitated by the availability of the internet that enabled students to generate and get updated information concerning the area. It is assumed that through the use of this learning style, Textiles and Clothing students may develop their research skills and independence to work their own.

5.5.1.3 Tutorial discussions between lecturers and students

Through in-depth interviews with lecturers and focus group discussions with students, it emerged that tutorial and group discussions were conducted through social media applications. It emerged from the lecturers that there were no tutors in the department but lecturers conducted tutorial discussions with students. Lecturers and students indicated that they engaged each other through social media applications to discuss tutorial questions or topics for presentations. These platforms were becoming teaching and learning tools to facilitate student discussions on topics they needed clarification and to discuss research work. On this note, one of the lecturers noted that:

With the availability of the mobile networks, we even use these social networks like Facebook or even the fastest one nowadays WhatsApp to discuss tutorial questions with the students (TCL 7).

Another lecturer echoed the sentiments that through the social media platform they were able to discuss research issues anytime with the students if at all they asked for the information. The lecturer remarked in the following words:

Discussions with students have been made easier through the e-mails, or even over phone through WhatsApp. I discuss research topics and design ideas with students any time (TCL 3).

The above observation was confirmed by students who reiterated that they discussed presentation topics as a group on WhatsApp where they gave each other suggestions. Students also indicated that they analyse their design on WhatsApp where they try to assist each other on the development of a design. One of the students from the focus group discussions had this to say:

Most of the time, I send photos of my design sketches on WhatsApp and ask my classmates and lecturers to give their suggestions or even critique the designs. We also discuss presentation topics and give each other ideas of how to present (FGS 2:1).

The views of lecturers and students were corroborated by one of the administrators who highlighted that social media platforms were becoming a vehicle through which lecturers and students used to clarify academic issues students would not be clear on. The administrator added that lecturers even clarified issues related to students assignments even if the students were away from the campus as evidenced by the excerpt below:

Through WhatsApp, lecturers chat with their students on issues the students are not clear on. These platforms are very useful when students are away on industrial attachment. Other lecturers use Facebook to post information to students (Ad3).

Confirming the above ideas of participants were the statements that were taken from the School of Art and Design E-policy document. The document emphasised the use of:

Internet... Skype to discuss issues with artists, industrialists and students. Use of facebook, You-tube, flick as platforms to discuss, demonstrate and test concepts and ideas (School of Art and Design E-policy Document; item 4.2).

From the findings above, it was unearthed that tutorial discussions between lecturers and students were conducted virtually through social network applications like

WhatsApp. It was clear that the tutorial and group discussions were conducted to discuss tutorial questions, discuss topics for presentations, and clarify academic issues to students. It was observed that face to face interactions and discussions were done as well among lecturers and students hence the teaching and learning was not completely changed by the integration of ICT.

5.5.1.4 Role of the lecturer

It emerged from the interviews with lecturers that the practical nature of Textiles and Clothing programmes encourages them to just provide guidance to students so that students come up with ideas necessary for them to generate and create their own designs. Lecturers reported that with the availability of ICT, their role was changing to that of a provider of information to students. Lecturers pointed out that they were no longer giving students notes and handouts as they used to do before the emergence of ICT. One of the lecturers remarked that:

It's now more of discovery instead of me giving students everything as I used to do before. Long back it used to be me who should be researching and researching and giving information and the students participated less. So now I give them guidelines only on how to go and carry out their researches or how they should find more information about the topic and they come and share the information in class (TCL 2).

The above sentiments were echoed by another lecturer in the following words:

We used to have drafted notes, books ... but now I simply give them topics and some subheading to search on the net, where student are doing research work which will be guided(TCL 3).

From the views expressed by the participants, it is clear that with the availability of ICT, the role of lecturers in the teaching environment was. Instead of researching, storing and delivering notes to students, lecturers acted as facilitator to guide students to search and find information for topics they would have been given.

5.5.1.5 Role of the students

The last sub-theme that emerged among the changes related to the teaching and learning styles concerns the role of the students in the learning of Textiles and Clothing programmes. Lecturers revealed that the students were taking an active role in their learning. During the in-depth interviews, most lecturers acknowledged that students had developed an interest in finding information on their own in such a way that they presented current information. One of the lecturers noted that:

Students are now learning better. Some information is not found in textbooks but if they go to the internet they get a lot of information that is current. This has also inculcated in some students the ability to manage their own learning (TCL 4).

This view of students taking an active role in their learning was supported by another lecturer in the following words:

Students find and prepare information on their own, when they are given topics to come and present to class (TCL 2).

Some of the lecturers reiterated that they were also learning from the feedback students brought after researching. It was explained that these students gave feedback in class where they confronted other peers in defending their presentations. One of the lecturers indicated that:

I am seeing a great change in that as a lecturer I am also learning a lot from what students bring to class if they use the internet. They get a lot of information (TCL2).

In order to affirm the views of the lecturers, students expressed that during the course of each semester they were given presentation areas or questions by their lecturers to do research. The students then gave feedback to the class in form of live presentations. One of the students had this to say:

Every semester the lecturers gave us presentation questions to research on. So most of the time we use the internet to get the best information to answer the questions. We then come and present to the class where other students will be commenting. So we have to work hard to find the information otherwise you will be stuck in front of others (FGS4: 7).

Data gathered during observation of students' study periods showed that students usually worked on their own in seminar rooms and some in the computer laboratory and library researching on the internet. In addition, it was observed that most students used their smart phones to find information for their assignments and research presentations which they made in class.

It is clear from the sub-theme that the role of the students in the teaching and learning environment was changing as students were taking an active role through research work and presentations. Students were responsible for finding information for each topic they were given. The information each student got was shared with the whole class. Though it was indicated that the bandwidth for internet connectivity was limited, it showed that all students relied on finding current information from the internet.

5.5.2 Adjustment to the content taught

The second theme that emerged regards the adjustment made to the content that was taught in the Textiles and Clothing programme. Data obtained from interviews with lecturers, documents and observations showed that content that was taught in some courses was adjusted to include technological components while in other courses manual methods of practical processes formed the major components of the courses content. Analysis of the core course plans of the Textiles and Clothing programme and academic regulations revealed that in one of the courses called Computer Aided Design, issues relating to computer integrated manufacturing, use of CAD in designing, CAD hardware, digital images, CAM in clothing design, design on screen, System software were included. It was noted, however, that in the Computer Aided Design course student used the general design related software programs like Photoshop and

CorelDraw to design that had been mentioned earlier. This was confirmed by the lecturer teaching the course who stated that:

Due to advances in technology you may find new issues coming up like the textiles and clothing industries are now using technology to design and manufacture. In that case we had to include the course computer aided design in the programme. There are new technologies which can now do more functions in the textiles and clothing industries, so that content needs to be included in the course. That why I have included issues related to use of CAD and computer integrated manufacturing(TCL 1).

Still on the same issue of content, it came out from another lecturer teaching Fashion Marketing and Retailing that she had aligned the content taught in the course to include methods of marketing products that were done through various ICTs. The lecturer indicated that:

I teach Fashion Marketing &Fashion Quality Management and there is a lot of use of ICT. I am now teaching the use of those ICT as a way of marketing students' products. There are technologies that are used to communicate as well as marketing products (TCL 3).

On the contrary, in courses like Pattern Development and Product development, it was established that content taught included manual methods of drafting, pattern making and grading. Observations made by the researcher during practical sessions of the courses established that lecturers and students were still using these manual practical methods of pattern making. One of the lecturers teaching the course explained that:

There is no pattern design software acquired by the department for the course, so am still teaching the ordinary manual methods of pattern design and development (TCL 7).

To add more, in the course Fashion Illustration, it was observed that during practical contact time, demonstrations that were done by the lecturer teaching the course were done manually through drawing pencils. It was also analysed that there were more

students practical assignments for the course that comprised manual methods of drawing and illustrating designs than those that were done by the general design software that were available.

A follow up with the HOD1 on the issue of the content taught among different courses in the Textiles and Clothing programmes showed a different side. The HOD1 claimed that content that is taught within a course does not change but the teaching style may change where one may want to demonstrate a topic with ICT. The HOD1 was quoted saying:

Content does not change, but how you deliver that content is what changes through these technologies because I can use the modern technologies to teach that content. What I think we need to do more is to encourage students and lecturers to be able to use the ICT. As an example where I would say to my students I want you to illustrate the Victorian era and how it influence current trends using the different ICT(HOD1).

Considering the above observations from the interviews, documents and observation, it was laid bare that in courses such as Fashion Marketing, Fashion Quality Management and Computer Aided Design, the content that was taught had been reviewed to include technological aspects. In other courses like Pattern Development, Product Development and Fashion Illustration, manual methods of doing practical processes formed the major components of the courses' content. This implies that not all aspects of the Textiles and Clothing programmes had been modified by the integration of ICT.

5.5.3 Changes to assessment of students' progress

The third theme that emerged was on the changes that had been done to the assessment of students' progress. This theme brought to limelight two sub-themes which focussed on the nature of the tasks given to students and the approach used to mark students' work. The sub-themes are presented below.

5.5.3.1 Nature of the tasks given

Through in-depth interviews with the lecturers and documents that were analysed, it came emerged that in Textiles and Clothing programme courses, tasks that were given to students were in form of projects and presentations. In the final year of the programme, it was revealed by lecturers that students were assessed through specialisation projects. The course plan documents that were analysed indicated projects as one of the assessment instruments used by lecturers teaching the Textile and Clothing programmes. In courses such as Computer-Aided Design, it was noted that students were assessed on continuous basis through practical projects. Analysis of students' portfolios revealed that there were practical projects with finished artefacts that were accompanied by word processed documents. It was noted that the word processed documents were meant to justify the students' choice of the projects. The lecturers pointed out that the projects were initiated so as to encourage students to research through the use of ICT where they get a variety of information to justify their projects. One of the lecturers admitted that:

I did make adjustment to assignments. I give more of projects even practical projects so that students research on the net (TCL5).

Another lecturer commented that the technical nature of the Textiles and Clothing programmes allowed for the use of projects as the best way of assessing students. The lecturer had this to say:

The way we teach the students change time and again even the tasks we have been giving have already changed, you see our area is technical, so there is no way we can continue to give theoretical assignments, projects are the best for students can research on the net and get a lot of information to work on them (TCL 1).

From the views of lecturers and data obtained from the documents, it was apparent that tasks given to students were in the form of practical projects where students produced finished artefacts that were accompanied by word processed documents. These

projects were necessitated by the students' ability to research through the use of ICT where they got a variety of information to justify their projects.

5.5.3.2 E-marking of student's work

Data collected from lecturers and administrators showed that the lecturer had agreed to mark students' assignments electronically instead of marking the hardcopy. It was however, noted by lecturers that there were some inconsistencies in the way marking was done through soft copy. Lecturers pointed out that e-marking presented problems as some students claimed to have submitted the assignments on time yet the assignment might not have been delivered to the lecturers. Lecturers attributed this to the poor internet connectivity that might fail to deliver the uploaded assignments. Other lecturers said that marking soft copy assignments was a challenge to them as they admitted to lacking technological skills to mark soft copy. Lecturers disclosed that the e-marking was reserved for undergraduate students' research projects only. One of the lecturers alluded to this by pointing out that:

When it comes to assignments during the semester, we no longer accept and mark soft copies because students deliver them lately well after the due date and some even lie that they have sent the assignments through mails yet they may not have been delivered. We now mark students' research projects only through the soft copy (TCL 1).

In agreement to the view above, the HOD1 indicated that they were e-marking the undergraduate students' research projects only. The HOD1 disclosed further that some of the lecturers were not very comfortable with marking assignments electronically. The HOD1 maintained that:

E-marking has been done with research projects only. We allowed this so as to avoid students on workplace learning travelling to the university time and again. With assignments it has been a challenge and some of the lecturers were not very comfortable with that (HOD1).

From the data obtained from the lecturers and administrators, it was apparent that marking of students' works electronically had not been fully mastered and implemented in all courses and by lecturers. While this was compounded by poor internet connectivity that might fail to deliver the uploaded assignments, it was revealed that lecturers lacked the technological skills to mark correctly on the soft copy.

5.5.4 Modes of communication between lecturers and students

The fourth theme that emerged was on modes of communication between lecturers and students. Through in-depth interviews with lecturers and focus group discussions with students, it surfaced that there were some changes to the modes of communicating between lecturers and students. Lecturer pointed out that it was now very easy to communicate through WhatsApp or even send messages on the phone to any students if they wanted to clarify academic issues or receive appointments from students. Some of the lecturers were quoted saying:

Communication with students has been made easier through the e-mails (TCL 3).

I have used WhatsApp, Facebook... to communicate with students and even to chat with students on academic issues (TCL 6).

Similarly, the other lecturer intimated that the use of e-mails had facilitated continuous dialogue between lecturers and students even if the students were away from campus during workplace learning at various textiles and clothing industries or companies. One of the lecturers also noted that:

We used to face challenges when students were on workplace learning, but now with technology, we e-mail and communicate with the students time and again to find out how they are progressing(TCL 5).

Students acknowledged that they could communicate with their lecturers on the mobile phones or through e-mails anytime when they wanted to make an

appointment or to get information about their courses. One of the students remarked that:

I can even seek appointment by talking to the lecturer on the phone or even send an e-mail if at all I want clarification on assignments (FGS 3: 6).

From the data above, it is clear that social media platforms like WhatsApp and e-mails were the modes of communication that were used by lecturers to send information and clarifying academic issues to students. Students were no longer using the hard copied mails to communicate with their lecturers but were simply sending electronic messages or e-mails. Hence, communication was one of the areas that had been changed by the integration of ICT.

5.5.5 Changes to supervision of students' research projects

The fifth theme that emerged was on the changes that were noted on the way lecturers supervised students' research projects. Lecturers reported that they supervised students' research projects through e-mails when the students were on workplace learning. Lecturers reported that students were experiencing challenges of travelling to and from university to discuss issues concerning their research projects during the period they would be attached to textiles and clothing industries and the department had to introduce the supervision of students through e-mails and Skype. This was confirmed by one of the lecturers who remarked that:

I supervise most of my students' projects through the e-mails and students are even using the e-mails to seek for information they want concerning the research projects (TCL1).

On the same note, other lecturers conceded that they used Skype to discuss research project issues with the students when they were on workplace learning. One of the lecturers was quoted saying:

I have been using Skype to discuss the research with one of my students who has been in South Africa for workplace learning. I have assisted the student very well because we could hear each other talking (TCL 7).

The responses above were substantiated by one of the administrators who noted that lecturers were using emails and Skype to supervise their students:

Lecturers supervise most of our students away when they are on industrial attachment through the use of emails and even over the phones. Other lecturers had been using Skype to discuss with their students (Ad 3).

As a follow up to the use of Skype by the lecturers, it was noted from the School of Art and Design E-policy document that the use of Skype was endorsed in section 4.5 of the document which stated that a member of staff in the school was encouraged to supervise students' research activities using internet based approach like emails, Skype whenever necessary.

From the data above, it was apparent that lecturers were supervising research projects of Textiles and Clothing students who were on workplace learning through emails and Skype other than having the students travel to and from university to see their supervisors. Supervision of research projects was one of the Textiles and Clothing areas that had been facilitated by the integration of ICT to a greater extent.

