

Cape Peninsula University of Technology
Faculty of Information and Design

The Perceptions and Implications of Techno-stress in an E-learning
Environment: An Exploratory Case Study

By

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DECLARATION

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Date

ABSTRACT

The rapid growth of digital technology has exceeded society's expectations. The overload and pace of technological advances causes many individuals at the workplace or organisations of higher learning, such as universities of technology, to become exposed and prone to stress. Students in higher education environments often find themselves vulnerable to technological stress. The problem is that we do not know the extent of the perceived implications of techno-stress, and it is not clear what the perceived psychological and emotional implications of techno-stress may have on the academic performance of higher education students.

The study investigated the perceptions and implications of techno-stress in an e-learning environment to explore and describe the implications of techno-stress; the physical, mental and behavioural outcomes also how it impacts on the academic performance of students at higher education institutions. The questions of the study were focused on finding what the implications of techno-stress are as perceived by students on their studies; what the types and elements of techno-stress that students experience at universities; what the potential causes of techno-stress are as perceived by students; and how students think techno-stress impacts on their academic performance.

The qualitative methods approach was used. It was found that students were more stressed over technology when problems occur as they lack the ability to manage or control it, and it was evident that this influence had an undesirable consequence on students' results. The research concluded that despite the importance technology plays in an e-learning environment by allowing students to conduct their research, download class material and learn online, students perceive technology as an important source of stress. Despite technology's advantages mentioned above, technology can be unpredictable and when problems occur, students exhibit lack of skills to manage or control it. It was recommended that universities of technology such as CPUT should design a program that helps students to cope with techno-stress.

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DEDICATION

This work is dedicated to my parents who never stop loving me, who have shown unconditional love, and pushed me to work hard for things I want to achieve.

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GLOSSARY

- **Campus-based blended learning (CBL):** the combination of different instructional procedures to accomplish an educational goal through integrating classroom teaching with online experience (Garrison & Vaughan, 2007). Throughout this treatise, the author refers to CBL interchangeably as an 'e-learning environment'.
- **Information technology (IT):** a “technology which uses computers to gather, process, store, protect and transfer information” (Rendulić, Kuo & Dzaja, 2011:1)
- **Techno-stress:** a “modern negativity of adaptation caused by an inability to cope with new computer technologies in a healthy manner” (Brod, 1984:n.p)

CHAPTER 1: INTRODUCTION

1.1 Introduction

In this chapter the researcher presents the research overview, the research questions, the research objectives, the research problem and the significance of the research. The researcher offers her rationale for conducting the analyses, briefly discusses the study's methodology to achieve the research objectives and contribution and delineate the geographic boundaries of the research scope. The section concludes with a framework of the thesis.

1.2 Overview

In the 21st century, the rapid growth of digital technology has exceeded society's expectations (Vergragt, 2006). The term technology denotes a progression in the procedures and tools people utilise to answer or accomplish goals (Luppicini, 2005). Digital technology can incorporate all kinds of items, ranging from computer software to online conferencing tools. However, the incessant upgrade of systems has affected universities and the way students adjust to these information systems. Even though technology was initially introduced to facilitate ease and solve problems, it has proven to sometimes have negative consequences for its users. So, the utilisation of different technologies such as Google, e-mail, mobile phones, smart devices, and learning management systems (LMS) may also lead, in some cases, to a certain level of stress when faced with technological challenges (Mahboob & Khan, 2016).

These challenges make it difficult to operate and use the latest programs due to small glitches in the system. For instance, universities use a range of online communication and information collaboration tools such as those incorporated in "Google Apps". These applications allow students and lecturers to share, edit and submit information online in real time. Moreover, tools such as tablets can be connected to computers, cloud-based platforms and projectors. These types of connections enable open communication between students and teachers using drawings and texts (Fish, Mun & Jontue, 2016). For instance, course management tools such as Canvas enable teachers to consolidate all the required resources for students (Laurillard, 2013).

It is required of students to familiarise themselves with these type of online tools at universities. Technostress can be attributed to various factors such as work overload, a lack of training concerning the use digital technology, inadequate standardisation of technologies, faulty hardware and software and work overload (Yuvaraj & Singh, 2015). In this research study, the investigator examines the implications of techno-stress; the physical and behavioural outcomes of techno-stress; and how it impacts academic performance of students at advanced education institutions. In the scope of this study, 'academic performance' denotes a student's ability to be functional in their role as a university student and achieve their educational goals; It does not extend to a student's academic grades.

1.3 Background to the Research Problem

Technology overload and innovation could make students prone to stress. According to Baqutayan (2015:479), stress occurs "when the observed pressure exceeds your perceived capability to cope". Alternatively, techno-stress is an outcome of application multitasking, continuous connectivity and data excess (Chandra, Srivastava & Shirish, 2015). The word stress has numerous connotations. In his book *Psychological stress and the coping progress*, Richard Lazarus states that "it seems wise to use 'stress' as a generic term for the whole area of problems that includes the stimuli producing stress reactions, the reactions themselves, and the various intervening processes" (1966:27). Lazarus further points out that even though technological change allows work to be done quickly and efficiently, there are many reports of users who have negative views about new technology; they express uncertainty concerning the use of new technology and struggle to adjust to technological change.

In adapting to the change of growing and complex technologies, many users tend to experience a level of emotional and physical stress such as nervousness and exhaustion (Bonnah, 2015). Take the workplace for example; stress reduces employees' productivity according to Knani and Fournier (2013). In effect, the increase of stress influences personal relationships and may also have damaging implications for one's health (Bradshaw & Zelano, 2013). Salanova et al. (2013:2) define techno stress as "a reflection of one's discomposure, fear, tenseness and anxiety when one is learning and using computer technology directly or indirectly". In this light, techno-

stress results in emotional and psychological instability, which in turn, results in the avoidance computer technology (Wang, Shu & Tu, 2008).

According to Brod (1984), the negative effects of techno-stress are feelings of anxiety, reluctance and fear towards computers. Techno stress manifest in the form of a person experiencing nightmares, headaches, irritability when using a computer or absolute refusal to use technology. Students are perceptible to the same negative effects. Salanova et al. (2013) indicate that techno-stress creates obstacles that hinder the adoption of Information and Communication Technology (ICT) and it includes two psychological experiences, namely techno-strain and techno-addiction. Techno-strain is associated with high levels of fatigue and anxiety and low self-belief related to the use of Information and Communication Technology; Techno-addiction is associated with the excessive and compulsive use of Information and Communication Technology.

The implications of techno-stress are far reaching and additional research is necessary to get a profound understanding of its impact on the lives of users. According to Amin, Ahmad and Hui (2012), techno-stress causes trauma amongst technology users because of these modern technologies. The way in which individuals deal with technology might significantly influence their online activity. Users' interaction with ICT is determined insofar as it addresses their needs, e.g. user-friendly interface and accessibility (Petrie & Bevan, 2009). The psychological practice of techno-strain in ICT is composed of four components namely fatigue, anxiety, scepticism and feelings of inadequacy related to the usage of ICT (Salanova et al., 2013).

For instance, students at universities are required to be oriented to the utilisation of computers, machines and the latest electronic devices. They are exposed daily to a range of ICTs. In addition, they rely on internet access to conduct research, submit projects and communicate with lecturers (Goold, Craig & Coldwell, 2008; Longman, 2013). According to Waycott, Bennett, Kennedy, Dalgarno and Gray (2010), students are in many cases frequently unprotected to online communication tools such as electronic mails and group discussions in social networks. Furthermore, this incessant daily exposure to technology could make them much more susceptible to techno-stress than other users. Therefore, technology requires people to change. Adapting to

these changes, however, can be challenging. The inability to deal with these changes also leads to techno-stress, which in turn, could have far-reaching implications (Agboola & Olasanmi, 2016).

The implications of techno-stress are social, psychological, economic and physiological. Similarly, psychological implications of techno-stress for students may result in a decline in academic performance. This aversion may be a barrier to their academic success. Wang et al. (2008) confirm this and argue that the psychological barrier to use computer technology caused by techno-stress could hinder one from further learning. The extent and depth of the psychological implications of techno-stress for students and how it impacts their academic performance is not exactly known. Although studies have been conducted on the implications of techno-stress, the extent of its effect(s) on the academic performance of students still needs to be researched. This study aims to obtain a more comprehensive understanding of the psychological implications of techno-stress, explore the extent of these implications in more detail and examine how it impacts on students' academic performance.

1.4 Statement of the Research Problem

The constant flux of technology places pressure on users to integrate and adapt to newly developed technologies, which in turn, induces stress (Tacy, 2015). To give students a better academic experience, institutions are increasingly looking at improving their technology infrastructure and equipping students with the necessary ICT skills. This technological demand could lead to unintended consequences such as performance problems and techno-stress amongst students.

Students in higher education environments often find themselves vulnerable to technological stress. This study's research problem is that we do not know the extent of the perceived implications of techno-stress; in particular, it is not clear what the perceived psychological and emotional effects of techno-stress have on the academic performance of higher education students.

Numerous studies have been done on technology acceptance and adoption in higher and further education (Jena, 2015). However, limited scholarly attention has been

given to techno-stress and its effects on learning in higher education environments (Jena, 2015; Johnson, Wisniewski, Kuhlemeyer, Issacs & Krzykowski, 2012).

1.5 Research Questions

The primary question that underpins this research reads as follows:

- What are the effects and implications of techno-stress as perceived by students on their studies?

The research sub-questions are as follows:

- What are the types and elements of techno-stress that students experience at universities?
- What are the potential causes of techno-stress as perceived by students?
- How do students think techno-stress impacts on their academic performance?
- How do students deal with techno-stress?

1.6 Aim and Objectives

The purpose of this investigation is to explore the impact techno-stress have on students at a University of Technology. The study seeks to make recommendations on how students can cope with techno-stress in campus-based blended learning. Blended learning combines online learning and traditional learning methods to improve the quality of education. E-learning will be used synonymously with campus-based blended learning as high institution of technology used e-learning methods to fundamentally redesign the approach of teaching and learning in order to increased efficiency, effectiveness and convenience.

These objectives were to:

- Identify the types of techno-stress that students experience at universities
- Determine the potential causes of techno-stress as perceived by students of a university of technology
- Find out how students think techno-stress impacts on their studies
- Describe how students deal with techno-stress

1.7 Rationale

Techno-stress plays a negative role in physical and psychological experiences of student (Tams et al., 2014). Consequently, there is an essential need to provide students with appropriate coping mechanisms that will allow them to deal with negative emotions of techno-stress induces. The reasons for conducting this study is backed up by the following rationale: firstly, there is no reported research in the area of perceptions and implications of techno-stress in an e-learning environment of institutions of higher learning; secondly, it is important to clarify the implication of techno-stress among students at institutions of higher learning and get a view of their perception regarding techno-stress; and lastly, there are no reported studies on perceptions and implications of techno-stress in an e-learning environment.

The research investigates the perceptions and implications of techno-stress in an e-learning environment. The aim is to develop an understanding of how students experience techno-stress and add to the knowledge base of e-learning in relation to techno-stress. The study will benefit students in institutions of higher learning as they can use the outcomes to guide them in future utilisation of technology in pursuit of their higher education. The study can also guide educational technologists in introducing coping strategies to help reduce the effects of techno-stress on physical and psychological health of students. The study will also underline the benefit of making use of technology in an e-learning environment.

1.8. Research Methodology

This research utilised qualitative techniques to analyse the perceptions and implications of techno-stress. The case study research strategy was used to advance insight into the effects of techno-stress on students enrolled at a University of Technology. To close the gaps in literature, the researchers identified themes from participant data; these themes were necessary to provide the investigator with coherent research answers from respondents. It was hence clear and evident that the most suitable technique of analysing information through this study would be a thematic analysis. In the past, thematic analysis has often been criticised as a data analysis technique that lacks clear guidelines (Attride-Stirling, 2001); furthermore, the author pointed out that others' criticism of thematic approach to some investigators is neglecting the process to how they will normally analyse their results; consequently, it

was then necessary to the investigator in the research to engage a vibrant, clear and transparent methodology.

1.9 Significance and Contribution of Study

The objective of the researcher is to make recommendations on best practices universities can follow to help students avoid physical and psychological stress caused by computers. This study contributes to understanding techno-stress among students at a university of technology. The findings added knowledge and value to the body of research. Overall, the study reveals critical results of understanding the consequences of using technology and stress-related issues.

1.10 Delineation of Research

There was a need for delineation to be point in this investigation. Firstly, the research was confined to phenomenon of techno-stress that students experience at one University of Technology. The research sample, therefore, excluded students from other universities who might experience techno-stress. The investigation findings, however, could be applied or extended to other higher education environments in South Africa. There is a need to include other students from different universities such as traditional universities. Secondly, due to the financial limitations, the research study only focused on students at the Cape Town campus of the Cape Peninsula University of Technology; other campuses of CPUT such as Bellville, Mowbray, Wellington and others were not involved. For future investigation, it is essential to involve all the campuses as well as other regions around South Africa which have higher education environments.

1.11 Thesis Structure

The dissertation is organised in the following way:

Chapter Two

In this chapter, an outline is provided of recent and past research on digital technology and its impact assessment.

Chapter Three

In this section research methodology is discussed. It will explain qualitative research methods, and discuss the method utilised in gathering data.

Chapter Four

The results and findings from interviews conducted at the Cape Peninsula University of technology are presented in this section. The responses will be analysed and finding will be provided.

Chapter Five

The findings from interviews presented in chapter five are discussed in this section.

Chapter Six

From this segment an effort is made to respond to the study foremost and sub questions that were listed earlier in this chapter. The chapter will be concluded and recommendations to the research will be given.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The previous chapter provided the backdrop for this research study. This chapter carefully reviews related past literature to contextualise and explain the study problem which was taken into consideration for this research. Given the limited literature on techno-stress in educational settings, different field of study such as psychology, administration and technology were used. Therefore, literature from the aforementioned disciplines could be used to make sense of techno-stress in education. Consequently, the following succeeding themes are explained in the section: Techno-stress, definition of stress implication, perception, e-environment and higher education.

2.2 Understanding the Stress Concept

Researchers in the past have produced numerous meanings associated with the notion of stress. In light of the acknowledgment of stress and its impact on emotional well-being and physical health several independent definitions of stress continue to create separation between “stress studies” and “institution of stress specialists” to produce a single common definition of stress (Kranner, Minibayeva, Beckett & Seal, 2010).

A study by Fink (2017) produced a meaningful definition related to stress that has been used in diverse areas such as education, health and social sciences. Fink defines stress as “the perception of threat with resulting anxiety discomfort, emotional tension and difficulty in adjustment” (2017:4). Recent definitions of stress have included the most recognisable components; stress represents an individual’s experience and a reaction encouraged by anxieties or pressure. In the field of psychology, Shadiya (2015:479) defines stress as “an unpleasant stage of emotional and physiological stimulation that people experience in situations that they perceive as dangerous or threatening to their wellbeing”. The causes of stress range from the environmental factors to genetics, with equally damaging effects that is equally as damaging as physical and mental health problems.

2.3 Techno-stress

Techno-stress is described as “the negative psychological link between people and the introduction of new technologies” (Agboola & Olasanmi, 2016:253). The inability of many users to adjust or adequately cope with ICT in an acceptable and healthy way is one of the foremost signs of techno-stress. The notion of techno-stress is defined by Brod (1984) a clinical psychologist, as a modern negativity of adaptation caused by an inability to cope with new computer technologies in a healthy manner. Students often experience feelings of compulsion to be connected to social media platforms and engage in incessant sharing of updates.

In addition, they sense the obligation to answer, study and share personal associated information in real time. As a result, they often participate in expected multi-tasking. This is especially evident with students. They feel compelled to work faster, complete tasks at faster rates because the input and output of information exceeds their capability to stay abreast with the latest technological updates. Consequently, students may discover that they do not have enough time develop creative analysis and critical thinking skills. In effect, this overexposure to technology may result in techno-stress (Agboola & Olasanmi, 2016).

2.3.1 Assessing Techno-stress

The results of the initial MCQ assessment indicates that techno-stress, computer anxiety and test anxiety were all experienced by the students (Davies, 2015). Furthermore, it was found that techno-stress lowers the ability of the student to work efficiently and creates an unsettled classroom environment (Hung, Chen & Lin, 2015). The outcome of this is either acceptance of the technology, hesitance or resistance towards it when used in the learning environment. In a study conducted by Venkatesh,

Morris, Davis and Davis (2003), a connotation was between acceptance to technology use, techno-stress and psychological acceptance. Technology acceptance directly affects the extent to which users use technology and is indirectly affected by the user’s perception of its usefulness (Rutherford & Kerr, 2014). Subsequently, attitudes towards technology use were developed. This resulted in a perceived ease of use (Erasmus, 2014).

Yuvaraj and Singh (2015) is of the view that techno-stress results in a user experiencing anxiety when using technology. This study assumes that techno-stress is an indicator of a user's intentions to use ICTs and his/her subsequent usage behaviour. Furthermore, result of the study also indicated that past negative experience with technology is a strong predictor of prospective technology use (Wrench & Punyanunt-Carter, 2007).

Numerous experimental researches have emphasised the association between negative perception of addictive technological behaviours, anxiety and depression (Walsh, White & Young, 2008). Kessler, Chiu, Demler and Walters (2005) maintain that certain psychiatric emotional disorders, namely depression and anxiety, might result from techno-addiction. Students who constantly practice online activity or checking in on social media platforms may experience some improvement in terms of feelings, nervousness or depression. However, overexposure might also aggravate nervousness and depression (Andreassen, Billieux, Griffiths, Kuss, Demetrovics, Mazzoni & Pallesen, 2016).

Psychological implications of techno-stress also include addictive user behaviour amongst technology user. These include silence, mood modification, intolerance, withdrawal, and feelings of discomfort due to prohibition or reduction of online activities. Negative social interactions may ensue from techno-addiction. These include work-based conflicts due to negligence and non-performance at the workplace, overindulgence in recreational online activities, and household conflicts (Popma, 2013).

The younger generation who have been born into the digital world are overly consumed in incessant communication via a myriad of communication platforms. These include email, social media platforms, or instant messaging such as texting (Allen, Ryan, Gray, McInerney, & Waters, 2014). ICT usage may lead to the development of two psychological experiences related to techno-stress: techno-strain and techno-addiction (Salanova et al., 2013). Techno-strain refers to the exhibition of feelings of anxiety, fatigue, scepticism related to the inefficacy of the use of technologies whereas techno-addiction refers to the excessive compulsive use of such technology (Salanova et al., 2013). OCD (Obsessive-compulsive disorder) and ADHD

(Attention Deficit Hyperactivity Disorder) are noted to be further psychological implications of techno-stress. These psychological conditions may be a result of a user's dependence on technology followed by technology addiction (Anderson et al., 2014).

The management of techno-stress is a highly individualistic and personal matter, and differs from individual to individual (Brillhart, 2004). It is thus imperative to develop personal methods of managing and avoiding techno-stress. It is also important to recognise that the constant changes generated by technology will result in varying degrees of techno-stress (Aida, Azlina & Balqis, 2007). Once this is accomplished, the user will be able to effectively manage techno-stress (Tarafdar, Tu, & Ragu-Nathan, 2011). Archibald (2003) has identified three fundamental stages to successfully manage techno-. These are: (1) The awareness and interpretation of techno-change; (2) Acknowledgement of feelings towards techno-change; and (3) Methods of managing techno-change effectively.

2.4 Elements of Techno-stress

Prystanski (2012) distinguishes between three elements of techno-stress: Techno invasion or conquest of individual life, highly complex technology, techno insecurity, and techno uncertainty

2.4.1 Techno Overload

Prystanski (2012) describes techno excess as the excessive deployment of technology that has negative effects on an individual's professional life and personal health. Prystanski argues that the dominance of these information devices and platforms makes users reliant on easy information exchange; therefore, it presents the challenge of information excess. The quantities and volumes of information users 'absorb' from ICTs can have detrimental effects. Switching between diverse devices and performing different activities reduces task quality and efficiency as individual's brain need time to process captured data. According to Tarafdar et al. (2011), portable technology devices together with social networking and collective application bring the opportunity to develop concurrent torrents of real-time data which subsequently result in data excess and multitasking

2.4.2 Techno Invasion

Techno invasion is when an individual can be contacted at any place and anytime and feels the need to be connected (Tarafdar, et al., 2011). With virtual offices, borderless administrations and the introduction of distant access, technology makes it possible for someone to perform work tasks several ways (Kreiner, Hollensbe & Sheep, 2009). Work-related challenges are the main architect of stress and additional tension-associated negative perception. Techno invasion in addition to deficiency of regular management and discipline, create distortion lines that separate occupation from an individual's life (Kreiner et al., 2009).

2.4.3 Techno Complexity

New applications are complex and difficult to use and can take a long time to properly operate. Instruction guidebooks can be difficult and impassable, and individuals can sometimes become stressed when they feel uncomfortable and frightened by the strain and difficulty in understanding many of the different features (Tarafdar et al., 2011). According to a study by Shu et al. (2011), the concept of techno complexity is related to the incapability to work with new technology. The perceived difficulty in technology use differs from individual to individual, but some technologies create the impression that usage will be difficult. If developers wish to see a high uptake of their technologies, it is important that they design their technologies with basic and user-friendly features (The Economist, 2010). The more complex the devices and software are, the more they evoke frustration and demoralise in an individual. In the workplace, this can negatively affect a person's productivity.

2.4.4 Techno Insecurity

Techno Insecurity refers to the lack of confidence when an individual is threatened by new technologies, or the availability of competitors who are considered to have a more technological skillset or knowledge (Mlotshwa, 2013). With the speed at which technology is evolving, younger generations are more comfortable understanding the mechanism of new technology. However, this evolution increases older people's lack of self-confidence and morale, making them susceptible to techno-insecurity (Mlotshwa, 2013).

2.4.5 Techno-uncertainty

Techno-uncertainty occurs the moment regular adjustment to software and hardware prevents individuals from constructing the essential knowledge acquired through the utilisation of certain devices, applications or systems (Tarafdar et al., 2011). Constant alteration in devices and software causes frustration, vagueness and nervousness among individuals as the change always requires the acquisition of new technological knowledge to efficiently use and operate it.

These elements are therefore the indicators of techno-stress within individual space and might seriously affect their well-being, focus and performance regarding task execution (Tarafdar et al., 2011). Addressing these problems might assist in adjusting individual bias by bringing into line personal goals and leading to a more focused and self-assured individual. Assessment, identification and solutions to these problems should be a privilege so that an individual avoids being disillusioned, demotivated and lacking a satisfactory drive towards accomplishing their goal.

2.5 Determinants of Techno-stress

The previous section focused on causes of techno-stress. The researcher identified two factors that causes techno-stress: environmental factors and social factors. Numerous studies that researched techno-stress aligned several aspects with regards to the causes of techno-stress (Salanova, Lorens & Cifre 2012; Prystanski, 2012). According to a study by Bloom (1985), the shortage of computer skills and experience are the biggest influences that cause computer related techno-stress. According to Clude (1998), lack of experience with computers, lack of training, performance nervousness, organisational factors, information overload, insufficient staffing and linguistic pressure are among causes that trigger techno-stress.

Huidburg (1996) considers the internet to be an important cause of techno-stress as the technology presents several new environments with no standards as to how it is constructed, preserved and reorganised. The study by Doronina (1995) focused on a number of types of computer anxiety. The author described the sensation of unawareness or incompetence, nervousness of innovative technology use, dread of infringement of the device in certain ways and various health threats.

2.5.1 Environmental Factors

Environmental factors that can cause techno-stress are triggered by circumstances that the environment presents such as deprived working conditions, poor lighting, insufficient equipment and security measures, operator unsuitability, loud equipment, software boundaries, absence of capital, electrical problems, danger of unintentional information loss, lack of maintenance knowledge, and lack of senior staff (Salanova, Lorens & Cifre, 2012).

2.5.2 Social Factors

Social factors illustrate the struggle produced through the utilisation of technology, the shuffle of roles and nervousness over failure; Work hierarchal shuffles might develop certain stress related to technology among individuals (Salanova, Lorens & Cifre, 2012). From the above factors, Enis (2005) also identifies six other main factors of techno-stress: absence of education, reliability of technology, increased workload, rapid changes, absence of standardisation in work and role alterations. For Enis (2005), the evolution and rapid change in technology such as mobile technologies create techno-stress at this particular time, regardless of changing approaches concerning the motives over techno-stress. The consequences of psychological burdens with regards to the condition of techno-stress are common to all individuals.

2.6 Perception

A study by Sethi, King, and Quick (2004) described two principles of techno-stress, which are techno-distress and techno-eustress. "Techno-eustress is the phenomenon that embodies the positive stress that individuals face in their use of IS" (Tarafdar, Cooper & Stich, 2017:9); on the other hand, techno-distress is stress with a harmful influence on the person's performance at work and effects the overall organisational productivity negatively. Califf and colleagues (2015) argue that care providers can cognitively appraise healthcare information technology. For example, both techno-distress and techno-eustress can present equally negative and positive consequences for care providers and hospitals.

Investigators in numerous disciplines recognise the significance of understanding both distress and eustress. According to Califf et al. (2015), both eustress and distress antecedents and outcomes have not been examined in the information system

discipline, particularly with healthcare. Furthermore, the authors point out that even though the preceding techno-stress investigation has focused on examining the influence of a multitude of techno-stress makers, many studies neglected to investigate the influence of these undesirable stressors or “distressors” in other domains such healthcare education and education in general.

2.7 Recognised Implications of Techno-stress

Techno-stress has physical, psychological, economic and social implications.

