LECTURERS AND STUDENTS' VIEWS OF INTEGRATING TECHNOLOGY IN THE FASHION CURRICULUM

By

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A dissertation submitted in partial fulfilment of the requirements for the degree of Masters of Education in the discipline of Higher Education

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2019

Declaration

I, Sweetlina Nomonde Peter, hereby declare that to the best of my knowledge this thesis is my original work. The thesis has not been published or submitted for the award of any degree or qualification. It contains no materials previously published; such sources used from other scholars have been acknowledged by referencing in the text and in the list of references.

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Acknowledgements

I wish to sincerely thank all the people who have contributed in one way or another to this study. I am most thankful to my supervisor, Professor Nyna Amin, for her supervision, and her meticulous care and patience in working with me since the inception of this research. Without her insightful suggestions, her guidance and encouragement, my research would have never come out in its present form.

I wish to express my sincere gratitude to Dr Ruth Searle for her guidance on the proposal development and writing and coming up with a workable research topic. Special thanks to Dr I Kariyana for his expert guidance during the proposal writing.

Special thanks as well to Dr Prince Jaca for his guidance in technical areas, encouragement and moral support. He has taught me to "bite the bullet" and stay focused throughout the research journey.

I must also thank Prof John Steele for his technical guidance, support and encouragement as I undertook the study. My sincere thanks to Claudette from UKZN and WSU library staff for their assistance in accessing data and relevant materials while carrying out the present study.

I am grateful to Mrs Cornel Tessendorf for her encouragement to carry on with my studies, and for granting me permission to administer and fill in the questionnaire.

I would like to thank the Walter Sisulu University, especially CLTD for providing the opportunity and resources for me to pursue this study; the WSU Research Office for granting me permission and support throughout my study period; and the Research Office staff for providing the administrative support. I would like to thank my old colleagues in Butterworth together with the fashion students for filling in the questionnaire. Without you, this study would not have been possible.

Thank you to the Visual Arts, Fashion students for piloting the questionnaire. I would also like to extend my thanks to my colleagues in the Visual Arts Department, with special thanks going to Lorian McLaren for her assistance and encouragement in this study.

To my HOD, Mr Pumlani Mbanya, thank you for encouraging me to finish my studies. To my class mates and my colleagues, Kowazo Poponi, Mpho Sealetse, Mbali Dlamini, Siyabonga Phika, Rhema Lekhehle and Mpumi Lufuso, together we travelled, studied, cried, and we persevered. The journey was not an easy one, but we held hands and walked together.

I would also like to express my heartfelt love and appreciation to all my friends, Feziwe Mbeki, Thembeka Mbalo, 'PFNNT' and 'Lovingit' for their constant encouragement and taking care of my children when I was away during this study. My endearing love and gratitude to my family - Mom, Zintle, Noluthando, Samkelisiwe, Onida, Mihle, Thalethu, Liyema and Olokhanyo. To my sister, Noluthando, you have been my pillar of strength: the love and care you have given to my children, for the countless sacrifices, the special things you did with them when I was away for my studies, to you I have no words to explain how grateful I am.

Above all, I am truly grateful to Almighty God for sufficient grace and health that enabled me to complete this study.

Dedication

I would like to dedicate this thesis to my loving mother, Theressa Peter, my two beloved sisters, Zintle and Noluthando, my precious daughter, Liyema, and my dear son, Olokhanyo, for nursing me with affection and love and their dedicated partnership for success in my life. To you my beloved children, my sunshine, I pray that my academic achievement will motivate you to work hard for something that you love and encourage you to reach greater heights.

Abstract

As new educational technologies become available, resources in higher education are lacking but the demand for access to better quality higher education is dramatically increasing. As such, the quest for academics to employ a variety of educational technologies that enable, extend and enhance teaching and learning is urgent and necessary.

The aim of this study was to examine the views of lecturers and students on integrating technology in the fashion design programme for the purpose of teaching and learning at the Butterworth campus of the Walter Sisulu University (WSU). This study employed the post-positivist paradigm to gather quantitative data to analyse the views of both lecturers and students about the integration of technology in the fashion programme. Based on the literature review, the Technological Pedagogical and Content Knowledge (TPACK) framework and Diffusion of Innovation (DOI) were selected as theoretical frameworks in this study.

The data was gathered through a questionnaire, which was adapted and modified from a study by Hossein and Kamal. All seven lecturers and a sample of seventy-nine fashion students participated in this study. The predetermined categories identified included technology knowledge, technology content knowledge, technology pedagogical knowledge, and technological pedagogical and content knowledge. These categories were measured with the view to generalize data to a wider population and to establish if there are any relationships between them.

The main findings of the study were that, even though lecturers seem to have a high pedagogical content knowledge, the inclusion of appropriate technologies in the fashion programme requires a combination of robust content knowledge, a diverse array of teaching techniques and competency with emerging teaching technologies.

Key words: Technology, fashion programme, lecturers, students, learning

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CHAPTER ONE: INTRODUCTION TO THE STUDY

INTRODUCTION

Information and Communication Technology (ICT) is complex in nature and also display a multitude of functions (Guri-Rosenblit, 2005). Technology has become part of us. The invasion of technological tools affords people instant access to a wealth of information anywhere in the world, instant communication or social interactions via social media (texting or video), emails, and the ability to purchase almost anything from anywhere around the world (on-line shopping). All this rapid rise of technology has led to a significant transformation of educational systems, churches, work places, and to our social lives. In Higher Education (HE), the use of these technologies includes on-line applications, on-line registration, on-line research, e-learning, computer-generated assignments, on-line written tests, and the list is endless.

The clothing and textile or the fashion industry is characterized by a short product life cycle, frequent style change, a wide assortment of product designs, variable product volumes, high competitiveness and often high demand for product quality (Nayak, Singh, Padhye, & Wang, 2015). Rapid changes in the fashion industry have been brought about by technological innovations and advancements in the textile and apparel industry. In the fashion industry, technology ranges from three-dimensional printed fashion, solar power fashions, virtual fashions, interactive fashions and smart mirrors that generally advise the customers on the fitting of the clothes they are trying on.

It is therefore no doubt that we live in a technological world. The question that can thus be asked is whether Higher Education (HE) institutions can prepare the current generation to be comfortable enough with technology whether in industries or in their everyday lives.

In South Africa currently higher education is under increasing pressure to meet both the social transformation and skill needs of the new South Africa (Kistan, 2002). The requirement for the twenty-first century is that students acquire skills necessary to be productive socially, in higher education and in the workplace. In South Africa, higher education policies on integrating ICT is seen in terms of both 'opportunities and threats' (Cross & Adam, 2007). Opportunities are perceived in relation to wider social benefits, enrichment and enhancement of the curriculum, together with the efficiency and flexibility of the learning process. It has been eleven years since the South African government identified the use of ICTs for teaching and learning as an important priority. This is so, in that, if it is used confidently and innovatively, ICTs will help develop knowledge and skills that students need as lifelong learners in achieving their personal goals and being active members of the global community (Jaffer, Ng'ambi, & Czerniewicz, 2007).

The rationale for introducing ICTs in education in South Africa can be classified as social, job-related, catalytic and pedagogical (Cross & Adam, 2007). These authors point out that the social rationale is based on the role that technology is perceived to play in the wider society. This role emphasises the need for expounding technology for students. The job-related rationale is concerned with equipping students for the jobs that require skills in technology. The catalytic rationale stresses the role of technology in improving performance and effectiveness in teaching, management, and many other related common activities (Keogh, 2000). The pedagogical rationale responds to how technology is perceived in enhancing learning, flexibility and efficiency in curriculum delivery (Cross & Adam, 2007).

As far back as 2007 Jaffer et al. (2007, p. 133) referred to "the search for ways in which educational technologies can contribute to addressing the educational challenges in the new South Africa". These have been driven by the existing focus on teaching and learning together with the growth in educational technology in South African higher education. Garrison and Kanuka (2004) refer to the leaders of the higher education sector who are being challenged to position their institutions

to meet the connectivity demands of prospective students and meet growing expectations and demands for higher quality learning experiences and outcomes. Also, sixteen years back, Kistan (2002) referred to the increasing pressures of HE having to meet the social transformation and skills required for the rapidly changing society in South Africa. One of the indicators for social transformation in education is increasing the demographic representation among graduates and the demographic difference between graduate intake and graduate output (Jaffer et al., 2007). This increased participation in higher education in South Africa has resulted in students with more diverse education backgrounds and levels of preparation entering into a variety of programmes. The priorities for HE also include greater responsiveness and inter-institutional co-ordination together with partnerships and efficiency (Cross & Adam, 2007). Students' motives and expectations of higher education not only affect their attitudes to learning tasks, but they also influence how students adjust to the broader higher education setting.

The key to economic development of a country is the quality of higher education and thus Teferra (2014) points out the importance of building a strong higher education system, which must not be seen as a luxury for which countries can be reprimanded for indulging in, but rather an imperative that is nationally critical for national development and global competitiveness. The emphasis is further put on the nurturing of governance and leadership skills, so that higher education can provide countries with the capable individuals required to establish a policy environment that is favourable for growth and economic development. In the South African context, especially amongst the previously disadvantaged communities, furthering education is linked with improving or changing of one's socio-economic status and that of one's family. The challenge that faces not only South Africa but the African continent as a whole is that higher education is the factor that influences and determines the success of individuals, and also is a key force for modernization and development (Teferra & Altbach, 2004).

Indeed there are demands for universities to "provide for a larger and more diverse cross-section of the population, to cater for emerging patterns on educational involvement which facilitate lifelong learning and to include technology-based practices in the curriculum" (Van den Bossche, Gijselaers, & Milter, 2013, p. 143). In examining the future of fashion design education and the evolving professional practice, Faerm (2012, p, 210), pointed out "the American fashion design programmes that are being re-examined to respond to several circumstances. The circumstances include a fashion industry that is changing at an unprecedented rate, an evolving student generation, and a new set of skills and abilities that are demanded by the design profession".

The questions that can be asked have to do with the possibility of the fashion programme being able to deliver a curriculum that is quick to respond to the ever changing needs of the country. This will help to bring about more appropriate, meaningful and effective learning experiences. This study examines the views of both lecturers and students about technology integration in teaching and learning courses in the fashion department in WSU, a developmental University in South Africa. Examining the views of a target audience is a widely used strategy built on the basis that views matter and often guide peoples' behaviours (Savery, 2002).

1.1 BACKGROUND OF THE STUDY

The research site, Walter Sisulu University (WSU), was established as a comprehensive university by merging two technikons and a university, viz. the Eastern Cape Technikon, Border Technikon and the University of Transkei. It is positioned in the rural heart of the Eastern Cape, which is arguably the province most in need of development in the country. The university has a footprint of about 1 000 square kilometres across the urban and rural areas of the region. WSU has four campuses with multiple delivery sites that are spread across Mthatha, Butterworth, Buffalo City and Queenstown. The National Diploma in Fashion is a three-year programme offered in both Butterworth and Buffalo City campuses.

Butterworth campus is in an area characterised by prevalent, deep poverty in which illiteracy, unemployment and poor access to basic social services are prevalent. The majority of students enrolled in this campus are African and currently the Fashion Department draws most of its students from the former homelands of Transkei and Ciskei, which were characterised by a poor standard of education caused by underfunding and inadequate or very limited resources.

The profile of students in WSU shows that most students coming to enrol at WSU are those who could not get admission into institutions of their choice (preferably in big cities, for example, Johannesburg, Cape Town, and Durban). The reasons for not enrolling at their preferred institutions differ from affordability, that is, the travelling costs, tuition and residence fees, to meeting institutional entry requirements. The thought-provoking factor is that some of the students who are currently enrolled for fashion design, did not want to do fashion, as it was not on the list of their careers, or they could not meet minimum requirements of their preferred programmes, so they ended up enrolling for fashion.

Because of the points already mentioned, some students registered for the Fashion Design Diploma have very little or no knowledge of the profession or industry that they have chosen. This poses a challenge in that the body of work that the fashion design course offers takes students aback. This is when the discourse of 'underprepared students' for higher education is embraced, and it can be viewed within the framework of cultural reproduction by Bourdieu (1973). This refers to that those who are rich in cultural capital are in a much better position to invest in their children's education which will in turn put them in a 'better space' for a 'better life'. Taylor and Vinjevold (1999) also claim that the differential access to formal knowledge open to children of different social classes is the greatest obstacle to equity in any schooling system.

As far back as seventeen years ago, the statement by Hicks, Reid, and George (2001) still holds true. The authors stated that there are demands for universities

to provide for a larger and more diverse cross-section of the population to cater for the emerging patterns on educational involvement that facilitate lifelong learning.

The mission of WSU points out that the institution will "provide an educationally vibrant and enabling environment that is conducive to the advancement of quality academics, moral, cultural and technological learner-centred education for holistic intellectual empowerment, growth and effective use of information." (WSU General Prospectus, 2018, p. 11) If the mission of the institution (WSU) is to provide "technological learner-centred education", it was of interest or rather importance that as both a researcher and a lecturer in the fashion department in WSU to engage in this study that explores the views regarding the integration of technology within the fashion curriculum in WSU for the purpose of teaching and learning.

1.2 PURPOSE OF THE STUDY

The study sought to examine the views of lecturers and students on integrating technology in the fashion design programme for the purpose of teaching and learning in Walter Sisulu University (WSU). The study also compared the views of lecturers and students based on the use of technologies available, Technology Knowledge, and Technology Content Knowledge. A study of this nature helps plan professional development models to integrate technology that is appropriate for the fashion programme.

1.3 MAIN RESEARCH QUESTION

What are the views of lecturers and students with regard to integrating technology in the fashion design programme at Walter Sisulu University?

Sub-questions

- What are the views of lecturers concerning technology integration in the fashion design programme at WSU?
- What are the views of students concerning technology integration in the fashion design programme at WSU?
- What are the similarities and differences between the views of lecturers and students concerning integrating technology in the fashion design programme at WSU?

1.4 SIGNIFICANCE OF THE STUDY

The results of this study have implications for determining whether the lecturers in the fashion department will be sensitized to the need to effectively use educational technologies for teaching and learning or maybe change their approaches and teaching strategies. This change also refers to their attitudes towards how students of the twenty first century learn so that students are better equipped for the technological era into which they have been born.

This study provided lecturers in the fashion department with an opportunity to reflect on their technological knowledge as it applies to the curriculum. The study also provided a better insight into effectively utilizing the digital practice that students bring to the educational context and their fitness to engage with the education/learning challenges and acquire the needed learning outcomes. Due to this study examining the lecturers and students' views of integrating technology in the fashion curriculum at WSU in Butterworth, the findings should not be generalized to other departments or other universities.

Results from this study can be used to identify lecturers' support needs, such as professional academic development, that could further enrich lecturers' understanding of how to effectively integrate technology as an educational or learning tool.

1.5 DELIMITATIONS OF THE STUDY

The study focused on the views of both lecturers and students of Walter Sisulu University (WSU). WSU has two campuses where the National Diploma Fashion is offered, but in this study the researcher focused on only one of the campuses, Butterworth campus. The participants were all lecturers in the programme together with a sample of 79 students who were registered in 2018 in the fashion programme during the period of data collection.

1.6 OUTLINE OF THE STUDY

This is a brief outline of how the study is organized. Chapter one consists of an overview of the study. It introduces the study and briefly provides a background to a technologically enhanced curriculum, and a brief description of the terms used. This chapter also provides the main research question, objectives, significance of the study, and limitations and delimitations of the study. Chapter two begins with an introduction to the literature review under this topic, and then follows a synopsis of what a technology enhanced curriculum is, and further examines in more depth the literature under this topic. Chapter three describes the methodology used for this study, the justification for a quantitative method approach, population and sampling procedure, data collection instrument, and ethical considerations of the study. Chapter four presents the results of the data collection and analysis. Chapter five provides the discussion in light of the literature review, implications of the findings as in chapter four, and recommendations that are linked to the findings.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

This study investigates the views of lecturers and students concerning integrating technology into the fashion curriculum. As part of this effort, the review of the literature will begin with a brief overview of the fashion design curriculum, and look at different technologies used in the fashion industry and technologies for teaching fashion in higher education. This chapter will further consider developments in higher education and knowledge of technology for teaching fashion in higher education. It also focuses on technology adoption theories by describing the theoretical frameworks on which this study was based, namely Rogers (2003) Diffusion of Innovation (DOI) framework, and the Technological Pedagogical and Content Knowledge (TPACK) model by Mishra and Koehler (2006).

2.2 AN OVERVIEW OF FASHION DESIGN IN HIGHER EDUCATION

The Classification of Educational and Subject Matter (CESM) by the Council on Higher Education (2004) categorises Fashion Design as a sub-discipline of the Visual and Performing Arts field. Fashion design, which is also referred to as 'apparel design', is an area of study that prepares individuals to apply design principles to the professional design of commercial fashions. This area of study is characterised as a practical course, whereby there is a range of technical skills that students need to acquire. The Oxford English Dictionary (2015 p. 545) defines fashion as "a popular style of clothes, hair, etc. at a particular time or place, in dress or social conduct". The use of the term 'current' implies that fashion is constantly changing. Sinclair (2014) notes that the emergence or growth of a style in fashion is influenced by the technological developments in general as well as the peoples' reactions to changing patterns of information technology.

In Visual and Performing Arts courses, the emphasis is more on procedures and ways of working for producing a particular project, which are more or less

appropriate in specific situations (Fry, Ketteridge, & Marshall, 2008). Classes in the fashion design programme occur in laboratories, studios or workshops, which provide opportunities for engaging in informal conversations about the work in progress amongst students, and between lecturers and technicians (Fry et al., 2008) further referred to as academics. The laboratories, ideally, are fully equipped with specialised equipment to produce the required projects, portfolios or storyboards. The equipment includes basic and specialized industrial sewing machines, and a computer lab that is equipped with computer-aided design software (CAD), especially for fashion design.