5.5.6 Summary of findings for changes related to teaching and learning

This section showed that there were five main themes that emerged from the participants, observation and document analysis. It was presented that the theme on changes to teaching and learning styles manifested five sub-themes that included lecturing delivery and presentation and tutorial discussion between lecturers and students among others. It was also discovered that along the teaching and learning styles that involved the use of ICT, traditional methods such as lecturing were also used. The other themes that were presented are related to assessment of students' work, adjustment of content taught and the modes of communication between lecturers and students. The next section presents finding on monitoring and evaluation measures.

5.6. MONITORING AND EVALUATION OF THE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING

This section presents findings on monitoring and evaluation measures provided for the implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes. Two main themes emerged from the in-depth interviews that were held to solicit data from lecturers and administrators as well as from documents analysis. The first theme focused on the mechanism used for monitoring the implementation of ICT integrated teaching and learning. The second theme centred on challenges encountered in providing monitoring and evaluation. The themes and sub-themes for monitoring and evaluation of the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes are presented in Table 5.6 below and in the paragraph that follow

Table 5.6: Themes and sub-themes for monitoring and evaluation

Main theme	Sub-themes	Issues raised
Mechanism for monitoring and evaluation	Use of peer review and evaluation	Administrators and lecturers indicated that peer reviewing is not very effective and sometimes abused by lecturers.
Challenges encountered in providing monitoring and evaluation	Administrators lacked expertise in monitoring	Lecturers indicated that administrators just talk about ICT in meetings but did not take necessary action even if lecturers raised their concerns.
	Negative attitudes of lecturers	Administrators indicated that lecturers were displaying negative attitudes as they were not fully utilizing the ICT provided by the university.
	Financial constraints compounded by the centralised buying systems at the university	Administrators said that the buying of ICTs was a problem for the responsibility falls on someone else who at times simply says there is no money.
	Negative attitudes of top management in providing enough resources	The administrators and lecturers indicated that ICT resource allocation depend on the attitude the top manager have towards the area.

5.6.1. Mechanisms for monitoring and evaluation

From this theme, it emerged that peer review and evaluations was the mechanism that was used. This sub-theme is presented below.

5.6.1.1 Use of peer review and evaluation

It emerged from the lecturers' and administrators' responses that the peer-review and evaluation mechanism that the peer review and evaluation mechanism that was adopted by the university was not effective. Lecturer participants reiterated that the peer review and evaluation mechanism was not functional at all as some lecturers chose to do it and others did not. In addition, lecturers reported that the peer review and evaluation form that was used was just a general form that looked at all aspects related to all classroom activities and did not specify whether the ICT was adequate or suitable. One of the lecturers disclosed that:

The school and department have risen these forms a...a peer review and evaluation forms but it seems they are not functional. One semester we got general comments but since then we rarely got any feedback from these administrators (TCL 7);

Another lecturer expressed that there was no proper procedure as to how and when the monitoring would be done. The lecturer said:

A-a besides the peer review, there is nothing much that has been done to review how we are implementing this. Last time, I did not get any comments from the person who has done the peer evaluation...In fact, I haven't been assessed much on how my teaching with ICT is progressing (TCL 1).

The HODI noted the ineffectiveness of the peer evaluations conceding that the evaluations were abused by lecturers. The HOD1 remarked:

Firstly, we have agreed that our course outlines must reflect how one is using the ICT. From the look of the course outlines, you can easily tell how

the ICT are being used. Then the peer evaluation, when a peer evaluates how the lecturer is progressing with using the ICT in teaching. Unfortunately lecturers pretend that they have done that and others do not even use the forms at all(HOD1).

Similarly, one of the administrators corroborated the observations above emphasizing that the peer review and evaluations were not being used effectively by lecturers. The administrator took the view that lecturers were not considering the peer reviews and evaluations as a way of assisting each other. The administrator had this to say:

Right, it seems we have kindly admitted weak policies. I will not call it monitoring as such for there is this tendency among lecturers to feel that there is witch-hunting if the Dean knocks at someone's office and say 'tomorrow I am coming to your class'....What we should be doing is to develop effective instruments for evaluating how all of us are implementing this ICT integrated teaching and how our students are learning through the ICTs which we have (Ad 2).

From the findings, it was discovered that the peer review and evaluation form which was used to monitor the implementation of ICT integrated teaching was not an effective method as it was a general form that did not emphasise aspects of ICT into teaching and learning of students.

5.6.2 Challenges encountered in providing monitoring and evaluation

This theme brought out four sub-themes which included administrators lacked expertise in monitoring, negative attitude of lecturers, financial constraints compounded by buying systems at the university and negative attitudes of top management in providing enough resources.

5.6.2.1 Administrators lacked expertise in monitoring

From the in-depth interviews that were held with lecturers, it emerged that administrators lacked expertise in monitoring the implementation of ICT integrated

teaching and learning in Textiles and Clothing programmes. The participants noted that the administrators just talked about the ICT integrated teaching in meetings and on paper without taking an action as evidenced by the response below:

The administrators just talked about the integrated teaching but they do not take action to see how we are progressing. Even if you try to ask like even a projector, you are told that it's in the school or department and you end up being bored and resort to the traditional teaching methods (TCL 2).

On the same note, another lecturer said that the administrators just talked about the implementation but did not provide the ICT that were required. The lecturer was quoted saying:

In meetings, the deputy dean reiterated on the use of ICT in our teaching but to no avail because if they cannot provide adequate projectors for example what can I do but resorting to old tradition (TCL 4).

Another lecturer asserted that there was nothing that could be termed monitoring as there were no measures taken to improve the way the lecturers were teaching with the ICT. The lecturer said:

A-a what monitoring, can I call that monitoring, most of the time they just talk about it but do not check how we are using the ICT and they don't even care to improve our situation, in-fact there is no monitoring at all (TCL 3).

Substantiating the opinions above, another lecturer stated that the administrators lacked the expertise in monitoring the implementation of ICT integrated teaching and learning. The lecturer was quoted saying:

Not much effort has been put on monitoring the implementation. I think our administrators lacked the expertise on the use of the ICTs in teaching as well. Look, they have not staff developed the staff... The administrator should monitor but I they do not have the expertise to do so (TCL 7).

In order to affirm the claims above, a follow-up with administrators was done on how they provide monitoring measures. The administrators indicated that even if lecturers were asked to put their teaching materials on the e-platform, the lecturers would not respond positively. From the administrator's responses, it was clear that no follow-up to the lecturers was done. One of the administrators had this to say:

Yes, we monitor but it's a challenge... even if I ask the staff to put their work on the e-platform they do not, what I can do (Ad 3).

From the data above, it can be deduced that administrators lacked the expertise on monitoring and administrators committed to the process theoretically but practically, nothing was delivered. Administrators were not well experienced to provide the adequate and suitable monitoring and evaluation measures to the implementation of ICT integrated teaching and learning.

5.6.2.2 Negative attitudes of lecturers

From the in-depth interview with administrators, it surfaced that lecturers displayed negative attitude towards the implementation of ICT integrated teaching and learning. Administrators noted that with the ICT that were available within the department, lecturer were reluctant to experiment with them. One of the administrators lamented that:

Like now, if I am to ask how many lecturers have uploaded their course outlines on the e-portal you might find none. So on that it's not a question of equipment but a case of attitude on the part of the lecturers. So it becomes a challenge but we need to encourage each other until it becomes a culture (Ad 3).

On the same note, another administrator expressed the view that the attitudes of lecturers were hindering them from experimenting with the ICT that were available for

the Textiles and Clothing programmes. The administrator clarified how attitudes affect lecturers in trying to do more with the ICT in teaching. The administrator had this to say:

Probably what I would to say is that the major impediment in the uptake of these technologies on lecturer's side is attitude; there are lecturers who are not willing to experiment, lecturers who are too tired to try new things. There is attitude that simply say I don't want to be bothered. So a change towards more sustained uptake of these ICTs starts with a change of attitude to say those things are for me (Ad 2).

Substantiating the notion above, the head of the Textiles and Clothing department commented on the attitudes of lecturers on the use of peer review and evaluation forms where some lecturers displayed their negative attitude by abusing the forms. The HOD1 disclosed that:

Unfortunately lecturers pretend that they have done that, but not all of us. So the reason why someone goes to the office and writes a peer evaluation which she has not observed. It's a question of attitude. Some of these lecturers are trying too much into pleasing each other which is not an advantage on the part of the recipient (HOD 1).

Data revealed that there were challenges that were encountered by the administrators as part of monitoring that were related to negative attitudes displayed by lecturers towards the implementation of ICT integrated teaching and teaching. Administrators felt that, lecturers were reluctant to experiment with the ICT that were available within the department.

5.6.2.3 Financial constraints compounded by the centralised buying systems at the university

It also surfaced from the lecturers and the HOD1 that providing proper monitoring and evaluation was constrained by financial constraints compounded by the centralised buying systems at the university. Lecturers indicated that even if they recommended to

administrators to buy software for the department, it took a long time to get one. Lecturers highlighted that the ICT were not fully provided due to financial constraints.

I think it's to do with the release of funds because some of these requisites are approved by the top management. It takes time and at times promises are made that they are going to buy but nothing is made (TCL2).

Clarifying the issue of finances, the head of the Textiles and Clothing department pointed out that to get funds to buy the ICT required was a challenge but that was compounded by the centralised buying system at the university that involved many offices that approve what to buy. The HOD1 lamented that:

It's not only money but the buying system as well. The procedure that we go for anything that we want to buy for the department is too tiresome. Remember we have the top, middle and low management and I do not have much say in terms of buying the ICT, I just recommend and do the requisitions. Those who approve are that top management (HOD1).

Another administrator explained the challenges they had with the top management responsible for the acquisition of ICT resources. The administrator noted that:

The buying is not our responsibility it falls with someone else. What we do basically is to make a follow-up on the requisitions which we have done to get the ICT resource. That's where the problem is because someone else has to go to someone to source the money; the ICT department, bursar and the top manager. The decisions that are made determine the ICT that are bought and all that will have a bearing on us as a school and department. Like now we are supposed to get a photo-printer and it was approved. The ICT manager said he will approve again....so up-to now we are following, that time-lag means and what we are supposed to do in the teaching and learning process with ICT is currently a draw back and we do not have power over(Ad 3).

It was clear from the lecturers' and the administrators' responses that financial constraints compounded by the centralised buying systems at the university limited the effective implementation of ICT integrated teaching and learning. There was little support in terms of acquiring the ICT resources that was provided to the teaching and learning Textiles and Clothing programmes.

5.6.2.4 Negative attitudes of top management in providing enough resources.

Data gathered from in-depth interviews with lecturers and administrators revealed that the top management of the university displayed negative attitudes towards acquiring enough ICT resources for the teaching and learning of Textiles and Clothing programmes. Lecturers lamented that the top management was not providing maximum support to the implementation of ICT integrated teaching and learning as the management was prioritising the financing of other departments. One of the lecturers disclosed that:

The finances maybe there but the management prioritises their finances. If their attitudes are towards the other departments within the university, it means they concentrate on those areas at the expense of other areas (TCL 7).

Still on the same issue of attitudes, other lecturers took the view that that university management emphasised research and publishing at the expense of the core business of teaching and learning. One of the lecturers contended that:

I think they should somehow refocus their attitudes towards the teaching and learning because at times they emphasise research and publish which is not the core business of the university. If they refocus on the teaching and learning it means they will provide enough funds for acquiring the ICT that are needed for our area (TCL 2)

The sentiments above were corroborated by the HOD1 who revealed that the financial support the Textiles and Clothing department was receiving to buy the ICT required was

not adequate at all. The HOD1 disclosed that such inadequate support was compounded by attitudes of the top management towards the Textiles and Clothing programmes which were technical and practical in their vision. The HOD1 lamented that:

It's not only money but attitudes as well, especially, in terms of priority on the part of the top management.... If they could only have the right attitude towards certain subjects, I do not think we would be crying. As long as we have top management that has been exposed to pre-colonial systems, I do not think attitude will change towards technical subject likes Textiles and Clothing. Remember technical subjects were regarded as for the academically challenged whereas it's the opposite for it's a skill that is meant for sustainability in life.... In terms of resource allocation, it's how a manager views the area (HOD1).

From the responses of the lecturers and the HOD1, it was evident that that the top management was not providing maximum support to the implementation of ICT integrated teaching and learning as the management was prioritising the finances in favour of other departments. The lack of support would compromise the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

5.6.3 Summary of findings for monitoring and evaluation measures.

This section presented two main themes emerged from the in-depth interviews and documents analysis that were held to solicit data from lecturers and administrators. The first theme focussed on the peer review and evaluation which was the mechanism that was used for monitoring and evaluating the implementation of ICT integrated teaching and learning. The other theme centred on challenges in providing monitoring and evaluation measures that manifested in subthemes such as administrators lacked the expertise in monitoring and evaluation, negative attitudes of lecturers and on financial constraints compounded by centralised buying systems at the university.

5.7 CHAPTER SUMMARY

The intention of this chapter was to present the data gathered from the participants through in-depth interviews, focus group interviews, observations and document analysis on the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. Data revealed that there were different forms of ICT resources that were used for the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes such as general design related software, hand held software applications and network infrastructure. As for the competences of lecturers, data revealed that lecturers had basic technological skills but were lacked through technological content and technological pedagogical knowledge. From the findings, it was obtained that there were changes that were brought out as a result of integrating ICT in Textiles and Clothing programmes that were related to teaching and learning styles, assessment of students' work, and supervision of students' research projects. It was discovered that the peer review and evaluation mechanism which was used was not an effective method to be used for monitoring the implementation of ICT integrated teaching and learning. Having devoted this chapter to the presentation and analysis of data, the next chapter discusses the findings in the light of the empirical literature and theoretical frameworks.

CHAPTER SIX

DISCUSSION OF RESEARCH FINDINGS

6.1. INTRODUCTION

The previous chapter presented and analysed the findings of this study according to themes and sub-themes regarding the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. This chapter discusses the findings of the study based on the major themes that emerged during the interviews, observations and document analysis. The thrust is to identify key areas in the findings of the study to draw conclusions in as far as the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes is concerned. The discussion is informed by the current literature as well as the three theoretical frameworks that underpinned the study to include AT, TPACK and the Functionality framework.

6.2. INFRASTRUCTURE AND RESOURCES TO SUPPORT EFFECTIVE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING.

This section discusses the findings of the study on the infrastructure and resources that were used in the Textiles and Clothing programmes to support the implementation of ICT integrated teaching and learning. According to the AT, the ICTs that have been integrated and implemented are referred to as tools or mediating artefacts which help to achieve the outcomes of the activity. The implementation of ICT integrated teaching and learning in Textiles and Clothing programme was mediated by different ICT resources. These were grouped into seven themes namely: the ICT hardware used; the use of basic Microsoft software programmes, use of general design related software programs, use of hand-held software applications, use of social media applications, network infrastructure used, and the physical infrastructure available. As noted from the AT, these ICTs are not easily handed to the subjects but are selected, acquired and then integrated into the teaching and learning system (Engestrom, 2001). This implies that

the ICT selected should have a functional pedagogical purpose in the teaching and learning of students. According to the Functionality Framework, the effectiveness of ICT software programmes and applications for supporting significant learning amongst students can be appreciated if the ICT are applied in a way that match the educational underpinnings of collaborative, data collection, location aware and microworlds software applications (Patten et al. 2006). The themes shall be discussed in light of the AT triangulated by the Functionality Framework.