2.7.1 The Effects of Techno-stress

The effects of techno-stress manifest psychologically through disagreeable feelings, undesirable self-image, undesirable opinions regarding work or supplementary computer operators, and in certain cases even psychosomatic sicknesses (Corradini, Marano & Nardelli, 2015). Further implications include memory loss, sleep complications and incapacity to focus on recreational activities (Ragu-Nathan, et al., 2008). Techno-stress sufferers may also experience poor health, negative self-image and even depression (Erasmus, 2014). These implications may ultimately result in technological avoidance, where users seek to avoid any form of interaction with technology. This is of primary concern as it impacts on their career prospects. Other studies investigated the connection between the psychological effects and the addictive use of technology (Whang, Lee & Chang, 2003). According to Schimmenti and Caretti (2010), there is a strong correlation between psychiatric disorders and addictive use of technology.

Users of technology are more prone to addictive disorders which affects their social and emotional functioning. Certain online communication technologies which have been proven to be more addictive than others are social media platforms and video gaming (Lee, Chang, Lin & Cheng, 2014). According to Lee et al. (2014) these technologies may produce progressive and major mental disorders. Female users were proven to be mostly addicted to social media whereas single people were proven to be more addicted to both video games and social media platforms (Andreassen, et al., 2016).

2.7.2 The Impact of Techno-stress

Techno-stress also affect the social and emotional intelligence of technology users (Brooks, 2015). The results of Trevino's (2014) techno-stress study indicate that IT professionals who had graduated with a Bachelor of Technology, exhibited lowered levels of stress and self-esteem in contrast to other lower degree who manifested socially awkward behaviour because of techno-stress exposure. Further analysis also discovered social intelligence was associated with emotional intelligence. Results revealed that social intelligence was directly associated with emotional intelligence, and that a diminution in the former resulted in a decrease in the latter as well (Trevino, 2014).

Rosen et al. (2013) observe that technology use and social media platforms may induce technology-related anxieties and attitudes. In addition, their study also confirmed that excessive technology use can lead to a range of personality disorders such as narcissistic behaviour, schizoid personality disorder, Obsessive-compulsive disorder, antisocial behaviour, histrionic personality disorder and paranoia. Mood disorders such as bipolar mania, dysthymia and major depression can also be experienced (Rosen et al., 2013).

Furthermore, their study shows that technology-associated anxieties pointedly anticipated medical indications of these disorders (Rosen et al., 2013). In addition, the outcomes of the research also highlighted some positive and adverse features of technology use including the detrimental effects that social media had on the ability of the user to multitask (Rosen et al., 2013). These results may prove significant for the aims of this study, because students are often expected to multitask and operate complex ICTs at university. Consequently, an overexposure to such pressures may aggravate the student's ability to deal with them and may lead to psychological strain. Universities depend heavily on online information and communication platforms (Rutherford & Kerr, 2014).

In a study conducted by Davies (2015), first-year undergraduate students who were studying psychology online experienced a significant degree of techno-anxiety. This occurred when they participated in multiple choice question (MCQ) assessments. According to the study, computer anxiety, techno-stress and test anxiety was proven

to be the causes of concern for a student's anxiety levels when engaging in online communication systems. Subsequently, their academic results were impacted by their anxiety levels, even though they studied diligently in preparation for the test (Davies, 2015).

2.7.3 Physical Implications

Tams et al. (2014) identifies the following physical effects of techno-stress: headaches, stomach or intestinal problems, irritability, high blood pressure and even heart attacks. Physical complications as a result of techno-stress also come in the form of backaches, eyestrain, headaches, repetitive strain injury, carpal tunnel syndrome and overexposure to Visual Display Units (VDUs) (Prabhakaran & Mishr, 2012). Furthermore, the warm temperatures and electricity emitted by digital devices can lead to incapacity and exhaustion. This may further impact on the student's ability to perform at an optimal level (Ragu-Nathan, Tarafdar, Ragu-Nathan & Tu, 2008).

2.7.4 Psychological Implications

In terms of its psychological implications, techno-stress manifests in various ways. For instance, users find struggle to adapt to ICT, also, Over-reliance on technology with such technologies (Harahap & Effiyanti, 2015). Although Brod (1984:19) regarded techno-stress as a sickness but mention that other researchers consider techno-stress as an "inability to adapt to changes brought on by technology". Ayyagari, Grover and Purvis (2011) argue that techno-stress is a condition whereby an individual must familiarise him- or herself with innovative technologies. This is particularly so in cases where there is an uncertainty on how to use technology. Tu, Wang and Shu (2005), however, regard techno-stress as resistance to change when generally dealing with technology.

According to Achuonye and Ezekoka (2011:49), other terms for techno-stress are "computer stress, techno phobia, computer nervousness and computer phobia". Tarafdar et al. (2007:301) describe techno-stress as "a problem of adaptation as a result of a person's inability to cope with or to get used to information and communication technologies (ICT)". Fuglseth and Sørenbø (2014:161) highlight five mechanisms of techno-stress, also identified as techno-stress creators. These are "techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-

uncertainty”. Sami and Pangannaiah (2006) argue that techno-stress represents any undesirable influence on opinions, attitudes and behaviours that are created indirectly or directly by exposure or use of ICT (Yuvaraj & Singh, 2015).

According to Knani (2013), techno-stress is a multifaceted occurrence and has further psychological implications than we may not yet be aware of. The psychological implications of techno-stress that have been studied include anxiety, negative thoughts and negative attitudes (Laspinas, 2015). Technology users feel a sense of nervousness about their current and future interactions with computer related technology (Califf et al., 2015). In addition, users also experience negative thoughts and engage in conflicted self-critical internal dialogues during interactions with technology (Erasmus, 2014). The final psychological impact that users may be affected with is the development of negative attitudes towards technology, its use and the way it impacts on them socially (Tiemo & Ofua, 2010).

Psychological impacts of techno-stress may also have physical consequences (Salanova, Gumbau & Cifre, 2013). Poor ergonomics at computer stations in classrooms, especially for students, may leave them feeling drained and affected by techno-stress. Students strive to obtain the skills required to operate innovative technology and are often compelled to over-identify with technology (Anderson, Brossard, Scheufele, Xenos & Ladwig, 2014). Firstly, technophobia is experienced by the user which is the fear of non-adaptation to technology and is a struggle to accept computer technology. Secondly, users may exhibit behaviours akin to techno-philia; that is, if a user is enthusiastic about technology which may lead to excessive use of technology.

Tiemo and Ofua (2010) elaborate on psychological patterns of techno-stress and classify the anxieties that technophobes experience in three categories:

- Technophobes in the first category physically exhibit signs of anxiety which are sweaty palms and nervousness.

- The second category of technophobes refers to users who do not externally exhibit signs of anxiety, but internalise them (Coklar & Sahin, 2011). These technophobes are termed as cognitive technophobes and appear relaxed but are internally overwhelmed by technology coupled with feelings of inadequacy and committing errors during interaction with these technologies (Akhtari, Mohseni, Naderi & Akhtari, 2013; Torfi, 2013).
- The last category of technophobes are those users who experience slight negative perception of anxiety and exhibit a small degree of negative attitudes towards technology, but are not in need of counselling (Dinello, 2005).

2.8 E-environment

2.8.1 Different Learning Environment Characteristics

There is no clear consensus on what exactly is meant by learning environments. A broad spectrum of understanding exists, with general descriptions such as web-based, online and e-learning. Learning environment include the implication and use of online courses and programs (Guilar & Loring, 2008). The uncertainty and contradictions around the term “learning environment” are identified with terms such as “learning management system (LMS), a course management system (CMS), a virtual learning environment (VLE) or even a knowledge management system (KMS)” (Nichols, 2003:1).

As mentioned earlier, the terms are used synonymously. Some authors believe that technologies should not be used synonymously as they perform different functions, Gagné, Wager, Golas, and Keller (2005), for example consider CMS as tools that are used in connection with the distribution of education, which are conducted through the use of the Internet. Furthermore, LMS is described as “more of a management system for the distribution of online learning” (Gagné et al., 2005:339); Nichols (2003:1) agrees with this description and notes that LMS is primarily utilised for online components and courses. From a decade ago, the synonymous use these terms seem not to have altered the general understanding of these environments as the overall definitions use the terms which recommend that education is happening in a precise web founded area. (Zhang & Kenny, 2010; Barnard-Brak, Lan & Paton, 2010; Rhode,

2009; Khan, 2001). So, education environment terminology is denoted as the education that will be distributed using the system.

Rhode (2009) view learning environments as programs, courses and learning objects which exist in online learning environments. These environments are self-directed, self-paced or instructor-led. For the author, the greatest communal form of distance related education strategy in traditional education environments such as higher education and university is instructor-led, which appears as a setting where teacher's direct students throughout the essential learning content. This learning environment gives the teacher full control of the steps related to teaching sequences and pacing, with students contributing to and participating in learning activities.

2.8.2 Online and Electronic Learning

The term "e-learning" might not have been conceived during the 1980s as many studies claim. The term is somehow given a clear definition by some authors, while others only try to suggest an exact definition. The given definitions, in many instances, appear to contradict each other. For example, Ellis's (2004) define of e-learning as strictly being accessible using technological tools that are either web-based, web-distributed, or web-capable. Even though technological features are encompassed in the description of e-learning, Tavangarian et al. (2004) is of the view that the use of technology to support learning is inadequate as a single descriptor. A study by Tavangarian et al. (2004:273) encompassed the constructivist hypothetical model as a context for improving their description by affirming that e-learning "is not only procedural but also shows some transformation of an individual's experience into the individual's knowledge through the knowledge construction process".

According to Triacca et al., (2004) and Ellis (2004), some level of interactivity should include concepts of descriptions that gives more appropriate concepts in defining the education practice. In their study, Triacca et al., (2004:4398) additionally pointed out that "e-learning was a type of online learning". There is uncertainty of which precise technological features the term promises, but the author pointed to all procedures of e-learning such as programs, applications, websites or objects will sooner or later deliver an education opportunity for people. However, a recent study by Epignosis

(2014) illustrates that e-learning is a computer based educational system or tool that permits an individual to study any place and at any time.

Nowadays, e-learning is mostly distributed through the use of the Internet, while in the past it was distributed by the use of combination of computer-based methods like compact discs (CDs). Epignosis (2014:5) states that, “technology has progressed in a way that the geographical gap is connected with the utilisation of tools that bring individual or students to have sensation as if they were inside the classroom.” Furthermore, the author points out that e-learning gives the capability to share material in several formats such as text, videos, slideshows, Document and PDF. This allow educators and students to conduct live online lessons and communicating through chat and message forums.

Oblinger and Oblinger (2005) regard online learning as one of the most difficult educational technologies to assign a specific definition to. Some authors have chosen to differentiate the change by assigning an overarching description to online learning, while others have preferred to conceptualise e-learning within the specific technology intermediate or frameworks it functions (Lowenthal et al., 2009). According to Carliner (2004:19), online education is defined as “access to learning experiences via the use of some technology”. Conrad (2002:1), on the other hand, classifies online education as “a more recent version of distance learning which improves access to educational opportunities for learners described as both non-traditional and disenfranchised”.

2.9 Higher Education and Technology Adoption

2.9.1 Information Communication Technology (ICT)

Information Communication and Technology (ICT) has evoked undesirable cognitive and psychological reactions and attitudes among students in higher education (Anderson et al., 2014). Salanova et al. (2013) notes how computer anxiety brings forth fear, nervousness and distress in people when they use computers. For example, some users are afraid of pressing the wrong key, losing data, or they show hesitation because they fear that the actions they perform on a computer will return erroneous data (Hackbarth, Grover & Mun, 2003). According to Gilbert, Lee-Kelley and Barton (2003), the term “technophobia” has been used in reference to computer-phobia which refers to the fear of using technology.

The user experiences different kinds of anxiety and negative feelings when interacting with computer-related technology (Brave & Nass, 2003). Besides the emotional and psychological effects that users experience, some also encounter physical reactions during such interactions. These include feeling inconvenienced or uneasiness, exercising excessive restraint, expressing negative attitudes and making negative remarks about computers which minimise their use of computers (Garland & Noyes, 2004). Thus, many workers find themselves feeling stressed out by the mere thought of using a computer, resulting in an increase of techno-stress. Subsequently, ICT devices such as computers have also been proven to be a positive predictor of stress at the workplace (Shu, Tu & Wang, 2011). Thus, techno-stress has major effects and implications such as ill-health and in a sense of general wellness.

According to a recent study conducted by Samaha and Hawi (2016), technology addiction, and more specifically communication technology, was a real dependence risk and was associated with perceived stress and undesirably associated with satisfaction in life. Also, addiction to certain communication technologies have negative connotations with academic performance. Nonetheless, the latter was absolutely associated to gratification with life (Kakabadse, 2007).

2.9.2 University of Technology context

According to the Kagisano (2010), a University of Technology does not mean purely the use of technology within the university. The distinction between technological university and traditional university does not raise the point of one using technology and other does not. It is rather the link, effort and relationship between technology and the landscape of a University, which defines a University of Technology.

A University of Technology focuses more on the study of technology from different viewpoints of numerous arenas of study and disciplines, rather than a single area of study; furthermore, the report defines technology as an efficient and effective method of amassed knowledge, know-how, skills and proficiency that if correctly applied, will produce a valuable output of services and processes and value-added products. In essence it is the knowledge to manufacture things, which includes creating and developing new technologies (Kagisano, 2010).

2.9.3 Campus-based blended learning

The use of Information and Communication technology (ICT) for a diversity online education has widened access to most programs of higher education as part of learning philosophy. According to Garrison and Vaughan (2007), campus-based blended learning is the combination of different instructional procedures to accomplish an educational goal through integrating classroom teaching with online experience. Bonk and Graham (2004) also noted that Campus-based blended learning is improving pedagogy and access to information through combination of face-to-face and online delivery model. At CPUT the optional innovation-decision approach is commonly used. Depending on context, content and student, blended learning accommodates diversity of learning experiences both on and off campus with a different range of distance between students and lectures. CPUT inspires its staffs to focus on the current practice of using technology in teaching and learning (Gachago, 2018).

2.10 Techno-stress theory

Many theories allow researchers to examine the techno-stress based on producing conditions, its result and inhibition mechanism of techno-stress. For the purpose of this study, the online study is created on the transaction theory of stress. Transaction theory holds that an individual's gender, age, education, computer efficacy and confidence allow them to experience stress due to stress-inducing factors or conditions using computers. According to Tarafdar, Tu and Ragu-Nathan (2011) stress is evident in opposing outcomes for the individual. Inhibiting mechanisms reduce stress. The degree to which an individual observes stress producing circumstances rest on demographic appearances relevant to the exact situation in which stress is created (Tarafdar et al., 2011).

Conditions that create techno-stress and effects associated with techno-stress

Persistent use of information system may create technostress. It is important to comprehend why technostress occurs, how it varies between individuals, what its adverse consequences are, and how it can be avoided. Techno-stress is more likely to occur if instances where users increase their use of information systems. Mobile computing devices together with social networking and collaborative applications

make it possible to process simultaneous streams of real-time information, resulting in information overload. Techno-complexity, for example, according to Tarafdar et al.'s (2011), greater effort in understanding the use of information system; it is associate with increased role conflict. Role-related conflict is often present to those facing challenging to their activities.

This research draws from Tarafdar et al.'s (2011) analysis of technostress theory to examine methods which will help the researcher understand how techno-stress impacts students in an e-learning environment. The study draws on literature in techno-stress, psychology, physical characteristics and student performance in order to develop an efficient manner of using technology. The study points to the procedure of a fit between techno-stress occurrence and operators within the content of experiences and consequences of techno-stress.

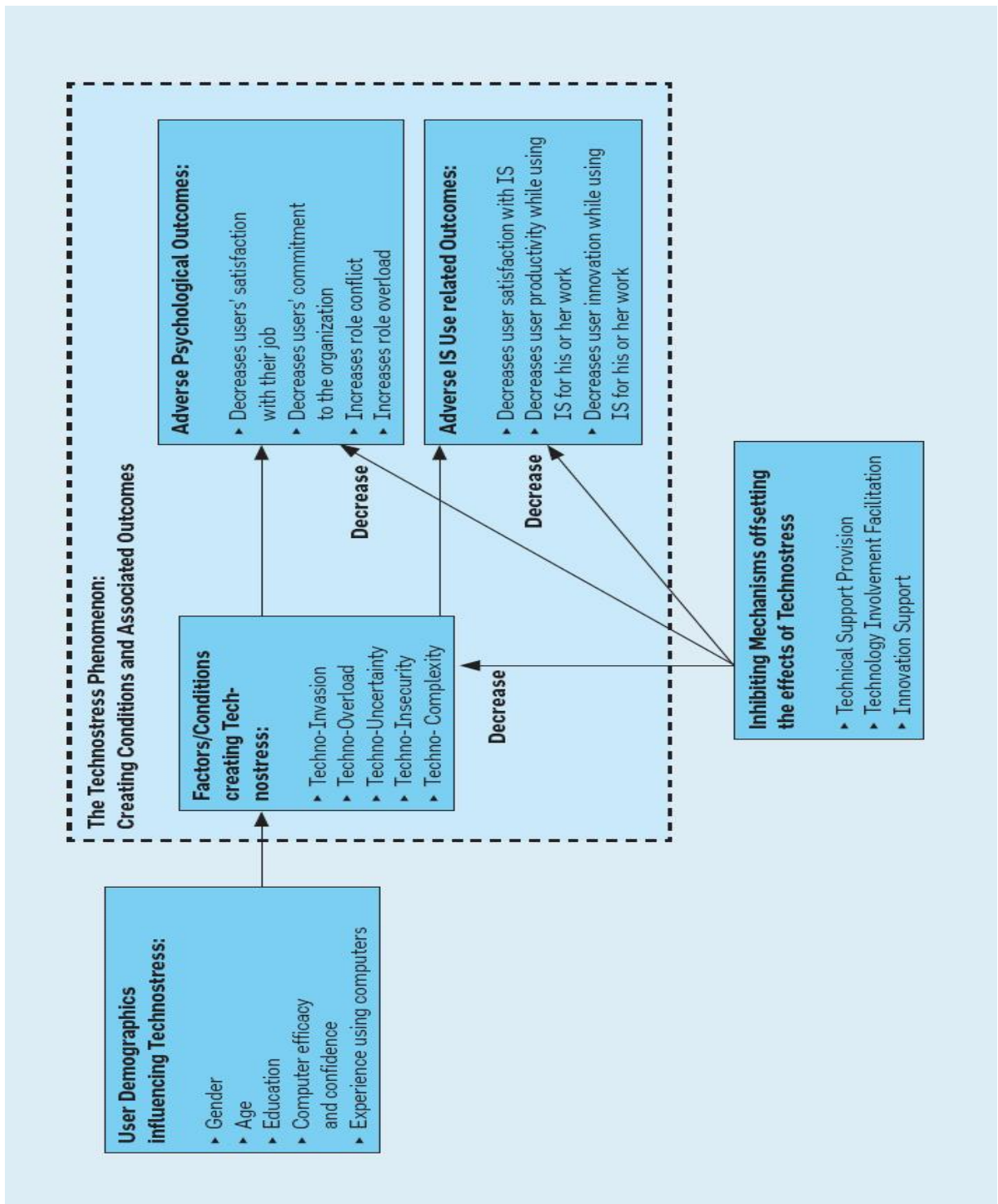


Figure 1: Creating conditions, outcomes and inhibiting mechanisms of techno-stress (Tarafdar, Tu & Ragu-Nathan, 2011)

2.11 Summary

Researchers from different fields of study have formulated numerous meanings associated with the notion of stress. What is noteworthy in these studies are that all the researchers share the view that stress affects emotional well-being (Fink, 2017). Several mentioned causes of techno-stress ranges from environmental factors to genetics, with effects just as far reaching physical and mental health problem when it comes to be too dangerous (The Work Foundation, 2007 & HSE, 2004). In this chapter the researcher illustrated how people struggle to adapt to newly developed technologies; as a consequence, they experience techno-stress (Agboola & Olasanmi, 2016:253). The negativity of technology is referred as techno-stress, which describe the negativity of psychological link between people and the introduction of new technologies. The inability of many users to adjust or adequately deal with ICT in a good and healthy way is one of the foremost signs of techno-stress (Brod,1984:19).

Students often feel compelled to be connected to social media platforms and engage in incessant sharing of updates. Poor ergonomics at computer workstations in classrooms, could induce techno-stress in students (Hung, Chen & Lin, 2015). Students also need skills required to use innovative technology and are often compelled to over-identify with technology (Davies, 2015). This chapter evaluated and analysed the possible causes of techno-stress amongst technology users. Two important groups of factors which causes techno-stress have been identified: environmental factors and social factors (Clute,1998). Numerous studies investigated the causes of techno-stress. The shortage of computer skills and experience are the biggest influences that presently cause computer-related techno-stress (Bloom,1985).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology the researcher will apply to answer the research question. The research methodology is a systematic plan and set of procedures developed by researchers to study a social or natural phenomenon and to realise a research aim (Bless & Smith, 2000). Jowah (2011) holds that a study's methodology is viewed as the structure of the research that is to be carried out to solve a problem or answer a research question. generally, the foremost importance of the research method is to gather the study contributors and collect information (Polit & Hungler, 2001). This section illustrates how the study methodology was applied to address this study's research problem. The utilised qualitative research approaches. Semi-structured interviews were deployed as a data collection technique to gather data.

Research methodology is an approach of collecting data in a systematic manner. This chapter defines the approaches utilised in research to address the investigation question also to realise the study objectives and aim. The research was conducted for the purposes of exploring the perceptions and implications of techno-stress among students who experience it in daily life at universities.

3.2 Interpretive Paradigm

The argument of this investigation was not to define or explain the concept of techno-stress, but it was designed to explore perceptions and Implications of techno-stress in an e-learning environment. The research focused on the interpretivist approach to lay down the perceptions of techno-stress and its impact on students. The interpretive research paradigm refers to the understanding of the universe from a personal opinion, searching for knowledge about the individual perspective and their experiences (Ponelis, 2015). As indicated in the preceding section, the researcher used qualitative research in the context of the interpretive paradigm. In fact, the distinction between qualitative and interpretive research is that a qualitative study might be positive or interpretive over the philosophical assumptions of the investigator (Rowlands, 2005).

Thus, qualitative research regroups various terms covering collection of methods in its quest of describing social phenomenological factors (Rowlands, 2005). On the other hand, interpretive study is a more specific term used to comprehend the research study context such as the human action aspect (Rowlands, 2005). Simply put, the interpretive paradigm means discovering of reality through a participant's view and through their own background and experiences (Thanh & Thanh, 2015). Therefore, the interpretive paradigm is focussed at understanding techno-stress from a person's perspective and interaction among individuals within their cultural context as well (Scotland, 2012). Researchers in this pattern seek to comprehend rather than elucidate (Mack, 2010). The interpretive pattern accepts numerous connotations and ways of knowing and acknowledging objective reality and more importantly focuses on recognising the meaning of human experiences and actions (Levers, 2013).

3.3 Qualitative Research

Qualitative research is based on exploration of social facts and human perspective within their context (Castellan, 2010). Burns and Grove (2003:19) describe a qualitative approach as "a systematic approach used to describe life experiences and situations to give them meaning". Holloway and Wheeler (2002:30) refer to qualitative research as "a form of social enquiry that focuses on the way people interpret and make sense of their experience and the world in which they live". One of the essentials of qualitative studies is the comprehensiveness of perception it gives to the research (Rubin & Babbie, 2010).

Thus, qualitative research was particularly suitable to study the context of phenomena that could be understood within their natural setting (Rubin & Babbie, 2010). Qualitative research was used to interpret the meanings of human action and seek a deeper understanding of social life as non-numerical data (Creswell, 2009). The key aspects of qualitative research are to focus on compound problems such as human behaviour, interaction and needs (Isaacs, 2014). Qualitative research can be categorised into various methodologies such as ethnography, narrative, phenomenological, interpretative, and grounded theory. This research study made use of a qualitative approach in the framework of the interpretive paradigm to explore the

perceptions and implications of techno-stress among students who experience it at a university of technology.

3.3.1 Advantages of Qualitative Research

According to Babbie and Mouton (2001), the qualitative research method has significant advantage as it permits the researcher to have full in-depth understanding of the research. Qualitative method gives a way of interpreting results easily and discovers new ideas (Babbie, 2004). Babbie and Mouton (2001) and Welman, Kruger and Mitchell, (2005) view the qualitative research method as appropriate for addressing variables that are difficult to quantify. The qualitative research methods also offer a high level of flexibility by permitting the investigator to manipulate the data collected at any given time in order to increase the validity of the findings. According to Mert, Bayramlik and Turgut (2014), one particular advantage is in assisting the researcher in improving the strategic competences.

3.3.2 Disadvantages of Qualitative Research

According to Babbie and Mouton (2001), the disadvantage of the qualitative method is usually on the result; the result obtained through the method are more reliant on the understanding of the investigator, which makes it responsive rather than objective; that might make it difficult for findings/results to be generalised. According to Rahman (2016) the investigation methodology is viewed as the logical method utilised to obtain new knowledge or to develop existing knowledge. Thus, research is interactive in nature and therefore requires researcher to present virtuous communication and analytical skills to provide the findings in a more clarified format (Babbie, 2004).

3.4 Case Study

A qualitative case study represents a technique that enables investigation of a phenomenon in its framework utilising different sources of data. This guarantees that the research context is not discovered from only one source but through different ones that permit a number of sides of the phenomenon to be exposed and understood (Baxter & Jack, 2008). A qualitative case study gives the researcher the opportunities to explore the perceptions and implications of techno-stress among students who experience it at a university of technology. This method was adequate for the study to

form a theory and facts, and to find the reason for its suppleness and consistency (Yin, 2003).