Courses, especially practical ones, are structured to include long periods (six periods with 45 minutes per period) of working on projects with individual interaction between the lecturer and the students. For this reason, class sizes are often kept small (25-30) to give the opportunity for one-on-one conversations or interactions about the work or projects in progress during class time. The content of the syllabus for a fashion programme varies according to the particular needs and interest of the programme (Jones, 2005). A comprehensive fashion design curriculum according to Jones (2005, p. 12) aims to deliver the following:

- Awareness of contemporary fashion and visual culture
- Basic principles of pattern-making and technology
- Garment construction and technology, fabric draping
- Design development
- Drawing and illustration
- Computer-aided design
- Fabric awareness: type, performance and sourcing
- Fashion basic: silhouette, proportion, colour, detailing and fabric manipulation
- Marketing and business awareness
- Range-building
- Research techniques and methods

- Presentation (portfolio) and communication techniques
- Technical specification and costing
- Written work, as in report-writing and cultural studies

A range of possible learning activities in the fashion curriculum are mostly undertaken purely through project work which is supported by briefs. The lecturers set the briefs that clearly set out the learning outcomes, that is, what students are expected to learn from the project or portfolio. The briefs also indicate how the project will be assessed as they set parameters for the work that students need to be engaged in. Despite the fact that projects are the most common form of engagement with learning for students in fashion, not all students approach the project work in the same way. According to Fry et al. (2008) approaches and concepts are not fixed traits of students and it is the role of academics to seek and expand students' awareness of ways to carry out their projects.

Fashion students, as pointed out by Van Den Dool and Kirschner (2003), must be able to communicate their designs through simple illustrations. This is achieved by understanding the human figure together with the physical construction of a garment, and then draft a pattern to cut and make the final product. There is no right way to learn, but there are certain styles that are more appropriate to a given situation, or unique to a particular task (Watson, 2003).

There is an abrupt discourse that has developed around students' learning which has embraced the terms of 'deep' and 'surface' learning without specific information about how these characteristics might manifest themselves in art and design courses. Thus an American study done by Drew, Bailey, and Shreeve (2002, pp. 187-188) explored the different ways that fashion design students approach their learning. The study was carried out in four fashion design departments in the United Kingdom (UK), and the results of the study identified four categories of variation in approach to learning for fashion design students, which are:

- A product-focused strategy with the intention of demonstrating technical competence, where the emphasis is concerned with remembering processes and techniques.
- A product-focused strategy with the intention of developing the product through experimenting and practicing to ensure competence.
- A process-focused strategy with the intention of developing the design process through experimenting and engaging with others in order to explore the design process rather than just perfecting the product.
- A concept-focused strategy with the intention of developing the students' own responses and ideas in relation to the project.

Six years ago Faerm (2012) wrote about the American fashion programmes that were re-examining their educational philosophies and practices in order to meet the needs of the changing fashion industry and evolving students' generation. The fashion industry is changing at an unprecedented rate and this is all due to the explosive growth of technology or the integration of technology into almost all aspects of life. Therefore, learning in higher education must be able to catch up with the pace of technology in order to produce the kinds of graduate that can fully participate in this digital community.

2.3 TECHNOLOGY INTEGRATION IN EDUCATION

The use of technology in educational institutions has many promises. It is premised to offer educators the means to engage in student-centred teaching (Otternbreitt-leftwich, Ertmer, & Tondeur, 2013) and enhance achievement in students' learning (Kopcha, 2010). Regrettably, many studies have revealed the inappropriate use of technology in student-centred ways, suggesting that educators may be ill-prepared to use technology to influence meaningful learning in their classrooms (Sutton & DeSantis, 2017). Technology, according to Kirschner (2015), is a new competency that does not only need to be acquired by educators but is also a twenty-first century equivalent of the twentieth century phenomena. Thus Johnson et al. (2016) write

about emerging technologies that are disrupting the patterns of teaching and learning that have dominated higher education for centuries. There is evidence that technology is altering the manner in which academics are teaching in their classrooms. Sandholtz (1997, p. 47) purports that:

> Technology is a catalyst for change in classroom processes because it provides a distinct departure, a change in context that suggests alternative ways of operating. It can drive a shift from a traditional instructional approach toward a more eclectic set of learning activities that include knowledge-building situations for students.

According to Kirschner (2015, p. 312) teaching involves a "combination of complex cognitive and higher-order skills, highly integrated knowledge structures, interpersonal and social skills, and attitudes and values". Therefore, one of the characteristics of the twenty-first century lecturer should include integrating various educational ingredients for effective, efficient and entertaining pedagogic/educational techniques, making use of the diverse tools and technologies that are afforded at a particular time.

There is a need to train those responsible for teaching and learning to "be able to make use of ICT as mind tools, with mind tools not just specialized computer software that 'teach' a subject, but rather computer programs or application that facilitate meaningful professional thinking and working" (Van Den Dool & Kirschner, 2003, p. 164). Mind tools help represent what the user knows as they transform information into knowledge. They are used for collaboration on pedagogical projects and cooperation between academics and students which, in turn, facilitate critical thinking and high-order learning.

Kirschner (2002, p. 18) suggested that "when technology mediates the social and educational contexts, we speak of 'technology affording learning and education'. This means that we must hold count with technological, educational, and social affordances". When integrating technology into the education system, the

development of infrastructure should not be only in the technological sense, but also in the social (psychological and organizational) sense (Van Den Dool & Kirschner, 2003). Simons (2002b, p. 167) worked out priorities for integrating technologies in education set-ups to include:

- Changing education to prior interest and knowledge,
- Facilitating higher-order skills training,
- Proposing opportunities for contextualization: authentic contexts, games simulation, exercises, real-life tasks and contacts,
- Enabling decontextualisation and reflection,
- Assisting to establish learning that is self-directed, and
- Supporting to encourage learning.

Technology tools that have been embraced successfully in educational practice around the world include, e-learning environments, web 2.0 tools, wikis, shared paces, and video conferencing (Bon, 2010). Dabbagh and Kitsantas (2012) cite Personal Learning Environment (PLEs) as an emerging technology, premised on social media, that has prospects of having a large influence on teaching and learning within education around the world. Three sets of interacting factors that influence the use of technology for teaching and learning as presented by Kirkwood and Price (2014) are: the context of learners and learning, differing designs for learning, and the characteristics, constraints and benefits of technology.

Looking at these interacting factors, together with the realization of the strategic goals of the institution, WSU's established Centre for Learning and Teaching Development (CLTD) seems to be appropriate. CLTD as a unit is responsible for the integration of ICT into teaching and learning. This unit is comprised of e-learning specialists whose core functions are to equip academic lecturers on the development of online courses, selection of course design elements, as well as the choice of electronic tools based on the outcomes to be achieved by the course through the

use of Blackboard. Blackboard is a learning management system referred to as WiSeUp in WSU.

This unit further assists in the plan of giving varying educational tools to a wider WSU population by overseeing the development and administration of online courses in various departments. WiSeUp helps manage the e-learning process by keeping students' data organized, planning courses, making content accessible to students, tracking students' performance and generating reports about it. Through WiSeUp, lecturers are able to communicate with students and assessments can be conducted.

CLTD takes integration of ICT into teaching and learning as one of the strategic plans to improve throughput rates across all WSU programmes. WSU, therefore, believes that the integration of ICT into teaching and learning will, in the long run, enhance the institution to produce 'digital graduates' which is what is required by modern industry. Therefore, it is necessary to look at what technologies or technological developments are in the apparel industry in comparison to the technological skills that students are equipped with in the fashion programme.

2.4 TECHNOLOGY AND THE FASHION/APPAREL INDUSTRY

Advanced technologies such as online marketing, interactive advertising and on-line shopping have brought a radical change to the fashion/apparel industry (Romeo & Lee, 2013). The changes do not influence only how different businesses conduct their business, and the way apparel manufacturers develop their products, but also the skills that companies expect their employees to have (Boothby, Dufour, & Tang, 2010).

Emerging technologies in the apparel industry encompass very broad aspects. To mention a few of these, fashion design software, computer-aided design/manufacture (CAD/CAM) technologies, 3D apparel design and pattern drafting and pattern grading software, innovative or smart fabrics. Technologies in

this industry further include technological advances that relate to 3D digital textile printing, 3D body scanning, product lifecycle management (PLM) systems, and wearable technologies (for example, smartwatches by Apple, necklaces, bracelets and bras that can tell something about you) (Boothby et al., 2010). For the purpose of this study, not all of the above-mentioned technologies will be discussed, but only those technologies applicable to the enhancement of teaching and learning regarding product design and the development or manufacturing of the designs or product as they are the core to the fashion curriculum.

2.4.1 Computer-aided design (CAD)

The fashion industry has significantly increased the use of computer aided design (CAD) for both designing and pattern making (Sayem, Kennon, & Clarke, 2010) like specialized 2D CAD software packages including packages such as *cad.assyst* (Assyst-Bullmer), *Modaris* (Lectra), *Accumark* (Gerber), *Master Pattern Design* (PAD System), *TUKAcad* (Tukatech), *GRAFIS* (Software Dr. K. Friedrich), *Audaces* (Audaces), *COAT* (COAT- EDV – Systeme) and Fashion CAD (Cad Cam Solutions) (Sayem et al., 2010). All these software packages support geometrical pattern drafting from its foundation using only anthropometric measurements of the anticipated size and shape.

Illustrator (Adobe Inc.) and *CorelDRAW* (Corel Corp.) are the two dimensional (2D) graphics software packages that have been specifically made for the apparel/fashion industry such as *Kaledo Style* (Lectra). Other packages that are being used around the world include *Vision Fashion Studio* (Gerber), *Tex-Design* (Koppermann) etc. (Sayem et al., 2010). The authors allude to the multiple benefits that these techniques offer which include greater efficiency and timesaving solutions to more complicated tasks.

2.4.2 3D body scanners

3D body scanning is "a fully automated 3D body scan that generates digitized measurements of the human body by selection of different processes (for example, scanning the profile of the body with laser beams) to create a highly detailed 3D virtual model" (Ross, 2016, p. 232). 3D body scanners provide a rapid and efficient way to collect a customer's body measurements accurately for a customized apparel fit (Shan, Huang, & Qian, 2012). More than ten years ago (D'Apuzzo, 2007) wrote about the existence of the complete system for the digitization of the human body, with the military industry being the main users of this technology. 3D body scanning is, in addition to the linear measurements, traditionally used by the apparel industry, as it provides information-rich data related to the body's unique shape and angles (Hicks, 2011). The same as CAD, these generated body measurements can be shared digitally and uploaded automatically to different CAD pattern-making systems (Romeo & Lee, 2013).

2.4.3 3D Garment design and pattern drafting

The advances in technology of CAD and 3D body scanning have brought about a constant growth in the use of 3D garment design and pattern drafting (Romeo & Lee, 2013). A customer's 3D model can be created from input of measurements, or imported from the customer's 3D body scan data (Qing, 2012). This, according to Qing (2012), provides the ability to not only draft but also fit apparel on a computer generated human body in virtual settings or cyberspaces.

2.5 KNOWLEDGE OF EDUCATIONAL TECHNOLOGY FOR TEACHING

Knowledge of technology often referred to as 'technology literacy' - refers to "computer skills and the ability to use computers and other technology to improve learning, productivity and performance, and is fundamental to a person's ability to navigate through society as traditional skills like reading, writing and arithmetic" (Georgina & Olson, 2008). Rogers (2003) further suggested that software as a

technological innovation has a low level of observability, which leads to its slow adoption rate. Adoption is a decision of "full use of an innovation as the best course of action available" and rejection is the decision "not to adopt an innovation" (Rogers, 2003, p. 259 in Sahin, 2006). Hohfield (2008) offered the following definitions for ICT literacy:

- Using communication tools, digital technology, and/or networks to access, integrate, manage, create and evaluate information, and
- Using technology as an aider to research, consolidate, evaluate and communicate information.

Teachers are believed to have the most impact on the quality of using or integrating technology in schools (Levin & Wadmany, 2008). For example, as far back as 1998 Hardy's review of studies on teacher attitudes revealed that the use of technology is highly affected by teachers' confidence, more than the variables such as access to equipment, organizational time and support.

The extent to which the lecturers use technology outside the lecture rooms may be an indicator of their interest and corresponding skill in using the technology (Baylor & Ritchie, 2002). These authors identified three patterns of technology use among lecturers. The first is "avoidance" which entails lecturers who do not use the technology for their own purposes, but allocate computer time to students. The second pattern is "integration" in which lecturers spend time trying out and learning to use hardware and software as well as structuring learning time to encourage effective and improved use of technology by their students. The third one is the "technical specialization", in which lecturers' use of the computer is more organized and purposeful than average lecturers because of their strong computing skills.

These classifications, which show the effectiveness of academic technology use, are ultimately supported by the amount of non-classroom computer use in which the academic is working on (Baylor & Ritchie, 2002). Various studies have noted

different teacher-related variables that influence effective technology integration. For example:

- teachers' realization of the advantages of incorporating technology in their lecturing (Scrimshaw, 2004);
- teachers' willingness to change their established pedagogical practices (Snoeyink & Ertmer, 2001);
- teachers' confidence to integrate innovation and their obligation to the innovation (Dawson & Rakes, 2003);
- teachers' capacity to integrate technology (Fryer, 2003);
- negative experiences that teachers have encountered when using technology (Snoeyink & Ertmer, 2001);
- feeling of pressure or fear when they sense that students seem to know more (Fryer, 2003); and
- teachers' needs to expand their computer technology abilities and knowledge.

Garrison and Kanuka (2004) describe technology enhanced learning as a process that takes learners and teachers through learning about technologies (exploring what can be done with technologies), learning with technologies (using technologies to supplement normal processes or resources), and learning through the use of technologies (using technologies to support new ways of teaching and learning. This process calls for the search for contexts and ways that might be created to best help academics in integrating technology in their teaching.

Honey, Culp, and Carrigg (2000) believe that in order to integrate technology successfully in schools, it is necessary to understand the complexity of the interactions taking place in the classrooms between academics, students and technology.

The primary goal of integrating technology into the curriculum is to enhance learning (Ertmer, 2005), even though Kirkwood and Price (2014, p. 210) query whether the "enhancement" is concerned with:

- Growing use of technology,
- Improving the conditions/situation in which education activities are carried out (e.g. increasing flexibility and convenience),
- Refining teaching practices,
- Improving student-learning outcomes (quantitatively and/or qualitatively).

Technology use and technology integration extend to more than just fluency in the use of technology. It encompasses the ability to critically manage, integrate, create and evaluate information. This level of engagement starts to move away from superficial activities to meaningful, value-adding activities that seek to change information into knowledge. Ertmer (2005) referred to the value-adding activities as higher level tasks. This view was shared by Okojie and Olinzock (2013) in a study which found that teachers' expertise in using technologies needs to extend to the integration of technology in the instructional setting in order to cultivate meaningful learning skills.

The literature confirms that ICT or technology cannot be viewed as a replacement of existing long proven instructional methods, but rather as a supplementary medium aimed at supporting newer ways of teaching and learning, and developing learners' cooperation, problem solving, and communication skills in line with global and learner evolution.

2.6 CONTENT KNOWLEDGE OF TECHNOLOGY

It is essential to note the "democratic discourse" that the current educational system in South Africa has produced. Young learners entering higher education have been brought up in the age of digital technologies and are presumed to be more familiar with using a variety of technologies, and hence the use of the terms like 'Net

Generation' and digital natives'. Net generation according to Tapscott (1998) are the young generation who had grown up surrounded by digital media or technology. Prensky (2001a) introduced the term 'digital natives' which mainly referred to the changing technologies that the young generation was surrounded with. It is often assumed that students already have the necessary intellectual skills and knowledge for real use of technology in their studies (Kirkwood & Price, 2014).

The implementation of the rapidly changing ICTs is one of the challenges at the heart of the development of higher education institutions (Välimaa, 1998). Higher education institutions are not only constructing and supporting technological advances, but are simultaneously the intensive users of ICT. ICT is, therefore, rearranging the established higher education and influencing the academic work done in universities by lecturers, just like it is changing the landscape of the support functions accomplished by administrative staff.

As society and technology changes, the mode in which people connect and learn unavoidably changes how people think. The lecturers' base of knowledge today includes a plethora of new and/or diverse domain-specific knowledge, pedagogic knowledge and pedagogic content knowledge that is progressively evidence informed (Kirschner, 2015). Lecturers are valuable assets to education, not only for the quality of education but also for the success or failure of educational innovations that take place in the classroom (Kirschner, 2015).

Garrison and Kanuka (2004) note how the teaching and learning environment has been transformed in HE settings because of the increasingly electronic world. This can be read or understood with the two distinct aims that underpin technology enhancement which Kirkwood and Price (2014) refer to as:

1. Variations in the ways through which university teaching happens, and
2. Variations in how teachers teach and learners learn in the university.

Kirschner (2015) refers to good and effective education together with efficient and enjoyable learning as determined by the exchanges between learners, teachers and their tools, within and in interaction with the environment.

Table 1 below usefully explains how educational technologies can be integrated into the curriculum.

Table 2.1: Teaching and learning events and associated media forms

Teaching and learning event	**Teaching action or strategy**	**Learning action or experience**	**Related media form**	**Examples of non-computer based activity**	**Example of computer based activity**
Acquisition	Show, demonstrate, describe, explain	Attending, apprehending, listening	**Narrative** Linear presentational. Usually same "text" acquired simultaneously by many people	TV, video, film, lectures, books, and other print publications	Lecture notes online, streaming videos of lecturers, DVDs, multimedia including digital videos, audio clips and animations
Discovery	Create or set up, find, guide through discovery spaces and resources	Investigating, exploring, browsing, searching	**Interactive** Non-linear presentational. Searchable, filterable, but no feedback	Libraries, galleries, museums	CD based, DVDs, or Web resources including hypertext enhanced hypermedia, multimedia resources, and information gateways

Dialogue	Set up, frame, moderate, lead, facilitate discussions	Discussing, collaborating, reflecting, arguing, analysing, sharing	**Communicative** Conversation with other students, lecturer or self	Seminars, tutorials, conferences	Email, discussion forums, blogs
Practice	Model		**Adaptive** Feedback learner control	Laboratory, field trips, simulation, role play	Drill and practice, tutorial programmes, simulations, virtual environments
Creation	Facilitating	Articulating, experimenting, making, synthesizing	**Productive** Learner control	Essay, object, animation, model	Simple existing tools, as well as especially created programmable software

Laurillard (2002) in Czerniewicz and Brown (2005, p. 5)

2.7 TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE FOR FASHION DESIGN

"Teaching well requires professors with great depth of knowledge about their subject area and a wide breadth of knowledge about how to communicate what they know to their students" (Sutton & DeSantis, 2017, p. 226). This can be seen as Shulman's pedagogical, content knowledge (PCK) that Park and Oliver (2008) refer to as knowledge that teachers should possess. PCK, according to Park and Oliver (2008), is an acknowledgement of the importance of the transformation of subject matter knowledge into subject matter knowledge for teaching. In educational standards, the goal that "all students should acquire high-level content

knowledge and high-order problem solving skills, demands a depth of sophistication in teachers' grasp of academic subjects" (Taylor & Vinjevold, 1999, p. 21).