6.2.1 ICT hardware used

The study revealed that there were old models of Hp Compaq desktop computers that were used in the Textiles and Clothing programmes for research purposes only. It emerged from the findings that the Hp desktop computers were just general computers with applications such as Microsoft office software programs. According to the Functional Framework, hardware that have applications that are mostly used for storing and retrieving of information, like the Microsoft office application, are administrative in nature and do not encourage knowledge construction (Patten et al.2006).In the Textiles and Clothing programmes, this hardware was used for accessing and storing referential materials. The Hp desktop computers were, therefore, not suitable for teaching the practical aspects of Textile and Clothing programmes as they had no design related software.

The findings showed that there were also Mac computers available for teaching and learning in the Textiles and Clothing programme. It was explained by the participants that the Mac computers were only used for teaching and learning of aspects that were related to designing. This showed that this type of hardware was useful in the teaching and learning of Textiles and Clothing programmes. This finding also expands that of Van-De-Borgart (1990) who posits that the Mac computer has software programmes that could be easily adapted to Textiles and Clothing courses. Though it was noted that the Mac computers were useful in the teaching and learning of Textiles and Clothing programmes, they were inadequate to cater for the whole class during teaching and learning. This implies that the Textiles and Clothing programmes had serious shortage

of the suitable computers compromise the effective application of ICT integrated teaching and learning in the programmes to foster the attainment of necessary skills that are related to ICT among students.

The findings of the study revealed that LCD projector was another ICT hardware that was available for use by lecturers during lecture delivery. It was revealed that the LCD projectors were used for beaming content that would have been prepared for lecture delivery and presentations. The LCD hardware was found to be very useful in the teaching and learning of Textiles and Clothing programmes as it assisted different groups of learners to synthesise the information as it was beamed. This finding supports those of Brock and Joglekar (2011) who observe from research that LCD projectors were used by lecturers to present slides with learning points. This means that discussion among students is stimulated as slides are beamed on the screen. On the other hand, the findings contradicted those of Jones (2003) who asserts that the use of LCD projectors for beaming content was a very limited pedagogical approach in the classroom for it was often limited to an information transmission mode. However, the Functionality framework indicated that multimedia devices like LCD projectors are capable of displaying learning materials clearly, hence, are pedagogically valuable. Through the use of such ICT hardware, students can construct their own understanding and knowledge from what they see.

It emerged from the findings that the projectors were not adequate to accommodate all lecturers at any particular teaching session. Similar results were also noted by Wambau-Kamau (2012) who found that Textiles and Clothing programmes in Kenyan universities faced serious challenges in providing appropriate ICT hardware for teaching and learning. The inadequacy of appropriate hardware can compromise the effective implementation of ICT integrated teaching and learning.

Findings also showed that Digital Television set (TV) was also used by lecturers during teaching sessions. The lecturers who participated in the study explained that the television was very helpful especially when teaching fashion and aspects related to event management as it helped students to get inspiring ideas. The findings resonate

with Shin's (2012) view that the use of digital television programmes offer access to contemporary fashion programmes for Textiles and Clothing students. In the teaching and learning of Textiles and Clothing programmes, such technological hardware like television sets ensured that students are exposed to current textiles, clothing and design trends. The use of digital televisions supports the category of multimedia applications of the Functional framework that reflect the idea of constructivist pedagogy. Through the use of TV sets students develop new understanding based on what they see. In Textiles and Clothing programmes, television sets are capable of displaying images. These can be used by students as basis for conceptual development of design projects or assignments. Therefore, the use of digital television sets in Textiles and Clothing cannot be overemphasised. The findings further revealed that there was only one television set waiting to be used by all academic levels of students. This further demonstrates the challenges the Textiles and Clothing programmes were facing. Such challenges limited the Textiles and Clothing department to achieve effective implementation of ICT integrated teaching and learning threatening the students' effective acquisition of proper technological skills.

The findings of the study revealed that mobile hand-held devices like laptops and smart phones were other ICT hardware used in the teaching and learning of Textiles and Clothing programmes. Lecturers and students elaborated by explaining that they had resorted to using their personal laptops due to shortage of suitable ICT hardware provided by the university and it was easier to install design-related software on them. The study revealed that through the use of hand-held devices like smart phones students could get clarification on assignment and content area anytime and anywhere. The findings corroborate those of Clarke and Svanaes (2014) who concluded that mobile hand-held devices offer unparalleled access to information. This shows that mobile hand-held devices offered potential for achieving great impact on teaching and learning of Textiles and Clothing programmes if effectively integrated in teaching and learning and where students have the same type of hand-held devices.

From the findings, it was revealed that there were ordinary industrial sewing machines that were used by Textiles and Clothing lecturers and students during product

development of designs. All the sewing machines were manually controlled whenever students wanted to do decorative processes on their designs. While it was reported by Lectra (2010) and Wambau-Kamau (2012) that in the teaching of Textiles and Clothing there were CAD systems supporting practical processes such as digitisers, computer controlled decorative machine and special equipment for laying and cutting, it was observed that there were no such ICT machinery for use in the Textiles and Clothing programmes at the university under study. In teaching and learning, the ICT machinery and software packages enable students to sketch, illustrate, make patterns, grade and do virtual prototyping which are core skills in the study of Textiles and Clothing and required in the textiles and clothing industries. The unavailability of such ICT machinery in the teaching and learning of Textiles and Clothing programmes reflects that students would lack the necessary ICT skills to enhance their employability in the textiles and clothing industries.

6.2.2 Use of basic Microsoft software programs

Emanating from the findings were basic Microsoft software programs that were commonly used in teaching and learning in Textiles and Clothing programmes. This theme manifested in three sub-themes of the software namely; Microsoft PowerPoint, Excel and Word. It was shown that most lecturers viewed PowerPoint as an effective software program that was used in teaching both theoretical and practical courses as it enabled students to get the information unlike reading from a paper, and where there were images; students could see and follow instructions clearly. The finding expands those of Huxham's (2010) study who noted that presentation software like PowerPoint was used as a basis for communication of learning material. The Functionality framework indicates that Microsoft office tools like PowerPoint are referential applications that enable teaching staff and students to store and access content for teaching and learning activities. This implies that presentation software programs such as PowerPoint are pedagogically sound as they may encourage students to use the information contained on the slides in different ways.

The findings also brought out two software applications that were in common use among lecturers and students that are Microsoft Word and Excel. From the participants' responses it emerged that Microsoft Word and Excel were software programmes that were used by lecturers to store information and recording progress of students respectively. As categorised by the Functionality Framework, software applications that concentrate on scheduling and grading are administrative in nature. This shows that such software applications do not encourage knowledge construction among students and therefore have little pedagogical philosophy underpinning their integration in teaching and learning.

6.2.3 Use of general design related software programs

Findings that surfaced from lecturers, technicians and students revealed that there was no specific ICT software bought by the university of Science and Technology instead there were general design-related software that had been incorporated in the teaching and learning of Textiles and Clothing programmes. There were four types of these general design related software programs namely; CorelDraw, Photoshop, Adobe Illustrator and Mac Paints. These are discussed in the paragraphs that follow:

The study revealed that CorelDraw was used to create textiles and fashion designs. It was indicated that with CorelDraw, students started from scratch to formulate ideas, sketch and finally create their fashion designs. These findings agree with Crel (2008) who unveiled that CorelDraw could be used to make technical illustrations, create garment features of Textiles and Clothing designs. The fact that students were able to create designs that were related to clothing fashion showed that CorelDraw is pedagogically useful in Textiles and Clothing courses. The findings reflect on two of the categories of the Functionality framework called educational microworlds and multimedia software applications. The capability of CorelDraw to create garment silhouettes reflects its microworlds capability encouraging students to generate own designs on screen. This allows students to construct their own knowledge through experimentation. The capability of CorelDraw to edit photographs and images reflects its multimedia characteristics. Such a software application can be used by students to

create, edit and display designs and illustrations for presentation and projects. As noted by Pattens et al. (2006), the microworlds and multimedia applications are more consistently informed in pedagogical principles as they tend to adopt a constructivist approach to learning enabling students to formulate new ideas as they try one stage after the other. This shows that with CorelDraw, students can generate their own knowledge hence pedagogically valuable in the teaching and learning of Textiles and Clothing programmes.

Emanating from the same theme of general design related software programs was software called Photoshop. The findings showed that Photoshop was used mostly for editing fashion designs and to create collages or mood boards for fashion collections. Similar findings were also noted by Al-Mousa (2013) who acknowledges that Photoshop is used to make colour changes on complicated patterns as well as forming repeats and colour-ways from scratch. The efficiency of Photoshop to edit photographs and images reflects its multimedia capability as noted from the Functionality framework. This means that the software application can be used by students to import, edit and display images in Textiles and Clothing design courses. From the way students used the software, it can be deduced that Photoshop is pedagogically valuable in Textiles and Clothing programmes as students can edit the images and end up producing a different design. Though Photoshop was found to be a general design related software program that can be used in any design field, in Textiles and Clothing, it was noted to be beneficial as the use of such a software application in teaching and learning reflects a constructivist pedagogy requiring students to generate new ideas based on the images they would have edited.

The other general design related software that was applied in the teaching and learning of Textiles and Clothing programmes was Adobe Illustrator. Explanations from the lecturers showed that Adobe Illustrator was used to make fashion illustrations. Though Shin (2012) posits that Adobe Illustrator is the most preferred software program that can be used in textiles and fashion drawing, it was noted in this study that the software was not in common use among students. The usefulness of Adobe Illustrator in

Textiles and Clothing programmes is emphasised by Centner and Vereker (2008) who states that Adobe illustrator can create and store different silhouettes, basic shapes of garments, stitches and trims. These aspects make the software application ideal for producing fashion sketches, technical illustrations and other images in Textiles and Clothing programmes. Through such software, students can develop their design concepts, develop templates of their designs, and display their completed illustrations on screen.

The fact that Adobe illustrator can handle different formats of images can allow students to create good quality illustrations that can be used for a variety of presentation drawings in Textiles and Clothing, hence it's pedagogically valuable. Against this background, it can be commented that if Adobe illustrator is effectively integrated in Textiles and Clothing programmes, it can be used by lecturers to enable students develop skills to creatively design original artefacts. While the AT emphasised the purpose of an ICT that has been integrated as that of changing how the lecturers control the teaching activity for the benefit of the student adapting to changing conditions, it has been noted that the use of the Adobe illustrator software has shown limited changes in the Textiles and Clothing programmes. In courses such as Fashion Illustration and Pattern Development, the use of this software was not even appreciated as it was observed that students produced manual and hand-made illustrations and drawings yet the software would have made a difference in the presentation of such courses.

Findings from the study showed that students' laptops had Mac paint software applications. It was revealed that Mac-paint as a software had been useful to first and second level students for which it was used for making and editing geometrical drawings. This finding corroborated Koch's (1990) recommendation that Mac paint could be the first software program that could be used in a design course because it is easy to operate enabling students with limited exposure to computer quickly motivated to develop designs. Koch's (1990) found out that in Textiles and Clothing programmes, the software is very suitable for garment line presentation, pattern drawing and figure

drawing. The efficiency and ease of adding and editing colour with Mac paint shows that it very suitable in Textiles and clothing programme.

Though these software applications, CorelDraw, Photoshop, Adobe illustrator and Mac paint were found to support the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes, it was revealed that they were general design-related software that could be used by any student designer in any design field and not specifically for Textiles and Clothing programmes. The capability of CorelDraw, Photoshop and Adobe illustrators would not even match the efficiency and accuracy of educational software systems that are specifically for teaching and learning of Textiles and Clothing courses such as Lectra-Modaris-3D-Fit software, Gerber technology and OptiTex 3D Runway. As observed by Park & Lee (2011), specific Textiles and Clothing educational software applications and programmes can help students draw, design, develop woven textures, create flat patterns, regulate sizes, determine fabric colours, virtually test, and construct designs and prototypes.

6.2.4 Use of hand-held software applications

The findings of the study revealed that hand-held software applications were also used in the teaching and learning of Textiles and Clothing programmes. It was revealed that there were four types of these hand-held software applications that were found in use namely digital camera, photoeditor, fashion design, and voice and video recorder.

The findings of the study showed that digital cameras found on smart phones were of high use in teaching and learning in Textiles and Clothing programmes. It was revealed that the digital cameras were used to photo shoot photographs which would be used for assignments and projects. The photographs that the students shot would later be edited and used to create different types of fashion boards such as inspiration and story boards. Handheld digital cameras could be grouped under the multimedia applications as they are capable of capturing images. The applications could be used to display photographs that can be used by students for practical projects or assignments. As explained by the Functionality framework, the digital cameras can be categorised as

reflective applications also for they could encourage reflective social practice as they are capable of collecting, displaying and storing information that can be used by students for reflection in lectures (Pattens et al, 2006). From the observations it was noted that students created their own albums of different photographs which would then be applied to different design collections to create fashion boards. This might inform that digital cameras are pedagogically useful in the teaching and learning of Textiles and Clothing design courses.

It also emerged from the findings that software applications such as photoeditor, found on smart phones, were manipulated by students for a variety of purposes. The photoeditor application was used by students to edit photographs taken from the environment into mini boards on the device which would then be used to create a large fashion board when transferred onto laptops. It was, however, revealed that the use of this application was mostly adapted by students to individual needs than it was by lecturers. This finding corroborates the findings of Sloan (2013) that access to handheld software applications allows students to design their own learning material, thereby allowing them to become increasingly self-directed. From the student participants' narration, the photoeditor sounded to be a software application with high pedagogical value as students used it to combine a number of photographs. This idea of combining enables students to develop cognitive skills. Cognitive skills fall within the higher-order levels of Bloom's (1956) revised taxonomy namely analyzing, evaluating, and creating. Encouraging students to use such applications as photoeditor give them opportunities to learn to solve real-world problems and to be inquisitive with an open mind. Students are challenged to stretch their imagination so as to come up with something different using the software applications. Facione (2011) stresses that providing graduating students with opportunities to develop cognitive skills is essential as it will enable them to be productive members in the knowledge economy who can function effectively and solve problems in ways that are sensitive and caring for others and the world as a whole. The usefulness of photoeditor is as well authenticated by the Functionality framework as the application falls on the category of multimedia applications of the framework. The use of such applications in teaching and learning implies a constructivist pedagogy which

requires students to be creative basing on the photographs they would have shot from the environment.

The findings of the study revealed another hand-held software application called Fashion design. It was observed that this application was installed on smart phones like Samsung iPad4 and Android Mobicel. Though the application was possessed by few students, it emerged from the findings that the fashion design application enabled students to experiment with more than twenty different silhouettes provided by the software application to develop and portray their illustrations. The Fashion design application seemed to match the category of educational microworlds of the Functionality framework for the application allowed students to construct their own textiles and fashion designs through experimentation (Pattens, etal 2006). The Fashion design application, however, did not have features that allow students to test their designs on virtual fashion model due to its limited visual representation. This is even supported by Junco and Cotton (2011) who indicated that microworlds software applications can be used beneficially on laptops and desktop computers that have high processing power. It points out that the Fashion design application was pedagogical valuable to the teaching and learning of Textiles and Clothing programmes as students were able to formulate their ideas and sketches of designs on the handheld devices. It was observed that through the use of the Fashion design applications, students tried several times to create textiles designs and fashion boards on the handheld till they come up with the desired product. Through such a process, students could learn that the process of coming up with something new involves many trials, errors and even failure, but at the same time, discovering that occasional mistakes are part of the creative processes rather than obstacles to an adventurous spirit. They learn to reflect on and to assess their practice and to collaborate with others so as to come up with improved ways of doing practical processes. From the findings, it was noted that the effective use of the Fashion design application was compromised by the fact that very few students had smart phone with high processing power. The software application could be used well in Textiles and Clothing programmes if all students had the same type of iPads and smart phones like Samsung iPad4.