The rationale of using the case study method is typically the opportunity of exploring intensive investigation of the perceptions and implications of techno-stress among students at a university of technology (Rubin & Babbie, 2010). The overall aim of the case study is to work with phenomena which will be inspected, described, observed and analysed in order to record important data and deliver in-depth knowledge related to the research topic (Yin, 2013). A case study was suitable for this research in revealing an accurate description and generating knowledge that will realise the research objective (Starman, 2013).

3.4.1 Exploratory Case Study

According to the Collins Dictionary (2001), exploratory activities are completed in order to determine something or to learn the reality about something. According to Burns and Grove (2003), an exploratory case study is defined as investigation directed to gain new understanding, learn new ideas and increase knowledge of a phenomenon. Yin (2003) suggests that an exploratory case study is appropriate if one is looking at answering a question that sought to clarify the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies. Furthermore, the author points out that the explanations link program implementation with program effects. Baškarada (2014) elaborates and suggests that exploratory case studies may be undertaken prior to the definition of the research questions and hypotheses and are mainly used for theory building. This type of case study is used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes (Yin, 2003). The goal of an exploratory case study is to discover theory by directly observing a social phenomenon in its natural context. The researcher may identify further research questions for future study as in an exploratory study but may also generate theory (Yin, 2012).

In cases where descriptive or explanatory theory cannot be developed easily before a case study, it is required of the researcher to consider whether the case is more of an exploratory case study. The exploratory case study was chosen for this research as the goal of a case study in research is to develop an understanding of the system. The

purpose laid in the research was to investigate the perceptions and implications of techno-stress in an e-learning environment and bring an understanding of how students experience techno-stress in order to add knowledge on examining the relationship between technology and stress experienced by students who use technology at a university of technology. Because an exploratory case study provides answers based on theory, the exploration of perceptions and implications of techno-stress in an e-learning environment developed through the study procedure will help to describe the theoretical concepts under which students can use to avoid techno-stress.

An exploratory case study was chosen for this research instead of the descriptive case study for the simple reason that an exploratory case study research seeks to define investigation questions of a subsequent study or to determine the feasibility of research procedures. This involves investigation and information collection a prior to the formulation of a research question (Hancock & Algozzine, 2016). It differs from the descriptive case study where the data is occasionally based on only a small set of individuals, often only one person or a small single group. The descriptive theory often articulates phenomenon that are already known and mean to specify the boundaries of the case, and also contributes meaningfully only to the consistency of the finished case study (Tobin, 2010). On the other hand, the use of explanatory case studies is to describe how the experience has taken place or why an experience took place (Yin, 2003:7). Furthermore, an explanatory case study's goal is to suggest "clues to possible cause-and-effect relationships". These suggestions of causality create chances for these cases to be confronted on the foundation that one situation does not make for a true experiment.

3.5 Population Type

The research population is the student body from the Cape Peninsula University of Technology (CPUT). According to CPUT (2016), the institution has 32 000 students enrolled across all qualification levels (first-year, second-year, third-year and post-graduate)

3.6 Sampling

Sampling is defined as a set of entities in which the participants are selected to gather sufficient knowledge related to research topic (Kothari, 2004). Sampling technique is divided into two types: probability and non-probability. This research study focused on “non-probability sampling” which is discussed in the upcoming segment. “Non-probability sampling refers to the case where the probability of including each element of the population in a sample is unknown” (Bless, Smith & Kagee, 2006:101).

Non-probability sampling presents regular boundaries related to the personal nature in selecting the participant. Also, it is valuable specifically in the case when randomisation cannot be used, especially if a research population is vast. It might be valuable as well when the researcher has inadequate time and resources. It might be utilised as well when the study does not aim to make outcomes that will be utilised to produce oversimplifications relating to the whole population (Etikan, Musa & Alkassim, 2016). Non-probability includes various sampling techniques. However, for the purpose of this research study, the investigator employed purposive sampling to select the contributors and also to gather empirical data to realise the research objectives. The method allowed the researcher to use her own gut and judgment for selecting participants. For the purpose of this study and due to the limited numbers of participants, this method was effective to address the research aims and objectives.

A purposive sampling technique is described as “selecting units such as individuals and organisations based on a specific purpose associated with answering the research study’s questions” (Teddlie & Yu, 2007:77). A purposive sampling approach is important in a study as the information is envisioned to contribute to a healthier sympathetic of a hypothetical context (Palinkas, Horwitz, Green, Wisdom, Duan & Hoagwood, 2015). Purposive sampling is broadly utilised in a qualitative study for the identification and choice of material associated with a phenomenon. The purposive sampling technique is also termed judgment sampling. Purposive sampling is typically used in qualitative studies (Tongco, 2007). Also, the researcher selected respondents who were willing to participate on a voluntary basis in the study (Farrokhi & Hamidabad, 2012).

According to Phrasisombath (2009:4), "sampling size encompasses the collection of a number of study units from a defined study population". The sample size for this research constituted 30 respondents. As mentioned above, this research study employed purposive sampling to select the contributors by letting the researcher use her own gut feeling and judgment in the way of selecting students at CPUT's Cape Town Campus. The students were randomly selected.

3.7 Data Collection

Data collection methods involves the gathering of empirical data from a diversity of sources. Here, the objective is to analyse the collected data from which the research results are produced. Qualitative data collection approaches are unstructured and semi-structured interviews, observations, documents, and visual materials (Creswell, 2009; LoBiondo-Wood, Haber, Cameron & Singh, 2013). For the purpose of this research, the investigator utilised semi-structured interviews, observation and focus group.

3.7.1 The interview processes

According to Yin (2003:79) a pilot study is an important part of the qualitative study method. It aims to provide some benefit such as helping in detecting flaws in the interpreting procedures and helping to identify unclear formulated items when conducted on a small number of respondents from the sample.

30 students volunteered to participate in the study. The interview questions were designed to find out what their perceptions of techno-stress are and how techno-stress affects them in an e-learning environment. The 30 students were selected and were divided into six groups. Five CPUT students were selected and put in one group to study their perception over techno-stress. The pilot was undertaken on completion of the first draft of the interview questionnaire. The questionnaire administered to five students was designed with open and closed-ended questions.

The researcher was able to adjust the questionnaire based on the preliminary interview outcomes and recommendations made by the interviewees. Upon the end of the pilot, the researcher started on the research interviews. Interviewees were

contacted to ask for permission in order to arrange an appointment. Interview session appointments were sent via email and social media for confirmation in writing.

During the interview, the researcher was the first to introduce herself and provided short background information of the study and how it would benefit the interviewee. Ethical consideration was presented as proof that the research was academically purposed. Most of the interview sessions were taken on campus in a classroom and library to make sure that the interviewees feel comfortable, secure and in surroundings that they preferred. The average time of interviews were between 50 to 70 minutes and were recorded on a smartphone. Furthermore, the requested language of the interview was English as it is the language of academic instruction at the university.

To balance the raw data of the recorded audio, recording was also registered by the investigator throughout the interview. At the end of every interview meeting the investigator acknowledged the applicant and asked if they could perhaps recommend at least five (5) other potential participants in their department that the researcher could invite of participate.

3.7.2 Focus Group Interviews

A focus group interview is defined as structured discussions which normally consist of 5 to 10 interviewees that participate in a research study to give their experiences (Stanley, 2016). Focus group interview aim to study public opinion to understand how populations or groups process and exchange meaningful information around an expected situation (Stanley, 2016). Alternatively, the determination of directing a focus group interview is clearly to comprehend how individuals think or feel regarding the problem, product, idea or service (Krueger & Casey, 2014). Similar to interviews, focus groups interview allows participants to interact and engage in deep discussions concerning related topics (Sellick, Umuhoza & Shoulders, 2016). Also, a focus groups interview counts as qualitative research data collection method. The empirical knowledge respondents produce from the focus group meeting are used to answer the research questions (Kamberelis & Dimitriadis, 2013).

The researcher conducted five sessions of focus groups interviews with CPUT students who shared similar types of experiences, including a different range of

perspectives. Each group consisted of at least five students; they were asked about their perceptions, opinions, beliefs and attitudes towards techno-stress and the use of technology itself. Bearing in mind that the beginning of a focus group discussion is imperative for the climate, the researcher created a thoughtful permissive atmosphere and provided ground rules that were followed during the discussion. This resulted in a successful focus group interview.

3.7.3 Observation

Observation is a research method of data collection in which researchers observe within a specific research field; the method is occasionally referred to as an unobtrusive method. It also a method of observing phenomenon in the societal setting environment which is selected for purpose of a research study. Typically, observation attaches the investigator to the most rudimentary of human experience and through determining engagement and involvement on how and why humans interact in a certain situation (Guest, Namey & Mitchell, 2013). Also, observation is the procedure of learning involvement to routine or day-to-day activities of the participants in the investigation settings (Kawulich, 2005). Observation is the procedure of creating a relationship within the public space and learning to act in such way as to merge into the public so that its members will act naturally (Driscoll, 2011).

To gather accurate data, the research first decided on when the observation might take place. During the course of the research, the observation was conducted daily during the academic week. Students were observed during rush hours which is between 11:00 am and 1:00 pm. The procedure was conducted once a day for a durations two hours in the surrounding campus' library and computer laboratory. The researcher was obliged to sit discretely at the back of each facility to record what was observable. Students who were unfortunately not approached to seek their consent to be observe; however, the researcher was able to set ethical grounds to respect students' privacy and their psychological wellbeing.

3.8 Data Analysis

Fereday and Muir-Cochrane (2006:80) holds that "thematic analysis is a search for themes that emerge as being important to the description of a phenomenon". Similarly, thematic analysis is frequently utilised to detect, analyse and report information

meaning that are produced by people, situations and events (Jebreen, 2012). Thematic analysis is a form of qualitative study that describes the data in great detail and deals with a diverse respondent (Ibrahim, 2012). As mentioned above, thematic analysis was used to analyse collected data. Jebreen's (2012) six steps were followed:

- Developing initial codes: the investigator conducted a series of observation, focus group interviews and also considered to identify the important parts of the raw data as initial codes, "investigators have to collate data through recurrence or repetition of words and phrases" (Jebreen, 2012: 171)
- Validate initial codes: Researcher directed an additional sequence of contributor interviews and focus groups. "When the initial codes were confirmed, the data is summarized, and clustered into groups that related to the research questions. By interpreting the data and assigning codes to the raw data, specific themes are identified" (Jebreen, 2012:172)
- Identify themes: The identification and clarification of codes necessitates a long procedure of interpretation and revisiting the collected data. "Once a code is identified, the data is studied again in order to identify and specify the parts of raw data which relate to the same theme" (Jebreen, 2012:172)
- Validating coded themes: According to Spradley (1979), the validity of the coded terms is clarified afterward organising and combining diverse codes under similar thematic umbrellas. "Domain analysis helps to identify and specify the relations between the themes" (Jebreen, 2012:173)
- Identifying relations between themes: This procedure was attained by recognising relations among themes, putting it clear what the philosophy says using why, how, when and what approach
- Emerging explaining and predicting theory: "Clear understanding of the themes and their relations leads to explaining and predicting theory. After this, the

theory can be validated by literature review discussion, and identified as the final product of the study” (Jebreen, 2012:173)

- These stages will be used as inductive thematic analysis to obtain an understanding of phenomena and analysing qualitative information (Harrell & Bradley, 2009) (see Figure 2)

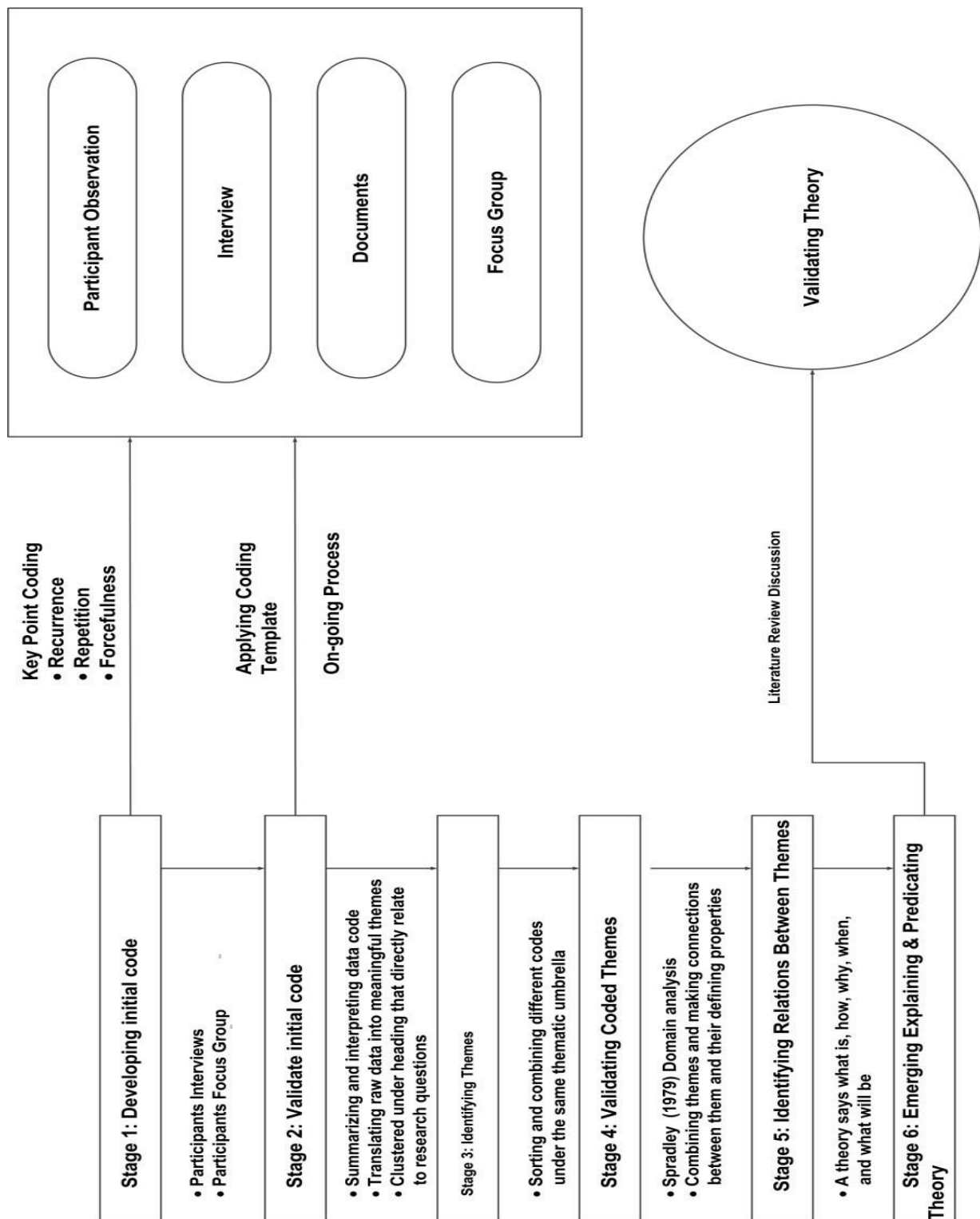


Figure 2: Diagrammatic Representation of Data Analysis Strategies (Thomas, 2006).

The data collected from all the focus groups was transcribed by the researcher. Throughout this process the researcher was able to classify initial thoughts and all ideas were written down. This transcribed information was reviewed and re-read on several occasions. It was important for the researcher to make sure that the transcripts

retained the information needed from the verbal explanation in a way which remains true to its original nature. It was then followed by codes identifying structures of the information that the investigator aligned with the relevant research question. At this level, it was the creation of initial codes from the data. Codes identify a feature of the data that appears interesting to the researcher and that can be assessed in a meaningful way regarding the phenomenon.

The procedure of coding allowed the researcher to search for themes. The procedure elucidated bigger unit of data by combing diverse codes that might have been very comparable or might have been considered the same aspect within the data. The themes were then refined as some candidate themes were not acceptable. Themes with limited data to support them including them with too many varieties were discarded. This modification of the themes was constructed within two levels. At the first level, with the code data to guarantee that they formed a clear outline. At the second level, the themes were then considered in relation to the data set as a whole once a clear pattern was formed. The researcher then defined and refined the themes that were presented for analysis and analyse the data within them. Each theme needed to be clear and escorted by a comprehensive analysis. Attention was given not only to the story narrated within individual themes, but on how these connected to the general narrative that was evident within the data.

3.9 Validity, Reliability and Triangulation

According to Polit and Hungler (2001) validity refers to the accuracy of the information. Validity is used when the investigator's findings replicate the perceptions of the individuals who are researched. Validity is significant in a qualitative study, as investigators are capable of establishing the authenticity of the contributors through a comprehensive explanation of the discussion. The first step in ensuring validity was choosing participants from a segment of CPUT and designate a good sample group of participants. Secondly, the researcher actively seeks alternative explanations by asking questions in an inverse format in order to strengthen the validity of the findings.

Reliability describes the Consistency of information over conditions and over time. A dependable research learning must be precise and reliable. Reliable information is dependable, unfailing, trustworthy and honest. Consistency is the principal degree of

reliability (Polit & Hungler, 2001). These were attained by using recognised research methods that have been tested for validity and reliability as discussed under section 3.1 to 3.3.2, also recognising biases in research sampling and continuing critical reflection of the research methods to ensure adequate relevance of data collection and analysis

Cooper (2000) refers to triangulation as the practice of different approach to develop conclusions. It encompasses indication from diverse sources, diverse approaches of gathering information, and diverse researchers. The usage of triangulation allows the investigator to attempt to differentiate useful information. The investigator used triangulation to establish the accuracy of data related to the questionnaires by applying more than one method to collect data. The researcher also used triangulation to analyse the research question from multiple perspective to arrive at the research data consistency. This triangulation of data strengthens the research method because the investigator's data has increased credibility and validity.

3.10 Limitations

This research was limited to:

- Cape Peninsula University of Technology, because it one the University of Technology in the Western were the research were conducted and there is no other university of Technology in the province; the research also was limited at CPUT Cape Town Campus because of the capacity of the campus.
- CPUT Students only were involved because they formed an essential target population of the research as University of technology students. The research could include students of other universities that are not Universities of Technology.
- Participants were requested to respond using English because of it being the primary language of instruction at the institution. This may have affected the quality of the data obtained, in that perceptions could not be communicated effectively.

- As the researcher was not a native English speaker, the analysis of information took much longer delaying some result to the study.
- The research is also limited on 'reported negative perception' as this is not the researcher's area of expertise and further recommendation was provided.

3.11 Ethical Considerations

The researcher made sure that permission was obtained from the Higher Degree committee academics at the Cape Peninsula University of Technology, Cape Town campus. The interviews were conducted directly with CPUT Cape Town campus students. Students across all qualification levels were invited to participate. The purpose of the study and the interview protocol was explained to the participants. Furthermore, respondents were assured that all responses would remain confidential. Upon completion, respondents were requested to participate in a focus group interview. Participants were given one week to respond upon accepting to participate. The use of consistent application of research methodologies as described in sections 4.8 to 4.8.3 helped to limit any bias that could be caused by the position of the researchers. It helped the researcher by reviewing the guidelines for conducting research, collecting data and keeping details records. A study by Escobedo, Guerrero, Lujan, Ramirez, and Serrano. (2007) indicates that informed consent are processes in which the participant agrees to partake in the study after being notified of its ethical principles.

For this study, participants were recruited via the administrative offices and other facilities such as library and computer laboratory of the CPUT. The purposes and objects of the study were explained to all participants in rigorous detail. Participants were given a detailed information page which outlines the purpose of the study and stipulates that participation is voluntary. Participants were asked to complete and sign a consent form to formally authorise their participation in the study. Anonymity and confidentiality were applied in the research and participant data was protected and used for the purpose of the study.

In addition, the investigator did not also discuss confidential responses with anyone else. The researcher ensured participants that they will not be exposed to emotional

and physical danger in the study. transcripts of respondent data were securely stored – only the researcher and the research supervisor had access to the transcripts. The researcher should respect the participant sufficiently to recognise their ability to make an informed decision in terms of participation and access to findings.

3.12 Summary

The study methodology was discussed in this chapter, as well as the population size was designated. Study site and the method of data collection that were utilised were discussed. The investigator used qualitative study approaches. Qualitative study approaches were used to gather an in-depth analysis of the contributors' knowledge and experiences of the area of the research. This chapter also discussed ethics, reliability and validity. The informants were ensured not to be exposed, also that the information that is gathered is within CPUT's ethical framework for conducting research. The next chapter highlight and discusses the outcomes of the research.

CHAPTER 4: PRESENTATION OF THE RESEARCH FINDINGS

4.1 Introduction

In this chapter the research findings are analysed and discussed. The research study will allow the investigator to conclude the topic, answer the research questions, make recommendations, and possibly suggest further research into techno-stress. The research accounted for 30 participants regrouped in six (6) groups. Of the 30 respondents, 10 were second year students, 5 were post-graduate students, 6 were first year students, and 9 were third year students at the CPUT.

The aim of this research study was to find out UoT students' perceptions of techno-stress in an e-learning environment. In addition, the researcher examined the impact of techno-stress on students' academic performance. The objectives were to identify the types of techno-stress that students experience at universities, determine the potential causes of techno-stress, find out how students think techno-stress impacts on their studies, and describe how students deal with techno-stress. In what follows, a brief historical context is given of the research site, followed by a description of the findings.

4.2 History of the Cape Peninsula University of Technology

According to the university website (2018), the institution of CPUT is the outcome of a merger between Cape Technicon and Peninsula Technicon. In the section below the researcher briefly give a historic overview of the merger between the two institutions.

4.2.1 The Cape Technicon

The Cape Technicon was found in 1920 in Longmarket Street as a technical college. The creation of the Cape Technical college followed more than a decade of requests by the public for the collaboration of technical courses that had been presented in different locations in Cape Town. By the late 1960's received the official status as a technical college and was called the Cape College for Higher Technical Education.

It was then a decade later in 1976, after the conversion of the institution to a college, that an act was then promulgated for changing the name to the Cape Technikon which received permission to offer degree programs. This institutional reform happened

during the apartheid era, therefore only white students were allowed. However, this changed in 1987 when the institution allowed to have government's regulation lifted, allowing coloured students access to the institution. Later the institution revealed new institutional structure, which included a number of faculties (six in total), a new mission and vision statement as well as a new institutional identity. In 2001, the Boland and Mowbray education college were combined into Cape Technikon, establishing the faculty of education at sites in Mowbray and Wellington.

4.2.2 The Peninsula Technikon

Back in the 1962, there was a need to grow and train the number black and coloured students in a diversity of trades. This resulted in the launch of the Peninsula Technical College. At the beginning the class were offered at Cape Town site before it was relocated to Belleville site in 1967. The sites at Bellville nowadays operate as main managerial site of the CPUT

Around the 1970's the status of the organisation was transformed to a college of higher technical training and later rebranded as Peninsula College for advanced technical education. The name and status were change in 1979 to the Peninsula Technikon. The institution opened its doors in 1987 and enrolled students from all races. However, the primary focus of this institution was established to offer education to black and coloured students during the apartheid era. In the 1990's considerable change occurred, the institution was authorised to offer degree programs. In 1997, the institution saw the rearrangement of its academic program, incorporating engineering, business and science.

4.2.3 The Merge: Cape Peninsula University of Technology

The merger of Cape Technikon and Peninsula Technikon took place on the 1st of January 2005. The two merged institutions became known as the Cape Peninsula University of Technology. The merger made possible under the national transformation policy framework and its goal was to achieve greater racial diversity with higher education. With more than 30 000 students, the institution nowadays is referred as the largest university of technology in the south of the country. The institution covers more than 70 programs and have several campuses and services

points. The name Cape Peninsula University of Technology was approved in 2003 by the minister of higher education (CPUT, 2014).

Nowadays, the vision of the Cape Peninsula University of technology is to “be at the heart of technology education and innovation in Africa, with the its mission to “build a university that is highly efficient, sustainable and environmentally conscious that will be recognized for the high quality of it teaching and learning and the relevance of its curriculum; create a vibrant learning environment for students; and promote innovation in aspects of work” (CPUT, 2014:1).

The Cape Peninsula University of Technology implemented an important 10 years academic plan named Vision 2020 in which the institution seeks to improve research and foreground innovation. Also make use of best practice throughout the university. The university adopt this vision as transition from what they believe as ‘good to great’ in order to produce important research and innovation that are parallel with the country’s needs. This will be done through its essential method of teaching which allow students to make a successful transition from student to employee (CPUT, 2012).

4.3 Part 1: Focus Groups

4.3.1 Result Analysis

The participants involved in the research were students at CPUT’s Cape Town campus. As mentioned in the data collection approach, the research used focus group interviews to collect raw data regarding techno-stress among students. The 30 participants were divided into six (6) focus groups. Table 1 below shows the composition of the respective groups.

Table 1: Composition of groups

Group A was composed of 5 students: 3 females and 2 males
Group B was composed of 5 students: 4 females and 1 male
Group C was composed of 5 students: 1 female and 4 males
Group D was composed of 5 students: 5 females
Group E was composed of 5 students: 3 females and 2 males
Group F was composed of 5 students: 2 females and 3 males

The above accumulative rate of participation shows that the majority of the contributors were females (n=18) with a minority of males (n=12). The higher level of female participation could be justified as the university's 2016-17 enrolment statistic shows that more women are enrolled (54.4%) in the institution.

The thematic analysis process that was applied to the transcripts produced key concepts that were evident in the data. The key themes produced are viewed as essential in making sense of participants' experience of techno-stress. However, in some cases the participant's understanding touched across the issue presenting concepts; but, are all relative to each other, this situation was viewed as a good interpretation of understandings and attitudes in general.

Group A

See tables in appendix B for group A individual response to questions

Context: the researcher interviewed the first group of students in the second week of June 2017. The group included 5 students and composed of 3 females and 2 males. Participants were not late (they were on time) before starting the interview. Various questions relating to the implications and experiences of techno-stress were asked. The following section describes this group's experience.