Various reasons for educators to integrate technology into teaching and learning, as noted by Hechter, Phyfe, and Vermette (2012, p. 137), include the following:

> "encouraging student engagement, teaching 21st century skills as best teaching practice,
>
> to stay current, for hands-on interactive learning, to vary instructional methods,
>
> to perform labs and demonstration, and for research and communication".

Fashion programme encompasses design and manufacturing and the students are expected to be proficient in most aspects of CAD drawing for fashion. Technology integration in the fashion curriculum occurs as students are encouraged to look at new and traditional trends, fabrics, fibres and trimmings to ensure that students have knowledge of the techniques they are most likely to anticipate in the real fashion world.

Teaching and learning with technology, according to Kirkwood and Price (2014), is influenced by three sets of factors, which are:

- The *context* of learners concerning learning the course and the context of teaching the course.
- *Design for learning.*
- Access to technology as the issue that can affect higher education institutions in different ways.

A study by Overbay, Patterson, Vasu, and Grable (2010) which assessed the association of teachers' level of constructivism and their use of technology indicates that constructivist approaches and beliefs were the predictors of technology use.

The study looked at 22 schools (four high, six middle, and twelve elementary) with 479 participants who were teachers in these schools. The results of the study indicated that teachers with more constructivist instructional practices were more likely to report using technology. The study further revealed that teachers who believed that IT was a useful tool for student-centred or constructivist teaching and learning were more likely to use technology. The results suggest that encouraging the use of educational technology in the classroom may hinge upon helping teachers see how meaningful knowledge can be constructed using technology.

The Publishers' Association of South Africa (PASA) supports technology-enabled learning and teaching with the right content. This content, according to PASA, is accompanied by technology-driven teaching and learning tools such as automated question banks, adaptive learning platforms, and various other interactive, multi-media resources that can be used with other resources available on the World Wide Web and other social media platforms. PASA also believes that technology as an enabler of learning and teaching opens up new pedagogies. These pedagogies allow an increased number of learning and facilitation in online settings, and can be used to create simulations that increase workplace exposure. These pedagogies can help fashion students of WSU increase their knowledge about the course as they navigate through their career.

Turoff (1999 in Rogers, 2000) stresses and seems to agree with Kirkwood and Price (2014) on the need for institutions to realize that technology alone is not important, but the key is in the learning methodologies that are utilized to employ technology. The author further adds that successful use of technology consist of virtual classes that are very unlike face-to-face classes, where the instructor acts as a guide or facilitator. Lecturers need to fully utilize the various innovations for the benefit of fashion students whose profile confirms the lack of the 'cultural capital' (Bourdieu, 1973) needed to navigate the fashion programme. Thus the author further questions the relationship between the academic success of the students and the social position of their families or relatives.

An effective use of technology in the classroom for higher education, as pointed out in a study by Le Grange (2006), will require what is referred to as a 'paradigm shift' from teaching to learning. A paradigm shift is where departments, faculties and institutions reconfigure teaching and learning undertakings to take full advantage of emerging technologies. This shift necessitates a change in the methods of thinking, doing and living; it is a shift in understanding, a shift in practice and a shift in values. The integration of technology into teaching and learning creates shifts in the skill requirements of faculty from curriculum delivery to curriculum design (Threlfall, 2001). It is therefore important for technology integration that there is a shift from teaching to learning, and thus necessary for the purpose of this study is to look at theories that explain the favourable conditions for academics to integrate new tools into their scope of teaching, which are referred to as theoretical frameworks.

2.8 TECHNOLOGY ADOPTION THEORIES

Sutton and DeSantis (2017) confirm that technology adoption has been studied for many years and numerous prominent theories, including the diffusion model (Rogers, 2003), and the technological pedagogical and content knowledge model (TPACK) (Mishra & Koehler, 2006) have emerged. All these theories have been established to explain the conditions essential for educators to integrate new tools in their scope of teaching. These models according to Mishra and Koehler (2006), clarify the process of learning new technologies and help those associated with learning and teaching in higher education to address the barriers that inhibit some educators from fully taking advantage of the opportunities that the emerging technologies offer. The theories that have been used for this study to describes the contexts that might be created to best assist higher education institutions in integrating technologies in their practice are technology diffusion, technological pedagogical and content knowledge models (TPACK) (Sutton & DeSantis, 2017). These theories are the theoretical frameworks that informed this study and are discussed below.

2.9 THEORETICAL FRAMEWORK

A theoretical framework influences the manner in which knowledge is studied and understood (Mackenzie & Knipe, 2006). A theoretical framework is "like the lenses through which you view the world" (Henning, Van Rensburg, & Smit, 2004, p. 25), and it also helps you to clearly make your assumptions about the interconnectedness of the way things are associated in the world.

2.9.1 Technology Diffusion Model

The "diffusion of innovation" (DOI) theory by Rogers is a widely used theoretical framework for integrating technology, according to Sahin (2006). Medlin (2001), and Parisot (1995) in Sutton and DeSantis (2017) also confirm that diffusion theory is considered the most suitable for studying the adoption of technology in higher education and other education environments.

Rogers identified technology users' uncertainty as a key barrier to the adoption of innovation and offered five attributes that serve to limit or increase an individual's uncertainty in adopting an innovation:

- Firstly, the innovation must have a 'relative advantage', "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229).
- Secondly, the innovation must be 'compatible', "the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters" (Rogers, 2003, p. 15).
- Thirdly, the innovation must not be too 'complex', "the degree to which an innovation is perceived as relatively difficult to use or understand" (Rogers, 2003, p. 15).
- Fourthly, the innovation must have a 'triability', "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 16).

- Lastly, the innovation must have 'observability', "the degree to which the results of the innovation are observable to others" (Rogers, 2003, p. 16).

Rogers (2003) argues that innovations that offer more of the above-mentioned five attributes have high chances of being adopted faster than other innovations. Efforts to encourage lecturers to utilize emerging technologies are unlikely to succeed if their uncertainties of integrating technologies are not addressed (Sutton & DeSantis, 2017). It is within this context that understanding the factors influencing lecturers and students' diffusion of innovation, together with their views of innovation (technology integration) will yield a better understanding of integrating technology in the fashion department.

2.9.2 Technology Pedagogy and Content Knowledge Framework

The need to define how teachers' understanding of educational technologies and Pedagogy Content Knowledge (PCK) interrelate with one another to yield technology-oriented knowledge (Koehler & Mishra, 2009) was recognized twelve years ago by Mishra and Koehler (2006). The Technology Pedagogy and Content Knowledge (TPACK) framework builds on Shulman's (1986, 1987) construct of pedagogy and content knowledge (PCK). The resulting theory of TPCK, now known as TPACK, provides a framework that is vital "not only for the examination of knowledge at the intersection of content and pedagogy as Shulman's framework allowed, but also for the consideration of educators' understanding of education technologies" (Sutton & DeSantis, 2017, p. 226).

According to the TPACK framework, specific technological tools (hardware, software, applications) work best when they are used to instruct and guide students to understand the subject matter better. This framework also emphasises the relations among technologies, curriculum content, and specific pedagogical approaches, and shows how teachers' understandings of technology, pedagogy, and content can relate with one another to yield effective discipline-based teaching with educational technologies.

Three types of knowledge that teachers must master in order to integrate technology successfully into curriculum delivery as outlined by the TPACK framework are:

- Content Knowledge - CK (curriculum), this is the educator's own knowledge of the subject matter (Koehler & Mishra, 2009).
- Pedagogical Knowledge - PK (specific pedagogical approaches), this is the educator's knowledge of the practices, processes and methods regarding teaching and learning. PK involves the purpose, beliefs and goals of education and may take into account understanding of students' learning styles, lesson design and assessments (Koehler & Mishra, 2009).
- Technological Knowledge - TK describes educators' knowledge of, and ability to use different technologies, various technological tools and associated resources. TK concerns understanding of technology integration for teaching and learning in view of its possibilities for specific subjects or classrooms. This further concerns learning to recognize when it will be useful to continue to learn and adapt as new technologies emerge (Koehler & Mishra, 2009).

TPACK is the result and is at the heart where the interplay among these three areas of learning environments exists. Figure 1 below illustrates the TPACK and its knowledge components.

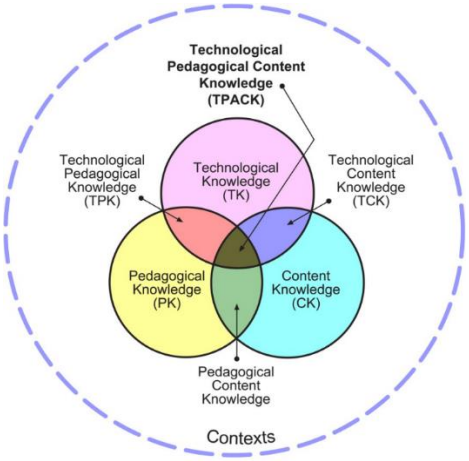


Figure 2.1: TPACK and its knowledge components (Koehler & Mishra, 2009, p. 63)

Any effective employment of technology in the classroom according to Kurt (2018) requires acknowledgement of the vibrant, transactional connection among content, pedagogy and the incoming technology, all within the unique contexts of differing spaces and cultures. Kurt (2018) further suggests factors such as the specific educator, the exact level of study, class demographics and more will mean that different circumstances call for different approaches to technology integration. These frameworks informed this study as they gave more insight when studying the views of lecturers and students on integrating technology in the fashion curriculum for the purpose of teaching and learning.

2.10 CONCLUSION

Using these prior studies as a basis, the current study examined the views of lecturers and students concerning technology integration in the fashion curriculum for enhanced learning in higher education. It must be noted that integration of technology has some challenges, and that institutions should try to reduce these challenges if they are to arm students with the skills and knowledge for the twenty-first century. The five underpinning constructs used were the personal use of technology, technology knowledge, technology content knowledge, technology pedagogical knowledge and technology pedagogical content knowledge.

The theoretical frameworks of TPACK by Mishra and Koehler (2006) and Roger's (2003), Diffusion of Innovation guided this research study. With TPACK as a goal and point of interest, the theory articulated that, in order for lecturers to successfully integrate technology, they must master pedagogy, content and knowledge.

CHAPTER THREE: RESEARCH METHODOLOGY AND DESIGN

3.1 INTRODUCTION

The previous chapter looked at the literature around fashion design and technology. This chapter presents the philosophical assumptions and the design strategies underpinning this research study. The research methodologies and research design used in conducting this study and relevant justification are also discussed. This chapter further describes the research strategies, instrument and sampling procedure used, the data collection methods, the analysis, validity and reliability of the researched data, and the ethical considerations for this study.

All research is based on some fundamental philosophical assumptions about what constitutes valid research and which are the appropriate methods for undertaking that enquiry (Mackenzie & Knipe, 2006). It is important to know what these assumptions are in order to conduct and evaluate any research.

3.2 RESEARCH, RESEARCH DESIGN AND RESEARCH METHODS

Research has been described by Reaves (1992, p. 8) "as a systematic way of answering questions about the world", or an inquiry whereby data is collected, analysed, and interpreted in an effort to "understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such a context" (Mertens, 2005, p. 2). MacMillan and Schumacher (2001, p. 166) define research as "a plan for selecting subjects, research sites, and data collection procedures to answer the research question(s)". However, it has been suggested that the "exact nature of the definition of research is influenced by the researcher's theoretical framework" (Mertens, 2005, p. 2). Methodology refers to the framework that is associated with a particular set of pragmatic assumptions that a researcher

uses to conduct a research. This can be either the scientific method, ethnography, or action research (O'leary, 2004).

3.3 RESEARCH PARADIGM

Paradigms can be defined as the "basic belief system or world view that guides the investigation" (Guba & Lincoln, 1994, p. 105). Kuhn (1962) cited in (Beaudry & Miller, 2016, p. 5) defines a paradigm as: "an integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools". The term 'paradigm' refers to a research culture with a certain set of beliefs, values, and assumptions that a community of researchers has in common concerning the landscape and conduct of research (Beaudry & Miller, 2016). Literature confirms a number of dimensions to paradigms, but for the purpose of this study only three dimensions of paradigms will be discussed. These are "*ontology,* which specifies the nature of reality that is to be studied, and what can be known about it. *Epistemology* specifies the nature of the relationship between the researcher (knower) and what can be known. *Methodology* specifies how the researcher may go about practically studying whatever he or she believes can be known" (Terre Blanche & Durrheim, 1999, p. 6).

Paradigms are crucial to research design as they have a bearing on both what is to be studied (nature of research question) and the way in which the question is to be studied. Paradigms are important as they "set down the intent, motivation and expectations for the research" (Mackenzie & Knipe, 2006, p. 2). In research it is important to first nominate a paradigm so as to have a basis for making choices regarding methodology, methods, literature and/or research design (Mackenzie & Knipe, 2006). It is evident from the literature that there are a number of theoretical paradigms which, to name just a few, include: positivist, post-positivist, constructivist, and intepretivist (Mackenzie & Knipe, 2006). Thus, the selection of an appropriate paradigm in this study to examine lecturers and students' views of integrating technology in the fashion programme was considered to be of great

importance. The post-positivist paradigm served as the guiding philosophy throughout the research process of this study.

The possible strongest criticism of the positivist theoretical paradigm as noted by Henning et al. (2004) is that the paradigm does not take into consideration how people make meaning or the influence of culture in people's interpretations. One of the characteristics of post-positivist research, according to Ryan (2006, p. 12), is that "theory and practise cannot be kept separate", that is, one cannot ignore theory for the sake of just facts. The post-positivist paradigm values and encourages different approaches and inspires insights that range beyond the realm of measurable facts (Ryan, 2006).

The post-positivist paradigm can move from a narrow perspective of positivism to a more encompassing way of examining real world problems (Henderson, 2011). The post-positivist paradigm assumes that a number of well-developed theories influences any bit of research (Mackenzie & Knipe, 2006). O'leary (2004) provides a different view of post-positivism that to some extent aligns with the constructivist paradigm, claiming that post-positivists see the world as ambiguous, variable and multiple in realities. This impression seems to be different from the widely used view that sees post-positivist research as mostly aligned with quantitative methods of data collection and analysis (Mackenzie & Knipe, 2006). This study employed the post-positivist paradigm to gather quantitative data in studying the views of lecturers and students on integrating technology in the fashion programme.

3.4 QUANTITATIVE RESEARCH METHODOLOGY

A quantitative study is one in which the researcher primarily uses post-positive claims for developing knowledge, testing theories, reducing specific variables and hypotheses and questions, and using measurements and observation (Creswell, 2002; Mackenzie & Knipe, 2006). Quantitative research is defined as "a process that is systematic and objective in its ways of using numerical data from only a selected

subgroup of a universe (or population) to generalize the findings to the universe that is being studied" (Maree, 2007, p. 145). The research process of such a study begins with a series of pre-set categories that are usually embodied in standardized measures and this data is used to make broad and generalizable comparisons (Terre Blanche & Durrheim, 1999). Quantitative research is "designed specifically for the identification and description of variables with a view to establishing the relationship between them" (Garner, Wagner, & Kawulich, 2009, p. 62).

This study employed a quantitative research method in studying the views of both lecturers and students on integrating technology in the fashion programme. The predetermined categories identified in this study included technology knowledge, technology content knowledge, technology pedagogical knowledge, and technological pedagogical and content knowledge. These categories were measured with the view to generalize data to a wider population and to establish if there are any relationships between them. Quantitative research, according to Cohen, Manion, and Morrison (2007), makes use of questionnaires, surveys and experiments to gather data that is reviewed and presented in numbers, which allows the data to be characterised by the use of statistical analysis. The three most essential elements of a quantitative research design are objectivity, numeric data and generalizability (Maree, 2007). The purpose of this quantitative study was not to generalise data to a wider population but only to that being studied, that is, fashion department, WSU.

3.4.1 Population

Population is defined as the larger group upon which a researcher wishes to generalize the information: it includes members of definite classes, events or objects (Welman & Kruger, 2001). The target population signifies the specific segment within a wider population that is best situated to serve as a primary source of data for the research. The Butterworth campus has 120 students registered in 2018 for the fashion programme. There are seven lecturers in the fashion programme on the

Butterworth campus who are all involved with teaching and learning in all three levels of study in the fashion programme. The study targeted the students and all lecturers in the Fashion Department on Butterworth Campus.

3.4.2 Sample

'Sample' is a subset of the population consisting of a predetermined number, referred to as the sample size (Maree, 2007). A sample should be "so carefully chosen that the researcher, through it, is able to see characteristics of the total population in the same proportions and relationships that they would be seen if the researcher were, in fact, to examine the total population" (Leedy & Ormrod, 2015, p. 177). The sample drawn from the above-mentioned population comprised of second year and third year fashion students. It was assumed that students doing second year and third year are returning students; therefore, they are to some extent content with their choice of study, and would hold a broader understanding and adequate knowledge and experience related to the fashion programme and fashion industry in general, and thus would provide useful information about the inquiry. With the above consideration, the sampling techniques were both quota and purposeful sampling techniques which are non-probability sampling methods (Leedy & Ormrod, 2015).

The researcher in quota sampling identifies categories of people who need to be in the sample and the required number is referred to as the quota (Maree, 2007). In this study, the researcher who is also a lecturer in the department identified students doing their second year and third year of study in the fashion programme. In addition to this sample, the seven lecturing staff in the Fashion Department were included. This sampling technique in this study also had characteristics of purposeful sampling. Purposeful sampling is a non-random sampling method where the researcher selects "information-rich" cases for study (Creswell, 2013). McMillan and Schumacher (1993) embrace purposeful sampling as it gives the researcher the choice of a sample that will mostly provide information and

knowledge that is valuable about the phenomenon under inquiry, thus the selection of students from second and third year level of study.

The researcher took into consideration the generalizability of the findings to the fashion department only, the number of students registered in fashion and also the type of data to be gathered (O'leary, 2004) in arriving at the sample size of 79 students and seven lecturers. This sample size was regarded as optimum. An optimum sample is one which fulfils the requirements of efficiency, representativeness, reliability and flexibility (Kothari, 2004). The sample size was also regarded as representative, which, according to Welman and Kruger (2001, p. 47), implies that "the sample has the exact properties in the exact same proportions as the population from which it was drawn".