Emanating from the hand-held software applications responses was the use of voice and video recorder during teaching and learning sessions. The students who participated in the study elaborated that through fashion events, students attended during their course, they were forced to use voice and video recorders to capture fashion or exhibition events. The video recordings were used as inspiration on how to organize and manage events which they would be asked to do as assessment projects. As observed in the Functionality framework, applications that are capable of recording and storing information for later use and evaluation are reflective applications. This might imply that the information captured by the students could later be used for stimulating reflective discussions in lectures. Using such applications encouraged collaboration by enabling learners to share their reflections with a wider community through utilising a variety of social applications like facebook and pinterest. Therefore, the use of voice and video recorders cannot be over emphasised in teaching and learning of Textiles and Clothing programmes.

The findings in this section, however, revealed that the hand-held software applications were more commonly used by students than lecturers. It was observed that the hand-held software applications were adapted by students to individual needs as students used the application in different ways. This indicates that a sense of independence was developing among the students. The findings coincide with those of Fabian and Maclean (2014) who found out that hand-held software applications offer a variety of multimedia tools that supported independent learning and the improvement of creative skills among students.

6.2.5 Use of social media applications

From the findings of ICT resources, it emerged that social media applications were also used to support the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. The social media applications that were commonly used were WhatsApp, Facebook, YouTube, Skype and e-mails. These applications are discussed below.

The findings showed that WhatsApp was used for conducting group discussions between lecturers and students. Most of these group discussions were conducted after lectures as a way of reflecting on what has been learnt by the students. Conducting the discussion through WhatsApp provided a way for critical reflection of the learning process as students are encouraged to look for gaps in whatever information they are given and to then seek ways in which these gaps can be filled in. This helps students to engage in reasoning, developing knowledge, applying reflection thereby developing critical thinking skills as they would be challenged to respond to the question asked on the WhatsApp application. Critical thinking requires cognitive levels that fall within the higher-order levels of Bloom's (1956) revised taxonomy namely analyzing, evaluating, and applying. Facione (2011) stresses that providing graduating students with opportunities for critical thinking is essential as it will enable them to be productive members in the knowledge economy and solve problems in society. Therefore the use of WhatsApp could not be over emphasized in teaching and learning in Textiles and Clothing programmes.

It emerged from the finding that Facebook was used as a teaching and learning platform where lecturers and students posted their textiles and fashion designs for evaluation. The comments that the students obtained from others were used to improve the quality of the final product. Teaching and learning through Facebook encourages students to take on responsibilities for joint work with others and to learn to value the ideas and contributions of every member of the team of which they find themselves part. The capability of Facebook to encourage sharing of information renders it features of collaborative applications as propounded by the Functionality framework. This is confirmed in the findings of Wankel (2011) and Mason and Rennie (2007) who stress that collaborative platforms, if used effectively, tend to establish a learning environment of knowledge sharing. This shows that Facebook can be used to share and critique information on creative design among students in Textiles and Clothing thereby encouraging collaborative learning for co-creation of knowledge thus contributing to improved teaching and learning. Such skills have been valued greatly for students to become active members of the knowledge economy. It has been emphasised by Trilling

and Fadel (2009) that, in the 21st century learning and work contexts, collaboration has taken on new dimensions which require people to work effectively with others that they have never met, don't know or will never meet face to face, but with whom they need to be able to cooperate on a common task or tasks. Therefore the use of Facebook if effectively used by all lecturers and students could improve the teaching and learning encouraging students to collaborate with other Textiles and Clothing students across the globe.

The findings of the study showed that YouTube was an application used by both students and lecturers to download working methods related to textiles and clothing technical processes they might not be knowledgeable. It was, however, noted that this application just provided step by step working instructions which the students just followed. Such type of application does not encourage critical thinking required for constructing knowledge but instead encourages memorisation of instruction. The Functionality framework emphasises that applications like YouTube are referential and not particularly beneficial to teaching as they tend to replicate traditional applications of knowledge transmission. However, Youtube could be pedagogically valuable in Textiles and Clothing programmes if lecturers develop strategies that can encourage students to use the Youtube application in a creative way.

The lecturers pointed out that e-mails had facilitated continuous dialogue between supervisors and supervisees even if they were off-campus. Though challenges with poor connectivity were experienced by students, it was noted that learning was no longer limited to the inside of the classroom, but has been extended to the outside environment. Communicating through email to instruct students could motivate the students to learn even better for they would not strain themselves by coming for face-to-face interaction but just send internet based messaging. This could help students to be flexible and increase their ability to communicate in different contexts. As students are exposed to the use of a wide range of media technologies they become to understand and to evaluate the effectiveness of different media technologies and be able to assess the potential impacts of the different media technologies used for communication. These findings corroborates those of Hung and Yuen (2010) who reported that emails

encourage teaching staff, tutors and students to communicate beyond the classroom environment thereby creating additional teaching and learning opportunities.

It was found out that other social media applications such as Skype were gradually used while blogs, wikis, Google Doc, LinkedIn, Twitter, Flickr and MySpace were not even used in the teaching and learning in Textiles and Clothing programmes at the selected university of Science and Technology. Similar findings were obtained by Moran, Seaman and Tinti-Kane (2011) who noted that the use of LinkedIn, Twitter, Flickr, SlideShare and MySpace was very minimal in American universities. This might be contributed by the fact that lecturers were not knowledgeable on how these can be used for teaching purposes.

6.2.6 Network infrastructure used

The findings of the study showed that network infrastructure such as wireless and local area network were available to support the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. All the four groups of participants, however, noted that there was a problem with network connectivity as the bandwidth ranged from weak to moderate on all working days. The challenges of bandwidth were also noted by Aguyo (2010) who found that bandwidth was the most insufficient ICT resource in African universities as it was compounded by more licensing fees and annual renewal fees charged to learning institutions. The bandwidth was therefore, a challenge to the university. Within such a scenario, lecturers and students would not be in a position to use e-learning platforms effectively as logging onto such a platform would take much time. This explains why the social media applications such as WhatsApp found on hand-held devices and facilitated by mobile network were popular among students and lecturers. These do not need much in terms of login compared to local fixed platform like Mylearning space.

6.2.7 Physical infrastructure available

It was noted that there was no computer laboratory specifically for the Textiles and Clothing department. It was observed that there was a small computer laboratory that

was shared between the Textiles and Clothing department and the other departments within the same School of Art and Design. Lecturer participants explained that for any web-based research work students needed to do, they had to use the main university research computer laboratory. This could be the major reason students were alternatively using their personal laptops as there was no computer laboratory with suitable computers specific to the practical requirements of the Textiles and Clothing programmes.

It also emerged from the findings that there were inadequate workshops and seminar rooms that were installed with few and poorly connected data cables to allow for effective teaching and learning with ICT. This implies that the Textiles and Clothing programmes at the university under study were greatly affected by inadequate physical infrastructure thereby compromising the effective implementation of ICT integrated teaching and learning. These challenges of physical infrastructure like inadequacy of appropriate workshops were also noted by Sintim (2008). It is apparent that the challenges of physical infrastructure continue to persist in the teaching and learning of Textiles and Clothing programmes. Hennesy (2010) notes that appropriate physical facilities are important requirements for effective implementation of ICT integrated teaching and learning. This statement of Hennesy (2010) posed great challenges to those working in the field of Textiles and Clothing as they needed to work hard to harness the ICT infrastructures and resources to boost the teaching and learning of Textiles and Clothing programmes.

6.3.THE EXTENT TO WHICH LECTURERS' COMPETENCES IN ICT SUPPORT EFFECTIVE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING IN TEXTILES AND CLOTHING PROGRAMMES.

This section discusses findings of the study on the extent to which Textiles and Clothing lecturers' competences in ICT support the implementation of ICT integrated teaching

and learning. The theme of the nature of ICT competences possessed by lecturers had four sub-themes which centred on lecturers' beliefs, basic technological skills, technological content knowledge and technological pedagogical content knowledge. The sub-themes are discussed in light of the AT triangulated by the TPACK framework.

6.3.1 Lecturers' beliefs

The findings of the study illustrated that all lecturers indicated that ICT has clear benefits to the teaching and learning of students. It was also observed that lecturers' beliefs towards ICT in teaching and learning were positive and that most lecturers were beginning to act as facilitators rather than transmitters of information to students. What this implies was that the implementation of ICT integrated teaching and learning was changing the pedagogical roles of lecturers. This finding is in line with Dogan's (2010) findings that positive beliefs towards ICT were enabling factors to the effective use of ICT in teaching and learning. The findings also expand those of Loveless' (2003) finding that the teaching staff's beliefs about the nature of a particular module and the associated teaching and learning styles greatly influenced their use of ICT. This finding showed that if lecturers would be provided with adequate ICT resources, their use of ICT could improve greatly. It is apparent that with the inevitable incorporation of ICT in teaching and learning, the beliefs of lecturers regarding their role in university teaching have to change. This is so because ICT causes certain teaching resources to become obsolete (Eze and Olusola, 2013). For example, the use of chalkboards may no longer be necessary if all students have access to the same networked resource on which the lecturer is presenting information.

6.3.2 Basic technological skills

It surfaced from the findings of the study that most lecturers possessed basic technological skills. It was obtained that lecturers were able to use the basic Microsoft Office package like word processor and spread sheets. According to Koehler and Mishra (2008), technological skills encompass skills to operate various ICTs. Though it was noted by Albirini (2006) that technological knowledge and skills were an important requirement for lecturers to possess, the TPACK framework shows that the

technological skills only do not enable lecturers to teach effectively with ICT. This implied that lecturers needed more than just technological skills for them to effectively implement ICT-integrated teaching and learning in Textiles and Clothing programmes.

6.3.3 Technological content knowledge

The study found out that lecturers had limited technological content knowledge. It was noted from the lecturers' explanations and observations that they faced challenges in using a variety of ICT to represent the subject content. Though lecturers showed that they had knowledge of concepts, theories and were specialists in the content of the Textiles and Clothing subject area, they had limited knowledge on how they can represent certain content in new ways through the various technologies that was not possible before. The lack of thorough technological content was aggravated by the fact that their training at universities did not expose the lecturers to the use of the various technologies in Textiles and Clothing programmes as there was no digital machinery during that time. The lack of technological content knowledge might have been worsened by the fact that lecturers had no post graduate certificates in higher education as was noted from their biographical profiles. Acquiring post graduate qualifications in higher education could have exposed the lecturers to various ways in which technology could be used to represent and manipulate contents in various ways. These findings of the study resonate with those of Hu and Fyfe (2010) who indicate that a number of teaching staff lacked technological content knowledge that enabled them to represent content in different ways. According to the TPACK framework, technological content knowledge enables teaching staff to understand how specific ICT can change the way students practise and understand concepts in a specific content area. This therefore imply that if lecturers have limited technological content knowledge they would face challenges in understanding the manner in which the subject content can be changed by the application of particular ICTs. Thus lecturers had to be exposed to a variety of ICT software in Textiles and Clothing such as pattern design software that could allow lecturers to guide students to design and create fashion designs on the screens of their laptops (Park and Lee, 2011). In addition, exposing lecturers to such 3-dimensional(3D) technological software like Lectra-3D-Modaris would enables lecturers to guide students

to virtually create, develop and model their fashion design prototypes and view these on the screens of computer devices other than making physical prototypes that are time consuming and costly (Jefferson et al, 2012).

6.3.4 Technological pedagogical knowledge

The findings of the study showed that most lecturers were not comfortable to manipulate a variety of ICTs as pedagogical tools. The findings of the study showed that most lecturers were not comfortable to integrate a variety of ICTs as pedagogical tools. It was noted from the findings that most of the lecturers were just comfortable with basic presentation software like PowerPoint and with guiding students to search content using websites. Though it was noted that network such as local, wide and wireless were available at the university to provide internet based technologies; these were not fully exploited by Textiles and Clothing lecturers to develop new pedagogical approaches that were appropriate for the tools at hand. The lack of technological pedagogical skills among lecturers could have been exacerbated by lack of staff developmental courses that focused on the use of ICT for pedagogical purposes. From the lecturers' narrations, it was noted that only two day workshops were conducted which might not provide enough opportunity for lecturers to grasp the necessary skills. The findings support those of Johansson (2012) who found out that teaching staff lacked understanding on how certain technologies are used in teaching. Johansson (2012) concluded that universities have concentrated on developing teaching staff's technological skills at the expense of training them on how to use the ICT to teach students. According to the TPACK framework, having technological pedagogical knowledge enables the lecturer to have the confidence to implement ICT integrated teaching allowing the lecturer to shape learning opportunities for students. Ochieng-Ondhoro (2013) notes that before an institution can successfully integrate ICT, it needs to ensure that teaching staff acquire appropriate ICT and pedagogical skills.

The limited technological content and technological pedagogical knowledge possessed by the lecturers revealed that lecturers had no thorough grounding in the technological-pedagogical-content knowledge as reflected by the TPACK. The lecturers most likely faced challenges in implementing ICT integrated teaching and learning. Implementing

ICT integrated teaching and learning has to be underpinned by sound pedagogical principles as informed by the TPACK framework. The merely mastering of technological skills is not enough hence lecturers needed to continuously learn new content and pedagogy since ICT evolves. The AT stresses lecturers as subjects of the implementation should continuously upgrade themselves for important transformations of teaching and learning to occur (Engestrom, 2010). As ICT advances, lecturers have to be concerned with acquiring new forms of knowledge and competences to be able to plan lessons and select appropriate technological resources and pedagogical strategies to teach students suitable content. Gaining the new forms of knowledge and ICT competences would help lecturers to develop the kinds of curricula and teaching methodologies that would ensure that their students engage in learning styles necessary for effective acquisition of ICT skills suitable to practise competently in the technological workplaces. Against this background, it could be noted that the Textiles and Clothing lecturers' competencies in ICT supported effective implementation of ICT integrated teaching and learning to a very lesser extent.

6.4. THE EXTENT TO WHICH THE TEACHING AND LEARNING OF TEXTILES AND CLOTHING HAS BEEN CHANGED BY THE INTEGRATION OF ICT.

The findings of the study showed that there were changes that were noted in the teaching and learning of Textiles and Clothing programmes. These changes were grouped under broad headings of teaching and learning styles, content taught, assessment methods, modes of communication between lecturers and students, and supervision of research projects. These changes will be discussed in the light of other studies.

6.4.1 Changes to teaching and learning styles

The findings of the study revealed that lecture delivery through the use of PowerPoint and projectors was one of the common teaching styles that were practised by lecturers. Lecturers who participated in the study elaborated by explaining that their teaching had

changed through the use of PowerPoint as they were no longer writing on the board using chalk. The lecturers reiterated that the use of PowerPoint presentation was an effective method as it helped students to see images in the original colour. Thus the use of PowerPoint becomes very useful even when presenting step by step instructions of practical working processes. The use of PowerPoint was observed to be an effective method as it catered for different learning styles of students. Lectures that are enhanced with PowerPoint enable students to see what is beamed and hear what is said and this helps to concretise what is being taught. The way in which PowerPoint benefits students when used for lecture delivery was noted in Brock and Joglekar's (2011) findings. The findings showed that the use of PowerPoint slides stimulated discussions among students and their instructors as the slides are beamed one after another. The benefits of using PowerPoint slides were also noted by Marcketti (2011) who indicated that lecture delivery through PowerPoint provides an energetic, participatory, and challenging learning environment. The use of PowerPoint during lecture delivery proved to have several benefits. However, the positive benefits of this style would not be maximised in the Textiles and Clothing programmes at the present for there were very limited projectors available to facilitate the beaming of slides and to cater for all lecturers who may be in need of them.