Findings: In this group, most of the participants said that they are certain that technology can make cause stressful. When they were asked to give the reason for this belief, most of the participants of this group responded when it stops working. Most of the participant expressed the same meaning of what techno-stress mean to them; It is stress that stems from negative encounters with technology devices. All participants responded that loss of concentration and focus is one of the affects they experienced as a result of techno-stress. The majority of the respondents also said that they felt emotions of anger as a consequence of techno-stress.

All respondents said that technology is necessary for good academic progress, especially if they need to do research and submit assignments. They also experience nervousness with new updates of technology; they feel that the functions and features

of the new technology upgrades is difficult to use. All the respondents in this group believed the malfunctioning of devices and poor internet connection are the causes that are related to techno-stress. The group illustrated that techno-stress impact negatively on their academic performance because of low mind set, nervousness and frustration. All participants in the group responded that the negative physical effect they feel when they have computer problems are headache and back pain. The way they manage techno-stress was by seeking help and they always react to it by frustration. The group feels that techno-stress do not affect to the extent that they do not want to use technology again; they feel that technology is still a vital and important in life.

Group B

See tables in appendix C for group B individual responses to questions

Context: the researcher interviewed the second group of students on the 20th of June 2017. The group included 5 students, composed of 4 females and 1 male. The procedure was as in the first group; participants were not late before starting the interview. Various questions about the implication and experiences with techno-stress was asked. The following section describes this group's experience.

Findings: In this group, most of the participants belief that technology can make them stress; the reason why they said so was that most of the participants of this group believed when it stops working. Most of the participants have a shared understanding of what techno-stress is to them; if a problematic encounter with computer technology causes a person to stress. From the influences of techno-stress students experience in their study, all participants said that it a negative one; the majority of the participants of this group also said that the kind of techno-stress they face when dealing with technology is nervousness.

The majority of this group respondents feel that technology is necessary for good academic progress because technology allow them to download class material and learn online. They also said they feel nervous with new update of technology as it become difficult to use. All the respondents in this group believed that slow internet, broken devices and malfunctioning devices are the causes of techno-stress. The

group also believe that techno-stress has a negative impact on their academic performance because they become frustrated. All participants in this group responded that headache, fast heartbeat and back pain are the negative physical they feel when they have problem with their computer. And the way they manage techno-stress was by letting it go and stay away but they react to techno-stress by frustration and anger. the majority of this group was convinced that techno-stress does not isolate them from using technology as they also responded “No” and said they need technology.

Group C

See tables in appendix D for group C individual responses to questions

Context: the researcher interviewed the third group of students on the 28th of June 2017. The group included 5 students and composed of 1 female and 4 males. The procedure was as undertaking on the previous group. Various questions about the implication and experiences with techno-stress were asked. The following section describes this group’s experience.

Findings: In this group, the majority of the participants said that technology can cause stress. They also added that they do not experience techno-stress every day. The mentioned that they only experience techno-stress occasionally, most when technology malfunctions. The majority of the participant arrived at a shared meaning for techno-stress; to them techno-stress was stresses that is related to technology devices. From the influences of techno-stress, all participants said that it had result one; most of the participants of this group also said that the techno-stress they face when dealing with technology is anger.

In this group all respondents said that technology is necessary for their academic performance because technology allow them to do research, download class material and learn online; the majority of this group also said they feel nervous with new update of technology as it become difficult to use. All the respondents in this group believed poor internet and malfunctioning devices are the causes that are related to techno-stress. The group also believe that techno-stress impact is negative to their academic performance because of frustration. The majority of the participants in this group

responded that palm sweat, and blood circulating fast are the negative perception they feel when they have problem with their computer; and the way they manage techno-stress was by letting it go and stay away but react by frustration and anger. The majority of this group was convinced that techno-stress does not isolate them from technology as they also responded “No” and said they need technology.

Group D

See tables in appendix E for group D individual responses to questions

Context: the researcher interviewed the Third group of students on the first week of July 2017. The group included 5 students and composed of 5 females and no males. The procedure was as undertaking on the previous group; participants were not late as the researcher was regrouping the participants before starting the interview. Various questions about the implication and experiences with techno-stress were asked. The following section describes this group’s experience.

Findings: In this group, all participants said that technology can make them stressful, the reason why they said so was that all of the participant of this group believed stress comes only when technology stop working. The majority of the participant expressed the same meaning of what techno-stress mean to them by saying that it stresses that is related to unable to control their technology devices. From the influences of techno-stress, they experience on their study, all participants said mentioned a loss of concentration; the majority of the participants of this group also said that the kind of techno-stress they face when dealing with technology is frustration. In this group all respondents said that technology is necessary for their academic performance because technology allow them to do research, to contact lectures, availability of information, download class material and learn online; the all of participant of this group also said they feel nervous with new update of technology as it become Complicate to use and difficult.

All the respondents in this group believed Slow internet, broken devices and technology not working are the causes that are related to techno-stress. All participants also believe that techno-stress impact is negative to their academic performance because of low mind set, nervousness and frustration. All of the

participants in this group responded that headache, mistrust and disliking technology are the negative perception they feel when they have problem with their computer; and the way they manage techno-stress was by letting it go and stay away but react by frustration and anger. the majority of this group was convinced that techno-stress does not isolate them from technology as they also responded “No” and said they need technology because it is the era of technology.

Group E

See tables in appendix F for group E individual responses to questions

Context: the researcher interviewed the Third group of students on the first second week of July 2017. The group included 5 students and composed of 3 females and 2 males. The procedure was as undertaking on the previous group; participants were not late as the researcher was regrouping the participants before starting the interview. Various questions about the implication and experiences with techno-stress was asked. The following section describes this group’s experience.

Findings: In this group, the majority of the participants said that technology can make them stressful, the reason why they said so was that participant of this group believed stress comes only when technology is not manageable or stop working. All of the participant in this group expressed the same meaning of what techno-stress mean to them by saying that it stresses that is related to unhappy with technology. From the influences of techno-stress, they experience on their study, the majority of the participants of this group also said that the kind of techno-stress they face when dealing with technology is anger. In this group all respondents said that technology is necessary for their academic performance because technology allow them to do research, download class material and learn online; the majority of the participant of this group also said they feel nervous with new update of technology as it become Complicate to use and difficult.

All the respondents in this group believed slow internet, broken devices and technology not working are the causes that are related to techno-stress. All participants also believe that techno-stress impact is negative to their academic performance because of frustration. All of the participants in this group responded that

headache and body shaking are the negative perception they feel when they have problem with their computer; the way they manage techno-stress was by letting it go and stay away but react by frustration and anger. the majority of this group was convinced that techno-stress does not isolate them from technology as they also responded “No” and said they need technology because it is the era of technology.

Group F

See tables in appendix G for group F individual responses to questions

Context: the researcher interviewed the Third group of students on the third week of July 2017. The group included 5 students and composed of 2 females and 3 males. The procedure was as undertaking on the previous group; participants were not late as the researcher was regrouping the participants before starting the interview. Various question about the implication and experiences with techno-stress was asked. The following section describes this group’s experience.

Findings: In this group, the majority of the participants also said that technology can make them stressful, the reason why also they said so was that this group believed stress comes only when technology stop working. The majority of the participant in this group expressed the same meaning of what techno-stress mean to them by saying that it stresses that is related to technology devices. From the influences of techno-stress, they experience on their study, the majority of participants mentioned a loss of concentration; the majority of the participants of this group also said that the kind of techno-stress they face when dealing with technology is anger.

In this group all respondents said that technology is necessary for their academic performance because technology allow them do research and submitting work; the majority of the participant of this group also said they feel nervous with new update of technology as it become Complicate to use and difficult. the majority of the respondents in this group believed malfunctioning of devices and poor connection are the causes that are related to techno-stress. All participants also believe that techno-stress impact is negative to their academic performance because of frustration and nervousness. All of the participants in this group said that headache, back pain and dizziness are the negative physical they feel when they have problem with their

computer; the group said they manage techno-stress by letting it go and stay away but react by frustration and anger. the majority of this group was convinced that techno-stress does not isolate them from technology as they also responded “No” and said they need technology because it is the era of technology

4.3.2 General themes insights derived from the focus groups

Theme 1: Technology and stress (See tables in appendix H)

Technology and stress are two words commonly known by students at high institute of technology. The result of technology driving students stressful was clearly identified as the majority of the respondents (20) strongly agreed that technology does make them stress; while the minority of (10) responded that technology does not constantly make them stress. However, according to the current research result, technology is categorised as a source of stress as it can be unpredictable. Students believed that it makes them stress every time it stops working or when it becomes impossible to manage. Thus, the idea of not being able to control technology also makes them stressful. This result is in parallel with Hampton, Rainie, Lu, Shin and Purcell’s (2015) study, the authors pointed out that constant users of any kind of technology are more likely to get stress from it. As a university of technology, the overall aim is to be in constant vicinity of technology. Hampton et al. (2015) pointed that technology is dominating people lives and creating negative physical and psychological pressure which automatically result in stress and unhappiness with technology.

Theme2: Influences and negative implication of techno-stress on academic performance (See tables in appendix I)

The effects of techno-stress were viewed differently among respondents in the study. The majority of the participants experience loss of concentration as a result of techno-stress. A small number of participants responded that because of constant connection to technology, they experienced techno-stress. This have a negative effect on their general academic experience, performance and results. The effect of working with (low mind sets) feelings of demotivation, nervousness and frustration has a direct and negative implication on their academic performance. The research results are can be linked to Sumi’s (2016) findings. The author found that the influence of using technology is not so dangerous or vulnerable for mental health. The affects technology

has on students' attention span is significant; this problem becomes worse if students' class attendances are poor.

Theme 3: Types and causes of techno-stress at high institution of technology (See tables in appendix J)

When dealing with technology, it was evident that participants experienced techno-stress which resulted in anger, frustration and nervousness. From these respondents, the result shows that encounters with technology is sometimes frustrating, increase nervousness and emotions of anger. These types of techno-stress were mainly triggered by using malfunctioning technology devices, slow internet connection, and broken technology devices at school or elsewhere as mentioned by the majority of students interviewed.

The findings of this research are concurrent with techno-stress theories advanced by Tarafdar et al. (2011). The authors argue that continuous alteration in technology causes frustration, vagueness and nervousness among individuals. This happen because change always requires the acquisition of new technological knowledge to efficiently use and operate it. The research result of this study shows this element of continuous alteration in technology is an indicator of techno-stress within students' academic spaces and might seriously affect their well-being, focus and performance.

Theme 4: Negative perception and isolation to technology (See tables in appendix K)

It was evident that participants were affected by physical illness such as headaches, faster heartbeat, back-pain, sweating, faster blood circulation and dizziness as a result of techno-stress. Psychologically, participants developed negative perception and a mistrust for technology. They also expressed a general dislike for technology. Despite all the negative perception identified above, participants do not avoid the technology since they still rely in many ways on technology to support their studies e.g. submit assignments, do research, etc. However, a small group of participants report that they sometimes stay away from technology just to avoid stress.

Theme 5: Management strategies of techno-stress (See tables in appendix L)

Participants displayed different way of dealing with or managing techno-stress. Participants believed that in order to manage techno-stress, one must seek help from

a helper such as student support services they might find in their immediate vicinity. Also, from this study, techno-stress might be managed by avoiding contact to technology.

4.3.3 Summary of themes

Students at high institution of technology are aware of common implication of technology to stress. It is believed that technology is a main cause and source of stress to student. Hampton, Rainie, Lu, Shin and Purcell's (2015) argue that the constant use of any kind of technology creates a high probability for techno-stress to manifest. With constant use of technology, students' daily lives and academic lives are affected negatively. According to Sumi (2016), techno-stress is substantial as they might skip classes which reduce academic performance. It is evident that techno-stress displays several types such as anger, frustration and nervousness that are caused by the use of malfunctioning technology devices, slow internet connection, and broken technology devices at school.

Negative physicality such as headaches, faster heartbeat, back pain, sweating, faster blood circulation and dizziness are mostly developed by students. One to achieve the situation is seeking help from student support services.

4.3.4 Further responses from the interviewees

Context: the researcher interviewed all 30 participants in June and July of 2017. The interview questions and responses below are verbatim transcriptions.

1. Do you think technology can make you stressful? Please explain?

One interviewee of **Group A, Respondent GA4**, answered that: *"I enjoy working with technology, but for example here at CPUT, it is not a guaranty to finish a day without getting stress over technology as some of university application to technology such as internet and*

other access to the system are usually defected, so to me technology is a direct point of getting stress”.

Respondent GA1 went to say: *“Yes, technology gives me stress every time, it is unenviable to avoid technology stress when it does stop working or by the time you when can't control it, so to me these two event of technology drive me directly to stress”.*

Respondent GA2 responded: *“Absolutely, like my colleague here said when technology stop working and you can't control it, that will bring stress you like it or not. Because me it drives me stressful easily by the time these events occur”.*

Respondent GA3 went to say: *“Contrary to my colleague here, I will say technology does not stress me every day, but I admit that when it does stop working which in case does not occur every day, yes it might bring some stress”.*

According to Mahboob and Khan (2016), even though technology was initially introduced to ease and solve problems, it has proven to sometimes have negative consequences for its users. From the participants' responses above, it is clear that constant exposure to technology such as Google, e-mail, mobile phones, smart devices, and learning management systems (LMS) may also lead to stress.

2 What does techno-stress mean to you?

One member of **Group B, Respondent GB3** elaborated that: *“techno-stress' to me mean, the stress I gets when I'm unable to submit my work through the mean of using technology as it the only way to me to submit my work.”*

Further another **Respondent GD2** responded: *“when I am*

unable to control technology devices, that anger I have or experience is what mean “techno-stress” to me.

Respondent GB2 went to say: *“techno-stress to me is all stress that I get over computer specially when it giving me problem. It is very frustrated because to use technology, so techno-stress to me it that unwelcome feelings I get using technology.”* **Respondent GB3** stated: *“to me for example at school, techno-stress to me is that stress I get when unable to submit work through the mean of using technology.”* **Respondent GD1** responded: *“techno-stress to me is the feelings I have when I’m unable to control my technology devices, it might be cell phone or even more to laptop or other.”*

Based on the responses above, students’ understanding of techno-stress can be deduced as follow “unable to control my technology devices”. The research result is consistent with Yuvaraj and Singh’s (2015). The authors point out that students are required to be familiar with all the online tools at universities. Furthermore, Yuvaraj and Singh (2015) consider lack of training concerting the use of online tools, accompanied with work overload, lack of standardisation in technologies, and the unreliability of software and hardware create favourable conditions for techno-stress to manifest amongst users.

3 What are the influences of techno-stress do you experience on yours study?

“After being stressed over technology, during the day I lose my concentration to carry out with my study. Sometime I’m in the classroom but the only thing I’m thinking of is how to come out with a solution for what had stressed me with my technology devices. The result always ends up bad as the way I stressed make me lose control of my study” (Group D, Respondent BD5).

Group A, Respondent GA5 said: *“Techno-stress on my study have been a use set back, as every day when it gets me, it makes me very lazy and feeling that I can’t do anything on my study. Preparing for my homework, assignment even a group work will seem like a nightmare to me. That influences ‘laziness’ cause by techno-stress has cost me a year on my study.”*

Respondent GE2 said: *“the influences of techno-stress I experience on my study is that, techno-stress negative impact my grade, you cannot work properly when you stress over something you do believe it supposed to help you.”* **Respondent GE3** went to say: *“to me, the influences of techno-stress I experience on my study is that, techno-stress affect my focus I loss of concentration at school.”* *“To me what I experience at my study, is that techno-stress effects my result, I always end up having bad result”,* **Respondent GC1** said.

A study by Bonnah (2015) finds that many users – when adapting to the change of growing and complex technologies – tend to experience a level of emotional and physical stress such as nervousness and exhaustion. These findings are in parallel with the results of this research study in light of students citing loss of focus and concentration as a result of techno-stress. Loh, Gan, Lim, Loh and Yong (2016) illustrate that stress also influences employees’ productivity, work and personal relationships.

4 What kind of techno-stress do you face when dealing with technology?

One of the **Group B** Respondents, **GB2** went to add that: *“The kind of techno-stress I can point out is “nervousness”. Techno-stress makes me nervous. Example, when I am working on my assignment, and the due date is close, then the internet gets disrupted or computer dies on, the*

situation makes me so nervous as I won't be able to submit my work."

Respondent GB3 said *"the kind of techno-stress I face when dealing with technology is nervousness, I get so nervous and that drive me crazy and usually drop everything I was doing."*

Respondent GB4 stated *"to me anger is the kind of techno-stress I face when I'm dealing with technology; techno-stress makes me angry in the way that some time I feel like braking everything."* *"The kind of techno-stress I face when dealing with technology is frustration, techno-stress is very frustrated makes you feel like it the end of the word,"* said **Respondent GD3**.

The kind of techno-stress that students face when dealing with technology are similar from one student to another, the research results points out that nervousness is one of the main symptoms of techno-stress. These results are similar to Andreassen et al., (2016) who found that students who constantly participate in online activity or checking in on social media platforms may feel less nervous or either depress. The overexposure to technology might aggravate negative perception of nervousness and depression.

5 Does technology necessary for your academic performance?

From the **Group B** interviewees, **Respondent GB4** answered, *"Technology to me is not really necessary for my academic performance. I do believe that technology is very important for our studies at university. But it doesn't mean that technology become a decisive point of increasing or decreasing one academic performance, to me your performance is laid on ability that you can learn, we can learn without technology which it still possible, for*

example going to the library reading books and newspapers. Also, academic performance it your understanding, how you can analyse your lecture information and the way you study the prescribed books”.

Respondent GE5 responded; *“yes, I do believe technology is necessary for my academic performance, can you imagine if we didn’t have technology at school? Technology is helping me to perform better in my grade, it also allowing me to do more research, to contact my lectures, it gives availability of information, I can download class material and learn more online; all of these actions that can easily performed with technology are essential to my academic performance”.*

The result of the importance of technology for academic performance was tied to Epignosis (2014:5) who found that technology has progressed in such a way that geographical gaps is closed and connected with the utilisation of technological tools. Educational Vlog allows students to experience lessons in similar fashion as traditional face-to-face lessons. Moreover, e-learning gives students the capability to share material in several formats such as videos, slideshows, word documents and PDF, conducting live online classes and communicating with professors via chat and message forums.

6 Do you feel nervous with new updates of technology?

One interviewee of **Group C, Respondent BC5** answered: *“It always exciting to deal with new king of technology, personally I enjoy playing around with new update of our department software, January to me it is exiting month because I always know that I am going to be face to face with a new software at school. Example this year the university updated the system to download directly Microsoft office 2016 from your student email, that*

updated was wonderful and exciting, now I am busy getting to know Microsoft office 2016. So, I think it very fare for something as fun as technology new update or new invention to drive you nervous, to me it doesn't actually it an excitement and opportunity to upgrade myself."

Group E, Respondent GE2 responded: *"Technology update itself doesn't make me nervous as long as I don't use it; but from other technology that I am constantly in contact with such as computer system and software, they make me nervous once they are updated. I always have difficulty to use windows 10 because I am use with windows 8; the difficulty to find items on a new updated system makes me so nervous which sometime bring anger."*

Respondent GF4 answered: *"no way, people will dislike or be nervous about new or upgraded technology; people like new technology, for example every time when a new cell-phone or laptop is out I always wish to have it because to me it opportunity to know more and excitement to use new thing features. Talking laptop for example, I start chasing laptop from series of (I3) now I'm using (I7) this is because new or upgrade is good to me"*.

It is clear that the participants' responses are in contrast with Agboola and Olasanmi's (2016) view that new or updated technology makes individuals nervous. In their study, the authors acknowledge that stress can affect emotional well-being. Agboola and Olasanmi's (2016) reported that the link between an individual and the introduction of new technologies or an update does have negative psychological effects as they are always nervous. This does not seem to be the case at a University of Technology.

7 What are the causes that are related to techno-stress?

Group A, Respondent GA3 responded: *“Every day when I get to school, either a computer or internet one of these technology ends up getting me stress. By lucky I might find the computer that is working properly, but the speed of the internet will get on my nerve. Even printing a simple document is stressful as I might find the printer is not linked to the post I have worked, or the document might print out with lower ink.”*

Respondent GF3 answered: *“the causes that are related to techno-stress are many. Because technology is difficult to manage, some people stress because they couldn’t work in harmony with the technology devices as they unable to use it, but on my side because I’m a IT student, the most causes affecting me or causes related to techno-stress are mostly the malfunctioning of devices including poor connection of internet here at school.”*

Respondent GF4 answered; *“slow internet, malfunctioning of some computer in most lab and complete defected computer (do not work at all) are the most causes of techno-stress, here at CPUT these problems occur daily, so there is no scape for that. When you need a school work done, it is a guarantee you going to face these causes in which you will end up stress.”*

The responses resonated with the assertion by Baqutayan (2015) that individuals in higher education institutions and other organisation are likely to suffer from techno-stress due to technology overload and the inability to cope with rapid technological advancements. As Chandra, Srivastava and Shirish (2015) pointed out above, techno-stress is an outcome of application multitasking, constant connectivity and information overload.

8 How does techno-stress impact on your academic performance?

“You can be as smart as you can be, but when you are dealing with stress, it is impossible to give all your potential as your mind is not well set. Techno-stress as you call it, to me it stresses at another level because I have to experience it daily during class or when working on assignment because of the technology I am using that always put me on the stage that my mind become unstable and start writing no sense which will cost my academic performance. So, to me personally that ongoing techno-stress does not help my academic performance at all, it very negative.” (Group C, Respondent GC1).

Respondent GD2 responded: *“You know it is clear that school related work need a peaceful mind; but when you stress over something your grade or call it academic performance will negatively be affected. Techno-stress bring a lot of effect such as nervousness and frustration, because of these effects, you end up having low mind set which in result your academic performance will decrease because you cannot work under the influence of stress.”*

Respondent GD3 answered: *“Techno-stress is capable of negatively affect your academic performance, when you deal with techno-stress, your academic performance is on a verge of being damaged. What I mean is that because techno-stress causes nervousness and frustration, as my friend here said, you can work under the influence of stress, it will have serious negative effect on your performance.”*

The implications of techno-stress are social, psychological, economic and physiological. Similar to a finding by Samaha and Hawi (2016), technology addiction,

and more specifically communication technology, have detrimental consequences for academic performance. Wang et al. (2008) added that. This dislike to technology may be a barrier to a student's academic success.

9 What are the negative perceptions you feel when you have problem on your computer?

Group B, Respondent GB1 responded: *“When I’m facing with technology problem or techno-stress, I have a strange feeling as my palm usually get sweat and sometimes I have a feeling that my blood is circulating so fast in body. These physical negative perception are usually associated with body shaking; I do shake and psychologically develop bad feeling about everything around.”* *“Usually when I am dealing with computer problem or techno-stress, my body suddenly get weak and tired at the point that I can’t work anymore and feel useless.”* (**Group A, Respondent GA4**).

Respondent GF1 answered: *“To me there are few negative perception I do experienced when I’m facing with techno-stress, but the most common is that few minutes I start stressing over my connection a got headache; and if I don’t get quick a solution after a moment I sometime start feeling dizzy. When you are dealing with techno-stress it means you will be trying to please your needs so spending all that time siting usually brings me back pain.”*

Respondent GE1 responded: *“I’m not going to say it differently as my colleague here already mentioned it, yes to me also headache is the common negative perception I usually experience when technology is giving me problem. In addition, on my side, I also experience body shaking; yes, actually my negative perception start with body shaking before I start having headache.”*

Brod (1984) in his study also found that the negative physicality of techno-stress are feelings of anxiety, reluctance and fear towards computers. The author points out that this anxiety manifest in the form of nightmares, headaches, irritability regarding the computer or absolute refusal of the technology. Brod's findings resonates with this study's finding (deduced from the responses above) that students experience feelings of anxiety, headaches, irritability or absolute refusal to use technology when they encounter problems using the computer.

10 How do you manage and react to techno-stress?

"The first thing that makes me stress at school is internet, so usually I do check first the internet if it not connected then I went for help either to a friend or helpdesk" (Group E, Respondent GE2). "To manage techno-stress, I usually change location when the current post is having problems" (Group E, Respondent GE4). "Personally, I do react with continuous frustration, because I will remain frustrated until the computer starts working as I expect it to work" (Group A, Respondent GA2).

Respondent GE5 said: *"To me every time when I'm facing with techno-stress, the only thing I can do to feel better is to get from whoever I find around me; sometimes I act like nothing happen then just walk away. Also, I do often ignore the situation and just let it go. My concern is that I always react over by techno-stress by feeling frustrated and angry."*

Respondent GF1 responded that: *"Seeking help is my best way of managing techno-stress, because once you have help, you can be relieved. I always seek help cool down my reaction which is always anger; yes, I get really*

angry and if nothing is done then frustration get in sometime for the all day.”

The research result shows students manage techno-stress in different ways. They all agree that one should seek help. Brillhart (2004) points out that the way of managing techno-stress is a highly individualistic and personal matter, as it differs from individual to another. Aida, Azlina and Balqis (2007) also found that it is imperative to develop personal methods of managing techno-stress and to recognise that the constant changes generated by technology will result in varying degrees of techno-stress.

11 Is techno-stress isolating you from technology?

One of **Group A** members said: *“techno-stress doesn’t keep me away from technology, because it what I relay on while doing my school work or other personal task, also 21st century it all about technology, so it not easy to stay away from it. But with ongoing defected devices at CPUT for example, sometimes it gives me the feeling of staying away from it for a while and forget about it, not just CPUT, even my own cell phone sometimes I feel like living it somewhere and forget about it, but you can’t deal without it”*

Respondent GD1 went on to say: *“To be honest, yes techno-stress somehow isolates me from using technology; this is because every time something goes wrong I end up being stress or angry. Sometimes it comes to my mind to stay away from technology so that I don’t get stress, it is the only way to avoid techno-stress by sometime cut your relationship with technology.”*

Respondent GD2 said: *“No, I do believe that techno-stress is somehow bad, but we are in the era of technology, so whatever kind of techno-stress I can experience it does*

isolates me from using technology because today we need technology. I cannot survive without technology, so techno-stress I accept it as it is, but not stay away from technology.”