3.5 DATA GENERATION METHODS

The data for this study was generated by means of questionnaire as the primary source of data, and a literature review as a secondary data source. A literature review, according to Terre Blanche and Durrheim (1999), puts the project into context by showing how it fits into a particular field. The primary purpose of collecting secondary data is to re-analyse the data. This has the advantage of compelling the researcher to be clear about the underlying assumptions and theories concerning the data (Mouton, 1996).

To answer the main research question, the study used questionnaires. Bouma and Ling (2004) define a questionnaire as an instrument in which respondents provide written response to questions or mark items that best indicate their responses. It determines how people really feel about a particular issue; it may seek to find out the effect of some event on people's behaviour. Questionnaires are useful as they have the prospect for correlation among the participants' responses, to look for possible patterns and causes-on-effects (Cohen et al., 2000). The quantitative nature of the study allowed the researcher to be separate from the subject matter

and remain objective. The main aim of the selected tool was to gather views of both lecturers and students concerning integrating technology in the fashion programme for the purpose of teaching and learning.

The questionnaire used in Appendix E, was adapted and modified from a study by Hosseini and Kamal (2012) on "developing an instrument to measure perceived technology integration knowledge of teachers". Hosseini and Kamal (2012) built their questionnaire upon the work of Schmidt et al. (2009) who aimed at developing and validating an instrument designed to measure perceived teachers' self-assessment of their Technological Pedagogical Content Knowledge (TPACK) and other related domains included in the framework. Schmidt et al. (2009) validated the content of the questionnaire with experts within the field of TPACK. Their final questionnaire contained 75 items for measuring preservice teachers' self-assessment of the seven TPACK domains. There were eight Technological Knowledge (TK) items, 17 Content Knowledge (CK) items, 10 Pedagogical Knowledge (PK) items, 8 Technological Content Knowledge (TCK) items and 9 TPACK items.

The instrument used by Hosseini and Kamal (2012) included 59 items which were also divided into seven sections that assess each domain of the TPACK. There were 11 TK items, 7 PK items, 6 CK items, 10 TPK items, 7 PCK items, 5 TCK items, and 7 TPACK items.

For the purpose of this study, the questionnaire by Hosseini and Kamal (2012) was adapted and modified to examine the views of both lecturers and students concerning integrating of technology in the fashion design programme. Of the seven TPACK domains identified by Schmidt et al. (2009) and Hosseini and Kamal (2012), the questionnaire was adapted to look at only four of the TPACK domains for lectures. There were 10 TK items, 6 TCK items, 10 TPK items and 6 TPACK items. The instrument for collecting data from students was also modified to only look at two of the TPACK domains. There were 10 TK items and 6 TCK items. For all these

items, the participants responded to each statement from both groups using the five point Likert Scale:

1. Strongly Disagree
2. Disagree
3. Undecided
4. Agree
5. Strongly Agree

The common domains in the questionnaire gave the researcher patterns to be observed and comparisons to be made between lecturers and students. Section A of the instrument included items addressing biographic information and Section B included information regarding technologies that participants have used in the past nine months. Section C looked at TPACK as the main point of interest of the study. Section D of the instrument included open-ended questions which allowed the participants to construct answers using their own words. In an open-ended questionnaire, participants can offer any information or express any opinion they wish, thereby generating rich and honest data (O'leary, 2004).

The advantages of a self-administered group questionnaire is that data is gathered from as many participants as possible at the same time while the researcher awaits for the questionnaire to be completed (Cohen et al., 2007). One of the advantages of group administration of the questionnaire is the fact that any issues that are not clear in the questionnaire can be dealt with immediately (Maree, 2007). Maree further alludes to the fact that the response rate on group administration is optimal in that participants can complete the questionnaires in a short space of time, it is cost-efficient and requires fewer research assistants compared to other sampling techniques. Considering such advantages, this study used self-administered group questionnaires.

The questionnaires were group administered by the researcher during the scheduled lunch time. During lunch time students are usually working on their own and lecturers are in their offices. This provided the researcher with an opportunity to get a larger number of participants to fill in the questionnaire at the same time. The researcher was ideally an objective observer who neither participated in nor influenced what was being studied (Maree, 2007). The participants provided their views based on their personal experience and understanding of integrating technology in the fashion programme, which might be new and unexpected data to enhance the quality of this study. As the researcher worked in the same department, it was easy to collect the questionnaires back from lecturers and students, and this provided a higher percentage of response rate of questionnaires.

The data collected from the open-ended questions was used to complement the structured questions, thereby giving the researcher the ability to see the whole picture and "not simply aggregate data to arrive at an overall 'truth'" (Ryan, 2006, p. 19).

3.6 DATA ANALYSIS

"Data analysis is the vehicle used to generate and validate interpretations, formulate inferences and draw conclusions" (Scheman, 2007, p. 147). It "involves 'breaking up' the data into manageable themes, patterns, trends, and relationships" (Mouton, 2001, p. 108). Data analysis, according to Garner et al. (2009), is usually executed through descriptive and inferential statistics which are drawn from a sample to the population based on the processed data. Maree (2007, p. 183) defines descriptive statistics as a collective name for a number of statistical methods that are used to organize and summarise data in a meaningful way. The aim of data analysis is to understand the elements that constitute one's data through an inspection of the relationships between concepts, constructs or variables (Mouton, 2001).

The data collected needs to be analysed to make sense of the situations, noting patterns and categories (Cohen, Manion, & Morrison, 2000). Coding is one of the ways to analyse data.

Data obtained from the closed-ended questions was coded and then analysed using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics were used to report participants' characteristics and paired *t*-test was used to test significant differences between the different demographics of both lecturers and students. Descriptive statistics "are used to describe and summarise the basic features of the study, and are used to present quantitative description in a manageable and intelligible form" (O'leary, 2004, p. 189). After data was analysed, descriptive analyses of the data were given in the form of tables and graphs. In order to report on the data analysed, the mean, mode, median, range of scores and minimum and maximum standard deviation were measured.

After data was analysed by the researcher, results were documented to give a clear understanding regarding the views of integrating technology in the fashion curriculum. Golafshani (2003) notes that in the quantitative paradigm:

- the importance is on the facts and causes of behaviour,
- data is in the form of numbers that can be quantified and summarized,
- the norm for analysing the numeric data is the mathematical process, and
- the statistical terminologies are used to express the results.

Themes were used to code participants' written responses or comments on the open-ended questions, with a new theme being added as it emerged. Content analysis was performed to analyse data gained from open-ended questions. Content analysis, according to Creswell (2013), is a technique that is known to be useful in the analysis of written or verbal communication. It allows researchers to gain a deeper understanding and make inferences about the message's characteristics.

3.6.1 Validity and reliability

"Reliability and validity are tools of an essential positivist epistemology" (Watling as cited by Golafshani, 2003, p. 598). Joppe (2006, p. 1) defines reliability as:

> "The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the instrument is considered to be reliable".

What emanates from this definition is the notion of replicability or repeatability of results or observations. Kirk, Miller, and Miller (1986, pp. 41-42) identify three types of reliability referred to in quantitative research, which relate to:

- "the degree to which a measurement, given repeatedly, remains the same,
- the stability of a measurement over time, and
- the similarity of measurements within a given time period".

High reliability is achieved when the instrument used will provide the same results if the research is repeated on the same sample.

Validity in a quantitative paradigm defines whether the research truly measures that which it was intended to measure or how frank the research results are (Joppe, 2006). Different forms of research validity that are indicated by Cohen et al. (2007) include content validity, criterion-related validity, construct validity, internal validity, external validity, concurrent validity and face validity. Measures to ensure validity of a research are based on:

- Suitable time scale for the study has to be nominated,
- Suitable methodology has to be nominated, taking into account the characteristics of the study,
- The most appropriate sample method for the study has to be nominated,

- The respondents must not be anxious in any ways to select specific choices among the sets.

The research instrument was tested for content validity by having the questionnaire reviewed by the supervisor. The questionnaire was piloted with students from another 'sister institution' offering the same fashion design programme.

3.7 ETHICAL ISSUES

A letter requesting permission to carry out this particular study was sent to the WSU research office. A clearance certificate for this study was obtained from UKZN (where the researcher is a registered student). This certificate gave the researcher permission to conduct research on the views of lecturers and students on integrating technology in the fashion programme. Once the certificate was issued, a letter requesting permission to conduct research was sent to the Rector of the campus and the Dean of the Faculty, and another letter was sent to the Head of the Fashion Department in the study (where the study was to be conducted).

A letter inviting participants to participate in the study and a consent form formed part of questionnaires. All participants signed a consent form prior to undertaking the study. The researcher informed the participants of their right to withdraw from the study at any time with no harm. The information from the questionnaire was used for the purpose of research and the participants were also ensured of confidentiality and anonymity. Responses were coded to make sure that the answers remained unknown and that no names of the participants were revealed in any part of this study.

3.8 LIMITATIONS

The present study added several important findings to the literature, yet there are some limitations to the study as well. First and foremost, this study was limited by time and the findings of this study may not be greatly generalized outside the

fashion, WSU community for various reasons. First, the research approach was quantitative in nature, and only looked at the seven TPACK domains in examining views of both lecturers and students on integrating technology in the fashion programme. The study used a questionnaire with a biggest portion of it being closed questions. These questions forced the participants into particular response categories, thereby limiting the range of responses.

The other limitation was the nature of the sample itself. In the sample size (n=79) there were disproportionate numbers in terms of second years and third years. In addition, the degree of similarity among participants limits the generalisability of the study. Yet the results are still important as this was the population that was studied.

3.9 CONCLUSION

This chapter discussed the research methods and design including the sampling technique, target sample and sample size, and data collection process that the study employed. The method of analysing data was also discussed, including the reliability and validity of the study. The next chapter will present the results from the collected data.

CHAPTER FOUR: PRESENTATION, INTERPRETATION AND ANALYSIS OF DATA

4.1. INTRODUCTION

Chapter three described the research design and the methodology used in the study and primarily focused on how the data was collected. This chapter presents the results of the research after data was captured, interpreted and analysed. The interpretation and analysis of data was done in line with the research questions of the study. The major research question was: What are the views of lecturers and students with regard to integrating technology into the fashion design programme at Walter Sisulu University?

The sub-research questions were:

1. What are the views of lecturers concerning technology integration in the fashion design programme at WSU?

2. What are the views of students concerning technology integration in the fashion design programme at WSU?

3. What are the similarities and differences between the views of lecturers and students concerning integrating technology in the fashion design programme at WSU?

4.2. DESCRIPTIVE ANALYSIS: BIOGRAPHICAL DATA

In this study, biographical data has been included as it assisted the researcher to analyse the data looking at the distribution of participants by demographic characteristics. For lecturers, biographical data includes experience in teaching, subjects taught and gender, and for students, these characteristics are gender, year of study and age group.

4.2.1 Biographical data for lecturers

There were seven lecturers in the Fashion Department and all of them participated in the study. Table 4.1 below shows the demographic characteristics of the lecturers in the Fashion Department concerning the number of years teaching, courses taught and gender. Out of the seven lecturers, there were three lectures with experience of two to five years' teaching in higher education, two lecturers had five to ten years of experience and two lecturers had over ten years of experience. Out of seven lecturers, three were females and four were males.

The table below shows that the majority of lecturers were teaching mostly practical courses in the programme, with two lecturers teaching both practical and theory courses and only one lecturer taught mostly theory courses.

Table 4.1: Distribution of lecturers by demographic characteristics

Variable	Category	Frequency	Percent
Teaching experience	2 to 5 years	3	42.8
	5 to 10 years	2	28.6
	Over 10 years	2	28.6
Courses Taught	Mostly practical	4	57.1
	Mostly theory	1	14.3
	Both	2	28.6
Gender	Female	3	42.9
	Male	4	57.1

The figure below further shows the difference in courses that lecturers were teaching during the study.

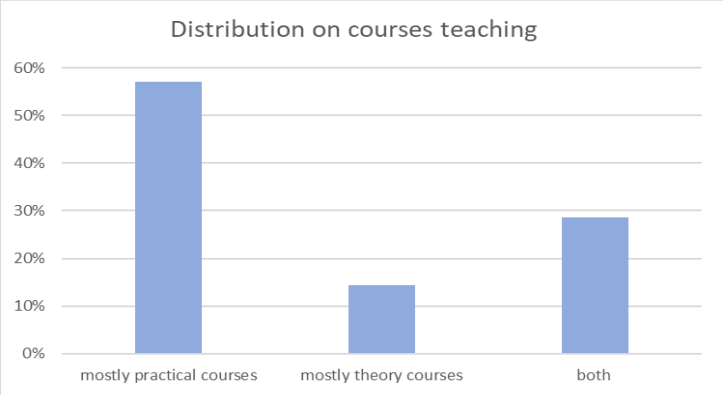


Figure 4.1 Distribution of courses being taught

4.2.2 Biographical data for students

Table 4.2 below shows the distribution of student participants in different categories. Category 1 participants (aged 19-20), Category 2 (21-25 years), and Category 3 (25 years and older).

Table 4.2: Distribution of participants by demographic characteristics

Variable	Category	Frequency	Percent
Age group	19 to 21 years	16	20.3
	21 to 25 years	52	65.8
	Over 25 years	11	13.9
Year of study	Second	44	55.7
	Third	35	44.3
Gender	Female	56	70.9
	Male	23	29.1

Most students who participated were doing their second year of study (55.7%), and only 44,3% were doing third year. Of the 79 students who participated in the study, there were 56 females (70,9%) and 23 males (29,1%). The Chart 4.2 below shows that of the 79 students who participated in the study, the majority of them were located in Category 2 (65.8%), followed by Category 1 (20.3%) then Category 3 (11%).

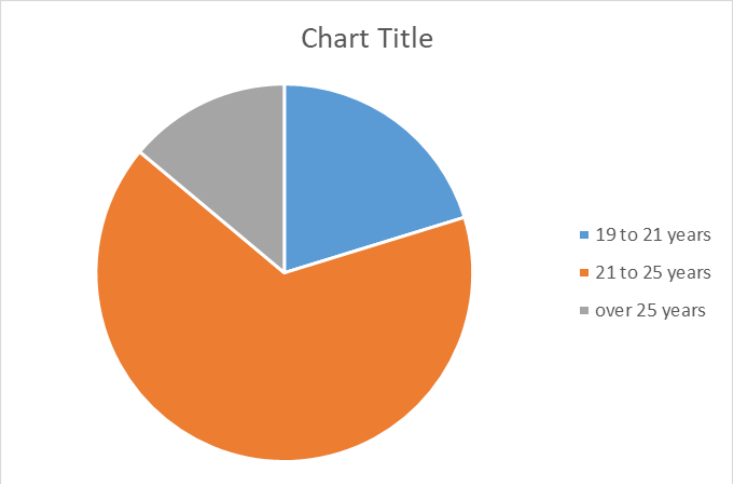


Figure 4.2 Frequency distribution of ages of students

4.3 VARIABLE DERIVATION FOR LECTURERS AND STUDENTS

For lecturers, the data was based on forty-five items of which thirteen addressed frequency of technology use, ten items dealt with technological knowledge, six items measured technological content knowledge, ten items measured technological pedagogical knowledge, and the remaining six measured technological pedagogical content knowledge.

For students, the data was based on twenty-nine items, with thirteen items that addressed frequency of technology use, ten items dealt with technological knowledge and the remaining six items measured technological content knowledge. Based on this distribution of items, five variables were derived for lecturers from the

forty-five items, whilst for students three variables were derived from the twenty-nine items. These are all explained below.

4.4 TECHNOLOGY USE

4.4.1 Technology use for lecturers

Thirteen different technologies were listed and lecturers were asked to indicate their frequency of use of these learning tools. For each technology, a Likert-type scale of four frequency levels for the current academic year was given for lecturers to tick their responses. The frequency levels were coded 1 to 4 with 1 representing *Never,* 2 representing *Less than five times (1-5)*, 3 being *Six to nine times*, and 4 being the highest value representing the most used technology, that is used *Ten times or more* in the academic year.

Table 4.3: Distribution of technology use for lecturers

Technology used	Frequency of use			
	Never	< 5 times	5-10 times	> 10 times
Whiteboard (dry erase)	0 (0.0)	0 (0.0)	1 (20.0)	4 (80.0)
Overhead projectors	1 (16.7)	2 (33.3)	2 (33.3)	1 (16.7)
Internet video, that is YouTube, etc.	0 (0.0)	4 (57.1)	1 (14.3)	2 (28.6)
Digital cameras	4 (57.1)	3 (42.9)	0 (0.0)	0 (0.0)
E-mail communication with students for instruction	2 (28.6)	4 (57.1)	0 (0.0)	1 (14.3)
Online discussion forums	5 (71.4)	1 (14.3)	1 (14.3)	0 (0.0)
Assigning task requiring computers	0 (0.0)	3 (42.9)	2 (28.6)	2 (28.6)

Teaching in a computer lab	0 (0.0)	2 (28.6)	3 (37.5)	2 (28.6)
PowerPoint presentation	2 (28.6)	1 (14.3)	1 (14.3)	3 (42.9)
Blackboard or WiSeUp	1 (14.3)	3 (42.9)	2 (28.6)	1 (14.3)
Library research	0 (0.0)	3 (42.9)	2 (28.6)	2 (28.6)
Internet research	0 (0.0)	2 (28.6)	2 (28.6)	3 (42.9)
Personal e-mail	5 (71.4)	1 (14.3)	0 (0.0)	1 (14.3)

It should be noted that, on the use of whiteboard, of the seven lecturers two did not choose any of the categories listed. Of the remaining five, four indicated to be using the whiteboard the most, with internet videos being barely used in the fashion programme, whilst four lecturers never used a digital camera at all in their classrooms for learning. The results also showed that lecturers do not communicate with students very often, as two lecturers indicated 'never', with four lecturers indicated that they use these communication technologies very rarely.

4.4.2 Technology use for students

The study also looked at students' views on the frequency of use of these learning tools by their lectures. The same list of thirteen items was used to examine the views of students regarding the use of these learning tools by their lecturers. The results from Table 4.4 below show that students claim that lecturers are using the internet the most (67.9%).