The study revealed that there were some changes to the way research work was done by students. The lecturers who participated in the study explained that web-based research work was a teaching and learning style that was initiated as a result of the integration of ICT in Textiles and Clothing programmes. The guided web-based research work was necessitated by the availability of the internet that enabled students to search through various websites and get updated information. The use of teaching styles like guided web based research work in Textiles and Clothing programmes enable student to develop the urge to research. The use of web- based research work requires particular skills and ability to cope with a fairly sophisticated level of language in order to avoid copying texts directly. These skills can be acquired effectively, when students are guided by the lecturers to make good use of academic websites. The findings of use of web-based teaching and learning styles relate closely with those of

Chu et al. (2008) who report that through the integration of ICT, teaching has been undergoing a shift from transitional-centred practices to transformational centred practices where students are involved in inquiry based learning. Guided web-based research work as teaching and learning style is in line with what Jansen (2009) and Bernstein (2000) termed competence pedagogies as emphasis is on individual differences than on recalling of knowledge. Chenard, Zilik and Prokic (2008) explains that teaching and learning styles involving accessing content through the websites improves students' critical thinking skills. The use of guided web-based research work needed to be effectively emphasised as it would assist students to acquire independent critical skills for the twenty-first century.

It emerged from the findings of the study that lecturers had introduced tutorial discussions through social media applications like WhatsApp. The students who participated in the study elaborated that participating in discussions through social media applications like WhatsApp were very helpful as they assisted each other on topics for presentations. Although in the past few years, social media was mostly used for personal communication, it has emerged to be a useful teaching and learning tool to facilitate group collaboration between lecturers and students and between students and students. In today's global economy, collaboration has been an indispensable skill necessary for effective functioning of society. The findings concur with Ravenscroft (2009) who maintain that tutorial discussion through social media platforms was one of the teaching and learning styles emerging in universities capable of enhancing collaborative authoring and distribution of information among students and their instructors. Mason and Rennie (2007) also explain that conducting discussion through social media increased students and lecturers' emotional connectedness and thus contribute to the development of communities of practice. Kai-Wai Chu and Kennedy (2011) posit that nowadays students are required to engage in collaborative activities such as group projects for knowledge building. Consequently, the importance of tutorial discussion through social network, as a teaching and learning style that encourage students to collaborate and foster critical thinking skills cannot be overemphasised in the Textiles and Clothing programmes.

The findings of the study showed that, with the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes, the role of lecturers in the teaching environment was changing from that of provider of information to that of one who facilitates the learning process. Instead of researching, storing and delivering notes to students, lecturers explained that they just guided the students to search and find information for topics they would have been given. The findings augment those from Johansson (2012) who observed that the use of a variety of ICT in learning was gradually changing the role of lecturer as they found supporting students in the creation of their own content. Jansen (2009) also emphasised that through the use of ICT the lecturer would have little or no control over the selection, sequence and pace of learning. The TPACK framework stipulates that ICT can afford new methods and avenues for teaching thereby changing the way certain classroom activities are carried out by teaching staff.

It emerged from the findings of the study that students were taking an active role in the learning of Textiles and Clothing programmes as they were responsible for finding information for each topic they were given. The lecturers who participated in the study elaborated by explain that the information each student got was shared with the whole class through live presentations. The ability of students to find information on their own encourages students to develop independent and problem solving skills which are critical in the 21st century society. The same findings corroborate those of Lakkala et al. (2007) who noted that, through the use of various ICTs, students became engaged in productive learning which improved their capability and collective cognitive responsibility. In such student centred teaching and learning styles, the lecturer has to play an important guiding role to structure tasks which students can engage with through discovery in order to build their own knowledge.

6.4.2 Adjustment to the content taught

The findings of the study showed that in some of the course of the Textiles and Clothing programmes the courses such as Fashion Marketing, Fashion Quality Management and Computer Aided Design, the content that was taught had been reviewed to include technological aspects. In other courses like Pattern Design, Product Development and

Fashion Illustration, manual methods of doing practical processes formed the major components of the courses' content. From the findings, it could be assumed that the programmes in Textiles and Clothing at the university under study were not structured properly to provide students with opportunities to acquire enough technological knowledge and skills to adapt competently in the digital workplaces. These findings concur with those of Nguku (2012) which revealed that some courses taught among Textiles and Clothing programmes in Southern-African universities were out of date and lacked technological aspects of textiles and applications in clothing fashion production.

While some earlier schools of thought (Van-De-Borgart 1990; Knoll, 1990) clung to and extended the belief that a good student designer of Textiles and Clothing should have a firm foundation of traditional practical methods of designing and pattern development like slashing and manipulating darts, this attitude could have been the reason why ICT use in practical courses lagged behind. McLaren (2008) notes that reviewing of programmes is necessary to ensure that Textiles and Clothing programmes devote adequate course content that meet the level of competences necessary for students to operate in the technological industries of the contemporary time. It has been advised by TPACK that effective implementation of ICT integrated teaching and learning cannot be achieved by "simply adding a new piece of technology upon existing structures but requires a shift in existing content domains and pedagogical practices"(Mishra and Koehler 2006:1024) This idea means that for Textiles and Clothing programmes to integrate ICT effectively in teaching and learning that enable student to acquire appropriate skills, they have to consider aligning relevant course contents to the demands of the society and the job performance trends.

6.4.3 Changes to assessment of students' progress

The study found out that tasks given to students were in the form of practical projects where students produced finished artefacts that were accompanied by word processed documents. Lecturers explained that these projects were necessitated by the ability of students to research through the use of ICT where they got a variety of information to justify their projects. The use of projects could benefit students as they can develop skills to solving their own problems. These findings relate to those of Voogt and

Pelgrum (2005) who found that through the use of ICT, the activities students engaged were long projects that were connected to real life and student's own experiences. The use of projects could benefit students as they can develop skills to solving their own problems. Tasks in form of projects give students room to try and reflect on all possible solution until they come up with the best innovative idea to solve the problem. However, it was noted that students were not exposed to projects that allowed them to work respectfully with different teams. It was noted by Trilling & Fadel (2009) that student should be taught flexibility and willingness to compromise so as to reach the goal that benefits all collaborating parties to encourage them to take on responsibilities for joint work with others.

It was noted from the findings that some of the students' procedures and processes were not tracked electronically as most lecturers were concerned about the physical end product. Eid-Al-harbi (2014) posits that in an ICT environment, the assessment should reveal both the process and the product. Assessing the process that led to the end product could enable lecturers to examine how the students complete the learning activities individually or how they come to construct knowledge collaboratively by using the ICT. On product assessment, lecturers could focus on investigating the quality of the final outcome such as solutions to the problem. Such forms of assessment indicate a student's progress that could provide useful information on how to assist the students on solving problems. Against this background, it can be noted that a combination of process and product assessment facilitated by ICT was not taken into consideration as part of the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

6.4.4 Modes of communication between lecturers and students

The findings of the study showed that the modes of communication between lecturers and students had changed from face-to-face and hard copy communications to soft modes of communication. It was explained by all groups of participants that social media applications like WhatsApp and e-mails were used to communicate with each other. The social media application facilitated continuous dialogue between lecturers and students when they were away from university campus. This saves even time and

reduces cost that student could spend traveling to see their lecturers for face-to-face discussions. Thus communication regarding academic issues was no longer confined to the classroom environment but had been extended to the outside environment. Through social media applications such as WhatsApp, lecturers were able to communicate with all students at once. Such social media applications enhance engagement of student community members as they could be able to offer their comments and generate collective solutions if need arise. The way lecturers and students communicated through social media applications could even increase students' emotional connectedness which could contribute to group affiliation.

The findings concurred with those of Hung and Yuen (2010) who indicated that ICT had provided opportunities for students to communicate beyond the walls of the classroom. Such extended communication led to extra learning opportunities and enhanced participation in the face-to-face classroom. Mason and Rennie (2007) also found out that social media played a central role as a communication tool between instructors and students in informal settings through its potential to encourage member participation. From this finding, it could be argued that communication through social media platforms is time and cost effective on the part of student and lecturers hence needed to be extended in the Textiles and Clothing programmes.

6.4.5 Changes to supervision of students' research projects

The study found out that there were some changes that were noted on the way lecturers supervised students' research projects. Lecturers reported that students were experiencing challenges of travelling to and from university to discuss issues concerning their research projects during the period they would be attached to textiles and clothing industries. The Textiles and Clothing department then had to introduce the supervision of students through e-mails and Skype. Supervision of research projects through e-mails was one of the areas that had been facilitated by the integration of ICT to a greater extent as lecturers were able to send feedback to students effectively. The finding corroborate those of Boyinbode, et al.(2012) who acknowledged the use of network technologies as having the potential of activating teaching and learning from

formal face-to-face approaches towards interactive and virtual-centred approaches where learning happens anywhere.

It was exposed in this section that there were some changes to the teaching and learning of Textiles and Clothing that had been necessitated by the integration of ICT. It was, however, noted that alongside some of the teaching and learning areas that were noted to have incorporated ICT, there were also other teaching styles that were mediated by traditional methods. It was also observed that there were some courses such as Pattern Development and Product Development that had failed to harness the ICT that were required for teaching and learning. From the findings, it was deduced that the ICT that had been integrated had modified the teaching and learning of Textiles and Clothing programme to a lesser extent. The AT posits that “tools that are adopted, selected and used by subjects may result in some alteration or just minor changes within the internal structure of an activity system” (Engestrom, 2001:137). In support of the AT, the integration of ICT had resulted in teaching and learning practices that were less mediated by ICT and more by the traditional methods with no ICT. This implies that the teaching and learning of Textiles and Clothing programmes had not been completely changed in a way.

6.5 MONITORING AND EVALUATING THE IMPLEMENTATION OF ICT INTEGRATED TEACHING AND LEARNING IN THE TEXTILES AND CLOTHING PROGRAMMES.

This section discusses findings of the study on monitoring and evaluation measures provided for the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes. The administrators and lecturers who participated in the study explained on the mechanism that was used and the challenges they encountered in providing maximum monitoring and evaluation. The AT notes that teaching and learning systems are social processes that succeeds from combined activities of the all the subjects of the system. The monitoring measures given by the management were an important component that could assist to achieve the objective of the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. The

failure to provide the necessary monitoring results in the collapse of the implementation process or the system attaining an unsatisfactory object as noted by the AT.

6.5.1 Mechanism used for monitoring the implementation of ICT integrated teaching and learning

The effective monitoring and evaluation of ICT integrated teaching and learning is of great importance if it is to be implemented effectively. Although it was revealed that the peer review and evaluation mechanism was used to assist in monitoring, it was noted that was not very functional as some lecturers chose not to do it. The procedure of peer evaluation required that the lecturers observe and evaluates each other in terms of their use of various ICT in teaching and learning and report their evaluations to the administrators. While the mechanism enable ideas about the ICT to be shared and observation to be discussed and explained in terms of their implications for effective teaching and learning, lectures were not utilising the mechanism very well. According to Lomas and Nicholls (2005), peer evaluation did not serve as a useful tool for monitoring implementation of teaching innovation as there is lack of objectivity on the part of the peer evaluator. Bell and Mladenovic (2008) also dismisses the use of peer evaluation as a monitoring document on the ground of its potentially intrusive nature and the challenges it presents to academic freedom.

It was observed that the peer review and evaluation document that was used to monitor the implementation of ICT integrated teaching and learning was just a general form that did not indicate aspects of ICT integrated teaching and learning. As advised by Njagi and Oboko (2013), a monitoring mechanism should be developed in such a way that it provide for the collection of data according to indicators that would have been specified. This means that an effective monitoring plan should specify the indicators on which the lecturers would be monitored. This agrees with Oldfield (2010) who observes that a monitoring plan with specified indicators allows administrators to obtain information for making decisions during the process of implementation thereby enabling them to map proper intervention strategies for the teaching staff and students.

A good example of a monitoring plan for the implementation of ICT integration was found by Davidson et al (2014) in the state of Texas where the ministry of education designed the STaR mechanism to assess teaching staff's progress on the integration of ICT in teaching and learning. The STaR monitoring plan showed aspects such as how, when, how often technology is used and how student mastery was mastered of the content taught and the technological-pedagogical strategies applied. Such a monitoring plan could provide the monitoring team with information that can be used for decision making for ongoing mentoring or even development of the teaching staff.

From the aspects provided on the STaR chart, it can be noted that monitoring the implementation of ICT integrated teaching and learning should as well consider the pedagogical function of the ICT that are selected by lecturers as advised by the Functionality Framework and the cohesion that exists between the content, technology and the ICT as described by the TPACK framework. Against this background it could be noted that the mechanism that was being used in the Textiles and Clothing programmes under study was not effective as it did not specify the specific indicators for the implementation of ICT integrated teaching and learning.

6.5.2 Challenges encountered in providing monitoring and evaluation measures

It was found out that there were challenges that were encountered by administrators in the course of providing monitoring and support measures to the implementation of ICT integrated teaching and learning. The challenges will be discussed in the paragraphs that follow. According to the AT, the implementation processes are characterised by challenges or tensions (Engeström, 2001). These challenges arise when the condition of the activity put the subject in conflicting situations that hinder achieving the objective of the implementation. This was also supported by Demiraslan and Usluel (2008) who found out that the implementation process is conjugated with contradictions within the activities and between the members of the teaching and learning system. The implementation of ICT integrated teaching and learning manifested challenges which

were explained by administrators and lecturers as lack of expertise, financial constraints and negative attitudes of top management.

One of the challenges indicated by lecturers was the lack of expertise administrators displayed on monitoring and evaluation. The lecturer elaborated by explaining that the administrators just talked about the implementation in meetings and on paper without taking any practical action. From the findings, it could be argued that the administrators lacked the necessary expertise on what and how to monitor the implementation of ICT integrated teaching and learning. Packham and Miller (2000), assert that monitoring and evaluation should be provided by teaching specialists who collect the required data for decision making. From the biographical profile of administrators, it was noted that the administrators had less than five years of administrative experiences showing that they might not have been well experienced in issues related to how implementation of teaching and learning could be monitored. The administrators had no qualification related to teaching in higher education which might compromise their ability and understanding of teaching and learning with ICT. Within such a scenario, it was very difficult for the administrators to make well informed decisions about the implementation of ICT integrated teaching and learning. These findings corroborated those of Tezci (2011) who discovered that the implementation of ICT in teaching and learning did not receive sufficient monitoring.

The finding showed that the administrators faced challenges in offering maximum monitoring and support to the lecturers as they clarified that lecturers displayed negative attitudes. The administrators elaborated by explaining that the lecturers were reluctant to experiment with a variety of ICTs that were available within the department making it a challenge to see how they were progressing on their use of the ICT. It came out that the reason for lecturers being reluctant to experiment with a variety of ICTs was their lack of appropriate knowledge and skills to use the ICT as pedagogical tools. The lecturers felt anxious about using ICT in the class when they perceive that the students know more about ICT than they do. These finding of the study corroborates those of Gulbahar and Guven (2008) who found that teaching staff have varying perceptions about their effectiveness about when using ICT in the classroom which subsequently

impact on how they use technologies in the classroom. Gulbahar and Guven (2008) conclude that regular use of ICT in the classroom can relate to teaching staff's feelings of effectiveness and usefulness of ICT.