The result of this finding is consonant with Ayyagari, Grover and Purvis (2011) who state that, technology is imperative for individuals to constantly engage with in order to get work accomplished. Even though existing literature and respondent data suggest that technology is responsible for increased stress levels in individuals, individuals do not stay away from technology.

4.3.5 Summary of the Interviews

From respondent data it is clear that students who encounter problems when they use technology are likely to experience techno-stress. Students can be affected by techno-stress every day. It is impossible to avoid techno-stress when technology does stop working, which in result produce the means of getting stress to students. From the student responses, it is apparent that one of the main symptoms of techno-stress they experience is nervousness. However, students recognise the importance of using technology for academic performance as they believe it helping them to perform better.

Technological updates do not make students nervous. In fact, they feel excited to use the new features of that comes with the update. The only problem is when technology malfunctions. Students then usually start to experience techno-stress which affects their academic performance negatively. The body exhibits different symptoms as a result of techno-stress. Some symptoms include sweaty palms, blood pressure and weakness. Students manage and react to techno-stress differently. The most appropriate approach to manage it is to seek help. Despite students' struggle with techno-stress, the feeling and stress seemed not to be a concern for students to be isolated from using technology.

4.4 Part 2: Observation

The observations summarised in this study were part of the perceptions and implications of techno-stress in an e-learning environment. Determinative research results were served as a means to explore the perceptions and implications of techno-

stress among students who experience techno-stress at a university of technology. The observational studies were conducted at numerous CPUT computer labs and reported the behaviour of students regarding computer use. Students at CPUT were observed with the naked eye inside computer labs. The primary data collected comprised of physical or psychological behaviour and attitudes. This data provides complementary information for problem evaluation.

The following objectives guided the observation protocol of students using technology in an e-learning environment:

- Technology usage
- Reaction to techno-stress
- Factors influencing techno-stress in academic performance
- Types of techno-stress when dealing with technology
- Technology's impact on studies: negative or positive
- Negative perception felt when having problems with computers
- Students' reaction when any problem occurs while using computers
- Students' feelings over new updated technology

4.4.1 Schedule of Observation

As mentioned above, observation was conducted in computer labs and the library. The observer was present in every computer lab for 2 hours Monday to Friday. At the end of each day, the data was collected in an envelope and labelled with the date, location, and observer's name. Due to the large number of students studying at CPUT, it took a month of observation to substantial data. The observation started on the 15th of June 2017 and ended on the 30th of July 2017. The observer managed to observe and record up to twenty (20) students a day. To avoid double observation of the same students, the observer used student timetables and observed during their lessons

The Schedule of Observation was as follows:

Table 2: schedule of observation

	Week 1	Week 2	Week 3	Week 4
Monday	library	Design labs	Commerce Labs	Engineering labs
Tuesday	Engineering labs	library	Administration labs	Commerce Labs
Wednesday	Administration labs	Engineering labs	library	Administration labs
Thursday	Commerce Labs	Commerce Labs	Design labs	library
Friday	Design labs	Administration labs	Engineering labs	Design labs
Saturday				
Sunday				

On the first week:

- Monday the observation was conducted in the library
- Tuesday the observation was conducted in the Engineering labs
- Wednesday the observation was conducted in the Administration labs
- Thursday the observation was conducted in the Commerce Labs
- Friday the observation was conducted in the Design labs

Second week

- Monday the observation was conducted in the Design labs
- Tuesday the observation was conducted in the library
- Wednesday the observation was conducted in the Engineering labs
- Thursday the observation was conducted in the Commerce Labs
- Friday the observation was conducted in the Administration labs

Third week

- Monday the observation was conducted in the Commerce Labs
- Tuesday the observation was conducted in the Administration labs
- Wednesday the observation was conducted in the library
- Thursday the observation was conducted in the Design labs
- Friday the observation was conducted in the Engineering labs

Fourth Week

- Monday the observation was conducted in the Engineering labs
- Tuesday the observation was conducted in the Commerce Labs
- Wednesday the observation was conducted in the Administration labs
- Thursday the observation was conducted in the library
- Friday the observation was conducted in the Design labs

4.4.2 Methods

To explore the perceptions and implications of techno-stress among students who experience techno-stress at a University of Technology, the researcher observed students at four (4) locations (labs in engineering, commerce, design and administration buildings). Students were only those studying at CPUT's Cape Town

campus. The study documented under-and postgraduate students in order to distinguish between the behaviour they present regarding techno-stress.

Numbers of Labs and Computers

- Numbers of labs observed in engineering was five (5) with an average number of computers in the labs of hundred and thirty-two (132)
- Numbers of labs observed in commerce was seven (7) with an average number of computers in the labs of hundred and forty-seven (147)
- Numbers of labs observed in administration was on (1) with an average number of computers in the labs of sixty (60)
- Numbers of labs observed in Design was two (2) with an average number of computers in the labs of fifty-two (52)
- Numbers of labs observed in library was one (1) with an average number of computers in the labs of seventy (70)

4.4.3 Site observation form

Table 2: Site form

Location		
Location: Cape Peninsula university of Technology		
Campus: Cape Town <input checked="" type="checkbox"/> Belville <input type="checkbox"/> Mowbray <input type="checkbox"/> Wellington <input type="checkbox"/>		
Site: Computer lab <input checked="" type="checkbox"/> Library <input checked="" type="checkbox"/>		
Observer		
HOUDA Sahal Salem		
Observation schedule		
Week 1		
Observation start time: 10h00 - Observation end time: 12h00		
Library (Monday) Students observed: 20 Male: 7 Female: 13 Library condition: Quiet	Engineering labs (Tuesday) Students observed: 20 Male: 16 Female: 4 Engineering lab condition: Noisy	Administration labs (Wednesday) Students observed: 20 Male: 8 Female: 12 Administration office condition: Quiet
Commerce Labs (Thursday)	Design labs (Friday) Students observed: 20	

Students observed: 20 Male: 3 Female: 17 Commerce lab condition: Noisy	Male: 11 Female: 9 Design lab condition: Noisy	
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Observed situation

Technology usage
 Reaction to techno-stress
 Factors influencing techno-stress in academic performance
 Types of techno-stress when dealing with technology
 Technology's impact on studies: negative or positive
 Negative perception felt when having problems with computers
 Students' reaction when any problem occurs while using computers
 Students feeling over new updated technology

Week 2

Observation start time: 13h30 - Observation end time: 15h30

Design lab (Monday) Students observed: 20 Male: 7 Female: 13 Design lab condition: Quiet	Library labs (Tuesday) Students observed: 20 Male: 15 Female: 5 Library condition: Noisy	Engineering labs (Wednesday) Students observed: 20 Male: 16 Female: 4 Engineering condition: Quiet
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Commerce Labs (Thursday) Students observed: 20 Male: 4 Female: 16 Commerce lab condition: Noisy	Administration (Friday) Students observed: 20 Male: 11 Female: 9 Administration lab condition: Noisy
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Observed situation

Technology usage
 Reaction to techno-stress
 Factors influencing techno-stress in academic performance
 Types of techno-stress when dealing with technology

Technology's impact on studies: negative or positive
 Negative perception felt when having problems with computers
 Students' reaction when any problem occurs while using computers
 Students feeling over new updated technology

Week 3

Observation start time: 13h30 - Observation end time: 15h30

Commerce lab (Monday) Students observed: 20 Male: 6 Female: 14 Commerce lab condition: Quiet	Administration labs (Tuesday) Students observed: 20 Male: 9 Female: 11 Administration lab condition: Noisy	Library (Wednesday) Students observed: 20 Male: 8 Female: 12 Library condition: Quiet
Design Labs (Thursday) Students observed: 20 Male: 13 Female: 7 Design lab condition: Noisy	Engineering (Friday) Students observed: 20 Male: 13 Female: 7 Engineering lab condition: Noisy	

Observed situation

Technology usage
 Reaction to techno-stress
 Factors influencing techno-stress in academic performance
 Types of techno-stress when dealing with technology
 Technology's impact on studies: negative or positive
 Negative perception felt when having problems with computers
 Students' reaction when any problem occurs while using computers
 Students feeling over new updated technology

Week 4

Observation start time: 10h00 - Observation end time: 12h00

Engineering lab (Monday) Students observed: 20 Male: 6 Female: 14	Commerce labs (Tuesday) Students observed: 20 Male: 16 Female: 4	Administration (Wednesday) Students observed: 20 Male: 16 Female: 4
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Engineering lab condition: Quiet	Commerce lab condition: Noisy	Administration condition: Quiet
Library (Thursday) Students observed: 20 Male: 5 Female: 15 Design lab condition: Noisy	Design lab (Friday) Students observed: 20 Male: 11 Female: 9 Engineering lab condition: Noisy	
Observed situation		
Technology usage Reaction to techno-stress Factors influencing techno-stress in academic performance Types of techno-stress when dealing with technology Technology's impact on studies: negative or positive Negative perception felt when having problems with computers Students' reaction when any problem occurs while using computers Students feeling over new updated technology		

4.5 Results

Students who received training or completed assignments in 15 computer labs were observed at CPUT's Cape Town campus, which involved labs in engineering, commerce, design and administration buildings. Approximately 500 students from all departments were observed. Most of the labs had at least 25 computer workstations. The majority of occupants at the stations were females estimated at 63% and males estimated at 37%. Most of the students observed were undergraduates.

Technology usage

The majority of students who was observed were using both computers and smart phones simultaneously. During the observation time, most students were connected to the Internet. After the observation concluded the researcher deduced that students from undergraduate studies were statistically and significantly found more likely to utilise social media than graduate and post-graduate students. A minimum number of students were observed carrying laptops to the campus, however, the vast majority of 92% carrying a smart phone.

Reaction to techno-stress

Psychologically, the observed students presented a lack of control over their devices as they switched between devices (computers and cell phones). Students couldn't manage priorities on what devices to consult first and their expression of stress could be observed.

Bodily and facial expressions showing frustration, irritability and anger were observed, with students feeling unhappy with the speed of the Internet as they felt that their work would not be done on time and that they are incapable of improving the situation. The amount of time student spends in front of a computer affected their energy level as bodily fatigue could be noticed through yawning. Physically the students were visibly tired and stretching their backs most of the time in order to release accumulated pain. In addition, minute by minute, students were observed stretching their neck from right to left also to release muscle tension.

Factors influencing techno-stress in academic performance

Even though students at CPUT attend face-to-face classes, academic work such as assignments and research are done using the Internet.

During observation of students, it was noteworthy that a disruption in the internet caused a lot of anger and frustration amongst students. Students shows their unhappiness by kicking the workstations and making negative remarks aimed at the institutional management. The insufficient number of computer workstations in labs also caused stress as they could not access their work. Finally, the corrupted access to the systems for different services also stressed the students as they were unable to log into their access point also unable to consult their student-blackboard.

Types of techno-stress when dealing with technology

From the student's observation it was clear that temporary internet disruptions, problems with access logins, and an insufficient number of computers available caused confusion and nervousness. The technology was not fulfilling their needs. Students were seemingly more flooded by technology and it seemed that they cannot function without technology.

Technology impact on studies: negative or positive

From the participant observations, it was noted that students were seemingly very happy once their work was submitted via email to their respective lecturers and it also seemed time-saving for them as they could do and submit more than one assignment at a time. Observations show that technology was somehow advantageous from observed students regarding their academic activities

Negative perception felt when having problem with computers

The observations done at CPUT's Cape Town campus labs and the library show two main negative perception when the computers workstations malfunctioned. Students had a change in mood which represented negative perception such as anger; some students even exhibited physical damaging behaviour towards the computer hardware. Frustration also was one of the negative perceptions as students did not know what they could do to satisfy their needs. These two negative perceptions are directly linked to techno-stress.

Students' reaction when any computer problem occurs

Observed students, when they encounter a problem with the computer, displayed different behaviours and emotions to communicate their unhappiness. They performed physical damaging action to computer as they tried to shake them like a human and also looking at computer from corner to corner as if it will tell them what the problem is. On the other hand, students observed in the library were still not happy but managed to call the lab assistant to assist them. In observing the students' process of how they react to computer malfunctions, the observation was that there were numerous problems that were linked to student's stress reaction. Most of the students observed were unable to use properly computers as they were seen looking constantly around to see if there is someone who can help them.

Students feeling over new updated technology

Even though the university upgrades some of its software every year, the observation data show that students were not worried that they will encounter problem with the newly updated software; in fact, the researcher noticed the excitement of a new application on students' faces. New applications were seemingly very important to

students as they constantly and excitedly share their knowledge about the application's new and updated features with their colleagues.

4.6 Summary of the Observations

From the observations, the researcher found that computers and smart phones were technology devices that were mostly used by CPUT students. It was evident from the observation data that students operate multiple technological devices at a time. The research found that students were forced to use both devices simultaneously for many reasons such as using social media on their phone and completing academic work on the computer.

Technology such as the internet only induce techno-stress if its 'down. Despite the advantage that technology presents, the reality was that, psychologically, as a result of not being able to prioritise on what devices to consult first, students were unhappy, visibly tired and some had back pain. However, disruption of the Internet was an important factor influencing students by frustrating them. Students were not concerned about technological upgrades, the new features and functionalities that potentially come with the upgrade seems to excite them. Despite the emotions of anger and frustration the researcher observed in students' behaviour, they also expressed satisfied and happy emotions when using technology, particularly after they successfully submitted an assignment on a computer.

CHAPTER 5: DISCUSSION

5.1 General Insights

From the participant observations, the research found that computers and smart phones were technology devices that are used the most. It was evident that students could not stay away from one device at a moment. The research found that students were forced to use both devices simultaneously for many reasons such as using social media on their phone and school work on the computer. Technology was found to be the most important source of a student's daily stress. Despite the advantage the technology present, the reality was that technology is very stressful as it can be unpredictable. It was also found that students were more stressed over technology when a problem occurs as they presented lack of skills to manage or control it.

Students have different ways of explaining what techno-stress means to them. However, it was evident that the general meaning of techno-stress for student is "all stress related to technology devices" when it does not satisfy their needs or expectations. The research finds that techno-stress influenced a student's studies by causing a loss of concentration. It was evident that this influence had a negative outcome on a student's academic results. The research found that students experience anger and frustrated when dealing with problematic and faulty technology. It was evident that dealing with technology makes students more nervous because of its uncertainty that it is unpredictable and can malfunction at any time. Students were found to be more confused and depressed.

It was evident that technology was necessary for students regarding their academic performance as the research found that technology allowed students to conduct their research, download class material, learn online, be in contact with their lecturers and have information available as close to them as possible. The research also found that most students were nervous because of an update to technology as they believed that the new technology or an update was difficult to work with and sometimes complicated in use. However, few students believed new technology or update was an opportunity for them to learn more as the excitement of using new technology was overwhelming.

The research finds that the causes behind techno-stress was malfunctioning of the technology devices that they constantly used at school such as a broken computer, disruption of the Internet, the insufficient number of computer workstations in labs, the corrupted access system to different services and complications of access points. It was clear that techno-stress has an impact on students' academic performance. The research finds that techno-stress has a negative effect on students' academic performance as they usually perform under the influence of stress which demoralised their mind set, bringing nervousness and frustration that does not help with their final results. Out of the interviewees, it was found that physically, students presented several negative perceptions related to techno-stress such headache, back pain, faster heartbeat, dizziness, palms getting sweaty, faster blood circulation, body weakness and tiredness. However, psychological negative perceptions were shown in a form of mistrust and dislike of technology.

The research found that students reacted differently regarding techno-stress as some were eager to smash some computers as they tried to shake them as if they were a human, and also looked from corner to corner on the computer as if the computer would tell them what the problem was. It was also found that students were reacting by expressing more frustration and anger. In response to the technology issue, the research found that students were managing their techno-stress by seeking help from their respective friends with more knowledge concerning the issue and from helpdesk agents where necessary. It was clear that techno-stress was not isolating students from using technology as students do rely on it to do their school work. However, some students admitted to taking a break from technology to alleviate some stress.

5.2 Discussion of Results from Interviews

Technology is necessary in today's higher education landscape, especially to help improve and support students' academic performance. Moreover, students rely on technology to download class material, access e-learning platforms and communicate with lecturers. One can argue that technology itself is a driving force for stress as it can be unpredictable. From the collected data, it was clear that the majority of students experience techno-stress on a daily basis as they are constantly studying with technology. Shin and Purcell's (2015) study found that, constant users of any kind of technology are more likely to get stress from it.

Even if different meanings of the term “techno-stress” were articulated, it was evident that the meaning was all about stress that relates to technology devices; Weil and Rosen’s (1997) defined techno-stress as caused of the incapability to manage or be in parallel with new technology. It can be argued that the influence of techno-stress is directly tied to a user’s loss of concentration as they are stressed over technology. The interview shows that kind of techno-stress a user faces when dealing with technology is dealing with anger, frustration” and nervousness due to some malfunctioning technology devices, slow internet connection and broken devices either at school or elsewhere.

The results of techno-stress can be both positive and negative and can have an impact on students’ academic performance. One can argue that the common perception of techno-stress usually negatively affects a user’s academic performance. The effect of working with a low mind set, nervousness and frustration, has a direct and negative effect on their academic performance; it present physical challenges such as headaches, faster heartbeat, back pain, sweating, faster blood circulation and dizziness as negative perception; also, psychological challenges such as mistrust over technology and dislike of technology as a whole lead to the feeling of disliking all activities involving technology have direct roots in techno-stress. It can be argued that despite the difficulty related to techno-stress, the situation does not keep the users away from using technology because it is important to students and can be managed by seeking help from the others or by simple avoidance. It is necessary to understand technology at university because its new approach or updated technology can make users nervous as it complicates usage and makes it difficult for them.

5.3 Comparisons with existing Research and Theory

As a reminder, the objective of this study was to explore the perceptions and implications of techno-stress in respect of students in institutions of high learning education particularly at university of technology to get knowledge and to know how students at institutions of high learning education can cope with techno-stress in the future terms. The study considered students at university of technology because of their constant use of technology. To achieve the research objective, the focus group data collection technique as selected as means of collecting data collection. Data was

analysed using thematic analysis. This analysis produced key themes that were pertinent to the participants understanding of techno-stress.

A search of the literature indicated that no previous research studies investigate techno-stress in an e-learning environment and it was necessary for the researcher to conduct the study. The methodology used proved to be pertinent and particularly valuable in generating these data that are discussed here in relation to previous findings. The themes of techno-stress has been previously studied in the field of education by Yuvaraj and Singh (2015). Yuvaraj and Singh investigated techno-stress among Librarians in selected University Libraries. The study reveals that there exists a high level of techno-stress among the library professionals engaged in libraries causing physical health problems such as eye strain, backaches, headaches, stiff shoulder and neck pain. Technology-based training, for example, is still probably the most useful way of making librarians more comfortable with new technology and more aware of its dangers. Implications of techno-stress include memory problems, sleep complications and incapacity to focus on recreational activities; these may bear clear negative consequences for students (Ragu-Nathan, et al., 2008). Techno-stress sufferers may also experience poor health, negative self-image and even depression (Erasmus, 2014).

Laspinas (2015) investigated techno-stress in the workplace. The author pointed that the fast evolution of modern digital technology has certainly brought along many changes in the workplaces today. Although technology has made it possible to perform and execute work tasks and processes faster and more efficient, there is instances of employees who struggle to adapt to new technology as they are not prepared to adopt change. Furthermore, the author notes that that their physical health is affected by techno-stress. This is affirmed by Selye's theory (1936) which holds that stress influences human behaviour whether in illness or in health and it is the body's nonspecific response to a demand placed on it. The result from this study in the field of workplace are parallel with the results found among students in the higher education landscape.

5.4 Adapted diagram for the present study

Previous literature has identified techno-stress among students but have not yet investigated concerning the perceptions and implications of techno-stress in an e-learning environment. Universities of technology encourage student to make use of technology, however, the researcher would encourage to bear in mind that technology can fail because of a technical problem as well, and the outcome are related to techno-stress. There was no evidence in the transcripts that any of the student were not aware of or did not understood this distinction, but research that investigates methods of avoiding techno-stress at a University of Technology needs further investigation. Educational Technologist should encourage an understanding of techno-stress to help increase a meaningful use of technology. The researcher carefully adapted Tarafdar and Ragu-Nathan's (2011) techno-stress framework in workplace to suit student in high education. The elements stated in the revised framework were chosen to understand techno-stress amongst students in high education. The element of revised framework is analysed alongside Tarafdar and Ragu-Nathan (2011) framework elements.

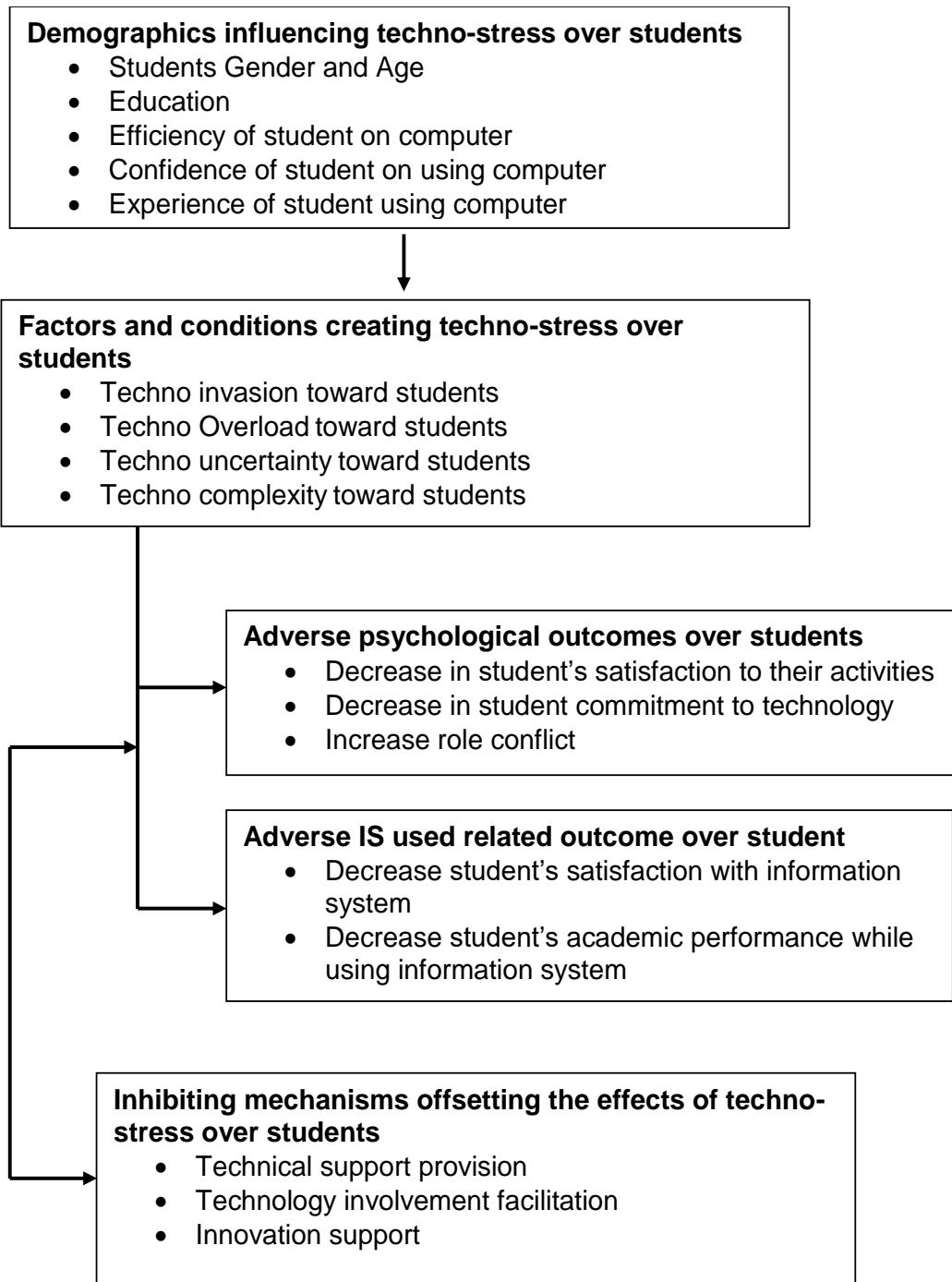


Figure 3: Adapted diagram for the present study on techno-stress among student

User demographic influencing techno-stress

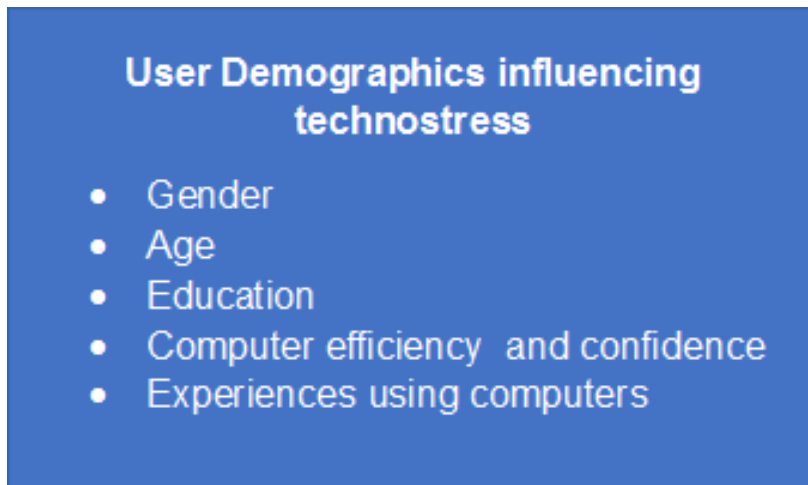


Figure 4: User demographic influencing techno-stress

(Tarafdar, Tu & Ragu-Nathan, 2011).