According to students, lecturers seem to be using computer labs for teaching a lot (57.7%), and 55.1% of the students reported a high use of the research library by the lecturers (55.1%). Similarly, the results from the students' view, 84.4% indicated no use of digital cameras in the fashion program, and 42.9% reported that no online discussions took place. Students viewed that lecturers barely use emails to communicate, with 39.5% indicating to barely using it.

From the results, students also indicated that there was a big number of lecturers using Blackborad or WiseUp (40.8%) and students accessed, uploaded learning materials like notes, assignments, and tests. According to the results from students, lecturers' use of email to communicate with students was very low (18.4%).

Table 4.4: Distribution of technology use as viewed by students

Technology used	**Frequency of use**			
	Never	**< 5 times**	**5-10 times**	**> 10 times**
Overhead projectors	12 (15.2)	33 (41.8)	24 (30.4)	10 (12.7)
Internet video, that is YouTube, etc.	20 (26.3)	19 (25.0)	15 (19.7)	22 (28.9)
Digital cameras	65 (84.4)	6 (7.8)	4 (5.2)	2 (2.6)
E-mail communication	19 (25.0)	30 (39.5)	13 (17.1)	14 (18.4)
Online discussion forums	33 (42.9)	19 (24.7)	13 (16.9)	12 (15.6)
Completing task requiring computers	11 (14.5)	19 (25.0)	25 (32.9)	21 (27.6)
Teaching in a computer lab	5 (6.4)	13 (16.7)	15 (19.2)	45 (57.7)
PowerPoint presentation	16 (20.8)	26 (33.8)	17 (22.1)	18 (23.4)
Blackboard or WiSeUp	13 (17.1)	22 (28.9)	10 (13.2)	31 (40.8)
Library research	2 (2.6)	21 (26.9)	12 (15.4)	43 (55.1)
Internet research	2 (2.6)	13 (16.7)	10 (12.8)	53 (67.9)
Personal e-mail	28 (35.4)	26 (32.9)	9 (11.4)	16 (20.3)

There seemed to be different views regarding the use of whiteboard, as lecturers indicated use of this learning tool the most (80%), but only 24.7% of student

participants indicated that lecturers used whiteboard the most. There seemed to be similarities found on the use of overhead projectors, email communication, and WiSeUp.

4.5 COMPARISONS ACROSS LEVELS OF DEMOGRAPHIC CHARACTERISTICS

Due to the fact the study looked at only seven lecturers in the Fashion Department, comparison across levels of demographic characteristics could not be statistically performed. The data below presents the results of the comparison across levels of demographics characteristics for student participants only.

The two independent samples t-test were used for comparing technology use scores between males and females and between second and third years. The results of the test are presented in Table 4.5 below and they show that the technology use scores significantly depended on gender (t=-2.7; p=0.0098) but not on year of study (t=-1.7; p=0.0876). The gender effect detected is such that males in the fashion programme (71.1%) have a significantly higher technology use score than females (61.4%).

Table 4.5: Tests for equality of technology use by students across gender and year of study

Variable	Category	N	Mean	t	P
Gender	Female	44	61.4	-2.7	.0098
	Male	19	71.1		
Year of study	Second	36	61.7	-1.7	.0876
	Third	27	67.7		

Table 4.6 below is a confirmation of the results already given above. The table shows the differences in the means of the technology use scores by gender and by year of study together with their confidence intervals. The difference in technology use scores by gender was found to be -9.7 with a 95% confidence interval of -16.96; -2.42.

Table 4.6: Mean differences and confidence intervals of technology use

Variable	Mean difference	95% confidence limits	
		Lower limit	Upper limit
Gender	-9.7	-16.96	-2.42
Year of study	-6.0	-12.99	0.92

The results in Table 4.7 below show that the technology use of lecturers, as viewed by the students, was lowest for the under 21 years (58.0%) followed by 21-25 years (64.4%), and the over 25 years age group had the highest score of 72.5%.

Table 4.7: Mean technology use and F test for age effect (students)

Age group	N	Mean	F	p-value
Under 21 years	13	58.0	3.185	0.040
21-25 years	41	64.4		
Over 25 years	9	72.6		

In order to determine the groups that significantly differed from the others, Tukey's multiple comparison procedure was used. Table 4.8 below shows the results from Tukey's test that the under 21 years and the over 25 years age groups are

significantly different, with the older group assigning a higher score to technology usage by lecturers. However, this analysis could not detect differences between these groups and the 21-25 years age group. The mean differences and associated p-values and confidence intervals are also shown in the table below.

Table 4.8: Multiple comparison procedures for comparing the age groups

Age group	Comparison group	Mean difference	Std. error	p-value	95% CI	
					Lower limit	Upper limit
Under 21 years	21 - 25 years	-6.5	4.270	.292	-16.72	3.80
Under 21 years	Over 25 years	-14.7	5.817	.038	-28.64	-0.68
21-25 years	Over 25 years	-8.2	4.938	.229	-20.07	3.66

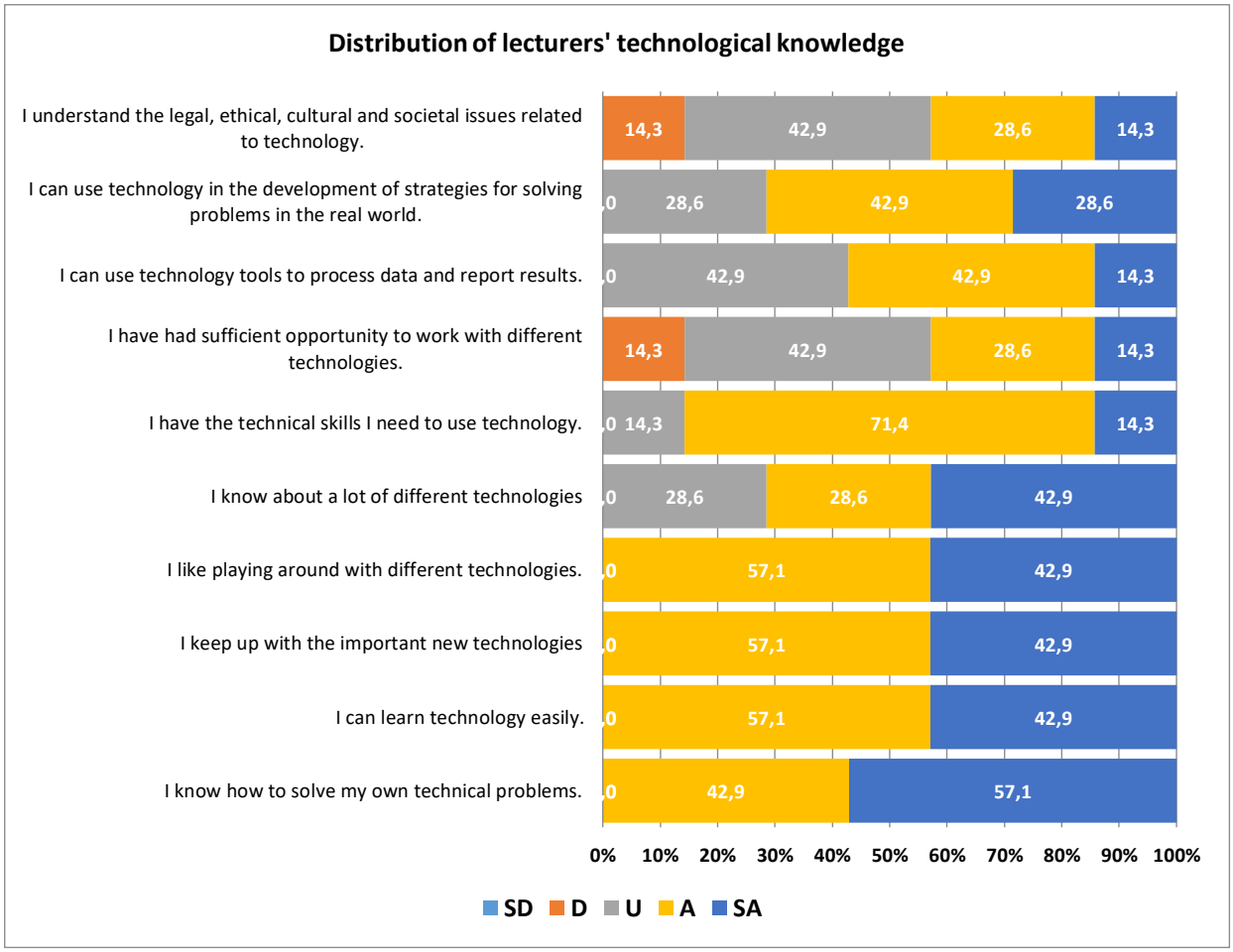
4.6 TECHNOLOGY KNOWLEDGE

Technology knowledge for both lecturers and students was measured using ten items, measured on a five point Likert scale of strongly disagree to strongly agree which was coded as 1 to 5 with low values indicating low agreement.

Before deriving the technology knowledge variable, the items were tested for internal consistency using the Cronbach's alpha reliability coefficient. The items were found to have a Cronbach's reliability coefficient of 0.76, which is higher than the acceptable level of 0.70. Having established internal consistency of the items, the technological knowledge variable was derived as the mean of the values of the

10 items. Table 4.9 below shows the results of distribution of lecturers' response to technology knowledge items.

Table 4.9: Distribution of lecturers' response to technology knowledge items



4.6.1 Technology knowledge for lecturers

Just like technology use, technological knowledge of lecturers could not be statistically analysed. The table below shows the responses of lecturers on the ten statements that were used to measure technology knowledge. Lecturers seem to either agree or strongly agree with the majority of the statements. The results also show that five out of seven lecturers agree that they have the necessary skills

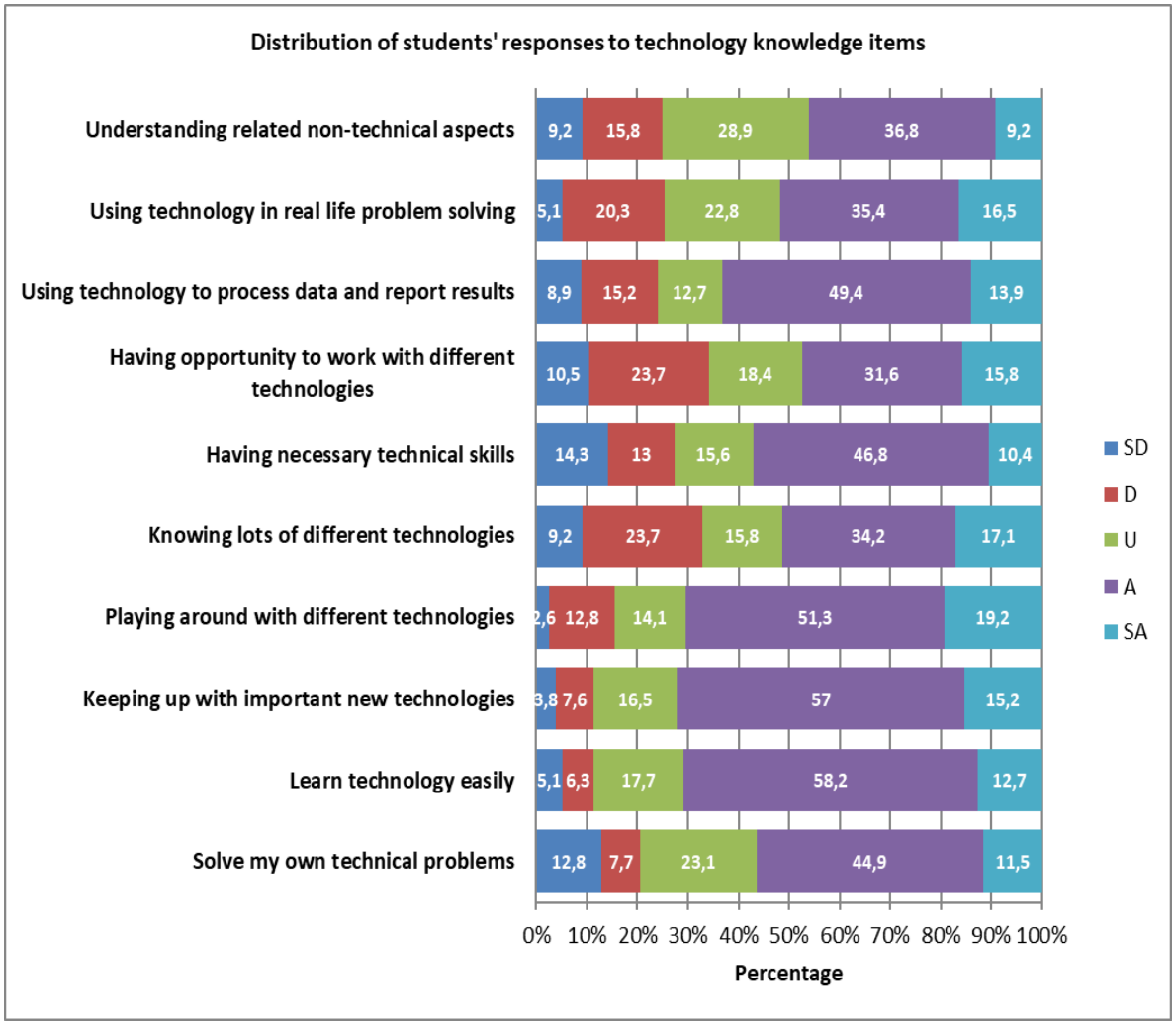
needed to use technology, with one lecturer strongly agreeing to the statement and the other one disagreeing.

This can suggest that lecturers have a high technology knowledge. Of interest though is to see how lecturers can use this high technology knowledge for facilitation of teaching and learning in the fashion programme for the benefit of students.

4.6.2 Technology knowledge for students

Table 4.10 below shows the technology knowledge of students measured on the ten statements, the same as the lecturers. The results show a high number of student participants agree and strongly agree to keeping up with latest technologies (72.2%). This was followed by learning technology easily (70.9%), and 70.3% student participants agree and strongly agree to playing around different technologies. The table below shows the distribution of students, responses to technology items.

Table 4.10: Distribution of students' responses to technology knowledge items



4.6.3 Comparison of the technology knowledge of students by gender

The technology knowledge scores of the females were lower than those of males. To determine if this difference was statistically significant, a statistical test was carried out and the results in Table 4.11 below shows that technology knowledge does not depend on gender.

Table 4.11: Students' t-tests for equality of factor variables by gender

Variable	Gender	N	Mean	t	p-value
Technology knowledge	Female	56	3.7	-1.8	0.083
	Male	23	4.0		

The results are further confirmed by the 95% confidence intervals of the mean differences shown in Table 4.12 below. The table shows the comparison about students' demographic characteristics.

Table 4.12: Mean differences by gender and their 95% confidence intervals

Variable	Mean Difference	Std. Error Difference	95% Confidence Limits	
			Lower	Upper
Technology knowledge	-0.32	0.181	-0.68	0.04

4.6.4 Technology knowledge of students by year of study

The same picture as with gender is depicted in the case of year of study. The results show that third year students have higher technology knowledge scores compared to second year students. However, the difference between these two years of study is less pronounced than the one between males and females. The significance of the differences by year of study was tested and the results are presented under year of study comparisons below.

4.6.5 Technological knowledge of students' comparison by year of study

The results in Table 4.13 below show that technology knowledge does not depend on year of study. The p-values associated with these variables are both greater than 0.05. These results are confirmed by the 95% confidence intervals of the mean differences shown in Table 4.13.

Table 4.13: Students' t-tests for equality of factor variables by year of study

Variable	Year	N	Mean	t	p-value
Technology knowledge	Second	44	3.8	0.8	.442
	Third	35	3.7		

Table 4.14: Mean differences by year of study and their 95% confidence intervals

Variable	Mean Difference	Std. Error Difference	95% Confidence Limits	
			Lower	Upper
Technology knowledge	0.13	0.168	-0.21	0.47

4.6.6 Technological knowledge of students' comparison by age group

The results in the Table 4.15 below shows that technology knowledge does not depend on age group. The p-values associated with these variables are both greater than 0.05. These results are confirmed by the 95% confidence intervals of the mean differences shown in Table 4.14.

Table 4.15: Age group means and ANOVA F tests for equality of means

Dependent Variable	Age group	Mean	F	p-value
Technology knowledge	Under 21 years	3.7	0.03	.974
	21 - 25 years	3.8		
	Over 25 years	3.8		

Table 4.16: Mean differences and their corresponding 95% confidence intervals

Dependent Variable	Group	Comparison group	Mean Difference	95% Confidence Interval	
				Lower limit	Upper limit
Technology knowledge	Under 21 years	21-25 years	-.04	-.55	.48
	Under 21 years	Over 25 years	-.07	-.77	.64
	21-25 years	Over 25 years	-.03	-.63	.56

4.7 TECHNOLOGICAL CONTENT KNOWLEDGE

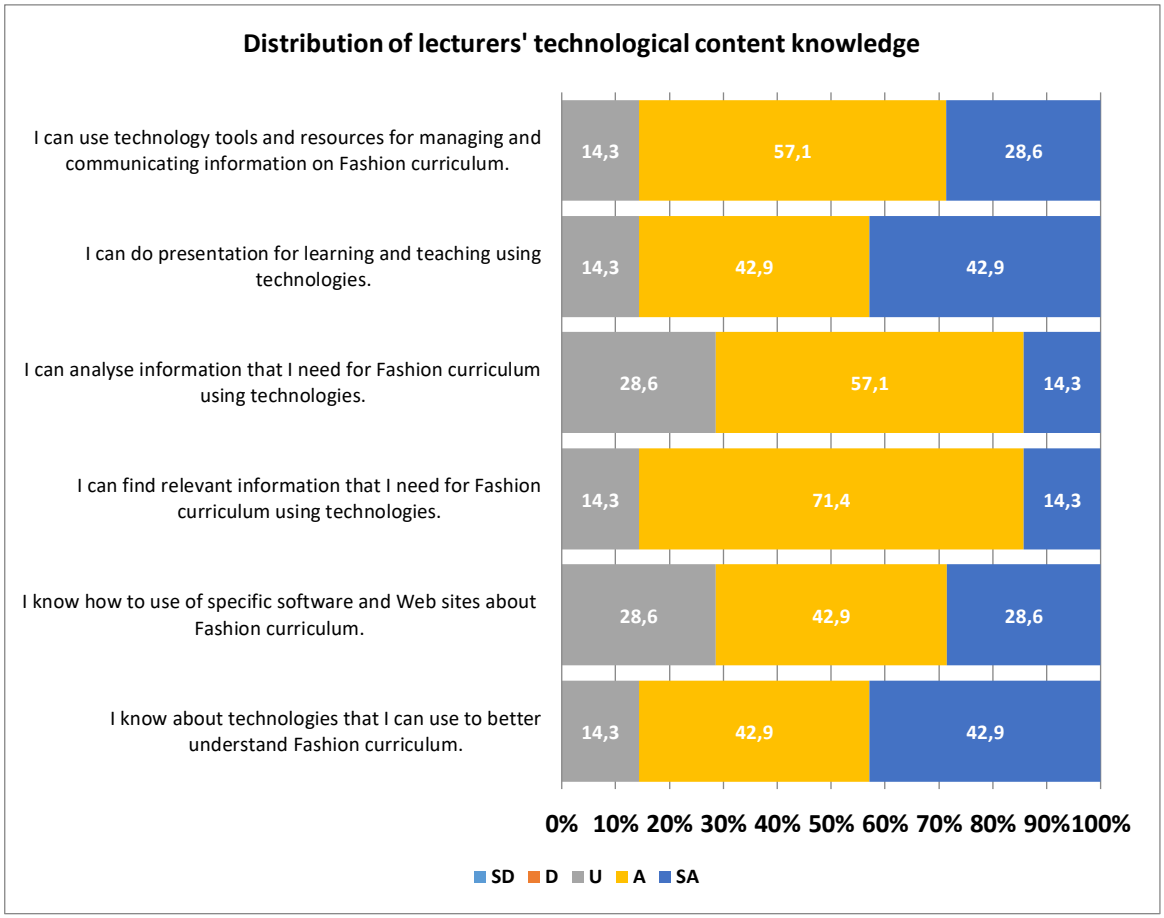
Technological content knowledge for both lecturers and students was measured using six items, measured on a five point Likert scale of strongly disagree to strongly agree which was coded as 1 to 5 with low values indicating low agreement.