The other challenge that was indicated by administrators was on the negative attitudes the top management displayed towards the Textiles and Clothing department. The administrators explained that the top management perceived the Textiles and Clothing programmes as one of those practical programmes that were meant for the less gifted people. The administrators elaborated by explaining that the top management was not providing maximum support to the implementation of ICT integrated teaching and learning as the management was putting much emphasis on other departments. These findings are similar to those of Makoche Kanwa and Kwaramba (2011) who established that for most decision makers in the African university education system, technical degree programmes carry an aura of being too simple and practical and are portrayed as a career path for the less academically gifted hence few resources are allocated to such areas. However, the perception that Textiles and Clothing programmes are meant for less gifted students could not be a fact for at the university under study, it was established that the students who enrolled for the Textiles and Clothing degree programmes were taken on the same entry requirements as other students from other degree programmes. Negative attitudes on the part of the management at the university could affect the Textiles and Clothing department to achieve effective implementation of ICT integrated teaching and learning in all its programmes.

It was clear from the lecturers and the administrators that financial constraints compounded by the centralised buying system at the university was the another challenge that administrators explained as limiting them from providing maximum monitoring and evaluation. It was elaborated by the administrators that it was difficult for them to get the ICT that would be needed by lecturers for the process of acquisition was very long and the money fund would not be released at the time they needed it. There was little support in terms of acquiring the ICT resources that was provided to the teaching and learning of Textiles and Clothing programmes. The nature of the ICT that

the Textiles and Clothing department was using which was not specific to the area even showed the financial constraints that existed.

Lecturers revealed that the university management emphasised the improvement of administrative issues at the expense of the resources that were required for the core business of teaching and learning. This could be the challenge why the teaching and learning in the Textiles and Clothing department was being under-funded and under-resourced by the university as financial resources would be channelled to other activities. These findings were also confirmed earlier on by the World Bank (2000) which disclosed that most universities experience tensions over resource allocation between ICT for administrative purposes and ICT for teaching and learning. In earlier studies, Shabani (1997) found that top management in universities considered demands for enhanced administrative resources as vital and end up allocating less to academic teaching and learning needs. Without adequate resources to ensure the effectiveness of the implementation, little success can be achieved. The inevitable conclusion is that unless adequate budgets are allocated for acquiring ICT resources needed in the Textiles and Clothing programmes, the extent to which the objectives of implementing ICT integrated teaching and learning are met is bound to be limited.

6.6 CHAPTER SUMMARY

This chapter discussed the findings of the study based on the major themes that emerged during the interviews, observations and document analysis. The discussion identified key areas in the findings of the study to draw conclusions in as far as the implementation of ICT integrated teaching and learning is concerned. The three theoretical frameworks that underpinned the study namely; the AT, TPACK and the Functionality framework were used to explain and discuss the findings of the study.

Of the ICT infrastructure and resources that were available, it was noted that the general design related software such as CorelDraw were pedagogical useful in the teaching and learning of Textiles and Clothing programmes. It emerged from the discussion that hand-held software applications such as fashion design were found to

match the microworlds category of the Functionality framework enabling students to create textiles and clothing designs on the screen of the device. Also significant in the discussion was that the poor network connectivity available compromised the effective the implementation of ICT integrated teaching and learning.

In this chapter the extent to which the competences of lecturers support the implementation of ICT integrated teaching was discussed in light of the TPACK framework. It was brought out that the limited technological content and technological pedagogical knowledge possessed by the lecturers implies that lecturers faced great challenges in implementing ICT integrated teaching and learning. The discussion noted some changes to teaching and learning due to the integration of ICT such as supervision of students' projects through e-mails. The discussion revealed, however, that the ICT that had been integrated had not completely changed the teaching and learning practises in the Textiles and Clothing programmes hence the system had been modified to a lesser extent as traditional methods of teaching were also used by lecturers such as manual demonstration. Worth noting from the discussion was that the mechanism that was used to monitor the implementation of ICT integrated teaching and learning was not effective as it did not show the specific indicators related to the implementation of ICT integrated teaching and learning. The next chapter focuses on the summary, conclusions and recommendations drawn from the findings of the study.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The previous chapter discussed the study's findings. This chapter is divided into seven sections. The first section provides a restatement of the research objectives and questions. The second section presents a summary of the major findings of the study based on the themes which surfaced during the interviews with the different groups of participants, from observations and document analysis. The conclusions drawn from the discussions of the findings are presented in the fourth section of the chapter. The fifth section puts into focus the implications of the study and the recommendations emanating from the study. The contributions the study makes are presented in the form of a model. The chapter also provides an assessment of the extent to which the objectives of the study were achieved. The last section suggests areas for further research.

7.2 RESTATEMENT OF RESEARCH OBJECTIVES AND QUESTIONS

The research objectives and questions that guided this study are restated below. This is done in order to give a detailed overview of the study to enable assessment to be made on the extent to which it has achieved its objectives.

7.2.1 Research aim and objectives

The purpose of this study was to explore how ICT-integrated teaching and learning was implemented in Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe. The following research objectives guided the study:

- To examine the infrastructure and resources that are used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.
- To explore the extent to which Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning.
- To establish how the teaching and learning of Textiles and Clothing has been changed by the integration of ICT.
- To examine how the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes is monitored and evaluated.
- To present a model that can be used to enhance effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?

7.2.2 Main research question and research sub-questions

The main research question that guided this study was: How is ICT integrated teaching and learning implemented in the Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe? The study was also guided by the following sub-research questions:

- What infrastructure and resources are used to support effective implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes?
- To what extent do Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning?
- To what extent has the teaching and learning of Textiles and Clothing programmes changed by the integration of ICT?
- How is the implementation of ICT-integrated teaching and learning in the Textiles and Clothing programmes monitored and evaluated?
- Which model can be proposed to enhance effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes?

7.3 SUMMARY OF FINDINGS

This section provides the summary of the findings with respect to the infrastructure and resources that were used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes, ICT competences of lecturers, the extent to which the teaching and learning of Textiles and Clothing programmes had been changed by the integration of ICT, and monitoring and evaluation. These are summarised in the sub-sections that follow.

7.3.1 Infrastructure and resources used to support effective implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.

The study established that the implementation of ICT integrated teaching and learning was supported by different infrastructure and ICT resources that were used for different purposes. From the findings it was noted that the ICT resources that were used served different pedagogical purposes in the teaching and learning of Textiles and Clothing programmes at the university under study.

7.3.1.1 *ICT hardware used*

It was established that there were Hp Compaq desktop computers that were used for research purposes only in the Textiles and Clothing programmes. The findings showed that there were also very few Mackintosh computers that were used for teaching and learning of practical aspects related to designing, illustrating and drawing. It was revealed that there were two portable LCD projectors only for use by all lecturers teaching in the Textiles and Clothing programmes. The findings showed that there was one Digital Television set (TV) which was used in the teaching and learning of students as they provided opportunities for students to get inspirational ideas. It was also learnt that lecturers and students used personally owned mobile hand-held devices such as laptops and smart phones due to shortage of suitable and adequate ICT hardware provided by the university. In addition to the above hardware, there were ordinary industrial sewing machines that were used to facilitate the teaching and learning of

practical processes. It was, however, found that there was not even one that was computerised or automatically controlled among these sewing machines.

7.3.1.2 Use of basic Microsoft software

Basic Microsoft software applications like PowerPoint, Excel and Word were used by lecturers and students. PowerPoint was commonly used in combination with projectors to facilitate lecture delivery and presentations in both practical and theoretical courses in the Textiles and Clothing programmes. Microsoft Word was commonly used by students to process assignments.

7.3.1.3 Use of general design related software

The findings showed that there were general design related software that were incorporated in the teaching of practical processes in Textiles and Clothing programmes namely; CorelDraw, Photoshop, Adobe Illustrator and Mac Paints,. CorelDraw was mainly used to create textiles and fashion designs from scratch whereas Adobe Photoshop was used mostly for editing fashion designs. Adobe Illustrator and Mac Paints were also used to make fashion illustrations and geometrical drawings respectively. It was, however, discovered that, in courses such as Fashion Illustration and Pattern Development, the use of Adobe Illustrator software was not even noticed as students tended to produce hand-made illustrations and drawings. Although it was found that Mac paint software applications were available on laptops, it was useful only to first and second level students.

7.3.1.4. Use of hand-held software applications

Although there were hand-held software applications that were found in use, such as digital camera, photoeditor, fashion design voice and video recorder, these applications were more widely used by students than lecturers. These hand-held software applications were manipulated by students to suit individual needs such as producing collages or making sketches of designs. Of these hand-held software applications, digital cameras found on smart phones were highly used for photo shooting different designs that were later edited and used to create fashion boards. While applications

such as photoeditor found on smart phones were manipulated by students for editing photographs, other software applications such as fashion design enabled students to design and experiment with their designs on the hand-held device. It was, however, observed that the fashion design application was installed on smart phones like Samsung iPad4, Android Mobicel only of which very few students had such type of hand-held devices. To add to that, hand-held applications such as voice and video recorders were used by students to capture and record fashion or exhibition events that would be used as inspirational sources for organizing and managing textiles and fashion events which they would be asked to do as assessment projects.

7.3.1.5 Use of social media applications

The study established that there were social media applications like WhatsApp, Facebook, YouTube, Skype and e-mails that were commonly used to support the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. Of these, WhatsApp was the most common platform that was manipulated by both lecturers and students into a tutorial and group discussion platform. It was noted by all groups of participants that having group discussions through WhatsApp enabled students to reflect on lecture ideas anytime and anywhere. Facebook was another platform that had been manipulated to discuss and post design ideas for evaluation. It was, however, found that not all lecturers were competent enough to use Facebook for discussing with students. The other two platforms that were used sparingly were YouTube and Skype. YouTube was used by few students and few lecturers to download working methods of any process they were not knowledgeable about and then simply follow instructions while Skype was gradually used in the teaching and learning to discuss research projects with the students when they were on workplace learning. E-mails were used to communicate as well as for supervising research projects of third level students who were on workplace learning.

7.3.1.6 Network infrastructure used

It was learnt that network infrastructure such as wireless and local area network was available to facilitate teaching and learning with ICT. It was found that there was a

problem with network connectivity as the bandwidth was very poor to such an extent that lecturers and students resorted to working during the evening if they wanted to research and upload documents. As a result, the e-learning platform called my learning space, which had been developed by the university, was not effectively used.

7.3.1.7 Physical infrastructure available

The study found that there was no computer laboratory specifically meant for the Textiles and Clothing department. There was one small computer laboratory which was shared between the Textiles and Clothing department and the other departments within the School of Art and Design. The small computer laboratory was ill-equipped. Textiles and Clothing students used main university computer laboratory whenever they wanted to do any internet based research work. There were also inadequate workshop and lecture rooms and the few that were available had poorly connected data cables and internet ports to allow for effective teaching and learning with ICT.

7.3.2 The extent to which lecturers' competences in ICT support effective implementation of ICT integrated teaching in Textiles and Clothing programmes.

Unfolding from the study was the nature of ICT competences possessed by lecturers. These are summarised under the following sub-themes: beliefs of lecturers towards ICT, basic technological skills, technological content knowledge, and technological pedagogical knowledge.

7.3.2.1 Beliefs of lecturers

Though lecturers indicated that ICT has positive benefits to the teaching and learning of students, they explained that the ICT skills they possessed and the ICT resources available limited them from effectively expressing their positive beliefs into a new practice which is ICT integrated. Lecturers had begun to act as facilitators rather than providing all the information to students.

7.3.2.2 Basic technological skills

The findings of the study revealed that lecturers had basic technological skills. The basic Microsoft Office package that lecturers were able to use included Word processor, spread sheets and PowerPoint.

7.3.2.3 Technological content knowledge

This findings of the study showed that lecturers had limited technological content knowledge. The lecturers had limited understanding of the manner in which ICT and content influence one another. It was also noted that in courses such as Pattern Development, and Fashion Illustration, manual methods of designing patterns and illustrating were used yet there were general design-related software that could have been used to represent most of the concepts within the courses. This showed that lecturers had limited understanding of the specific ICT that were suited for addressing content learning in the Textiles and Clothing programmes.

7.3.2.4 Technological pedagogical knowledge

The findings showed that lecturers had limited understanding of how various ICT can be used in teaching. Most of the lecturers were just content with basic software like PowerPoint for lecture delivery and guiding students to look for content using websites. There were indications that besides being qualified, lecturers could not incorporate ICT as pedagogical tools as most of the lecturers were not able to use even the e-learning platform that was developed by university. Lecturers were not very competent to select the best ICTs to address their teaching and learning needs

7.3.3The extent to which the teaching and learning of Textiles and Clothing has been changed by the integration of ICT.

The study found out that there were some changes due to the integration of ICT. The changes were related to: teaching and learning styles, content taught, assessment methods, modes of communication between lecturers and students, and supervision of research projects.

7.3.3.1 *Changes to teaching and learning styles*

The study discovered that lecture delivery was mostly aided by PowerPoint slides and projectors. It was indicated by lecturer participants that they no longer used chalks and talk but simply projected the content from slide onto screens. The use of PowerPoint presentation was identified as an effective method as it assisted to cater for different learning need of students. It was, however, found that alongside these methods involving ICT, the traditional lecture method of dictating notes to students was used also.

Instead of using hardcopy references, it emerged that lecturers and students used web based sources to conduct their research work. While in the past few years, social media was used for personal communication, it was found out that it used for facilitate tutorial discussions between lecturers to students and students to students. It was noted that social media applications like WhatsApp and Facebook were very helpful as students assisted each other in discussion of topics for presentations and clarifying academic issues to each other.

With the availability of ICT, it was found that the role of lecturers was changing from one who provides information to the one who guides the learning process. Instead of preparing and delivering notes and handouts to students, lecturers mentioned that they just gave students guidelines of finding information. Subsequently, the students were found to be taking active roles in the learning of Textiles and Clothing programmes as they were found making presentations of their discoveries for each topic they were given.

7.3.3.2 *Adjustment to the content taught*

The study revealed that in courses such as Fashion Marketing, Fashion Quality Management and Computer Aided Design, the content that was taught incorporated technological aspects. Contrary to other courses like Fashion Illustration, it was found that manual methods of doing practical processes formed the major components of the courses' content. In courses like Pattern Development and Product Development, content taught included manual methods of drafting, pattern making and grading. It was

noted that during practical sessions, students used these manual methods as there was no pattern design and development software acquired by the department for the courses.

7.3.3.3 *Changes to assessment of students' progress*

Emerging from the findings were changes related to the way assessment of students' progress were done. Practical projects that were supported by word processed documents were given as tasks. It was acknowledged by lecturers that these projects were initiated as a result of students being able to research through the internet where they could get a variety of information to justify their projects. It was, however, noted that using soft methods of assessing students had not been fully mastered and implemented in all courses and by all lecturers.

7.3.3.4 *Modes of communication between lecturers and students*

While it was explained by the lecturers that face to face and hard copy communications were the formal ways of communication that were preferred in academic settings, it was reiterated by all groups of participants that social media platforms like WhatsApp and e-mails were the modes of communication that were now used by lecturers to send information to students. The WhatsApp and e-mails facilitated the continuous exchange of ideas between lecturers and students even if they were away from university campus.

7.3.3.5 *Changes to supervision of students' research projects*

The finding of the study revealed that the Textiles and Clothing department had to introduce the supervision of students through e-mails and Skype other than having the students travel for face-face discussions with their supervisors. It was, however, noted that Skype for supervision was not used by all lecturers for some indicated that their laptops and desktop computers were not well connected to allow for effective use of Skype.