Tarafdar, Tu and Ragu-Nathan's theory of user demographics which plays a role in techno-stress,

describes the fit of user demographic influencing by techno-stress occurrence within the context of gender, age, education, computer efficiency and experiences using computers by looking at how gender might make a difference in this relationship between technology and techno-stress

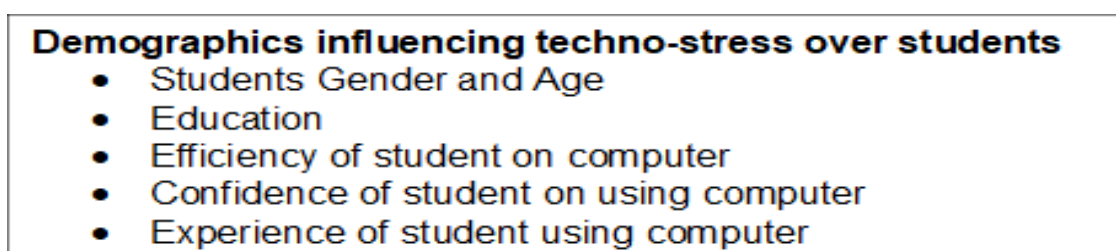


Figure 5: Demographic influencing techno-stress over students (adapted diagram from Tarafdar, Tu & Ragu-Nathan, 2011)

Throughout this study, the finding revealed the covering of society as a whole. Therefore, it was evident that the creation of technology affects society as a whole with no distinction on gender or age as illustrated in the theory. The finding of the research was an accumulation of information from males and females of different

ages. Regarding education, the theory depicted how it has brought new roots by giving students new efficiency options and changing the way of schooling.

The findings of this research are consistent with this theory. It was revealed that, technology is necessary in educational environments as it allows users to improve their academic performance, also perform other tasks such as downloading class material and access the e-learning platform.

Nowadays, the utilisation of technology has become the driving force in the way users perform their work. This involved the confidence and experience in using computers to influence techno-stress. It is true that people who are confident and experience in using ICTS is less likely to be affected by techno-stress. The research found that the causes that are related to techno-stress are many, for example: technology is difficult to manage and students with no skill or no confidence in using technology, experience techno-stress because they lack ICT knowledge and skills. Therefore, they end up experiencing loss of concentration on their studies due the techno-stress. Wolski and Jackson (1999) point out that, adapting to technology is not easy. Some users embrace technological transformation while others resist it.

Before deciding on whether to use technology or not, individuals might look at the practical and social consequences of accepting change.

Factors and conditions creating techno-stress

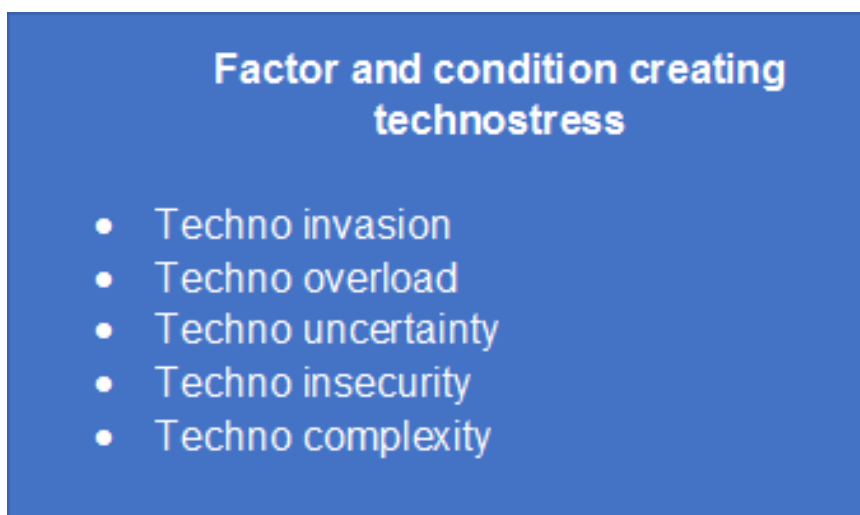


Figure 6: Factors and conditions creating techno-stress (Tarafdar, Tu & Ragu-Nathan, 2011)

Techno-stress is a consequence of the consistent exposure to and use of technology in any sector, such as organisations or e-learning environments. Tarafdar, Tu and Ragu-Nathan's theory illustrates techno invasion, overload, doubt, timidity and complexity as factors and conditions that create techno-stress.

Factors and conditions creating techno-stress over students

- Techno invasion toward students
- Techno Overload toward students
- Techno uncertainty toward students
- Techno complexity toward students

Figure 7: Factors and conditions creating techno-stress over students (adapted diagram from Tarafdar, Tu & Ragu-Nathan, 2011)

The researchers agree with the factors in Figure 7 which leads to techno-stress as similar results of this study point to similar findings. The researcher techno invasion effects University of Technology student as well; students tend to let technology invade their life and they are more dependent on technology. This finding is based on observation data that reveal how students make use of both computers and smart phones simultaneously. The research also revealed that students are more dependent on social media. As Mlotshwa (2013) points that, the accessibility of portable devices and easy access to the Internet makes individual to get into others' lives. Techno overload in technological advances, revolution, change, and exposure, causes many students of universities of technology to become exposed and prone to stress. The research findings resonate with the techno-stress theories of Tarafdar, Tu and Ragu-Nathan (2011). The authors' hold that constant connectivity, information overload and application multitasking put students in a vulnerable position where they are susceptible to techno-stress. Prystanski (2012) supports that much technological innovation negatively affect individual's professional life person.

Technology is becoming increasingly indispensable in many aspects of the e-learning environment. Techno uncertainty has a significant impact on students, as it was found that the uncertainty in technology operation makes students more nervous and the result is that students to become more confused and depressed. As mentioned earlier, regular adjustment to software and hardware prevents individuals from constructing the essential knowledge acquired through the utilisation of certain devices,

applications or systems (Tarafdar et al., 2011). It was found that despite the advantage that technology presents in e-learning environments, the reality is that techno-insecurity is very stressful as it can be unpredictable. Complexity in using an update technology. New features that comes with updated technology can sometime be overwhelming and difficult to learn how to use them which result in creating techno-stress.

Adverse psychological outcomes

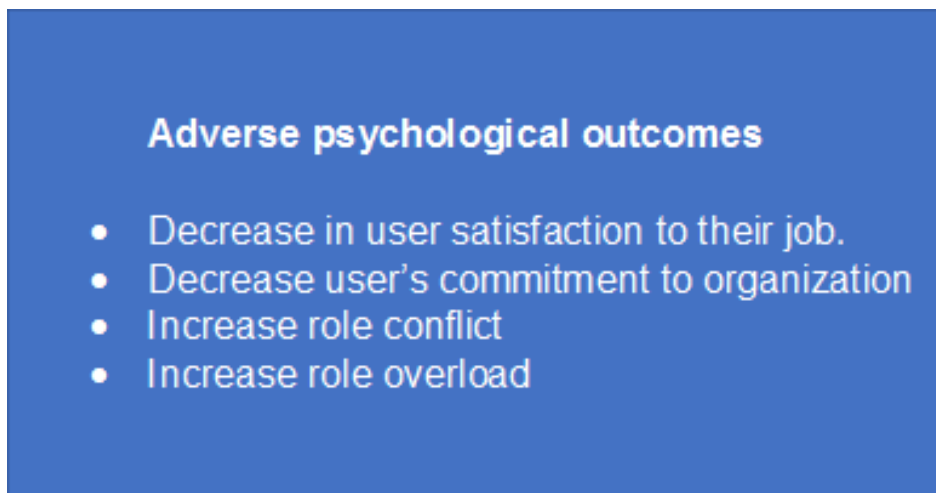


Figure 8: Adverse psychological outcomes (adapted from Tarafdar, Tu & Ragu-Nathan theory, 2011)

The adverse psychological outcomes of techno-stress, according Tarafdar, Tu and Ragu-Nathan's (2011) theory indicate a decrease in user satisfaction to their activity, user decrease in commitment to the organisation, increased role overload and role conflict. The research findings show connection to adverse psychological outcomes over decrease in commitment.

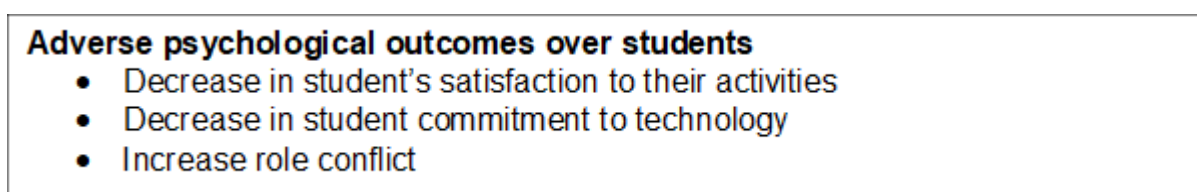


Figure 9: Adverse psychological outcomes over students (adapted diagram from Tarafdar et al., 2011)

The research found that psychologically, students mistrust and dislike technology especially when it is giving them problems. However, the research did not find a decrease in commitment over technology. However, it was found that the current era

makes it difficult to live without technology, student's commitment to technology does increase and the situation over techno-stress does not keep them away from using technology as it is important for day to day academic activity. From the decrease in student's satisfaction to their academic activity, the research found that some students at a university of technology show some decrease in satisfaction as they tend to develop the feeling of disliking all activities related to technology.

The research did find increase role conflict as illustrated in the theory. The increased role conflict occurs to students as they believe that technology has many different expectations, it might not work, the Internet might be slow, and it might break at any time. In terms of increased role overload element, however, it was not listed either or found affecting students as they believe it helps them to process several academic works at once and quicker.

Adverse IS used related outcome

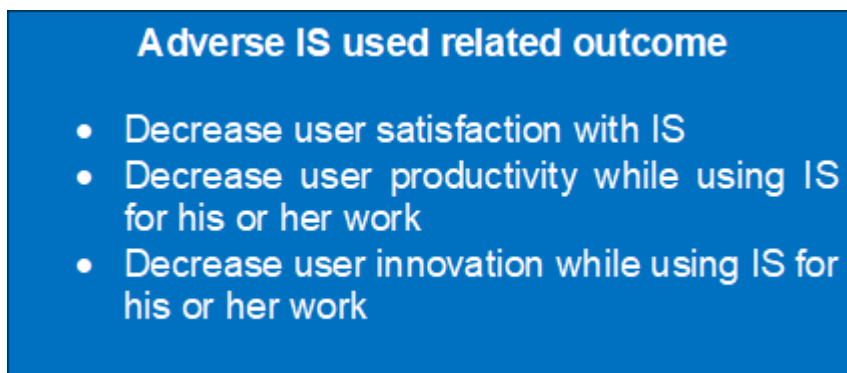


Figure 10: Adverse IS used related outcome (adapted from Tarafdar, Tu & Ragu-Nathan, 2011)

Tarafdar, Tu & Ragu-Nathan's (2011) theory of Adverse IS used related outcomes, list three detrimental outcomes as a result of decrease user satisfaction with information system, decrease user productivity while using information system for his or her work and decrease user innovation while using information system for his or her work.

Adverse IS used related outcome over student

- Decrease student's satisfaction with information system
- Decrease student's academic performance while using information system

Figure 11: Adverse IS used related outcome over students (adapted diagram)

Through this study, the finding that's show that technology helps students to become more efficient, innovative and productive. The elements of outcome were different to this research result as student believed information system help them to easily and quickly complete their academic work. This study's results show that technology is necessary for their academic performance as it helps them to process a lot of academic work at and quicker.

Inhibiting mechanisms offsetting the effects of techno-stress

Inhibiting mechanisms offsetting the effects of technostress

- Technical support provision
- Technology involvement facilitation
- Innovation support

Figure 12: Inhibiting mechanisms offsetting the effects of techno-stress

Source: (Tarafdar, Tu & Ragu-Nathan theory, 2011)

In the Tarafdar, Tu and Ragu-Nathan's (2011) theory of *Inhibiting mechanisms offsetting the effects of technostress*, there is evidence that various inhibitors can help counterbalance the negative effects of techno-stress on activities' satisfaction commitment such as innovation support, technical support provision and technology involvement facilitation.

Inhibiting mechanisms offsetting the effects of techno-stress over students

- Student technical support provision
- Student technology involvement facilitation
- Student innovation support

Figure 13: Inhibiting mechanisms offsetting the effects of techno-stress over students (adapted diagram)

The inhibiting mechanisms on technology allow students to act stress free were addressed in this study. With technical support provision, the research mentioned that introduction to technology or basic training should be put in place by universities to manage techno-stress were addressed in this study. With technical support in place in the instance of a malfunctioning computer, the research mentioned that introduction to technology or basic training should be put in place by universities to manage techno-stress. For technology involvement facilitation, a help desk will be essential for students to contact in order to resolve technology issues. The innovation support to student was also mentioned in this study as universities should design a program that helps students cope with techno-stress.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

Preceding chapters were aligned and elaborated. The first segment of the chapter offered a reduced summary of all the chapters by pointing out key points elaborated in each of them. In the second section, the researcher provided research answers by addressing the research's main questions. The chapter ends by a proposed recommendation based on overall reviews and findings, conclusions and possible areas for further research are also provided.

6.2 Summary of the Research

The investigation chapters are summarised by stating important points from each chapter.

Chapter One

In this section, the investigator outlined and introduced the study project and background related to the study problem on techno-stress. The section stated the research problem and elaborated research questions and objectives.

Chapter Two

In this section, an outline was provided of the recent and past research on digital technology and its impact assessment. The research considered the view of techno-stress and its elements. Also, the causes and types of techno-stress in environments and social aspects were discussed. The researcher looked at implications of techno-stress at a physical and psychological level. The researcher addressed techno-stress in the e-environment and higher education.

Chapter Three

In this segment, the study looked at the methodology of research. Qualitative methods were chosen to conduct the research giving large freedom to the participant to express clearly their views over techno-stress. The semi-structured interview method was utilised as a resource to collect data. The research adopted a non-probability sampling method, and purposive sampling technique was chosen.

Chapter Four

The results and findings from interviews conducted at Cape Peninsula University of Technology was presented in this section. The responses were analysed, and findings were provided.

Chapter Five

The chapter outlined the research results analysis from interviews directed at CPUT. Information that was gathered from the participants were clustered giving to the refrains that appeared and helped to develop and integrate the outcomes of the surveys. The chapter also presented structured findings and a discussion of the result was done.

Chapter Six

In this section, an effort was taken to respond the study foremost and sub-questions that were listed earlier in this chapter. The chapter was concluded, with recommendations to the study also provided.

6.3 Addressing the Research Questions

In this section, main and sub-questions are addressed to give clarification to the main study question.

What are the implications of techno-stress as perceived by students on their studies?

In general, techno-stress is stressing that students encounter when interacting with technology. Techno-stress' implication on student's studies is perceived as a negative influence that directly affects a student's ability to perform. The influence of techno-stress attacks students' concentration which has direct effect on the students' academic results. Furthermore, the implication of techno-stress is that it also results in a mental disability as students become lazy and unable to carry on with daily studies and activities thereby causing the students to not do anything beneficial to their studies. The implication of techno-stress on student's studies overpowers a student's ability to have control over their respective studies' activities.

What are the types and elements of techno-stress that students experience at universities?

When technology does not satisfy students' needs or expectations, the situation causes them to be exposed to several types of techno-stress. Evidently students on e-environments or at universities are faced with patterns of anger when exposed to techno-stress. Students tend to develop frustration over malfunctioned technology devices. Students also experience techno-stress particularly by developing nervousness as they face uncertainty with technology. Dealing with technology is frustrating, boosts nervousness and anger on students' behaviour.

What are the potential causes of techno-stress as perceived by students?

The potential cause behind techno-stress on students stems from the malfunctioning of the technology devices that students constantly use at school. It was found that broken computers, disruption of the Internet, the insufficient number of computer workstations in labs, the corrupted access system to different services, and complications of access points, are the primary reasons behind techno-stress that students experienced and perceived from their study activities.

How do students think techno-stress impacts on their academic performance?

Techno-stress has a direct impact on student's academic performance. The fact of performing academic activities under the influences of stress negatively affects students' academic performance. Furthermore, students expressed their negative view on techno-stress as they usually perform under circumstances that demoralised them. Techno-stress brings nervousness and frustration which automatically endangers their ability to work and most importantly their final result.

How do students deal with techno-stress?

Students deal differently regarding techno-stress. To some students, dissatisfaction with technology drives them to a swing mood of anger, while others into a swing of frustration. Students managed most of their techno-stress by seeking help from their respective friends with more knowledge concerning the issue at hand and from helpdesk agents were necessary. On the other hand, physically, students deal with several issues related to techno-stress such as headaches, back pain, faster heartbeat, dizziness, palms getting sweaty, faster blood circulation, body weakness

and tiredness. Psychologically, students deal with techno-stress by manifesting mistrust and dislike of technology.

6.4 Limitations of the Research

The study presented some boundaries. First of all, the study was limited to CPUT's Cape Town campus. The university has other campuses such as Bellville, Mowbray, and Stellenbosch. Due to the method used of collecting data (focus group interviews), the research is limited in the fact that respondents might be influenced by other group member's answers, as they might deliberately replicate answers without trying to make a personal effort to elaborate or give their own view on the question. Another limitation might be students could be playing up their techno-stress in the hope that the research is communicated higher up and leading to changes in ICT infrastructure at CPUT.

6.5 Recommendations

It is significant to highlight the perceptions and implications of techno-stress in an e-learning environment:

- A university of technology such as CPUT should design a program that helps students to cope with techno-stress
- Universities should design programs such as "introduction to technology basic training" and "maintenance base training" and also introduce support groups capable of dealing with techno-stress management
- Students also have to bear in mind that technology does fail every now and again, so it will be necessary for students to contact the facility responsible for technology issues
- Due to the area of expertise which is information technology, further study is needed by medical researcher to ascertain negative perception related to techno-stress
- Students should not get themselves involved in getting angry or frustrated while they can seek help from friends or the help desk

6.6 Conclusion and Further Research

Despite the importance that technology plays in an e-learning environment by allowing students to conduct their research, download class material, learn online, be in contact with their lecturers and have information available as close to them as possible, students perceive technology as an important source of stress, despite the advantage that technology has. As mentioned above, technology can also be unpredictable in its utilisation and when problems occur, students present lack of skills to manage or control technology.

Techno-stress aligns with several meanings. However, students view techno-stress in general as “all stress related to technology devices”. The perception is aligning with concordance to when technology does not satisfy students’ needs or their expectations. The implications of techno-stress in an e-learning environment influence students’ studies as it has a direct impact on students’ concentration, leading to a negative effect on students’ academic results. Thus, in dealing with technology problems, students end up faced with anger, frustration and nervousness leading to more confusion and depression.

Technology is necessary for a student’s academic performance as it introduces flexibility. However, the introduction of new technology or its update has the effect of driving students to nervousness as new technology presents several challenges and confusion. However, the circumstance of new technology or update to some students comes as an opportunity to learn more.

The cause behind techno-stress in an e-learning environment arises from malfunctions of the technology devices where students constantly experience broken computers, disruption of the Internet, insufficient number of computer workstations in labs, the corrupted access system to different services, and complications of access points. When techno-stress occurs, students usually perform under the control of stress which has a negative influence on their academic performance as the presence of stress tends to demoralise students’ mind sets, bringing nervousness and frustration that does not help their final academic results.

Techno-stress engenders several negative effects. Physically, students experience effects such as headaches, back pain, faster heartbeat, dizziness, palms getting sweaty, faster blood circulation, body weakness and tiredness. These effects, in the future, might develop into serious illnesses on a student's life. On the other hand, students are also being affected psychologically where they feel like dropping technology and start mistrusting and disliking it.

It is evident that students react differently to techno-stress. However, the usual reaction among students rests around frustration and anger as students' sudden reactions are smashing some technology devices. In response to the technology issue, students' best way of managing their frustration and anger is by approaching or seeking help from respective friends with more knowledge concerning the issue or from helpdesk agents. Even if technology presents all of the negative effects aligned earlier, students admit to the continued use of it as they do rely on it to conduct school work. Thus, techno-stress does isolate people from using technology.

Further Research

The study recognises the prevalence of technology on students' academic work.

The researcher suggests, for future research to:

- Examine the influence of basic training of techno-stress on students at university of technology to overcome academic performance.
- Explore the implication of professional mechanism to deal with techno-stress to overpower student's ability to have control over their respective studies' activities.

References

- Achuonye, K. A. & Ezekoka, G. K. 2011. Technophobia among female undergraduate students: A challenge to attainment of the MDGs in Nigeria. *British Journal of Educational Research*, 1(1):49-57.
- Agboola, A. A. & Olasanmi, O. O. 2016. Technological Stressors in Developing Countries. *Open Journal of Applied Sciences*, 6(04):248-259.
- Ahmad, U. N. U. Amin, S. M. & Ismail, W. K. W. 2009. The impact of techno-stress on organizational commitment among Malaysian academic librarians. *Singapore Journal of Library and Information Management*, 38: 103-123.
- Ahmad, U.N.U. & Amin, S.M. 2012. The dimensions of techno-stress among academic librarians. *Procedia-Social and Behavioural Sciences*, 65:266-271.
- Aida, R. I. R. Z. Azlina, A. B. & Balqis, M. N. S. 2007, July. Techno stress: a study among academic and non-academic staff. *International Conference on Ergonomics and Health Aspects of Work with Computers* (pp. 118-124). Springer Berlin Heidelberg.
- Akhtari, P. Mohseni, M. Naderi, M. Akhtari, P. A. & Torfi, A. 2013. The Effect of Organizational Environment on Techno-stress of Employees, Case Study: Shahid Tondguyan Petrochemical Company (Control Room Section). *International Journal of Conceptions on Management and Social Science*, 1(1):9-14.
- Allen, K. A. Ryan, T. Gray, D. L. McInerney, D. M. & Waters, L. 2014. Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *The Australian Educational and Developmental Psychologist*, 31(1):18.
- Amin, S. M. Ahmad, U. N. U. & Hui, L. S. 2012. Factors contributing to customer loyalty towards telecommunication service provider. *Procedia-Social and Behavioral Sciences*, 40, 282-286.
- Anderson, A. A. Brossard, D. Scheufele, D. A. Xenos, M. A. & Ladwig, P. 2014. The "nasty effect:" online incivility and risk perceptions of emerging technologies. *Journal of Computer-Mediated Communication*, 19(3):373-387.
- Andreassen, C. S. Billieux, J. Griffiths, M. D., Kuss, D. J. Demetrovics, Z. Mazzoni, E. & Pallesen, S. 2016. The relationship between addictive use of social media and video games and negative perception of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviours*, 30(2): 252-262.
- Archibald, R. D. 2003. *Managing high-technology programs and projects*. John Wiley & Sons.
- Attride-Stirling, J. 2001. Thematic networks: an analytic tool for qualitative research. *Qualitative research*, 1(3):385-405.

- Ayyagari, R. Grover, V. & Purvis, R. 2011. Techno-stress: technological antecedents and implications. *MIS quarterly*, 35(4):831-858.
- Babbie, E. 2004. Survey research. *The practice of social research*, 10(1): 242-280.
- Babbie, E. & Mouton, J. 2001. Qualitative data analysis. *The Practice of Social Research*, South Africa Edition, 489-516.
- Baqutayan, S. M. S. 2015. Stress and Coping Mechanisms: A Historical Overview. *Mediterranean Journal of Social Sciences*. Rome: MCSER Publishing.
- Barnard-Brak, L. Paton, V. O. & Lan, W. Y. 2010. Profiles in self-regulated learning in the online learning environment. *The International Review of Research in Open and Distributed Learning*, 11(1):61-80.
- Baškarada, S. 2014. Qualitative Case Study Guidelines. *The Qualitative Report*, 19(40):1-18.
- Baxter, P. & Jack, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, 13(4): 544-559.
- Bless, C. & Smith, C. H. 2000. *Fundamental of social research methods: An African perspective*. Lusaka: Juta Education.
- Bless, C. Higson-Smith, C. & Kagee, A. 2006. 4th. ed. *Fundamentals of social research methods. An African perspective*. Cape Town: Juta.
- Bloom, A. J. 1985. An anxiety management approach to computerphobia. *Training & Development Journal*.
- Bonnah, F. 2015. Techno-stress and Afrocentric coping strategies: An Exploratory study among Academic Library Employees in Ghana, Master Dissertation University of Pretoria.
- Bradshaw, R. & Zelano, J. A. 2013. *Exploring Themes of Techno-stress for End Users Working with Hardware and Software Technology*. Singapore: E-Leader Singapore.
- Brave, S. & Nass, C. 2003. Emotion in human–computer interaction. *Human-Computer Interaction handbook*. Hillsdale: L. Erlbaum Associates. pp.53.
- Brillhart, P. E. 2004. Techno-stress in the workplace: Managing stress in the electronic workplace. *Journal of American Academy of Business*, 5(1/2):302-307.
- Brod, C. 1984. Techno-stress: *The Human Cost of the Computer Revolution*. Reading: Addison-Wesley.
- Brooks, S. 2015. Does personal social media usage affect efficiency and well-being? *Computers in Human Behavior*, 46:26-37.