4.7.1 Technological content knowledge of lecturers

The same with technology use and technological knowledge, technological content knowledge of lecturers could not be statistically analysed. The table below shows the responses of lecturers on the six statements that were used to measure technology content knowledge. It was interesting to observe that lecturers either agree or strongly agree with all the statements.

The results show that five out of seven lecturers agree to know how to use technologies to find the relevant information needed for the fashion curriculum, with one lecturer strongly agreeing to the statement and the other one disagreeing. Out of seven lecturers, six lecturers reported to use technology tools and resources for managing and communicating information on the fashion curriculum, with lecturers strongly agreeing to the statement.

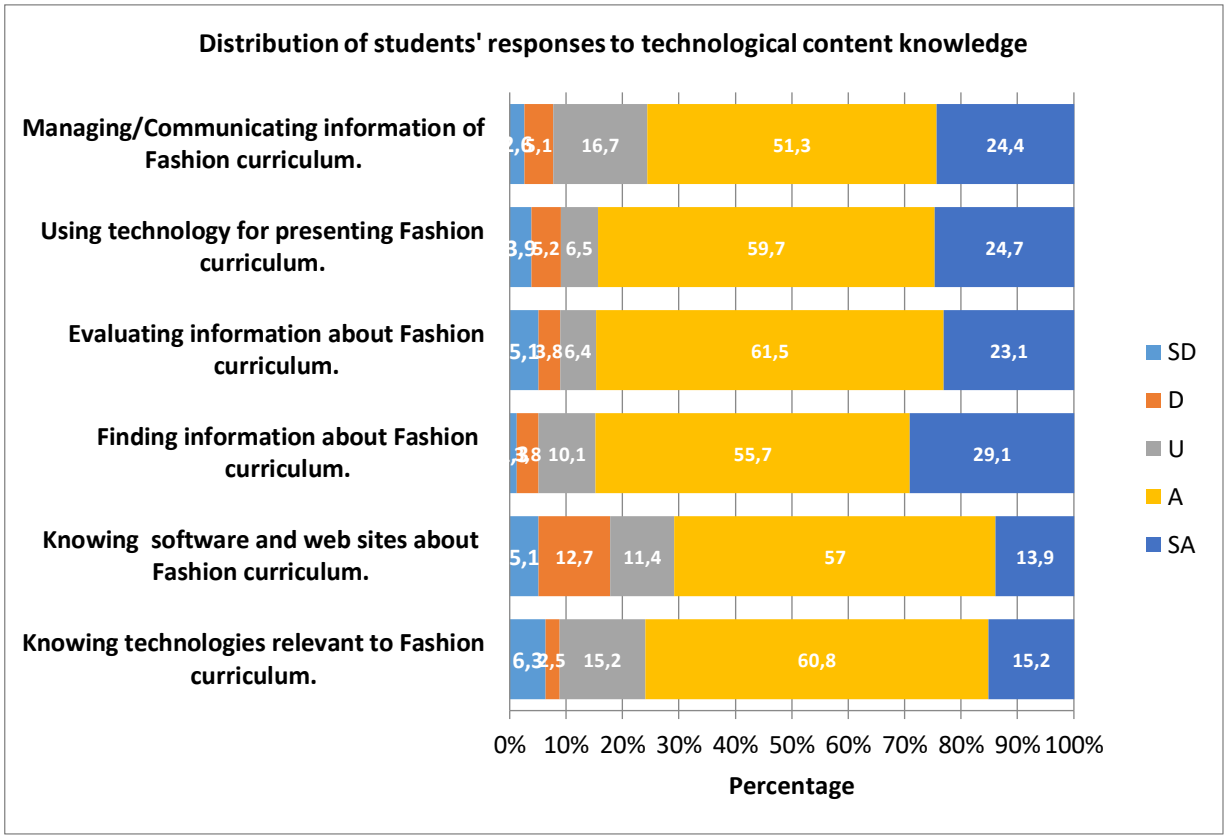
Table 4.17: Distribution of lecturers' responses to technology content knowledge



4.7.2 Technological content knowledge of students

Table 4.18 below shows the technology content knowledge of students measured on the six items, the same as the lecturers. The results show a high number of student participants to either agree or strongly agree to the majority of the statements, with evaluating information about fashion scoring more (61.5%) and 60.8% student participants know about technologies relevant to fashion curriculum.

Table 4.18: Distribution of students' responses to technology content knowledge items



According to the results, students seem to have a high technological content knowledge and the data about the comparison of students' demographic characteristics is presented below:

4.7.3 Technological content knowledge of students' comparison by gender

The results showed that males scored slightly higher than females on the technological content knowledge variable. To determine if this slight difference was statistically significant, tests for statistical significance were carried out and the results are presented in Table 4.19 below.

Table 4.19: Student's t-tests for equality of factor variables by gender

Variable	Gender	N	Mean	t	p-value
Technological content knowledge	Female	56	3.7	-0.9	0.394
	Male	23	3.8		

As with technology knowledge, results show that technological content knowledge do not depend on gender. Note that the p-values associated with these variables are both greater than 0.05. These results are confirmed by the 95% confidence intervals of the mean differences shown in Table 4.20.

Table 4.20: Mean differences by gender and their 95% confidence intervals

Variable	Mean Difference	Std. Error Difference	95% Confidence Limits	
			Lower	Upper
Technological content knowledge	-0.17	0.198	-0.56	0.22

4.7.4 Technological content knowledge of students' comparison by year of study

Similar to the results for gender, technological content knowledge may not be significantly different between second and third year students although third years

appear to have a slightly higher value. The results of the tests for statistical significance of the year of study effect are presented in Table 4.21 below.

The results in the table below are the same with technology knowledge showing that technological content knowledge does not depend on year of study. The p-values associated with these variables are both greater than 0.05. These results are confirmed by the 95% confidence intervals of the mean differences shown in Table 4.21.

Table 4.21: Students' t-tests for equality of factor variables by year of study

Variable	Year	N	Mean	t	p-value
Technological content knowledge	Second	44	3.8	0.7	.458
	Third	35	3.6		

Table 4.22: Mean differences by year of study and their 95% confidence intervals

Variable	Mean Difference	Std. Error Difference	95% Confidence Limits	
			Lower	Upper
Technological content knowledge	0.14	0.181	-0.23	0.50

4.7.5 Technological content knowledge of students' comparison by age group

The results showed that technological content knowledge increases slightly with age. The under 21 year age group had the lowest score followed by the 21-25 years group and then the over 25 years age group. The statistical significance of these graphical differences was tested and the results are presented in Table 4.23. The results in Table 4.23 below show that technological content knowledge does not depend on age group. The p-values associated with these variables are both greater than 0.05.

Table 4.23: Age group means and ANOVA F tests for equality of means

Dependent Variable	Age group	Mean	F	p-value
Technological content knowledge	Under 21 years	3.7	0.28	.759
	21 - 25 years	3.7		
	Over 25 years	3.9		

These results are confirmed by the 95% confidence intervals of the mean differences shown in Table 4.24.

Table 4.24: Mean differences and their corresponding 95% confidence intervals

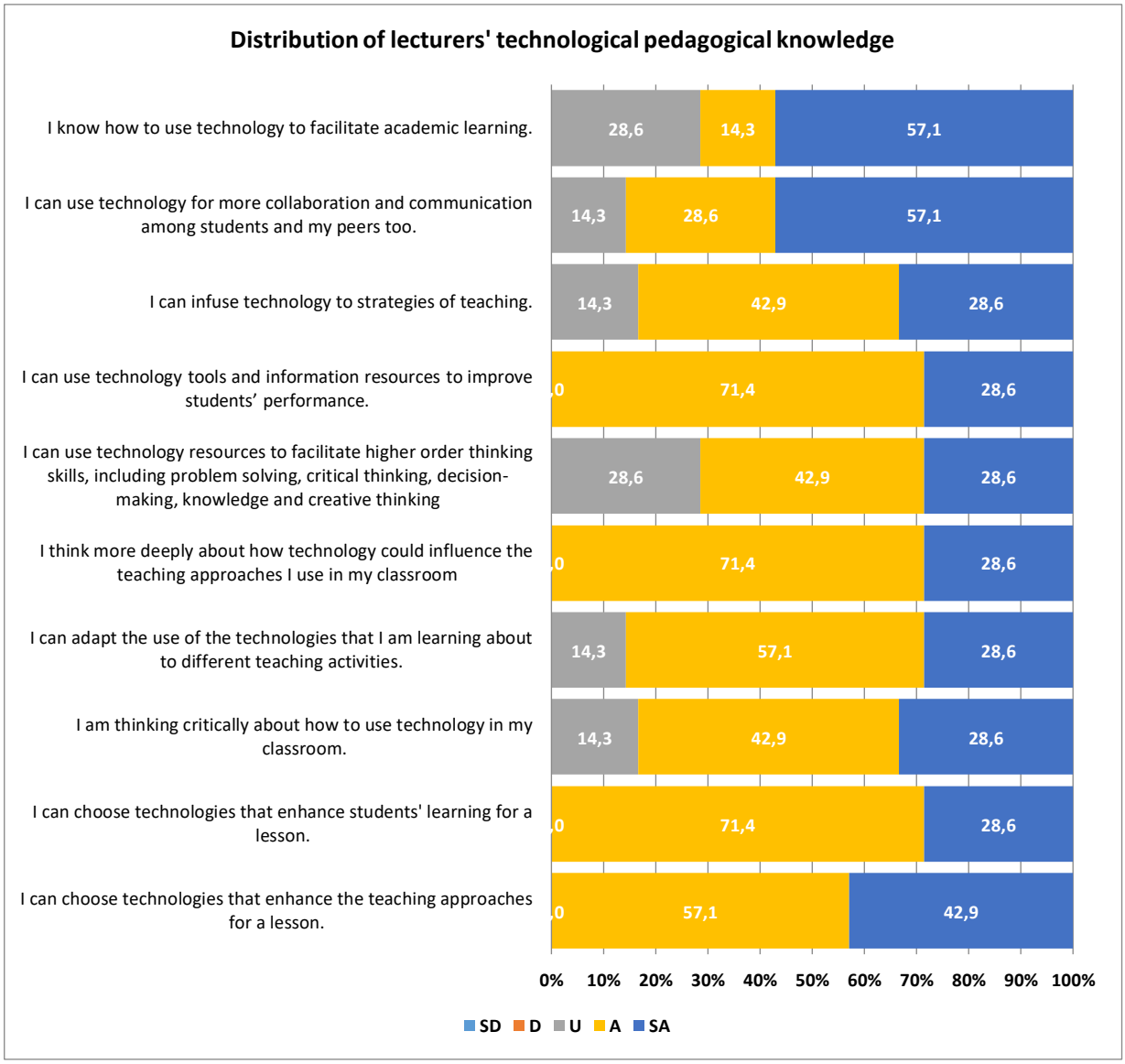
Dependent variable	Group	Comparison group	Mean difference	95% Confidence Interval	
				Lower limit	Upper limit
Technological content knowledge	Under 21 years	21-25 years	-.02	-.57	.53
	Under 21 years	Over 25 years	-.21	-.96	.54
	21-25 years	Over 25 years	-.19	-.83	.45

4.8 TECHNOLOGICAL PEDAGOGICAL KNOWLEDGE

In this study, the data measuring technological pedagogical knowledge was gathered from lecturers only. Technological pedagogical knowledge was measured using ten items, measured on a five point Likert scale of strongly disagree to strongly agree which was coded as 1 to 5 with low values indicating low agreement.

The table below shows the responses of lecturers. Similar patterns of lecturers' responses were found, as more lecturers either agree or disagree with the statements given, with a low number of lecturers undecided.

Table 4.25: Distribution of lecturers' responses to technology pedagogical knowledge items



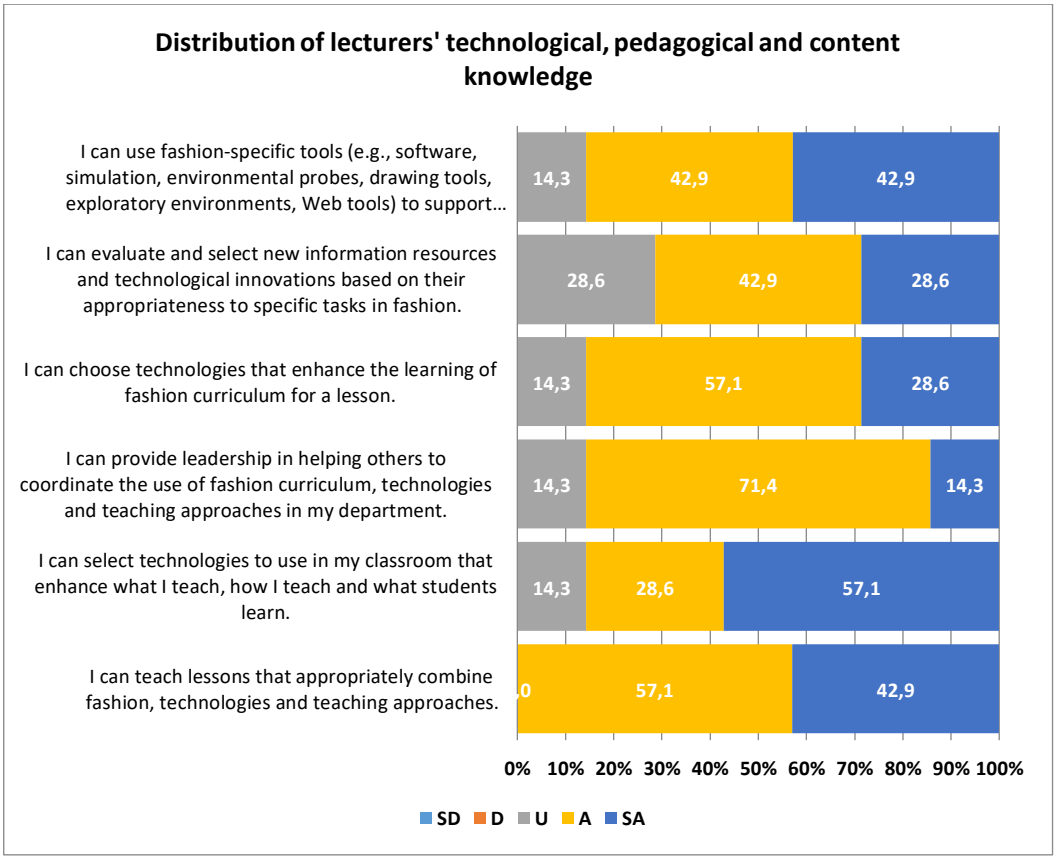
4.9 TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE

Technological pedagogical content knowledge for lecturers was measured using six items, measured on a five point Likert scale of strongly disagree to strongly agree which was coded as 1 to 5 with low values indicating low agreement.

The table below shows the responses of lecturers on the six statements that were used to measure technological pedagogical and content knowledge. A similar pattern of lecturers' responses was found, as more lecturers either agree or disagree with the statements given. The results show that all the lecturers in the programme can teach lessons that combine fashion, technologies and teaching approaches appropriately. Only two lecturers who taught mostly practical courses were undecided about evaluating and selecting new information resources and technological innovations based on their appropriateness to specific tasks in fashion.

Also interesting was to see that six out of seven lecturers can provide leadership in helping others coordinate the use of the fashion curriculum, technologies and teaching approaches, and only one was undecided.

Table 4.26: Distribution of lecturers' responses to technology pedagogical content knowledge items



It is evident from the results that lecturers in the Fashion Department seem to have a high technology pedagogical content knowledge.

4.10 CONCLUSION

The chapter analysed, interpreted the results and presented these findings in numerical table form and graphical presentation. The data from the open-ended questionnaire was also analysed and a summary of this analysis will be presented in the following chapter. It will discuss the results of the findings presented in this chapter and discuss the summary of the open-ended questions.

CHAPTER FIVE: DISCUSSION, IMPLICATIONS AND CONCLUSION

5.1 INTRODUCTION

The previous chapter presented the research findings on the views of lecturers and students concerning technology integration in the fashion curriculum in WSU, Butterworth campus. The study focused on TPACK to assess technology integration. From the results, it emerges that there is a need to integrate technology in the fashion design programme in WSU. Based on the conclusions drawn from the study, this chapter considers some implications based on the views of both lecturers and students on integrating technology in the fashion design programme.