7.3.4 Monitoring and evaluating the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.

While monitoring and evaluation plays a critical role in the implementation of any project or programme, this study found lack of consistence in monitoring and evaluation provided to the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes at the university under study. This section summarises the nature of the mechanism that was used for monitoring the implementation of ICT integrated teaching and learning as well as the contradictions that arose in providing monitoring and evaluation measures.

7.3.4.1 Mechanism for monitoring the implementation of ICT integrated teaching and learning.

The study found that the peer review and evaluation mechanism was used to monitor the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. Of concern on this theme was that this mechanism was viewed as ineffective by all groups of participants as it did not indicate the specific aspects for ICT integrated teaching and learning that need to be monitored.

7.3.4.2 Challenges encountered in providing monitoring and support measures

It was learnt from the lecturers that the administrators who were expected to provide monitoring displayed limited expertise in monitoring the implementation of ICT integrated teaching and learning. Among the concerns raised by lecturers was that the administrators concentrated more on talking than providing the practical solutions to the implementation process. It emerged that administrators were not well knowledgeable on what and how to monitor the implementation of ICT integrated teaching and learning.

It was learnt that administrators facing challenges in providing maximum support to lecturers as they explained that lecturers displayed negative attitudes towards the implementation of ICT integrated teaching and learning. Administrators explained that it was difficult to see how lecturers were progressing for they lecturers were not experimenting with the ICT that were available.

It was revealed from by the administrators that the top management of the university was not providing maximum support on the acquisition of ICT resources to facilitate teaching and learning in the Textiles and Clothing programmes for the management

was viewed as prioritising its financing of other departments at the university. It was revealed that the UST top management had negative attitudes towards the Textiles and Clothing department as it was believed that technical degrees like Textiles and Clothing were meant for less academically gifted people. As a result, the Textiles and Clothing department was under-resourced in terms of ICT needed for teaching and learning purposes.

7.4 CONCLUSIONS OF THE STUDY

The study sought to investigate how ICT integrated teaching and learning was implemented in Textiles and Clothing programmes at one university of Science and Technology in Zimbabwe. The study found out that ICT-integrated teaching and learning was applied in the Textiles and Clothing programmes three years ago. The findings enabled the researcher to make an assessment as to whether the ICT integrated teaching and learning was effectively implemented on the basis of the ICT resources and infrastructure that were found in use, the competences possessed by lecturers, the teaching and learning practises that had changed in Textiles and Clothing programmes, and the monitoring and evaluation measures employed. The conclusions that were drawn from the findings are presented with respect to the main themes which emerged during interviews with the participants, observations and document analysis. From the study it was concluded that:

- The Textiles and Clothing programme had serious shortage of suitable ICT hardware and subject-specific ICT software applications to facilitate the teaching of practical components which compromised the effective implementation of ICT integrated teaching and learning to foster effective skill acquisition in relation to ICT among students. Though general design related software like CorelDraw, Photoshop and Adobe illustrators and hand-held software applications like photoeditor, fashion design and digital cameras were pedagogically useful, these were not specifically designed to support the effective acquisition of technological practical skills that were specifically required in the textiles and clothing industry. There was a poor network infrastructure for both wireless and local area

network that was characterised by low bandwidth posing challenges to the effective implementation of ICT integrated teaching and learning. There was also lack of a computer laboratory and poorly connected workshops and lecture rooms suitable for the technical nature of the Textiles and Clothing programmes.

- Lecturers encountered difficulties in effectively implementing ICT integrated teaching and learning due to limited ICT competencies. Though lecturers held positive beliefs and basic technological skills, they lacked thorough technological-pedagogical-content knowledge and skills that could enable them to prepare lessons and select appropriate technological resources and pedagogical strategies to teach students relevant content using ICT. This disadvantaged the students who are at the receiving end for they would not be equipped with the necessary and relevant technological skills when they finish their studies at the university.
- The ICT that had been integrated had changed the teaching and learning of Textiles and Clothing programme to a limited extent. The teaching and learning of Textiles and Clothing programmes had not been completely changed as some of the traditional teaching practices like the traditional lecture method and manual demonstrations were being used in combination with other methods involving ICT. Some of the changes that had been necessitated by the integration of ICT included lecture delivery aided by PowerPoint, web-based research work, tutorial and group discussion through social media, soft modes of communication and supervision of research work through e-mails and Skype.

- The effective implementation of ICT integrated teaching and learning was further strained by the lack of an efficient mechanism for providing monitoring and evaluation. The peer review and evaluation mechanism that was used in the Textiles and Clothing programmes was not helpful as it did not specify the specific indicators for the implementation of ICT integrated teaching and learning. The administrators lacked the expertise on how to monitor the implementation of ICT integrated teaching and learning.
- There were challenges that were faced by the administrators in providing maximum monitoring measures to the implementation of ICT integrated teaching and learning. There was lack of financial support from the top management with regards to the acquisition of ICT resources needed in the Textiles and Clothing department. The shortage was aggravated by the negative attitudes displayed by university top management towards the Textiles and Clothing department as it was believed that technical degrees like Textiles and Clothing were for academically challenged people. As a result, this compromised the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

7.5 IMPLICATIONS OF THE STUDY, CONTRIBUTION WHICH IT MAKES AND RECOMMENDATIONS ARISING FROM IT.

Although the study found evidence of the Textiles and Clothing teaching staff implementing ICT integrated teaching and learning, it was also found that they were prevented from achieving success in the new practice due to some inconsistencies that hindered effective implementation at present. The implications for future policies of all these inconsistencies are discussed in the following sections as well as the contributions which the study has to make and the recommendations emanating from the conclusions.

7.5.1 Implications

The study's findings pointed to the need to reconsider the way in which ICT integrated teaching and learning was being implemented which would entail both policy and practical considerations.

7.5.1.1 Policy Implications

In terms of policy, the university management needs to develop clear policy guidelines to guide the implementation of ICT integrated teaching and learning. These changes in policy would enable the procedures for the acquisition of ICT resources for teaching and learning to be decentralised other than having a centralised buying system to cater for all departments at the university. This change in policy would also need to be extended to the development of specific initiatives for lecturer professional development in ICT and for effective monitoring and evaluation systems to best support the implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. The Textiles and Clothing department needs to develop its own departmental policies to guide the implementation of ICT integrated teaching and learning in its programmes. This would enable the department to set its own target and procedures for the implementation rather than being guided by the university and school-wide policies only.

7.5.1.1 Practical Implications

On the practical level, the findings should help the administrators and lecturers to identify the challenges which are preventing the effective implementation and enable them to make the changes to established practises necessary for effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes. The students happen to be the major beneficiary of the results of this study if the ICT integrated teaching and learning is effectively implemented as a result of the recommendations presented. These would result in a new practice effectively mediated by ICT to encourage effective acquisition of ICT skills among the students.

7.5.2 The potential contribution which the study makes

Even though this research was conducted at a moderately small scale, it was able to identify important insights into the implementation of ICT Integrated teaching and learning in Textiles and Clothing programmes. Despite the fact the ICT integrated teaching and learning was being implemented, the inconsistencies and challenges that were noted could continue to exert influence that could negatively impact the achieving effective teaching and learning practices mediated by ICT. The model proposed in Figure 7.5 below may enlighten and provide guidance to various stakeholders concerning how ICT integrated teaching and learning could be effectively implemented in order to afford opportunities for students to acquire necessary skills. The model has its foundation in the theoretical framework and the literature which was reviewed before this study took its shape.

7.5.2.1 Aligning curriculum to meet technological demands of society

Figure 7.5 below depicts that effective implementation of ICT integrated teaching and learning requires that the curriculum of an academic programme be aligned to the technological needs of the society for which students are being prepared. As informed by the Activity theory, the curricula of a programme is an important regulation that contains what is to be taught and learnt, and implementation of ICT integrated teaching happens within this curriculum. Regulations, just like rules, are subject to change and are not static. The alignment of the programme must be done taking into cognisance the three interrelated components; technology, pedagogy and content.

7.5.2.2 Developing Competences of Subjects

Figure 7.5 shows that for implementation of ICT integrated teaching and learning to be effective, there should be adequate personnel that have the necessary competencies, who can structure the interrelated components namely; technology, content and pedagogy into a meaningful whole. This requires that academic staff have the technological-pedagogical-content knowledge so as to develop appropriate teaching and learning strategies.

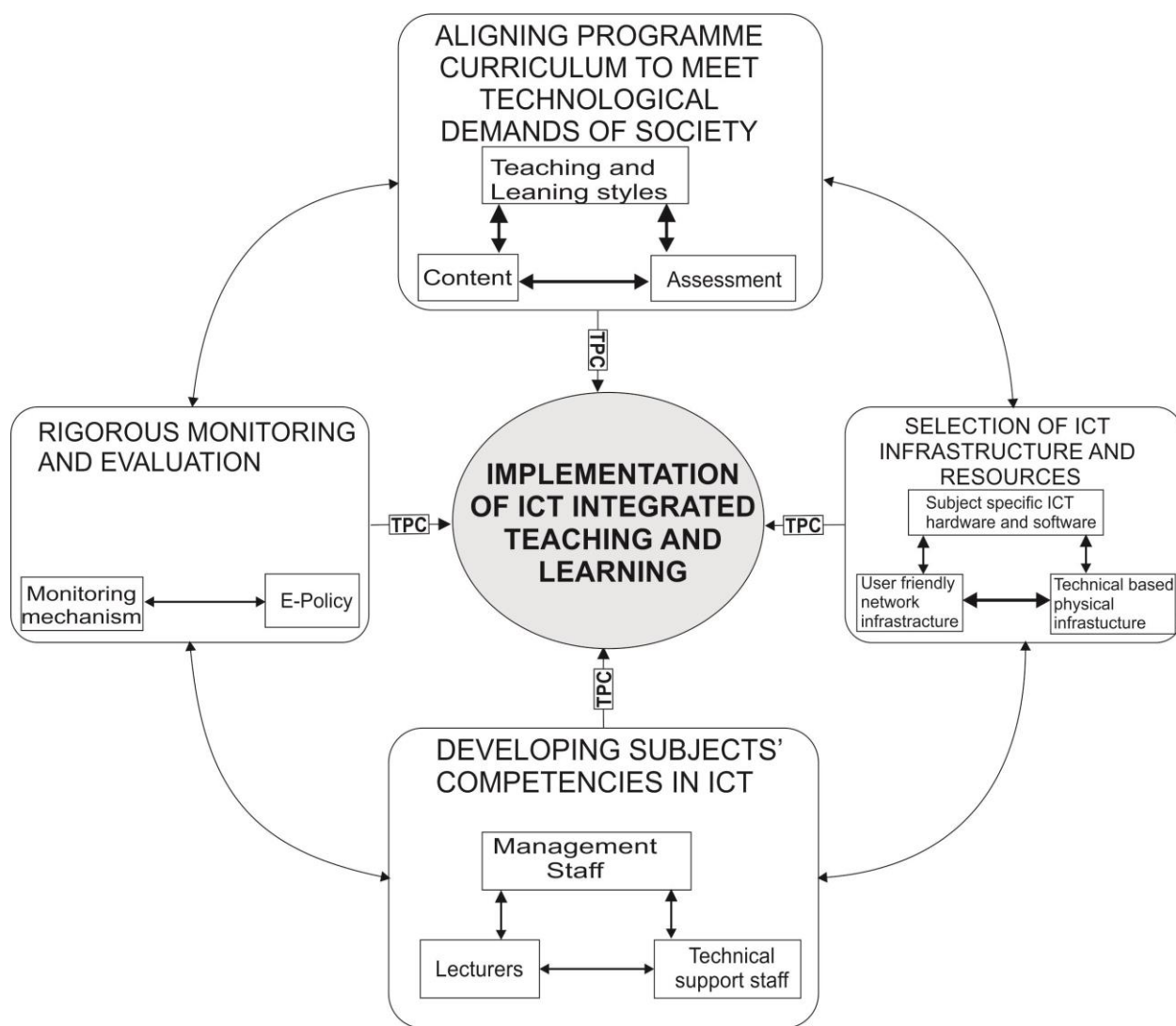


Fig 7.5 Model for enhancing the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes.

7.5.2.3 Selection of ICT infrastructure and resources

As reflected in Figure 7.5, effective implementation of ICT integrated teaching and learning depends on the availability of pedagogically valuable ICT resources. Textiles and Clothing programmes require appropriate and subject-specific technological software applications which will provide a suitable environment for teaching and learning of students.

7.5.2.4 Rigorous Monitoring and evaluation

Figure 7.5 indicates that rigorous monitoring and evaluation is necessary for the effective implementation of ICT integrated teaching and learning as it allows actors to specify the determinants of success and provides points of unity for adjustments. Monitoring the implementation of ICT integrated teaching should be done taking into consideration the pedagogical underpinning of the ICT applications to suit the content being taught and learnt.

7.5.2.5 Technology-pedagogy-content (TPC)

As shown in Figure 7.5, effective implementation of ICT integrated teaching and learning requires alignment of the existing programme curriculum, developing subject competencies, selection of appropriate ICT resources, and monitoring the process with a focus on the relationships between the three components namely; technology, pedagogy, and content. Technology-pedagogy-content is a vehicle through which each of the components of implementation must be negotiated.

7.5.3 Recommendations emanating from the study

From the analysis, discussion and conclusions drawn from the findings of the study, the following practical recommendations are offered for ensuring the effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes, not only to university management and Textiles and Clothing departments and lecturers at this UST, but also at other universities working under similar conditions. The recommendations are identified below.

- The Textiles and Clothing department, through the support of the university, should acquire subject related educational hardware and software like Gerber, or Lectra to teach the practical courses of the programmes.
- The university should provide facilities for students to acquire hand-held design related iPads like Samsung iPad 4 that can be used for design purposes as they are believed to be faster when accessing information needed.

- The university should develop user-friendly network facilities at institutional level and upgrade their bandwidth as this would enable all the lecturers and students to access network faster.
- The Textiles and Clothing department should provide suitable computer laboratories and workshop rooms specific to the practical technological nature of the Textiles and Clothing programmes.
- Professional development programmes focusing on TPACK need to be organised by the university to assist lecturers to develop competences in ICT necessary for teaching.
- The Textiles and Clothing department should organise staff exchange programmes with other regional or international universities to aid lecturers to gain skills and ideas on ICT integrated teaching and learning in Textiles and Clothing programmes.
- There is the need for the Textiles and Clothing department to organize training and refresher courses with industry to help lecturers develop skills and knowledge on the use of the ICT software packages that are in various textiles and clothing industries. This would assist lecturers especially on teaching of practically oriented courses like Pattern Development.
- Textiles and Clothing department should align programme curriculum to meet technological demands in society so as to provide content that enable students to be aware and solve problem in society through improved use of ICT.
- Textiles and Clothing lecturers should increase teaching and learning practices that encourage the use of ICT so as to foster effective acquisition of technological skills among students.
- The university and Textiles and Clothing department should develop rigorous and effective mechanism for monitoring and evaluating the implementation of ICT integrated teaching and learning to determine whether objectives set are met.

7.6 THE EXTENT TO WHICH THE STUDY ACHIEVED ITS OBJECTIVES

The extent to which the study has achieved its objectives have been met will be assessed under the following themes: infrastructure and resources to support effective implementation of ICT integrated teaching and learning, lecturers' competencies in ICT, the extent to which the teaching and learning was changed by the integration of ICT and monitoring and evaluation provided.