- Burns, N. & Grove, S. 2003. Understanding quantitative research. 3rd ed. Philadelphia: W B Saunders.
- Califf, C. Sarker, S. Sarker, S. & Fitzgerald, C. 2015. The Bright and Dark Sides of Techno-stress: An Empirical Study of Healthcare Workers, Conference Paper at the Thirty Sixth International Conference on Information Systems, Fort Worth 2015.
- Carlner, S. 2004. An overview of online learning (2nd ed.), Human Resource Development Press, Armherst, MA.
- Castellan, C. M. 2010. Quantitative and Qualitative Research: A View of Clarity. *International Journal of Education*. 1(2):1-14.
- Chandra, S. Srivastava, S. C. & Shirish, A. 2015. Do Techno-stress Creators Influence Employee Innovation? In *PACIS*. p. 93.
- Clark, R. 2002. Six principles of effective e-learning: What works and why. *The e-learning Developer's Journal*, 6(2):1-10.
- Clute, R. 1998. Techno-stress: A Content Analysis. Master's Research Paper, Kent State University.
- Coklar, A. N. & Sahin, Y. L. 2011. Techno-stress levels of social network users based on ICTs in Turkey. *European Journal of Social Sciences*, 23(2):171-182.
- Conrad, D. 2002. Deep in the hearts of learners: Insights into the nature of online community. *International Journal of E-learning & Distance Education*, 17(1):1-19.
- Cooper Ph. D, M. D. 2000. Towards a model of safety culture. *Safety science*, 36(2):111-136.
- Corradini, I. Marano, A. & Nardelli, E. 2015. Prisma-ra: A set of tools for work related stress risk assessment. *World Institute for Advanced Research and Science*. p.118.
- Creswell, J. W. 2009. *Research design: Qualitative, Quantitative, and Mixed Methods Approaches*. London: Sage Publications.
- Davies, G. 2015. Online MCQ Assessment Anxiety Amongst First Year Undergraduate Psychology Students: A Case Study. *Journal of Perspectives in Applied Academic Practice*, 3(1).
- Dinello, D. 2005. Technophobia. Science fiction visions of post human technology. Austin: University of Texas Press. pp. 211.
- Doronina, O. V. 1995. Fear of computers. *Russian Education & Society*, 37(2):10-28.

- Driscoll, D. L. 2011. Introduction to Primary Research: Observations, Surveys, and Interviews. *Writing spaces: readings on writing*, 1.
- Du Pré, R. 2010. Universities of technology in the context of the South African higher education landscape. *Kagisano*, 7, 1-41.
- Ellis, C. 2004. The ethnographic I: A methodological novel about autoethnography (Vol. 13). Rowman Altamira.
- Enis, L. A. 2005. Much of what I found out about techno-stress and librarians. *Computers in Librarians*, 25(8):10-12.
- Epignosis, L. L. C. 2014. E-learning concepts, trends, applications. Version.
- Erasmus, E. 2014. Technology acceptance, psychological attachment and techno-stress, Doctoral dissertation at the North-West University.
- Escobedo, C, Guerrero, J, Lujan, G, Ramirez, A. & Serrano, D. 2007. Ethical issues with informed consent. *Bio-Ethics*, 1, Fall 2007.
- Etikan, I. Musa, S. A. & Alkassim R. S. 2016. Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*.
- Farrokhi, F. & Hamidabad, A. M. 2012. Rethinking Convenience Sampling: Defining Quality Criteria, *Theory and Practice in Language Studies*, 2(4):784-792.
- Fereday, J. & Muir-Cochrane, E. 2006. Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive Deductive Coding and theme Development. *International Journal of Qualitative Methods*, 5(1):80-92.
- Fink, J. K. 2017. Reactive polymers: Fundamentals and applications: A concise guide to industrial polymers. William Andrew.
- Fish, K. Mun, J. & A'Jontue, R. 2016. Do Visual Aids Really Matter? A Comparison of Student Evaluations before and after Embedding Visuals into Video Lectures. *Journal of Educators Online*, 13(1):194-217.
- Fuglseth, A. M. & Sørenbø, Ø. 2014. The effects of techno-stress within the context of employee use of ICT. *Computers in Human Behavior*, 40:161-170.
- Gagne, R. M. Wager, W. W. Golas, K. C. Keller, J. M. & Russell, J. D. 2005. Principles of instructional design. *Performance Improvement*, 44(2):44-46.
- Galletta, A. 2013. Mastering the semi-structured interview and beyond: From research design to analysis and publication. NYU press.

- Garland, K. J. & Noyes, J. M. 2004. Computer experience: a poor predictor of computer attitudes. *Computers in Human Behavior*, 20(6):823-840.
- Gilbert, D. Lee-Kelley, L. & Barton, M. 2003. Technophobia, gender influences and consumer decision-making for technology-related products. *European Journal of Innovation Management*, 6(4):253-263.
- Goold, A, Craig, A. & Coldwell, J. 2008. The student experience of working in teams online. Proceedings of the Ascilite Conference, Institute of Teaching and Learning, Deakin University, Melbourne, November 30 – December 3.
- Guest, G. Namey, E. E. & Mitchell, M. L. 2013. *Collecting Qualitative Data: a field Manual for Applied Research*. Thousand Oaks: Sage Publications.
- Guilar, J. & Loring, A. 2008. Dialogue and community in online learning: Lessons from Royal Roads University. *International Journal of E-learning & Distance Education*, 22(3):19-40.
- Hackbarth, G. Grover, V. & Mun, Y. Y. 2003. Computer playfulness and anxiety: positive and negative mediators of the system experience effect on perceived ease of use. *Information & management*, 40(3):221-232.
- Hampton, K. Rainie, L. Lu, W. Shin, I. & Purcell, K. 2015. Social media and the cost of caring. *Washington, DC: Pew Research Center*.
- Hancock, D. R. & Algozzine, B. 2016. Doing case study research: A practical guide for beginning researchers. Teachers College Press.
- Harahap, K. & Effiyanti, T. 2015. Techno-stress among educators: A revisit of Social Cognitive Perspective. *Asia Pacific Journal of Contemporary and Communication Technology*. 1(1):108-120.
- Harrell, M. C. & Bradley, M. A. 2009. Data Collection Methods Semi-Structured Interviews and Focus Groups. Santa Monica: Rand National Defense Research Institute.
- Heinssen Jr, R. K. Glass, C. R. & Knight, L. A. 1987. Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in human behavior*, 3(1):49-59.
- Holloway, I. & Wheeler, S. 2002. Ensuring trustworthiness and quality. Holloway I, Wheeler S. *Research in nursing*. 2nd Ed. Blackwell Publishing, India 1996, 250-63.
- Hudiburg, R. A. & Necessary, J. R. 1996. Coping with computer-stress. *Journal of Educational Computing Research*, 15(2):113-124.

- Hung, W.H. Chen, K. & Lin, C.P. 2015. Does the proactive personality mitigate the adverse effect of techno-stress on productivity in the mobile environment? *Semantic Scholar: Telematics and Informatics*, 32(1):143-157.
- Ibrahim, A. M. 2012. Thematic Analysis: A Critical Review of Its Process and evaluation. *West East Journal of Social Sciences*, 1(1):39-47.
- Ibrahim, H. Yusoff, Y.M. & Othman, N.Z. 2014. The Influence of Techno stress and Organizational-Is Related Support on User Satisfaction in Government Organizations: A Proposed Model and Literature Review. *Information Management and Business Review*, 6(2):63.
- Isaacs, A. N. 2014. An overview of qualitative research methodology for public health researchers. *International Journal of medicine and public health*, 4(4): 318-323.
- Ivala, E. N. 2011. Implementing e-learning at a university of technology, South Africa: A qualitative study.
- Jebreen, I. 2012. Using Inductive Approach as Research Strategy in Requirements Engineering. *International Journal of Computer and Information Technology*, 1(2):162-173.
- Johnson, T. Wisniewski, M. Kuhlemeyer, G. Isaacs, G. & Krzykowski, J. 2012. Technology adoption in higher education: Overcoming anxiety through faculty bootcamp. *Journal of Asynchronous Learning Networks*, 16(2):63-72.
- Jowah, L. E. 2011. *Research Methodology*. Cape Town: Jowah Book Publishers.
- Kakabadse, N. K. 2007. *Technology overload: explaining, diagnosing and dealing with techno-addiction*. Switzerland: Walabab.com.
- Kamberelis, G. & Dimitriadis G. 2013. *Focus Groups: From Structured Interviews to Collective Conversations*. London: Routledge.
- Kawulich, B. B. 2005. Participation observation as a data collection method. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 6(2).
- Kessler, R. C. Chiu, W. T. Demler, O. & Walters, E. E. 2005. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of general psychiatry*, 62(6):617-627.
- Khan, B. H. 2001. *Web-based training*. Educational Technology.
- Klenke, K. 2016. *Qualitative research in the study of leadership*. Emerald Group Publishing Limited.
- Knani, M. & Fournier, P.S. 2013. Burnout, Job Characteristics, and Intent to Leave: Does Work Experience Have Any Effect. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, 4(4):403-408.

- Knani, M. 2013. Exploratory study of the impacts of new technology implementation on burnout and presentism. *International Journal of Business and Management*, 8(22):92.
- Kothari, C. R. 2004. *Research Methodology: Methods and Techniques*. New Delhi: New Age International Publishers.
- Kreiner, G. E. Hollensbe, E. C. & Sheep, M. L. 2009. Balancing borders and bridges: Negotiating the work-home interface via boundary work tactics. *Academy of management journal*, 52(4):704-730.
- Krueger, R, A. & Casey, M. A. 2014. *Focus Groups: A Practical Guide for Applied Research*. New Delhi: Sage Publications.
- Laspinas, M. L. 2015. Techno-stress: Trends and Challenges in the 21st Century Knowledge Management. *European Scientific Journal*.
- Laurillard, D. 2013. *Rethinking university teaching: A conversational theory for the effective use of learning technologies*. London: Routledge.
- Lazarus, R.S. 1966. *Psychological stress and the coping process*. New York. McGraw-Hill.
- Lee, Y. K., Chang, C. T., Lin, Y. & Cheng, Z. H. 2014. The dark side of smartphone usage: Psychological traits, compulsive behaviour and techno-stress. *Computers in Human Behaviour*, 31:373-383.
- Levers, M. D. 2013. *Philosophical paradigms, grounded theory and perspectives on emergence*. Thousand Oaks: Sage Publishing. pp 1-6.
- LoBiondo-Wood, G. & Haber, J. 2013. *Nursing research in Canada: Methods, critical appraisal and utilization with study guide*. Milton, ON: Elsevier Science.
- Longman, S. M. D. 2013. *A Comparison of the Perceptions of Techno-stress Experienced by Teachers versus Technology Used by Teachers in Elementary Education in a South*. Dissertation at Southeastern Louisiana University.
- Lowenthal, P. R. Wilson, B. G. & Parrish, P. E. 2009. *Context matters: A description and typology of the online learning landscape*.
- Loh, H. S. Gan, L. Y. Lim, Z. W. Loh, W. S. & Yong, S. Y. 2016. *The relationship between Stress and Job Satisfaction of Nurses in private hospitals of Georgetown, Penang*. (Doctoral dissertation, UTAR).
- Luppicini, R. 2005. A systems definition of educational technology in society. *Educational Technology & Society*, 8(3):103-109.
- Mack, L. 2010. The philosophical of educational research. *Collaborative Repository of RU & APU*, 19: 5-11.

- Mahboob, A. & Khan, T. 2016. Techno-stress and its management techniques: A literature review. *Journal of Human Resource Management*, 4(3):28-31.
- Martins, L. L. Gilson, L. L. & Maynard, M. T. 2004. Virtual teams: What do we know and where do we go from here? *Journal of management*, 30(6): 805-835.
- Mert, İ. S. Bayramlik, H. & Turgut, H. 2014. A qualitative research to define the successful decision making competencies in public sector: evidence from Turkey. *International Journal of Academic Research in Business and Social Sciences*, 4(5):395-409.
- Mlotshwa, S.C. 2013. Developing an observational assessment for evaluating the Sinovuyo caring families parent training programme. Unpublished honours thesis). University of Cape Town, Cape Town, South Africa.
- Nichols, M. 2003. A theory for e-learning. *Educational technology & society*, 6(2):1-10.
- Oblinger, D. Oblinger, J. L. & Lippincott, J. K. 2005. Educating the net generation. Boulder, Colo.: EDUCAUSE, c2005. 1 v. (various pagings): illustrations.
- Palinkas, L. A, Horwitz, S. M, Green, C. A, Wisdom, J. P, Duan, N. & Hoagwood, K. 2015. Purposeful sampling for qualitative data collection and analysis in mixed methods implementation research. *Adm Policy Ment Health*, 42(5):533-544.
- Petrie, H. & Bevan, N. 2009. The evaluation of accessibility, usability and user experience. *The Universal Access Handbook*. Boca Raton: CRC Press.
- Phrasisombath, K. 2009. Sample size and sampling methods. Faculty of Postgraduate Studies and Research University of Health Sciences: Vientiane.
- Polit, D. & Hungler, T. 2001. Introduction to Research Design. [Online] Available at: <http://dwb4.unl.edu/Diss/Hardy/chapter3> [Accessed 13 November 2017].
- Ponelis, S. R. 2015. Using Interpretative Qualitative Case Studies for Exploratory Research in Doctoral Studies: A Case of Information System Research in Small and Medium Enterprises. *International Journal of Doctoral Studies*, 10:535-550.
- Popma, J. 2013. *The Janus Face of the New Ways of Work: Rise, Risks and Regulation of Nomadic Work*. London: CRC Press.
- Prabhakaran, A. & Mishr, H. K. 2012. Technological change in libraries: The evolution of techno stress. *Researchers World*, 3(1):131.
- Prystanski, K. 2012. Attentional and psychophysiological responses to seasonal and eating stimuli in seasonal depression and disordered eating (Doctoral dissertation).
- Ragu-Nathan, T. S, Tarafdar, M, Ragu-Nathan, B. S., & Tu, Q. 2008. The Consequences of Techno-stress for End Users in Organizations: Conceptual

- Development and Empirical Validation. *Information system Research*, 19(4): 417-433.
- Rahman, M. S. 2016. The advantages and disadvantages of using qualitative and quantitative approaches and methods in language “testing and assessment” research: A literature review. *Journal of Education and Learning*, 6(1):102-112.
- Rendulić, D. Kuo, V. & Dzaja, A. 2011. *ITdesk.info – project of computer e-education with open access*. Zagreb: Open Society for Idea Exchange.
- Rhode, J. 2009. Interaction equivalency in self-paced online learning environments: An exploration of learner preferences. *The international review of research in open and distributed learning*, 10(1).
- Rosen, L. D. Whaling, K., Rab, S. Carrier, L. M. & Cheever, N. A. 2013. Is Facebook creating “iDisorders”? The link between clinical negative perception of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior*, 29(3): 1243-1254.
- Rowlands, B. 2005. Grounded in practice: Using Interpretive research to build theory. *The Electronic Journal of Business Research Methodology*, 3(1):81-92.
- Rubin, A. & Babbie, E. 2010. *Essential Research Methods for Social Work*. Belmont: USA.
- Rutherford, A. G. & Kerr, B. 2014. An inclusive approach to online learning environments: Models and resources. *Turkish Online Journal of Distance Education*, 9(2):64-85.
- Salanova Soria, M. Llorens Gumbau, S. & Cifre, E. 2013. The dark side of technologies: Techno-stress among users of information and communication technologies. *International Journal of Psychology*, 48(3):422-36.
- Samaha, M. & Hawi, N. S. 2016. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in Human Behavior*, 57:321-325.
- Sami, L. K. & Pangannaiah, N. B. 2006. “Techno-stress” A literature survey on the effect of information technology on library users. *Library review*, 55(7): 429-439.
- Schimmenti, A. & Caretti, V. 2010. Psychic retreats or psychic pits? Unbearable states of mind and technological addiction. *Psychoanalytic Psychology*, 27(2):115.
- Scotland, J. 2012. Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive and critical research paradigms. *Canadian center of science and education*, 5(9): 9-16.

- Scott, C. R. & Timmerman, C. E. 2005. Relating computer, communication, and computer-mediated communication apprehensions to new communication technology use in the workplace. *Communication Research*, 32(6):683-725.
- Scott, C. R. & Rockwell, S. C. 1997. The effect of communication, writing, and technology apprehension on likelihood to use new communication technologies. *Communication education*, 46(1):44-62.
- Sellick, S. Umuhoza, J. & Shoulders, C. W. 2016. An Evaluation of a Youth Camp Program's Impact on Parents' Perceptions of Sustainability and Family Engagement.
- Sethi, V. King, R. C. & Quick, J. C. 2004. What causes stress in information system professionals? *Communications of the ACM*, 47(3):99-102.
- Shu, Q. Tu, Q. & Wang, K. 2011. The impact of computer self-efficacy and technology dependence on computer-related techno-stress: A social cognitive theory perspective. *International Journal of Human-Computer Interaction*, 27(10):923-939.
- Stanley, L. 2016. Using focus groups in political science and international relations, political study association. *Politics*, 36(3):236–249.
- Spradley, J. P. 1979. *Ethnography and culture. The ethnographic interview.* Holt, Rinehart, and Winston: Florida.
- Starman, A, B. 2013. The case study as a type of qualitative research. *Journal of contemporary educational studies.* pp 28-43.
- Sumi, C. 2016. U.S. Patent No. 9,326,748. Washington, DC: U.S. Patent and Trademark Office.
- Tacy, J. W. 2015. Techno-stress Effects on Technology Acceptance by Nurse Faculty.
- Tams, S. Hill, K. de Guinea, A.O. Thatcher, J. & Grover, V. 2014. NeuroIS-alternative or complement to existing methods? Illustrating the holistic effects of neuroscience and self-reported data in the context of techno-stress research. *Journal of the Association for Information Systems*, 15(10):723.
- Tarafdar, M, Tu, Q. & Ragu-Nathan, T. 2011. Impact of techno-stress on end-user satisfaction and performance. *Journal of Management Information Systems*, 27(3):303-334.
- Tarafdar, M., Tu, Q. Ragu-Nathan, B. S. & Ragu-Nathan, T. S. 2007. The impact of techno-stress on role stress and productivity. *Journal of Management Information Systems*, 24(1):301-328.
- Tavangarian, D. Leybold, M. E. Nölting, K. Röser, M. & Voigt, D. 2004. Is e-learning the Solution for Individual Learning? *Electronic Journal of E-learning*, 2(2):273-280.

- Taylor, S. J. & Bogdan, R. 1984. Introduction to qualitative research: The search for meanings.
- Teddlie, C. & Yu, F. 2007. Mixed Methods Sampling: A Typology with Example. *Journal of Mixed Methods Research*, 1(1):77-100.
- Thanh, N. C. & Thanh, T. T. L. 2015. The interconnection between interpretivist paradigm and qualitative methods in education. *American Journal of Education Science*, 1(2):24-27.
- Tiemo, A. P. & Ofua, J. O. 2010. Techno-stress: Causes, Negative perception and Coping Strategies among Librarians in University Libraries. *Educational Research*, 1(12):713-720.
- Tobin, M. J. 2010. Principles and practice of mechanical ventilation. McGraw Hill Professional.
- Tongco, M. D. C. 2007. Purposive sampling as a tool for informant selection. *A Journal of Plants People and Applied Research, Ethnobotany Research & Application*, 5(1):147-158.
- Torkzadeh, G. & Doll, W. J. 1999. The development of a tool for measuring the perceived impact of information technology on work. *Omega*, 27(3):327-339.
- Trevino, J. O. 2014. Emotional and social intelligence: A study of interpersonal, intrapersonal, social awareness, and social facility skills of information technology professionals in higher education. Doctoral dissertation submitted at the Texas A&M University-Corpus Christi.
- Triacca, L. Bolchini, D. Botturi, L. & Inversini, A. 2004. MiLE. In *Proceedings of EDMEDIA 2004, Lugano, Switzerland* (Vol. 1, p. 4398).
- Tu, Q. Wang, K. & Shu, Q. 2005. Computer-related techno-stress in China. *Communications of the ACM*, 48(4):77-81.
- Venkatesh, V. Morris, M. G. Davis, G. B. & Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. *MIS quarterly*, 1: 425-478.
- Vergragt, P. J. 2006. *How technology could contribute to a sustainable world. Great Transition Initiative*. Boston: Tellus Institute. pp.1-28.
- Walsh, S. P. White, K. M. & Young, R. M. 2008. Over-connected? A qualitative exploration of the relationship between Australian youth and their mobile phones. *Journal of adolescence*, 31(1):77-92.
- Wang, K., Shu, Q. & Tu, Q. 2008. Techno-stress under different organizational environments: An empirical investigation. *Computers in Human Behavior*, 24(6):3002-3013.

- Waycott, J. Bennett, S. Kennedy, G. Dalgarno, B. & Gray, K. 2010. Digital divides? Student and staff perceptions of information and communication technologies. *Computers & education*, 54(4):1202-1211.
- Weil, M. M. & Rosen, L. D. 1997. Techno-stress: Coping with technology@ work@ home@ play. pp. 29-32. New York: Wiley.
- Welman, C. Kruger, F. & Mitchell, B. 2005. Research methodology (pp. 9-79). Cape Town: Oxford University Press.
- Whang, L. S. M. Lee, S. & Chang, G. 2003. Internet over-user's psychological profiles: a behavior sampling analysis on internet addiction. *CyberPsychology & Behavior*, 6(2):143-150.
- Woods, P. 2011. *Sociology and the School* (Vol. 209). Routledge.
- Wrench, J.S. & Punyanunt-Carter, N.M. 2007. The relationship between computer-mediated-communication competence, apprehension, self-efficacy, perceived confidence, and social presence. *Southern Communication Journal*, 72(4):355-378.
- Yin, R. K. 2003. *Case study research: Design and methods*. Thousand Oaks: Sage Publication.
- Yin, R. K. 2011. *Applications of case study research*. Sage.
- Yuvaraj, M. & Singh, A.K. 2015. Effects and measures of techno-stress among librarians in selected University libraries of Delhi. *Library Philosophy and Practice*.
- Zhang, Z. & Kenny, R. 2010. Learning in an online distance education course: Experiences of three international students. *The International Review of Research in Open and Distributed Learning*, 11(1):17-36.

APPENDIX A: INVESTIGATION INTERVIEW

INVESTIGATION INTERVIEW

Research title:

The Perceptions and Implications of Techno-stress in an e-learning Environment: An Exploratory Case Study.

The research:

Name of the researcher: HOUDA SAHAL SALEM
Course: Master Technology in Information Technology
Department: Informatics & Design

Name of University: Cape Peninsula University of technology (CAPE TOWN CAMPUS)
University address: Keizersgracht Street P.O Box 652 CAPE TOWN Postal code: 8000
University contact details: +27 (0)21 460 3068

I would like to invite you to take part in my research study, which concerns exploring the perceptions and implications of techno-stress within students who experiences techno-stress at university of Technology; and to determine the potential causes of techno-stress as perceived by students of university of technology

If you agree to participate in this research, time and location to conduct the interview will entirely be of your choice. Questions about background, activities and perception will be asked. The interview should last about an hour. Students at lower or high education will broadly benefit from the study.

The information will be treated as confidential and will only be used for the purpose of the research. Your participation in this investigation is entirely voluntary. Some of the research questions may make you uncomfortable or upset. You are free to decline to answer any questions you don't wish to, or to stop the interview at any time. If results of this study are published or presented, individual names and other personally identifiable information will not be used. The original interview record will be held in locked cabinets in the university offices until the end of 2017, and then destroyed. I will not save the tapes and notes for use in future research to be done by myself or others.

With your permission, please select the appropriate format:

Audiotape Yes No

Notes Yes No

Videotape Yes No

If you agree to being audiotaped or videotaped but feel uncomfortable at any time during the interview, I will turn off the recorder at your request.

The research will be completed by October 2017. If you have any questions please contact Houda Sahal Salem at +27 (0)76 371 3965 or hodashal@gmail.com

If you have any questions about your rights or treatment as a research participant in this study, please contact the Cape Peninsula University of Technology (CAPE TOWN CAMPUS); Keizersgracht Street P.O Box 652 CAPE TOWN Postal code: 8000; Tel: +27 (0)21 460 3068.

I agree to participate in this study "Yes" - "No"

Name:.....Signature:.....Date:
...../...../.....

Background questions

- Name
- What do you do study? For how long have you been studying?
- Why did you prefer University of Technology?

General questions for students

1. Do you think technology can make you stressful? please explain?
2. What does techno-stress mean to you?
3. What are the influences of techno-stress do you experience on yours study?
4. What kind of techno-stress do you face when dealing with technology?
5. Does technology necessary for your academic performance?
6. Do you feel nervous with new update of technology?
7. What are the causes that are related to techno-stress?
8. How does techno-stress impact on your academic performance?
9. What are the negative perceptions you feel when you have problem on your computer?
10. How do you manage and react with techno-stress?
11. Is techno-stress isolate you from technology?