5.2 TECHNOLOGY USE

The study examined the views of both lecturers and students on the frequency of technology use by lecturers to support teaching and learning. The results showed that the majority of the students (86.1%) who participated in the study were 25 years old or younger. One assumes that these students were brought up in an era with more exposure to technology than the preceding generations. This is the generation that is referred to as 'net generation' (Tapscott, 2009) and 'digital natives' (Prensky, 2001a). It is further assumed that this generation already play an active role using technology in their social spaces, it would seem reasonable to expect them to be more ready to integrate technology in their learning spaces too. This generation according to Jones and Shao (2011, p. 40) are "understood to prefer receiving information quickly, rely on communication technologies, often multi-tasking and having low tolerance of lecturers, preferring active rather than passive learning".

5.2.1 Internet use

From the thirteen items that were given, the results showed that internet research was the type of technology that most students declared they used most often by lecturers (67.9%), followed by library research at 55.1%. Teaching in computer labs also scored high for students at 57.7%. Computer labs in the Fashion Department were also used as teaching labs, for non-computer based subjects due to lack of classroom space. This does not mean that because students are in the computer lab that they are using computers for learning as only 27.9% reported frequent use of computers to complete tasks requiring the use of computers.

5.2.2 Age and technology use

Even though the results showed that the technology use does not significantly depend on age, there is a lot of literature that describes university students as 'digital resident[s]' (Wright, White, Hirst, & Cann, 2014). According to the aforementioned authors, this simply means students are accustomed to experiencing digital technologies as seamless, 'always-on' and highly participatory in social spaces. The results also support what has been pointed out by M. Henderson, Selwyn, and Aston (2017, p. 1568) that "for students, digital technologies are a way of life rather than discrete functional tools that can be switched on and off".

5.2.3 Use of WiseUp

The results also showed that 40.8% of students used WiSeUp the most. WiSeUp is a learning management system and a course management system in use at WSU. These results also revealed only one lecturer seemed to use WiSeUp the most, in particular, the lecturer who taught mainly theory subjects. By contrast the lecturers who taught both practical and theory subjects used it about five to ten times.

The same lecturer who taught mainly theory subjects was the only one who responded to using email communication with students the most. The results also revealed that five out of the seven lecturers never used an online discussion with students despite it being the official learning management system at WSU.

5.2.4 Use of whiteboard

The results of this study, which showed the majority of lecturers using the whiteboard for teaching and learning, seems to corroborate the findings of Sutton and DeSantis (2017). These authors confirm that lecturers continue to use the tools that they know best. Even though a technology learning tool like WiSeUp is available for use by all in the university, its usage does not seem to be fully optimized, especially by the lecturers who continue to use the whiteboard. As with WiSeUp, technology solutions that are easy, effective and affordable now exist, but the challenge that remains is on how to empower lecturers to invest their time and energy to discover these opportunities in order to integrate technologies in their practice (Sutton & DeSantis, 2017).

The use of technology in fashion design programmes seems to vary considerably between the nature of subjects, namely, between practical and theory. As noted by (Sandholtz, 1997) more than twenty years ago, teachers have insight into student needs and progress, and teachers are therefore responsible for juggling knowledge, curricular activities and materials used. This means that lecturers need to shift from the traditional way of teaching (chalk and talk) and adopt contemporary technologies which will benefit students. The teacher-related variables that influence integration of technology, as pointed out by Snoeyink and Ertmer (2001), are the teachers' willingness to change their long standing pedagogical practices and teachers' ability to integrate technology (Fryer, 2003).

5.2.5 E-mail communication and on-line discussions with students

Only one lecturer reported the use of e-mail for communicating with students. The results about using e-mail communication were similar to those from students' views, with only 15,6% of students confirming the use of e-mails by lecturers. On the other hand, 42.9% of students reported that lecturers have never utilized online discussion forums. E-mail and online discussion forums are the communication technologies that are available for use in the department. If they are effectively used they can strengthen the departmental interactions as students will have increased access to lecturers as they provide and solve curriculum related problems jointly (Chickering & Ehrmann, 1996).

In light of all the challenges facing higher education all over South Africa, especially concerning student protests that lead to class disruptions which have become the 'new normal', one would assume there should be a very high use of these technologies, especially communication technologies. This would help both lecturers and students to continue to interact with the curriculum even out of campus, thus making up for the time lost during unrest events.

5.3 TECHNOLOGY KNOWLEDGE

5.3.1 Technology knowledge of lecturers

Ten items were used to measure the knowledge of technology for both lecturers and students. From the results lecturers seem to have a high technology knowledge as they either agree or strongly agree to most items like:

I know how to solve my own technical problems.

I can learn with technologies easily.

I keep up with the important technologies.

I like playing around with different technologies.

Technology knowledge of students

The same results of high technology knowledge were found with students. This is evident as the results show a high percentage of participants in the 'agree' and 'strongly agree' columns of the items. For example, according to the results, 72.2% of student participants like to keep up with important technologies, 70.9% seem to learn technology easily, while 70.5% like playing around with different technologies, and also 63.3% are able to process data and report results. Even though the results show students to have high technology knowledge, the complex changes in students as noted by Jones and Shao (2011) are related to age coupled with the newest wave of technology. The most prominent use of technologies for students involve social networking sites (e.g. Facebook), uploading and manipulating of multimedia (e.g. YouTube) and the use of hand-held devices to access mobile internet (Jones & Shao, 2011). It is important for lecturers to appreciate and try to understand how these digital practices can be incorporated into the education context.

5.3.2 Need for technology as viewed by lecturers

The three-part open-ended question was given to both lecturers and students. The question asked if there was a need for technology in the fashion programme and, if so, why and how it would be used. The most frequently raised response was the use of technology for *facilitation of learning.* Lecturers mention WiSeUp as being wonderful for connectivity with the student. For example:

> *L1: Technology is a way of life, so it should be used in the fashion programme. The WiSeUp facility is the wonderful tool to make information available to students and to facilitate their learning. However, students also need manual skills to form the basis of their learning.*
>
> *L5: There is a need for technology, fashion is evolving very fast therefore technology needs to be incorporated into the curriculum to help with methods of fast delivery and students to be easily employable.*

L7: I think technology makes teaching and learning more easy and appropriate.

There was evidence from the lecturers' responses on the need for integrating technology in the fashion curriculum, but there was no information regarding how lecturers see themselves using it, thus still confirming what Jonassen and Reeves (1996) highlighted more than twenty years ago. This referred to the lack of clear consensus on how technology can enhance and improve learning, even though there is a growing body of research suggesting this. Digital technologies such as computers, handheld devices and software applications, are "protean (useable in many different ways)" Mishra and Koehler (2006, p. 61). Digital technologies are also "unstable (rapidly changing), and opaque (the inner workings are hidden from the users)" (Mishra & Koehler, 2006, p. 61).

The main purpose of using open-ended questions was to allow for a deeper understanding of the use of technology in fashion. As already mentioned, it was disappointing that the third part of the questionnaire (How would you use it?) was not answered at all by lecturers. This made it difficult to gain more insight into this topic. This is one of the disadvantages of the research instrument used, as written responses did not give the opportunity to probe for further information, and participants can also be limited by the space in the questionnaire.

As much as lecturers display high technology use judging from the results, the different characteristics that technologies have can in many ways present new challenges to lecturers who are struggling to use technology in their teaching.

5.3.3 Need for technology as viewed by students

One of the mostly raised benefits of technology by students was using 'technology as a tool'. These tools varied from using technology to do patterns, pattern grading, photoshop and presentation. As with the lecturers, the mostly cited tool mentioned by students was using CAD for pattern making, and pattern grading.

CAD is widely used for pattern making, pattern grading, marker making, and textile design and is also fundamental in the application of mass customization (Romeo & Lee, 2013). Pattern grading is the process of producing big and small sizes from the master pattern, and this can be done digitally and manually. When doing digital pattern grading on CAD, "with the help of a digitiser it is possible to input existing block patterns into virtually any of the various software packages that are currently available, and thus an extensive library of patterns in many sizes can be efficiently stored on the computer for future use" (Sayem et al., 2010, p. 1). Pattern making is done manually and students alluded that, if CAD pattern making could be used, that would save time and would also serve as an efficient way of storing their master patterns and block patterns. For example:

> *S8: Yes, there is need for computerized patterns, sometimes when you do your manual patterns, and something happens then you lose and yet if it was on computer you would have saved it for future use*.
>
> *S18: Yes, it is easier and much faster to your pattern grading on computer*.
>
> *S66: Yes, doing pattern with a brown paper takes a lot of time.*

Another frequently talked about benefit centred on *catching up, keeping up-to-date with information including fashion trends, and awareness.* Also, often mentioned was *the role that technology can play in augmenting students' learning or emphasizing of learning that was done in class.* For example:

> *S9: Yes, you can watch videos, when there is something that you don't understanding. In most cases lecturers just give you work without explaining how to do it.*
>
> *S5: Yes, we need technology in order for us to understand exactly what the lecturer is saying.*

Even though this was an open-ended question, the same as for lecturers, student participants could not adequately express their opinions on the issue. The data gathering instrument did not allow for further probing in order to gain an understanding on this issue. This was the disadvantage of the instrument, even though it was assumed that the three-way open-ended type of a question would allow participants to give as many responses to the questions as possible.

Even though the research instrument used limited the ability of the researcher to gain a better understanding of the participants' true attitudes about their knowledge of technology, it was evident from the responses (both lecturers and students') that there is a need for integrating technology in the fashion curriculum.

5.4 TECHNOLOGICAL CONTENT KNOWLEDGE

Technological content knowledge for both lecturers and students was measured using six statements as discussed below.

5.4.1 Technological content knowledge of lecturers

As with technology knowledge, most lecturers agreed and strongly agreed with most of the six statements that measured their technological content knowledge. Interestingly, only two out of seven lectures were undecided about knowing how to use the specific software about fashion. This finding indicates that, even though most lecturers know about the specific software, the use of these forms is evidently absent in practice.

The only frequently mentioned software was CAD, which is the only one that is currently in use in fashion design. Only one lecturer made mention of the computerized garment sewing machine that the department does not have. This can suggest that lecturers are probably aware of the other specialised technologies available in the fashion industry, but possibly lack the understanding of how these technologies can be used for teaching and learning.

Because lecturers have a responsibility of imparting knowledge or facilitating learning for students, they are, therefore, the drivers of technology. Lecturers are mostly influential in terms of students' abilities to use technology and thus their views on the benefits of technology matter for keeping the discipline up-to-date with the cutting edge technologies that they will encounter in industry.

5.4.2 Technological content knowledge of students

The students also see technology as augmenting their learning as they refer to playing videos. This simply means students have the potential technological savvy to access information about their course, which can encourage self-learning for students. In design education, learning management systems like WiSeUp are aimed at revolutionising how institutions deliver curriculum, but are to be used as tools to support teaching and not replace face-to-face encounters (Unver, 2006).

5.4.3 Benefits of integrating technology into the fashion programme

In studying the views on integrating technology, the study also looked at what students think are the benefits of integrating technology in the fashion programme. A three-part open-ended question was asked, "*Do you think there is a need for technology in the fashion programme? If so, why and how would you use it*?" The most frequently reported benefit was the information research, and keeping up to date with the latest fashion trends (which was also mentioned as a need). This confirmed the results earlier on frequent use of technology, where internet research was high, followed by library research. For example, some of the students' responses were:

> *S 19: Yes, we need technology to find relevant information about fashion*.
>
> *S28: Yes, one can collect information from the internet based on business, for example, how to open a business*.

S59: Yes, some of us don't know the fashion industry, so we can also use social media to get information.

S31: Yes, to gain more inspiration from the internet.

Students described information research as looking for inspiration or ideas to do their designs, wanting to know more about fashion and course-related requirements, for example, completion of assignments, in particular, the YouTube videos that they (students) can access using the internet. Most often these sources were cited as offering help when they had difficulties with a particular topic in class.

Fashion has greater digital content and, from the results, students do see themselves and their learning benefiting from the use of or integrating technology. The current students who are 'digital natives' are used to receiving information fast (Prensky, 2001a,b) and this should not be confused with the students' demand for newer technologically centred learning. Jones and Shao (2011, p. 2) argue that "the developments about new kinds of learning environments in universities should be choices about the kinds of provision that the university wishes to make and not a response to general statement about what a new generation of students are demanding." This is the discourse that has been brought about by technology, as one would argue that the fact that we are currently in a technologically rich era, that alone demands that our pedagogies talk to the now.

5.5 TECHNOLOGICAL PEDAGOGICAL KNOWLEDGE

The TPACK framework calls for having access to technology to be nothing without connection to content and effective instructional strategies (Mishra & Koehler, 2006).

On the results from the open-ended questions from both student participants and lecturers the following emerged:

The most prominent theme was researching for information, which was understood to be in line with internet and library research. Less frequently reported was *up-to-datedness*, *keeping up with the latest trends.* One would assume that this is related to assignment deadlines and other course management requirements but, for fashion, this is looking for the latest fashion trends in relation to colours, fabric prints, and silhouettes. This is the type of information that fashion students are always looking for (which can be referred to as 'inspiration'), when they are in the conceptualisation stage of the design process. Rampersad (2011) refers to computers and associated communication as the most pervasive tool of modern society. Thus, it is assumed that greater interaction with technology in the classroom environment will enhance the learning experiences of learners.

5.5.1 Using technology for presentation

A less frequently mentioned benefit by students was the use of technology for the presentation of work. Often, the presentation of students' work in fashion design takes the form of a storyboard, depending on the nature of the subject that needs to be presented. For example, for design subjects, students are required to present their ideas visually on paper. This is done using a pen and a paper, and in some cases requires the use of very expensive boards to finish the presentation. Students manually illustrate the designs and attach pieces of fabrics and/or colour to show exactly how the finished product will look. With the use of technology students can present their portfolios digitally (e-portfolios).

An e-portfolio is a collection of student work that exhibits achievements in one or more areas over time. Videos of the process of developing the storyboard can form part of the e-portfolios, which also adds to the authentication of students' work. The students also raised *organizing and storing of 'things'* . Technology can play a vital role if used effectively in presenting students' portfolios. The e-portfolios can provide students and lecturers with a way to organize, archive and display their work. The results of this study are aligned with Jones and Shao (2011), who found that

students do not naturally use many of the most mentioned technologies for learning, such as Blogs, Wikis, and 3D virtual worlds.

5.5.2 Barriers associated with integrating technology

On barriers associated with integrating technology, the three-part question was: *Are there any technology integration barriers that you think exist in the Fashion Department? What are they and how do you think these can be solved?*

Again, CAD (pattern making and grading), as the only specialized software technology that students currently receive training on, was referred to as being outdated by both student participants and lecturers.

> *L2: Yes, the technology systems here are outdated, e.g. plotter digitizer, and general stationery for students.*
>
> *L3: Fashion software to be on pace with other universities.*
>
> *L4: Lack of computers in CAD lab, printer not working, plotter not working.*
>
> *L6: Lack of computer labs and problematic network systems. New labs with the latest technologies and software would solve the problem.*

There are financial pressures in all institutions of higher learning and universities are expected to come up with strategies to improve the quality of learning for students while at the same time resources are diminishing. CAD being the only specialised software currently being used in the fashion programme was offered without any proper equipment to use this technology effectively for students' learning. This showed that, although the department uses CAD technology, there are no up-to date, cutting-edge facilities or equipment acquired for students to interact with the software and hardware more effectively. The students only interact with CAD during the allocated time during the presence of the lecturers, and there is no time for them to get to experience or play around with it and get more

comfortable with its functions. This leaves the students without the cutting-edge knowledge and skills of how these specialized technologies can be used in the real world of the apparel industry. This software also needs to be used with other specialised software that is used in the apparel industry as referred to in the literature review.

5.6 TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE

Lecturers' technological pedagogical and content knowledge was measured using six statements to which they had to respond. The same pattern as in technological content knowledge and technological pedagogical knowledge was observed. Lecturers either agree or strongly agree to the majority of the statements, with one or two of them being undecided about some statements.

All seven lecturers reported to have the ability to *teach lessons that combine fashion, technologies and teaching approaches*, with three lecturers strongly agreeing to the statement. From the results, four out of seven lecturers strongly agree that they have the *ability to select technologies to use in class that enhances what is being taught, how it is taught and how students learn*. With the exception of only one lecturer, all others equally agree and strongly agree that they can use fashion-specific tools to support learning and research. This can suggest that lecturers in the fashion department have high technological pedagogical and content knowledge.

When the above results were again analysed in conjunction with the open-ended questions, lecturers could not explain how they used technology for teaching and learning. The majority of them mentioned the positive impact that technology has on their teaching approaches and students' learning. For example, for the open-ended question that asked them to reflect briefly on whether technology increases or improves students' learning, the following responses were received:

L1: I trust it increases learning as the student profile is valuing screen-interaction more than the traditional method.

L3: It improves learning, as some students learn well when they see videos.

L5: It improves the quality of learning due to having videos and pictures as is arouses interest and help put things into perspective.

L6: It improves my teaching. I once managed to do a project via 'what's app' with students while they were on strike, with campus being locked and closed.

Again, as with other open-ended questions in this study, the researcher could not get a deeper understanding and the feelings of the participants regarding this issue. The participants could not sufficiently express their feelings and opinions about the topic under discussion. This is another limitation of the written responses.

From the results, it is evident that students being born in the technological era - 'digital natives' - are comfortable with the use of technology. It is therefore necessary for the lecturers to understand the digital cultures that students are bringing to their courses, the educational context that students find themselves in, and the digital practices they bring to the educational context. In order for teachers to make effective use of the TPACK framework, Kurt (2018) suggest that lecturers should be open to certain key ideas, including:

1. Technology can be used to present the concepts from the content that is being taught.
2. Pedagogical practices can communicate content in various ways using technology.
3. Diverse content concepts necessitate different skill levels from students, and educational technologies can assist in addressing some of these requirements.

4. Classrooms come with students from different backgrounds – including prior educational experience and experience with technology – and lessons employing educational technologies should take this into account.
5. Educational technology can be used in tandem with students' standing knowledge, helping them to either build on earlier epistemologies or develop different ones.