7.6.1 Infrastructure and resources to support effective implementation of ICT integrated teaching and learning

The study found out that there were different ICT infrastructure and resources that were used to support the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes. These were grouped into seven categories namely; ICT hardware, basic Microsoft software, general design related software, hand held software applications, social media applications, network infrastructure such as wireless and local area networks, and the physical infrastructure. Though some of the ICT software applications were pedagogical useful, they were not subject specific for Textiles and Clothing programmes.

7.6.2 Textiles and Clothing lecturers' competencies in ICT.

Though lecturers held positive beliefs and basic technological skills, they lacked thorough technological-pedagogical-content knowledge and skills that could enable them to prepare lessons and select appropriate technological resources and pedagogical strategies to teach students relevant content using ICT. As a result, their competencies were not enough to allow them to effectively implement ICT integrated teaching and learning.

7.6.3 The extent to which the teaching and learning in Textiles and Clothing programmes has been changed by the integration of ICT.

Though teaching and learning practises involving ICT such as lecture delivery aided by PowerPoint and web-based research work were noted, it was found that the traditional

teaching practices like the traditional lecture method and manual demonstrations were being used as well. Thus, the ICT that had been integrated had changed the teaching and learning of Textiles and Clothing programme to a lesser extent.

7.6.4 Monitoring and evaluating the implementation of ICT integrated teaching and learning.

The study found that the peer review and evaluation was the mechanism used for monitoring the implementation of ICT integrated teaching and learning. It was, however, found that it was not an effective instrument. It was also noted that there were challenges that the administrators encountered in their attempt to provide monitoring measures that were related to acquiring the ICT resources.

7.6.5 Model that could be proposed to enhance the effective implementation of ICT integrated teaching and learning.

A number of strategies which could contribute to effective implementation of ICT integrated teaching and learning were suggested. An alternative model for enhancing the effective implementation of ICT integrated teaching and learning was provided. Refer to Fig 7.6 above.

7.7 SUGGESTIONS FOR FURTHER RESEARCH

The aim of the study was to explore how ICT integrated teaching and learning was implemented in Textiles and Clothing programmes at one university of science and technology in Zimbabwe. As the study could not cover all the facets of the topic, the following aspects are recommended for further studies:

- The study explored views of participants in Textiles and Clothing only as part of technical degree programmes and it is suggested that further studies should research the opinions of participants in other technical-oriented programmes like Metal work, Woodwork so as to compare the results.

- The study explored all the various ICT resources that were used to support the implementation of ICT integrated teaching and learning. It is suggested that further studies consider in detail each of the categories of the ICT resources.
- As the study was conducted at one university in one state in Zimbabwe, further studies could be conducted in other state universities so as to determine similarities.
- As the study was conducted at only one university, its scope could be too narrow to provide results which could be used to develop a theory. It is suggested that the study could be conducted at a number of universities in order to compare the results.

7.8 CHAPTER SUMMARY

This chapter provided the summary, conclusions and recommendations that emanated from the study. The study sought to investigate how ICT integrated teaching and learning was implemented in Textiles and Clothing programme at one university of science and technology in Zimbabwe. The first component of the study examined the ICT infrastructure and resources that were used to support the implementation of ICT integrated teaching and learning. The study found ICT hardware such as Hp desktop computers Mac computers, LCD projectors; mobile handheld devices and TV set; basic software such as Microsoft PowerPoint, Word and Excel, general design related software such as CorelDraw, Photoshop, Adobe illustrator and Mac paints; handheld software applications such as fashion design and social media platforms such as WhatsApp and facebook.

The second component established the nature of Textiles and Clothing lecturers' competences in ICT. It was found out that lecturers had basic technological skills but with limited technological- pedagogical-content knowledge. A summary of the extent to which the teaching and learning of Textiles and Clothing programme had been changed by the integration of ICT was given. Monitoring and support measures that were provided to the implementation were also presented. The conclusions drawn from the discussions of the findings were also presented in the chapter. One of the key

conclusions made was that the implementation of ICT integrated teaching and learning was characterised by a serious shortage of suitable ICT hardware and subject-specific ICT software applications to foster effective technological practical skill acquisition related to textiles, clothing and design among student. The chapter then provided practical recommendations and presented a model that can be used to ensure the effective implementation of ICT integrated teaching and learning. The chapter closed by giving suggestions for further research.

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APPENDIX I: INTRODUCTORY LETTER



I am a student at University of Fort Hare who is conducting research regarding **the implementation of ICT integrated teaching in Textiles and Clothing programmes**. You have been selected as one of the participants of this research. There are no direct benefits to your participation in this research but I would really appreciate it if you do share your opinions with me to help the future implementation of ICT integrated teaching and learning. Please understand that you are not being forced to take part in this study and the choice whether to participate or not are yours alone. If you choose not take part in this research, you will not be affected in any way. If you agree to partake in this research, you need to show by signing the consent form.

You will be asked questions related to how you are implementing ICT integrated teaching and learning. Some questions may be of a personal and/or sensitive nature. The information you are to give will remain confidential and there will be no “come-backs” from the answers you give. When it comes to answering questions there are no right and wrong answers. When I ask questions about the future we are not interested in what you think the best thing would be to do, but what you think would actually help to improve the situation.

Should you require any other information, you are free to contact **Ms Chipo Dzikite** on 00263772784988 or on 0027622195134 or email me at dzikitechipo10636@gmail.com.

APPENDIX II: INFORMED CONSENT

INFORMED CONSENT

I hereby agree to participate in research regarding implementation of ICT integrated teaching. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop this interview at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not necessarily to benefit me personally.

I have received the telephone number of a person to contact should I need to speak about any issues which may arise in this interview.

I understand that this consent form will not be linked to the questionnaire, and that my answers will remain confidential.

I understand that if at all possible, feedback will be given to my community on the results of the completed research.

.....

Signature of participant

Date:.....

I hereby agree to the tape recording of my participation in the study

.....

Signature of participant

Date:.....

APPENDIX III: IN-DEPTH INTERVIEW GUIDE FOR LECTURERS

Biographical data

- 1) Gender -----
- 2) Age-----
- 3) Highest professional qualification-----
- 4) Area of specialization in teaching-----
- 5) Teaching experience in Textiles and Clothing-----
- 6) Any post graduate certificate in higher education-----
- 7) ICT qualifications or training-----

Available ICT infrastructure and how they are used.

- 8) Tell me about the different forms of ICT hardware that you use for teaching in your course.

- 9) Describe any software applications that you use for your teaching sessions.

- 10) Tell me about your experiences in using these softwares during your teaching.

- 11) What do you suggest could be done to improve the ICT infrastructure for teaching purposes in your course?

Lecturers' Competencies in ICT.

- 12) Can you tell me about the benefits you think ICT has in teaching and learning of students.-----

- 13) Can you tell me about any changes you think ICT has on the content that you teach of the course you teach to accommodate ICT integrated teaching.

14)How would you describe your competences in using the different forms of ICT in your teaching?

15)Can you describe how you can adapt any one form of ICT software for use in teaching your course.

The extent to which the teaching and learning has been changed by the integration of ICT.

15). Can you tell me about any changes you have made to the course you teach to accommodate ICT integrated teaching.-----

16). Describe how ICT has changed your teaching and learning of students.-----

17) Tell me about any of the way you use ICT to assess students' learning.-----

Monitoring and Support measures.

18) Can you tell me how your progress in implementing ICT integrated teaching is being monitored.

19)Can you describe the support you receive from the departmental administrators and managers in terms of implementing ICT integrated teaching and learning.

Thank you for your cooperation!

APPENDIX IV: IN-DEPTH INTERVIEW GUIDE FOR ADMINISTRATORS

Biographical data

- 1) Gender-----
- 2) Age-----
- 3) Highest professional qualification-----
- 4) Administrative experiences in the university teaching environment-----
- 5) ICT related qualification or training-----

Lecturers' Competencies in ICT.

- 6) How would you describe your lecturers' competences in teaching using the different forms of ICT?

Monitoring and evaluation measures

- 7) Tell me about the monitoring if any that you give to lecturers to enable them to teach effectively with ICT.

- 8) 9)Can you talk about any support that you give to lecturers to enable them to teach effectively with ICT.

- 10) In your opinion, to what extent have you evaluated the suitability of ICT hardware and software that are used by your staff for teaching their modules?

- 12) Tell me about the challenges that you face in monitoring the use of ICT among your staff.

Thank you for your cooperation

APPENDIX V: IN-DEPTH INTERVIEW GUIDE FOR ICT TECHNICIANS

Biographical Data

- 1) Gender-----
- 2) Age-----
- 3) Highest professional qualification-----
- 4) ICT related qualification/experience-----
- 5) Teaching qualification or training-----
- 6) Experience as a technical assistant-----

Available ICT infrastructure and resources

7) What is your opinion regarding the ICT infrastructure that is available in the Textiles and Clothing department to support teaching?

8) Describe your experiences on how you assist lecturers in using the software during teaching sessions.

9) Describe the challenges you encounter with the ICT resources in your department that are used for teaching.

Thank you for your cooperation!

APPENDIX VI: FOCUS GROUP INTERVIEW GUIDE FOR STUDENTS

Introduction

I would like to thank you for coming. My name is Ms Chipso Dzikite. I am conducting a research on how you are using the different ICT resources in your learning. The major aim of the research is to improve how you are learning with ICT. As I have already highlighted, your involvement in this study is voluntary and if you choose not take part in this research, you will not be affected in any way and feel free to leave. However, I appreciate all your opinions and your stay to share your the views will be greatly cherished.

You will be asked questions related to how you are using ICT in your learning. The information you are to give will be kept confidential and used for research purposes only. When it comes to answering questions there are no right and wrong answers. I am looking for diverse opinions from you so be at ease to air your views, to disagree with any member of this group but not forgetting to respect the ideas of others.

During the discussion, I will be taking down notes and recording what you say so that I don't miss any word from you. Please do not be worried about this, everything will be confidential. Are there any questions that you may want to ask before we start?

Biographical Data

- 1) Gender: Female-----
Male-----
- 2) Year of study-----
- 3) ICT device owned -----

Available ICT infrastructure.

- 1) Tell me about the different forms of ICT resources that you use for learning purposes in your course.

- 2) Describe your experiences in using the ICT during your learning sessions.

3) Can you tell me the way in which you use ICT with your lecturers.-----

4) Tell me about the challenges you experience when using the ICT during learning.

Conclusion

We are now reaching the end of our discussion, Is there anyone with a burning issue or contribution to add to before we end the session? I would like to thank you all for your being part of this research, your contributions are of great value in helping to improve the implementation of ICT integrated teaching and learning in the Textiles and Clothing programmes.

Thank you for your cooperation!

APPENDIX VII: DOCUMENT ANALYSIS SCHEDULE

DOCUMENTS (SET A)	ASPECTS TO BE ANALYSED AND COMMENTS			
	<i>Nature of Subject content</i>	<i>Form and nature of ICT tools stated</i>	<i>Teaching and learning methodologies stated</i>	<i>Assessment methods</i>
a) Programme regulations				
b) Course outlines				
c) Lecturers' Portfolios				
d) Students' work and assignments				
DOCUMENTS (SET B)	<i>Aspects to be analysed</i>			
	<i>Goal stated</i>	<i>Aspects included</i>	<i>Form of ICT stated to be used for teaching and learning</i>	<i>Milestone when monitoring is done</i>
a) E-policy document				
b) Monitoring and evaluation plan				

APPENDIX VIII: OBSERVATION CHECKLIST

Participant Code No.....

Course title code.....

Aspect observed	Notes
Form of ICT tools used by lecturer	
How ICT is used	
Form of ICT tools used by students	
How ICT is used	
Ratio of student to hardware	
Teaching and learning strategies	
Nature of subject matter taught, learnt	
Nature of the tasks	

APPENDIX IX: LETTER OF PERMISSION TO COLLECT DATA



CHINHOYI UNIVERSITY OF TECHNOLOGY

✉: P. Bag 7724 ☎: 263-67-22203-5 📠: 263-67- 26321 E-mail : admin.chinhoyi@cut.ac.zw

Vice Chancellor's Office: Prof D.J. Simbi, PhD, BSc, MIM, CEng, FZ'welE, FICorr, FZAS, Hons'welE

HUMAN RESOURCES DEPARTMENT

8 June 2015

Ms. Chipo Dzikite
Chinhoyi University of Technology
P. Bag 7724
CHINHOYI

Dear Ms. Dzikite

RE: **REQUEST TO CARRY OUT A RESEARCH PROJECT AT CHINHOYI UNIVERSITY OF TECHNOLOGY**

We acknowledge receipt of your application letter dated 28 June 2015 seeking permission to undertake a research study under a title that reads: *The implementation of ICT integrated teaching in Textiles and Clothing programmes in Universities of Science and Technology in Zimbabwe.*

You are kindly advised that permission to undertake your study is hereby granted. However, you are reminded to observe the University Official Secrecy Oath.

The University would also expect results of your research upon completion.

Thank you.

T. A. Kaseke (Mr)
DEPUTY REGISTRAR, HUMAN RESOURCES



APPENDIX X: UNIVERSITY ETHICAL CLEARANCE CERTIFICATE



University of Fort Hare
Together in Excellence

ETHICAL CLEARANCE CERTIFICATE REC-270710-028-RA Level 01

Certificate Reference Number: NSU011SDZI01

Project title: **The implementation of Information and Communication Technology (ICT) Integrated teaching in Textiles and Clothing programmes at a selected university of Science and Technology in Zimbabwe**

Nature of Project: PhD

Principal Researcher: Chipso Dzikiye

Supervisor: Dr Y Nsubuga

Co-supervisor: Dr V Nkonki

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

Special conditions: Research that includes children as per the official regulations of the act must take the following into account:

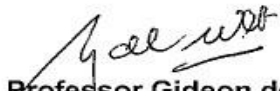
Note: The UREC is aware of the provisions of s71 of the National Health Act 61 of 2003 and that matters pertaining to obtaining the Minister's consent are under discussion and remain unresolved. Nonetheless, as was decided at a meeting between the National Health Research Ethics Committee and stakeholders on 6 June 2013, university ethics committees may continue to grant ethical clearance for research involving children without the Minister's consent, provided that the prescripts of the previous rules have been met. This certificate is granted in terms of this agreement.

The UREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
 - Any unethical principal or practices are revealed or suspected
 - Relevant information has been withheld or misrepresented
 - Regulatory changes of whatsoever nature so require
 - The conditions contained in the Certificate have not been adhered to
- Request access to any information or data at any time during the course or after completion of the project.
- In addition to the need to comply with the highest level of ethical conduct principle investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to the Dean of Research's office

The Ethics Committee wished you well in your research.

Yours sincerely


Professor Gideon de Wet
Dean of Research

09 June 2015

APPENDIX XI: ENGLISH LANGUAGE EDITOR CERTIFICATE



**Wits University:
Faculty of Humanities
Wits School of Education**

LANGUAGE EDITING CERTIFICATE

To whom it may concern

I hereby confirm that I have proof read and edited the following PhD thesis using Windows 'Tracking' System to reflect my comments and suggested corrections for the author to action:

The Implementation of Information and Communication Technology (ICT) Integrated Teaching and Learning in a Textiles and Clothing Programme at one University of Science and Technology in Zimbabwe

BY

DZIKITE CHIPO

Although the greatest care was taken in the editing of this document, the final responsibility for the product rests with the author.

Sincerely

A handwritten signature in black ink, appearing to read 'Jabulani Sibanda'.

SIGNATURE

DATE: 03.06.2016

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