The 3D garment design technology is one of the technologies that can be useful if it can be integrated into curriculum. This allows garment try-on and pattern alteration to be made on a virtual model produced from the 3D body scan data. Liu, Zhang, and Yuen (2010) point out that 3D virtual models give the opportunity to view a garment's drape and fit in different poses. Currently, this process in the development of garments involves a repeated number of samples or prototypes, including trial fittings, in order to arrive at the best and most satisfactory fit for the block that one will use to make up the final garment. Even when developing the final garment, the process mentioned above is repeated over and over again. This process becomes costly and takes a lot time, as one needs to buy fabrics, cut and make the sample, and then fit the sample.

Virtual prototyping and virtual fitting reduce both time and cost of producing a garment significantly (Sayem et al., 2010). The other benefit of 3D garment design is its ability to adjust garments that were custom designed to fit potential customers who do not conform to the standard target size and shape (Li & Lu, 2011). These types of technologies are the ones that students can benefit from and also increase interaction with lecturers, thereby promoting constructive learning.

Eight years ago Bon (2010) viewed digital tools, virtual environments and physical spaces as attributes of twenty-first century education, and this still holds true. Twenty-first century education emphasizes no boundaries, seamlessness and the integration of technologies in physical settings is essential. There are links between the design of digital tools and their affordability, physical spaces, and digital

information within the learning environments (Kirschner, 2015). As much as Jones and Shao (2011) point out the low use of 3D Virtual Worlds amongst students, they further argue that if students are required to use these technologies in their courses, they are not likely to reject them.

Lecturers need to develop up-to-date working knowledge of a range of technologies, as well as the knowledge to suitably match and apply technologies that are relevant to the content in the classroom so as to teach the digitally confident students (Wang, Myers, & Sundaram, 2012). Students will react positively to changes in teaching and learning tactics that are well presented, well explained and are entrenched properly in curriculum (Jones & Shao, 2011).

As new educational technologies become available, resources (including financing) in higher education are gradually diminishing and the demand for access to a better quality higher education is dramatically increasing. As such, lecturers need to be innovative when sourcing equipment or materials required for the facilitation of learning for their programmes.

A study conducted by Threlfall (2001) on incorporating technology into a fashion programme reveals that technological approaches need to be merged in the fashion curriculum, irrespective of the institutional budgets and lack of instructors' experience with computers. Some technologies like communication technologies can strengthen departmental interactions as students have increased access to lecturers as they share useful resources and jointly solve problems related to their studies. Learning technologies, as pointed out by Johnston and Baker (2002), are effective only when treated as one section in implementation strategies that also incorporate curricular developments, sophisticated and numerous assessment, effective professional development, well-maintained technology infrastructures and maintenance systems, and rearrangement of organizational practices.

5.7 RECOMMENDATIONS

It is evident from the study that gaps exist in the fashion curriculum regarding technology use and technology knowledge, pedagogical and content knowledge. All the identified gaps need to be addressed by the university if the vision of WSU is to be realised and achieved. There is a need for the Fashion Department to collaborate with industries to keep up with the latest technology used by the industries. These technologies need to be made available for students to use. Lecturers need to be fully trained on specialized technologies to be confident in using them for successful integration. Lecturers in the fashion design programme need to temper enthusiasm for what might be achieved through integrating technology in learning with better understanding of the realities that students encounter with technology.

Suggested technologies could include full integration of CAD which is used for both designing and pattern making. This CAD system if used effectively can help the students compile their e-portfolios, and be submitted electronically. With the use of 3d body scanners, computer generated body measurements can be shared digitally and uploaded automatically to different CAD pattern-making systems, allowing students to draft and produce their patterns.

It is evident from the study that both lecturers and students appreciate the value of integrating technology in the fashion curriculum and lecturers have a responsibility to prepare students so that they are familiar with the technologies that they will encounter as they go out to be part of the bigger world. The pedagogies used should focus on bridging the gap in knowledge and best practices in the fashion industry.

5.8 RECOMMENDATIONS FOR FUTURE RESEARCH

This study revealed a number of possible future studies, some aimed at addressing the limitations of this current study, and others at expanding the results and research findings that have emerged from this study.

- Quantitative research has a range of possible challenges when trying to probe for more insight into the responses given. Thus, it is recommended that future research look at using a mixed method research design to allow for more explanation through face-to-face interviews and possible triangulation of the findings.
- Further research could investigate the perceptions of lecturers towards the use of WiSeUp for teaching and learning in order to understand the reasons for its slow use or adoption.
- Future research could explore the same study, but in another area of study with more practical components for comparison purposes.
- Finally, future research could explore the same study, but in another university for benchmarking purposes.

5.9 CONCLUSION

Lecturers have a responsibility to be innovative about pedagogies that they use in their classrooms. These pedagogies should, by all means, support and encourage student learning in and outside classrooms. The results of the study confirmed the findings of Sutton and DeSantis (2017) that some lecturers in the fashion programme are extremely experienced in their fields, others are well-informed in teaching pedagogies, and some are very effective at using classroom technologies. All these forms of knowledge are valuable for teaching and learning, and thus lecturers who lack or have limited knowledge in any one or more of these areas are less likely to be effective than those who can draw from all three areas of knowledge.

While the data confirms technology as essential to the manner in which students experience their studies, the results also suggest that technology has not transformed teaching and learning in university yet. It is evident that the fashion curriculum and the learning environment have not been transformed to meet the current needs of our society. Transformation of the learning environment for an

increasingly electronic world in the HE settings is critical to ensure that the benefits of technology are fully appreciated (Williams & Kingham, 2003). It is evident from the literature that, to ensure that the apparel-related curriculum is aligned with the technological developments, there should be consultation with the industry in order to specify their expected skill requirements. Furthermore, comment is needed on whether or not graduates who have joined the workplace are well equipped for their jobs.

From the results, students seem to appreciate the various benefits of using technology and thus some of them talk about the modules that need to be improved and the need for increased access to computer labs.

Due to the descriptive nature of the study, the results may emphasize that, although a population represents the sum of individual views, each individual still has a specific view concerning integrating technology in the fashion programme. All these views, therefore, still need to be considered and addressed in order to produce graduates who have the relevant skills necessary to survive and participate not only in the fashion industry, but also in the global economy.

Another conclusion that can be drawn from these findings is that lecturers have high technological content knowledge, high technological pedagogical knowledge, and high technological, pedagogical and content knowledge. It is also evident from the results that lecturers seem to have a challenge in identifying and make use of situations or learning areas where educational technologies will be appropriate and identifying when and how to integrate technology into the curriculum. These results can also suggest that lecturers do learn about technologies and, therefore, they should be prepared to be learners with students in learning about technology through technology.

The results also show that students have high technology use, high technology knowledge and high technology content knowledge. All these types of knowledge

need to be tempered so that students can develop natural curiosity to use them not only in their personal or social spaces but also in educational learning spaces.

The study has confirmed the findings by Sutton and DeSantis (2017) that the inclusion of appropriate technologies in the fashion programme require a combination of vigorous content knowledge, a varied array of teaching methods and competency with developing education technologies. The diffusion model and the technological, pedagogical and content knowledge model can help leaders in higher education encourage their staff in using the emerging educational technology tools effectively. This will help lecturers to better prepare students for future careers, capitalise on best teaching practices with technology integration, cultivate high-order thinking activities, and involve students whose association with technology is becoming more and more inherent in them.

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APPENDICES

APPENDIX A: ETHICAL CLEARANCE

24 October 2017

Ms Sweetlina Nomonde Peter 9404929
School of Education
Edgewood Campus

Dear Ms Peter

Protocol reference number: HSS/0481/017M
Project title: Technology enhanced curriculum: A study a Walter Sisulu University, Fashion Department.

Full Approval – Expedited Application

In response to your application received on 4 May 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and FULL APPROVAL for the protocol has been granted.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Prof Nyna Amin
Cc Academic Leader: Dr SB Khoza
Cc School Administrator: Ms Tyzer Khumalo

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
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UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

13 March 2019

Ms Sweetlina Nomonde Peter (9404929)
School of Education
Edgewood Campus

Dear Ms Peter,

Protocol reference number: HSS/0481/017M
New project title: Lecturers' and students views of Integrating Technology in the Fashion Curriculum

Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on 20 February 2019 has now been approved as follows:

- Change in Title

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for period of 3 years from the date of original issue. Thereafter Recertification must be applied for on an annual basis.

Best wishes for the successful completion of your research protocol.

Yours faithfully

.....
Dr Rosemary Sibanda (Chair)

/ms

cc Supervisor: Professor A Nyna
cc Academic Leader Research: Professor SB Khoza
cc Post Graduate Administrator: Ms Sheryl Jeenarain

Humanities & Social Sciences Research Ethics Committee
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APPENDIX B: UNIVERSITY GATEKEEPER

DIVISION OF ACADEMIC AFFAIRS AND RESEARCH
DIRECTORATE OF RESEARCH DEVELOPMENT

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26 September 2017

Ms SN Peter
University of Kwazulu-Natal
South Africa

Dear Sir

Re: Request for Permission Letter to Conduct Research at WSU

Permission is hereby granted for the study entitled **Technology enhanced Curriculum: A study at Walter Sisulu University, Fashion Department**, provided that copies of your completed study will be submitted to the Campus Rector of the campus in which the study will be conducted and the Directorate of Research and Development

All data pertaining to Walter Sisulu University will be treated confidentially and you are required to abide by ethical principles. Finally, you will seek consent from the participants.

Regards

Dr. E.N. Cishe
Acting Director: Research Development

Walter Sisulu University

APPENDIX C: LETTERS TO THE PARTICIPANTS

10 February 2017

Dear Participants

You are invited to participate in a research study that I am undertaking. The research is in partial fulfilment of the requirements for the completion of Masters in Higher Education at the University of KwaZulu-Natal. The study is about the perceptions of both students and lecturers with regards to the integration of technology in curriculum delivery in the fashion design programme on the Butterworth campus.

There are no anticipated risks or discomfort related to this research. By participating in this research, it may help to understand how best technologies can be effectively integrated in the delivery of the fashion curriculum in WSU.

Interviews sessions will be less than one hour, and will be tape recorded to be transcribed for later analysis. Your identity will be kept confidential at all times, and questionnaires will be coded. Your participation in this research study is voluntary; you may withdraw at any stage for any reason and that will not affect your relationship with the researcher.

The results from this study will be analysed and presented in writing in the project. Any information that can be identified with you will remain confidential and will not be disclosed without your permission.

Permission to conduct this research study has been obtained from the University of Kwa-Zulu Natal. The supervisor of this project is Dr. Nyna Amin from the University of KwaZulu-Natal, School of Education.

Thank you for your co-operation.

S. Nomonde Peter

APPENDIX D: PARTICIPANTS' CONSENT FORM

I hereby confirm that I have been adequately informed by the researcher about the nature of the study. I have also read and understood the information regarding this study, and of my free will I consent to participate in this study.

Participant's Name: ……. (Please print)

Participant's Signature: ……..

Date: ……

Researcher's Name: ……. (Please print)

Researcher's Signature: ……..

Date: ……

APPENDIX E: RESEARCH INSTRUMENT

QUESTIONNAIRES FOR LECTURERS

SECTION A

BIOGRAPHICAL DATA

Indicate your most appropriate choice in each of the following with a tick (√) in the blocks provided.

1. NUMBER OF YEARS TEACHING

0-2	2 to 5	5 to 10	+10
1	2	3	4

2. COURSES TEACHING

Mostly practical courses	Mostly theory courses	Both
1	2	3

3. GENDER

Female	Male
1	2

SECTION B

Please indicate in the blocks with a tick (√) which of these technologies you have used to support learning and teaching in the last nine months and how frequently you have used them. Scale is 1=Never; 2=5 times or less; 3= 6 to 9 times; 4= 10 times and more.

TECHNOLOGIES USED	**1**	**2**	**3**	**4**
	Never	**Less than 5**	**6 to 9**	**10 & more**
Whiteboard (dry erase)				
Overhead projectors				
Internet video, that is YouTube, etc.				
Digital cameras				
E-mail communication with students for instruction				
Online discussion forums				
Assigning task requiring computers				
Teaching in a computer lab				
PowerPoint presentation				
Blackboard or WiSeUp				
Library research				

Internet research				
Personal e-mail				

SECTION C

Indicate your most appropriate choice in each of the following statements or questions with a tick (√) in the blocks provided. Read the statements carefully and decide how much it pertains to you personally, using the scale below:

1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree

TECHNOLOGY KNOWLEDGE	**1**	**2**	**3**	**4**	**5**
	Strongly Disagree	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
1. I know how to solve my own technical problems.					
2. I can learn technology easily.					
3. I keep up with the important new technologies.					
4. I like playing around with different technologies.					

5. I know about a lot of different technologies.					
6. I have the technical skills I need to use technology.					
7. I have had sufficient opportunity to work with different technologies.					
8. I can use technology tools to process data and report results.					
9. I can use technology in the development of strategies for solving problems in the real world.					
10. I understand the legal, ethical, cultural and societal issues related to technology.					
TECHNOLOGICAL CONTENT KNOWLEDGE	**Strongly Disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
11. I know about technologies that I can use to better understand the Fashion curriculum.					
12. I know how to make use of specific software and Web sites about the Fashion curriculum.					
13. I can find relevant information that I need for the Fashion curriculum using technologies.					
14. I can analyse information that I need for the Fashion curriculum using technologies.					
15. I can do presentation for learning and teaching using technologies.					
16. I can use technology tools and resources for managing and communicating information on the Fashion curriculum.					

TECHNOLOGICAL PEDAGOGICAL KNOWLEDGE	**Strongly Disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
17. I can choose technologies that enhance the teaching approaches for a lesson.					
18. I can choose technologies that enhance students' learning for a lesson.					
19. I am thinking critically about how to use technology in my classroom.					
20. I can adapt the use of the technologies that I am learning about to different teaching activities.					
21. I think deeply about how technology could influence the teaching approaches I use in my classroom.					
22. I can use technology resources to facilitate higher order thinking skills, including problem solving, critical thinking, decision-making, knowledge and creative thinking.					
23. I can use technology tools and information resources to improve students' performance.					
24. I can infuse technology to strategies of teaching.					
25. I can use technology for more collaboration and communication among students and my peers too.					
26. I know how to use technology to facilitate academic learning.					

TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
27. I can teach lessons that appropriately combine fashion, technologies and teaching approaches.					
28. I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.					
29. I can provide leadership in helping others to coordinate the use of fashion curriculum, technologies and teaching approaches in my department.					
30. I can choose technologies that enhance the learning of fashion curriculum for a lesson.					
31. I can evaluate and select new information resources and technological innovations based on their appropriateness to specific tasks in fashion.					
32. I can use fashion-specific tools (e.g., software, simulation, environmental probes, drawing tools, exploratory environments, Web tools) to support learning and research.					

Adopted and modified from Hosseini and Kamal 2012

SECTION D - OPEN-ENDED QUESTIONS

Using more than one word, answer the questions below.

1. Do you think there is a need for technology in the Fashion programme? If so why and how would you use it?

   _____

   _____

   _____

   _____

2. What resources are available to promote the integration of technology in the Fashion Department of WSU? Which one do you use the most and why?

   _____

   _____

   _____

   _____

3. How is technology impacting on your teaching approach? Does it increase or improve learning? Reflect on this briefly.

   _____

   _____

   _____

   _____

4. Are there any technology integration barriers that you think exist in the Fashion Department? What are they and how do you think these can be solved?

   _____

   _____

   _____

   _____

   _____

QUESTIONNAIRES FOR STUDENTS

SECTION A

BIOGRAPHICAL DATA

Indicate your most appropriate choice in each of the following with a tick (√) in the blocks required.

1. AGE

-19	19 to 21	21 to 25	+25
1	2	3	4

2. LEVEL OF STUDY

First year	2nd year	3rd year
1	2	3

3. GENDER

Female	Male
1	2

SECTION B

Please indicate in the blocks with a tick (√) which of these technologies your lecturers have used to support learning and teaching in the last nine

months and how frequently they have used them. Scale is 1=Never; 2= 5 times or less; 3= 6 to 9 times; 4= 10 times and more.

TECHNOLOGIES USED	**1**	**2**	**3**	**4**
	Never	**Less than 5**	**6 to 9**	**10 & more**
Whiteboard (dry erase)				
Overhead projectors				
Internet video, that is YouTube, etc.				
Digital cameras				
E-mail communication with your lecturers for learning				
Online discussion forums				
Completing task requiring computers				
Teaching in a computer lab				
Power Point presentation				
Blackboard or WiSeUp				
Library research				
Internet research				
Personal e-mail				

SECTION C

Indicate your most appropriate choice in each of the following statements or questions with a tick (√) in the blocks provided. Read the statements carefully and decide how much it pertains to you personally, using the scale below.

TECHNOLOGY KNOWLEDGE	**1** **Strongly Disagree**	**2** **Disagree**	**3** **Undecided**	**4** **Agree**	**5** **Strongly Agree**
1. I know how to solve my own technical problems.					
2. I can learn technology easily.					
3. I keep up with the important new technologies.					
4. I like play around with different technologies.					
5. I know about a lot of different technologies.					
6. I have the technical skills I need to use technology.					
7. I have had sufficient opportunity to work with different technologies.					
8. I can use technology tools to process data and report results.					
9. I can use technology in the development of strategies for solving problems in the real world.					

10. I understand the legal, ethical, cultural and societal issues related to technology.					
TECHNOLOGICAL CONTENT KNOWLEDGE	**Strongly Disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
11. I know about technologies that I can use to better understand Fashion curriculum.					
12. I know how to use of specific software and Web sites about Fashion curriculum.					
13. I can find relevant information that I need for Fashion curriculum using technologies.					
14. I can evaluate information that I need for Fashion curriculum using technologies.					
15. I can use technology for presenting Fashion curriculum.					
16. I can use technology tools and resources for managing and communicating information of Fashion curriculum.					

Adopted and modified from Hosseini and Kamal, 2012

SECTION D – OPEN-ENDED QUESTIONS

Using more than one word, answer the questions below:

1. Do you think there is a need for technology in the Fashion programme? If so why and how would you use it?
_____
_____
_____
_____
_____
_____

2. What resources are available to promote the integration of technology in the Fashion Department of WSU? Which one do you use the most and why?
_____
_____
_____
_____
_____
_____
_____

3. How is technology impacting on your learning process? Does it increase or improve learning? Reflect briefly on this.
_____
_____
_____
_____
_____
_____
_____

4. Are there any technology integration barriers that you think exist in the Fashion Department? What are they and how do you think they can be overcome?
_____
_____
_____
_____
_____
_____