Thank you for your co-operation

Houda Sahal Salem
Master technology in Information Technology
Email: hodashal@gmail.com
Telephone: (0)76 371 3965
Cape Peninsula University of technology

APPENDIX B: GROUP A: RESPONSES TO INDIVIDUAL QUESTIONS

1. Do you think technology can make you stressful? Please explain?

From the question above, the key themes produced by the group's participants through their answers were as follow:

GA1	Yes
GA2	Absolutely
GA3	Yes,
GA4	Yes
GA5	Not every day

Reason from the answer above

GA1	only when stop working, when can't control
GA2	only when stop working, when can't control
GA3	but not every time (only when stop working
GA4	When defected
GA5	only when stop working, when can't control

2. What does techno-stress mean to you?

Reason to the question above

GA1	stress that is related to technology devices
GA2	stress over computer
GA3	Bad feeling to technology
GA4	stress that is related to technology devices
GA5	stress that is related to technology devices

3. What are the influences of techno-stress do you experience on yours study?

Reason provided by respondents

GA1	loss of concentration
GA2	loss of concentration
GA3	loss of concentration
GA4	loss of concentration
GA5	laziness

4. What kind of techno-stress do you face when dealing with technology?

Reason provided by respondents

GA1	anger
GA2	anger
GA3	anger
GA4	frustration
GA5	frustration

5. Does technology necessary for your academic performance?

GA1	Yes
GA2	Yes
GA3	Yes
GA4	Yes
GA5	Yes

Reason provided by respondents

GA1	Doing research, submitting work
GA2	Doing research, submitting work
GA3	Doing research, submitting work, download material online
GA4	Doing research, submitting work, download material online
GA5	Doing research, submitting work, download material online

6. Do you feel nervous with new update of technology?

GA1	Yes
GA2	Yes
GA3	Yes
GA4	Yes
GA5	Yes

Reason provided by the respondents

GA1	Complicate to use, difficult
GA2	Complicate to use, difficult
GA3	Complicate to use, difficult
GA4	Complicate to use, difficult
GA5	Complicate to use, difficult

7. What are the causes that are related to techno-stress?

Reason to the question above

GA1	Malfunctioning of devices, poor connection
GA2	Malfunctioning of devices, poor connection
GA3	Malfunctioning of devices, poor connection
GA4	Malfunctioning of devices, poor connection
GA5	Malfunctioning of devices, poor connection

8. How does techno-stress impact on your academic performance?

Reason

GA1	Negative effect (because of low mind set, nervousness and frustration)
GA2	Negative effect (because of low mind set, nervousness and frustration)
GA3	Negative effect (because of low mind set, nervousness and frustration)
GA4	Negative effect (because of low mind set, nervousness and frustration)
GA5	Negative effect (because of low mind set, nervousness and frustration)

9. What are the negative perceptions you feel when you have problem on your computer?

Reason

GA1	headache, back pain
GA2	headache, back pain
GA3	headache, back pain
GA4	headache, back pain, tiredness, weakness
GA5	headache, back pain

10. How do you manage and react to techno-stress?

Reason

GA1	Manage by (seeking help) React by (frustration)
GA2	Manage by (seeking help) React by (frustration)
GA3	Manage by (seeking help) React by (frustration)
GA4	Manage by (seeking help) React by (frustration)
GA5	Manage by (seeking help) React by (frustration)

11. Is techno-stress isolating you from technology?

GA1	No
GA2	No
GA3	No
GA4	No
GA5	No

Reason to the question by respondents

GA1	we need technology, important to today life
GA2	we need technology, important to today life
GA3	we need technology, important to today life
GA4	we need technology, important to today life
GA5	we need technology, important to today life

APPENDIX C: GROUP B: RESPONSES TO INDIVIDUAL QUESTIONS

1. Do you think technology can make you stressful? Please explain?

From the question above, the key themes produced by the group's participants through their answers were as follow.

GB1	Yes, it does
GB2	Not really
GB3	Yes
GB4	Yes of course
GB5	Yes

Reason from the answer above

GB1	(only when stop working)
GB2	(only when stop working)
GB3	(only when stop working)
GB4	(only when stop working)
GB5	(only when stop working)

2. What does techno-stress mean to you?

Reason to the question above

GB1	stress over computer
GB2	stress over computer
GB3	unable to submit work through the mean of using technology)
GB4	stress over computer
GB5	stress over computer

3. What are the influences of techno-stress do you experience on yours study?

Reason provided by respondents

GB1	negative impact
GB2	negative impact
GB3	negative impact
GB4	negative impact

GB5	negative impact
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4. What kind of techno-stress do you face when dealing with technology?

Reason provided by respondents

GB1	nervousness
GB2	nervousness
GB3	nervousness
GB4	anger
GB5	anger

5. Does technology necessary for your academic performance?

GB1	Yes
GB2	Yes
GB3	Yes
GB4	No
GB5	No

Reason provided by respondents

GB1	Doing research, download class material, learn online
GB2	Doing research, to contact lectures, availability of information, download class material, learn online
GB3	Doing research, to contact lectures, availability of information, download class material, learn online
GB4	no comment
GB5	no comment

6. Do you feel nervous with new update of technology?

GB1	Yes
GB2	Yes
GB3	Yes

GB4	No
GB5	No

Reason provided by the respondents

GB1	Difficulty
GB2	Difficulty
GB3	Difficulty
GB4	Good for knowledge
GB5	Good for knowledge

7. What are the causes that are related to techno-stress?

Reason to the question above

GB1	Slow internet, broken devices, do not work
GB2	Slow internet, broken devices, do not work
GB3	Slow internet, broken devices, do not work
GB4	Slow internet, broken devices, do not work
GB5	Slow internet, broken devices, do not work

8. How does techno-stress impact on your academic performance?

Reason

GB1	Negative effect (because of frustration)
GB2	Negative effect (because of frustration)
GB3	Negative effect (because of frustration)
GB4	Negative effect (nervousness)
GB5	Negative effect (nervousness)

9. What are the negative perceptions you feel when you have problem on your computer?

Reason

GB1	headache, fast heartbeat, back pain
GB2	headache, fast heartbeat, back pain
GB3	headache, fast heartbeat, back pain
GB4	headache, fast heartbeat, back pain
GB5	headache, fast heartbeat, back pain

10. How do you manage and react to techno-stress?

GB1	Manage by (let it go, stay away) React by (frustration and anger)
GB2	Manage by (let it go, stay away) React by (frustration and anger)
GB3	Manage by (let it go, stay away) React by (frustration and anger)
GB4	Manage by (let it go, stay away) React by (frustration and anger)
GB5	Manage by (let it go, stay away) React by (frustration and anger)

11. Is techno-stress isolating you from technology?

GB1	No
GB2	No
GB3	No
GB4	No
GB5	Yes

Reason to the question by respondents

GB1	need technology
GB2	need technology
GB3	need technology
GB4	need technology
GB5	to avoid stress

APPENDIX D: GROUP C: RESPONSES TO INDIVIDUAL QUESTIONS

1. Do you think technology can make you stressful? Please explain?

From the question above, the key themes produced by the group's participants through their answers were as follow.

GC1	Not every day
GC2	Not every day
GC3	Yes
GC4	Not every day
GC5	Not every day

Reason from the answer above

GC1	when not manageable, stop working
GC2	when not manageable, stop working
GC3	when not manageable, stop working
GC4	when not manageable, stop working
GC5	when not manageable, stop working

2. What does techno-stress mean to you?

Reason to the question above

GC1	stress that is related to technology devices
GC2	stress that is related to technology devices
GC3	stress that is related to technology devices
GC4	stress that is related to technology devices
GC5	stress that is related to technology devices

3. What are the influences of techno-stress do you experience on your study?

Reason provided by respondents

GC1	Bad result
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GC2	Bad result
GC3	Bad result
GC4	Bad result
GC5	Bad result

4. What kind of techno-stress do you face when dealing with technology?

Reason provided by respondents

GC1	anger
GC2	anger
GC3	anger
GC4	frustration
GC5	frustration

5. Does technology necessary for your academic performance?

GC1	Yes
GC2	Yes
GC3	Yes
GC4	Yes
GC5	Yes

Reason provided by respondents

GC1	Doing research, download class material, learn online
GC2	Doing research, download class material, learn online
GC3	Doing research, download class material, learn online
GC4	Doing research, download class material, learn online
GC5	Doing research, to contact lectures, availability of information, download class material, learn online

6. Do you feel nervous with new update of technology?

GC1	Yes
GC2	Yes
GC3	Yes
GC4	Yes
GC5	No

Reason provided by the respondents

GC1	Difficulty
GC2	Difficulty
GC3	Difficulty
GC4	Difficulty
GC5	Opportunity to know more, excitement

7. What are the causes that are related to techno-stress?

Reason to the question above

GC1	poor internet, malfunctioning devices
GC2	poor internet, malfunctioning devices
GC3	poor internet, malfunctioning devices
GC4	poor internet, malfunctioning devices
GC5	poor internet, malfunctioning devices

8. How does techno-stress impact on your academic performance?

Reason

GC1	Negative effect (because of frustration)
GC2	Negative effect (because of frustration)
GC3	Negative effect (because of frustration)
GC4	Negative effect (because of frustration)

GC5	Negative effect (because of frustration)
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9. What are the negative perceptions you feel when you have problem on your computer?

Reason

GC1	palm sweat, blood is circulating fast
GC2	palm sweat, blood is circulating fast
GC3	palm sweat, blood is circulating fast
GC4	headache, palm sweat, blood is circulating fast
GC5	headache, palm sweat, blood is circulating fast

10. How do you manage and react to techno-stress?

GC1	Manage by (seeking help) React by (frustration)
GC2	Manage by (seeking help) React by (frustration)
GC3	Manage by (seeking help) React by (frustration)
GC4	Manage by (seeking help) React by (frustration)
GC5	Manage by (seeking help) React by (frustration)

11. Is techno-stress isolating you from technology?

GC1	Yes
GC2	No
GC3	No
GC4	No
GC5	No

Reason to the question by respondents

GC1	to avoid stress
GC2	need technology
GC3	need technology

GC4	need technology
GC5	need technology

APPENDIX E: GROUP D: RESPONSES TO INDIVIDUAL QUESTIONS

1. Do you think technology can make you stressful? Please explain?

From the question above, the key themes produced by the group's participants through their answers were as follow.

GD1	Yes, I do
GD2	Yes, I do
GD3	Yes, I do
GD4	Yes
GD5	Yes

Reason from the answer above

GD1	only when stop working
GD2	only when stop working
GD3	only when stop working
GD4	only when stop working
GD5	only when stop working

2. What does techno-stress mean to you?

Reason to the question above

GD1	unable to control his technology devices
GD2	unable to control his technology devices
GD3	unable to control his technology devices
GD4	stress that is related to technology devices
GD5	stress that is related to technology devices

3. What are the influences of techno-stress do you experience on your study?

Reason provided by respondents

GD1	loss of concentration
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GD2	loss of concentration
GD3	loss of concentration
GD4	loss of concentration
GD5	loss of concentration

4. What kind of techno-stress do you face when dealing with technology?

Reason provided by respondents

GD1	anger
GD2	anger
GD3	frustration
GD4	frustration
GD5	frustration

5. Does technology necessary for your academic performance?

GD1	Yes
GD2	Yes
GD3	Yes
GD4	Yes
GD5	Yes

Reason provided by respondents

GD1	Doing research, to contact lectures, availability of information, download class material, learn online
GD2	Doing research, to contact lectures, availability of information, download class material, learn online
GD3	Doing research, to contact lectures, availability of information, download class material, learn online
GD4	Doing research, to contact lectures, availability of information, download class material, learn online
GD5	Doing research, to contact lectures, availability of information, download class material, learn online

6. Do you feel nervous with new update of technology?

GD1	Yes
GD2	Yes
GD3	Yes
GD4	Yes
GD5	Yes

Reason provided by the respondents

GD1	Complicate to use, difficult
GD2	Complicate to use, difficult
GD3	Complicate to use, difficult
GD4	Complicate to use, difficult
GD5	Complicate to use, difficult

7. What are the causes that are related to techno-stress?

Reason to the question above

GD1	Slow internet, broken devices, do not work
GD2	Slow internet, broken devices, do not work
GD3	Slow internet, broken devices, do not work
GD4	Slow internet, broken devices, do not work
GD5	Slow internet, malfunctioning devices, do not work

8. How does techno-stress impact on your academic performance?

Reason

GD1	Negative effect (because of low mind set, nervousness and frustration)
GD2	Negative effect (because of low mind set, nervousness and frustration)
GD3	Negative effect (because of low mind set, nervousness and frustration)
GD4	Negative effect (because of low mind set, nervousness and frustration)
GD5	Negative effect (because of low mind set, nervousness and frustration)

9. What are the negative perceptions you feel when you have problem on your computer?

Reason

GD1	headache, mistrust” and “dislike technology
GD2	headache, mistrust” and “dislike technology
GD3	headache, mistrust” and “dislike technology
GD4	headache, mistrust” and “dislike technology
GD5	headache, mistrust” and “dislike technology

10. How do you manage and react to techno-stress?

Reason

GD1	Manage by (seeking help) React by (frustration)
GD2	Manage by (seeking help) React by (frustration)
GD3	Manage by (seeking help) React by (frustration)
GD4	Manage by (seeking help) React by (frustration)
GD5	Manage by (seeking help) React by (frustration)

11. Is techno-stress isolating you from technology?

GD1	Yes
GD2	No
GD3	No
GD4	No
GD5	No

Reason to the question by respondents

GD1	to avoid stress
GD2	need technology, era of technology
GD3	need technology, era of technology

GD4	need technology, era of technology
GD5	need technology, era of technology

APPENDIX F: GROUP E: RESPONSES TO INDIVIDUAL QUESTIONS

1. Do you think technology can make you stressful? Please explain?

From the question above, the key themes produced by the group's participants through their answers were as follow.

GE1	Not every time
GE2	Not every time
GE3	Yes
GE4	Yes
GE5	Yes

Reason from the answer above

GE1	when not manageable, stop working
GE2	when not manageable, stop working
GE3	when not manageable, stop working
GE4	when not manageable, stop working
GE5	when not manageable, stop working

2. What does techno-stress mean to you?

Reason to the question above

GE1	Unhappy with technology
GE2	Unhappy with technology
GE3	Unhappy with technology
GE4	Unhappy with technology
GE5	Unhappy with technology

3. What are the influences of techno-stress do you experience on yours study?

Reason provided by respondents

GE1	negative impact
GE2	negative impact
GE3	loss of concentration
GE4	loss of concentration
GE5	negative impact

4. What kind of techno-stress do you face when dealing with technology?

Reason provided by respondents

GE1	anger
GE2	anger
GE3	frustration
GE4	anger
GE5	anger

5. Does technology necessary for your academic performance?

GE1	Yes
GE2	Yes
GE3	Yes
GE4	Yes
GE5	Yes

Reason provided by respondents

GE1	Doing research, download class material, learn online
GE2	Doing research, download class material, learn online
GE3	Doing research, download class material, learn online
GE4	Doing research, download class material, learn online

GE5	Doing research, to contact lectures, availability of information, download class material, learn online
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6. Do you feel nervous with new update of technology?

GE1	Yes
GE2	Yes
GE3	Yes
GE4	No
GE5	Yes

Reason provided by the respondents

GE1	Complicate to use, difficult
GE2	Complicate to use, difficult
GE3	Complicate to use, difficult
GE4	Opportunity to know more, excitement
GE5	Difficulty

7. What are the causes that are related to techno-stress?

Reason to the question above

GE1	Slow internet, broken devices, do not work
GE2	Slow internet, broken devices, do not work
GE3	Slow internet, broken devices, do not work
GE4	Slow internet, broken devices, do not work
GE5	Slow internet, broken devices, do not work

8. How does techno-stress impact on your academic performance?

Reason

GE1	Negative effect (because of frustration)
GE2	Negative effect (because of frustration)

GE3	Negative effect (because of frustration)
GE4	Negative effect (because of frustration)
GE5	Negative effect (because of frustration)

9. What are the negative perceptions you feel when you have problem on your computer?

Reason

GE1	headache, body shaking
GE2	headache, body shaking
GE3	headache, body shaking
GE4	headache, body shaking
GE5	headache, body shaking

10. How do you manage and react to techno-stress?

Reason

GE1	Manage by (let it go, stay away, help) React by (frustration and anger)
GE2	Manage by (let it go, stay away, help) React by (frustration and anger)
GE3	Manage by (let it go, stay away, help) React by (frustration and anger)
GE4	Manage by (let it go, stay away, help) React by (frustration and anger)
GE5	Manage by (let it go, stay away, help) React by (frustration and anger)

11. Is techno-stress isolating you from technology?

GE1	Yes
GE2	Yes
GE3	No
GE4	No
GE5	No

Reason to the question by respondents

GE1	to avoid stress
GE2	to avoid stress

GE3	need technology
GE4	need technology
GE5	need technology

APPENDIX G: GROUP F: RESPONSES TO INDIVIDUAL QUESTIONS

1. Do you think technology can make you stressful? Please explain?

From the question above, the key themes produced by the group's participants through their answers were as follow.

GF1	Yes
GF2	Yes
GF3	Yes
GF4	Sometime
GF5	Sometime

Reason from the answer above

GF1	only when stop working
GF2	only when stop working
GF3	only when stop working
GF4	when not manageable, stop working
GF5	when not manageable, stop working

2. What does techno-stress mean to you?

Reason to the question above

GF1	stress that is related to technology devices
GF2	stress that is related to technology devices
GF3	stress that is related to technology devices
GF4	stress over computer
GF5	stress over computer

3. What are the influences of techno-stress do you experience on yours study?

Reason provided by respondents

GF1	negative impact
GF2	negative impact
GF3	loss of concentration
GF4	loss of concentration
GF5	loss of concentration

4. What kind of techno-stress do you face when dealing with technology?

Reason provided by respondents

GF1	anger
GF2	anger
GF3	anger
GF4	frustration
GF5	frustration

5. Does technology necessary for your academic performance?

GF1	Yes
GF2	Yes
GF3	Yes
GF4	Yes
GF5	Yes

Reason provided by respondents

GF1	Doing research, submitting work
GF2	Doing research, submitting work
GF3	Doing research, submitting work
GF4	Doing research, submitting work
GF5	Doing research, submitting work

6. Do you feel nervous with new update of technology?

GF1	Yes
GF2	Yes
GF3	Yes
GF4	No
GF5	Yes

Reason provided by the respondents

GF1	Complicate to use, difficult
GF2	Complicate to use, difficult
GF3	Complicate to use, difficult
GF4	Opportunity to know more, excitement
GF5	Difficulty

7. What are the causes that are related to techno-stress?

Reason to the question above

GF1	Malfunctioning of devices, poor connection
GF2	Malfunctioning of devices, poor connection
GF3	Malfunctioning of devices, poor connection
GF4	Slow internet, malfunctioning devices, do not work
GF5	Slow internet, malfunctioning devices, do not work

8. How does techno-stress impact on your academic performance?

Reason

GF1	Negative effect (because of frustration and nervousness)
GF2	Negative effect (because of frustration and nervousness)
GF3	Negative effect (because of frustration and nervousness)
GF4	Negative effect (because of frustration and nervousness)

GF5	Negative effect (because of frustration and nervousness)
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9. What are the negative perceptions you feel when you have problem on your computer?

Reason

GF1	headache, back pain, dizziness
GF2	headache, back pain, dizziness
GF3	headache, back pain, dizziness
GF4	headache, back pain, dizziness
GF5	headache, back pain, dizziness

10. How do you manage and react to techno-stress?

Reason

GF1	Manage by (seeking help) React by (frustration and anger)
GF2	Manage by (seeking help) React by (frustration and anger)
GF3	Manage by (seeking help) React by (frustration and anger)
GF4	Manage by (seeking help) React by (frustration and anger)
GF5	Manage by (seeking help) React by (frustration and anger)

11. Is techno-stress isolating you from technology?

GF1	Yes
GF2	No
GF3	No
GF4	No
GF5	No

Reason to the question by respondents

GF1	to avoid stress
GF2	we need technology, important to today life

GF3	we need technology, important to today life
GF4	we need technology, important to today life
GF5	we need technology, important to today life

APPENDIX H: ACCUMULATIVE VIEW TECHNOLOGY AND STRESS FOR THEME 1

group A		reason
GA1	Yes	(only when stop working, when can't control)
GA2	Absolutely	(only when stop working, when can't control)
GA3	Yes, but not every time	(only when stop working)
GA4	Yes	(When defected)
GA5	Not every day	(only when stop working, when can't control)
group B		
GB1	Yes, it does	(only when stop working)
GB2	Not really	(only when stop working)
GB3	Yes	(only when stop working)
GB4	Yes of course	(only when stop working)
GB5	Yes	(only when stop working)
group C		
GC1	Not every day	(when not manageable, stop working)
GC2	Not every day	(when not manageable, stop working)
GC3	Yes	(when not manageable, stop working)
GC4	Not every day	(when not manageable, stop working)
GC5	Not every day	(when not manageable, stop working)
group D		
GD1	Yes, I do	(only when stop working)
GD2	Yes, I do	(only when stop working)
GD3	Yes, I do	(only when stop working)
GD4	Yes	(only when stop working)
GD5	Yes	(only when stop working)
group E		
GE1	Not every time	(when not manageable, stop working)

GE2	Not every time	(when not manageable, stop working)
GE3	Yes	(when not manageable, stop working)
GE4	Yes	(when not manageable, stop working)
GE5	Yes	(when not manageable, stop working)
group F		
GF1	Yes	(only when stop working)
GF2	Yes	(only when stop working)
GF3	Yes	(only when stop working)
GF4	Sometime	(when not manageable, stop working)
GF5	Sometime	(when not manageable, stop working)

APPENDIX I: ACCUMULATIVE INFLUENCES AND NEGATIVE IMPLICATION OF TECHNO-STRESS ON ACADEMIC PERFORMANCE FOR THEME 2

group A		reason
GA1		(loss of concentration)
GA2		(loss of concentration)
GA3		(loss of concentration)
GA4		(loss of concentration)
GA5		(laziness)
group B		
GB1		(negative impact)
GB2		(negative impact)
GB3		(negative impact)
GB4		(negative impact)
GB5		(negative impact)
group C		
GC1		(Bad result)
GC2		(Bad result)
GC3		(Bad result)
GC4		(Bad result)
GC5		(Bad result)
group D		
GD1		(loss of concentration)
GD2		(loss of concentration)
GD3		(loss of concentration)
GD4		(loss of concentration)
GD5		(loss of concentration)
group E		
GE1		(negative impact)
GE2		(negative impact)
GE3		(loss of concentration)
GE4		(loss of concentration)
GE5		(negative impact)
group F		
GF1		(negative impact)
GF2		(negative impact)
GF3		(loss of concentration)
GF4		(loss of concentration)

GF5		(loss of concentration)
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Group A		reason
GA1		Negative effect (because of low mind set, nervousness and frustration)
GA2		Negative effect (because of low mind set, nervousness and frustration)
GA3		Negative effect (because of low mind set, nervousness and frustration)
GA4		Negative effect (because of low mind set, nervousness and frustration)
GA5		Negative effect (because of low mind set, nervousness and frustration)
group B		
GB1		Negative effect (because of frustration)
GB2		Negative effect (because of frustration)
GB3		Negative effect (because of frustration)
GB4		Negative effect (nervousness)
GB5		Negative effect (nervousness)
group C		
GC1		Negative effect (because of frustration)
GC2		Negative effect (because of frustration)
GC3		Negative effect (because of frustration)
GC4		Negative effect (because of frustration)
GC5		Negative effect (because of frustration)
group D		
GD1		Negative effect (because of low mind set, nervousness and frustration)
GD2		Negative effect (because of low mind set, nervousness and frustration)
GD3		Negative effect (because of low mind set, nervousness and frustration)
GD4		Negative effect (because of low mind set, nervousness and frustration)
GD5		Negative effect (because of low mind set, nervousness and frustration)
group E		
GE1		Negative effect (because of frustration)
GE2		Negative effect (because of frustration)
GE3		Negative effect (because of frustration)
GE4		Negative effect (because of frustration)

GE5		Negative effect (because of frustration)
group F		
GF1		Negative effect (because of frustration and nervousness)
GF2		Negative effect (because of frustration and nervousness)
GF3		Negative effect (because of frustration and nervousness)
GF4		Negative effect (because of frustration and nervousness)
GF5		Negative effect (because of frustration and nervousness)

APPENDIX J: ACCUMULATIVE TYPES AND CAUSES OF TECHNO-STRESS AT HIGH INSTITUTION OF TECHNOLOGY FOR THEME 3

Group A		reason
GA1		(anger)
GA2		(anger)
GA3		(anger)
GA4		(frustration)
GA5		(frustration)
group B		
GB1		(nervousness)
GB2		(nervousness)
GB3		(nervousness)
GB4		(anger)
GB5		(anger)
group C		
GC1		(anger)
GC2		(anger)
GC3		(anger)
GC4		(frustration)
GC5		(frustration)
group D		
GD1		(anger)
GD2		(anger)
GD3		(frustration)
GD4		(frustration)
GD5		(frustration)
group E		
GE1		(anger)
GE2		(anger)
GE3		(frustration)
GE4		(anger)
GE5		(anger)
group F		
GF1		(anger)
GF2		(anger)
GF3		(anger)

GF4		(frustration)
GF5		(frustration)

Group A		reason
GA1		(Malfunctioning of devices, poor connection)
GA2		(Malfunctioning of devices, poor connection)
GA3		(Malfunctioning of devices, poor connection)
GA4		(Malfunctioning of devices, poor connection)
GA5		(Malfunctioning of devices, poor connection)
group B		
GB1		(Slow internet, broken devices, do not work)
GB2		(Slow internet, broken devices, do not work)
GB3		(Slow internet, broken devices, do not work)
GB4		(Slow internet, broken devices, do not work)
GB5		(Slow internet, broken devices, do not work)
group C		
GC1		(poor internet, malfunctioning devices)
GC2		(poor internet, malfunctioning devices)
GC3		(poor internet, malfunctioning devices)
GC4		(poor internet, malfunctioning devices)
GC5		(poor internet, malfunctioning devices)
group D		
GD1		(Slow internet, broken devices, do not work)
GD2		(Slow internet, broken devices, do not work)
GD3		(Slow internet, broken devices, do not work)
GD4		(Slow internet, broken devices, do not work)
GD5		(Slow internet, malfunctioning devices, do not work)
group E		
GE1		(Slow internet, broken devices, do not work)
GE2		(Slow internet, broken devices, do not work)
GE3		(Slow internet, broken devices, do not work)
GE4		(Slow internet, broken devices, do not work)
GE5		(Slow internet, broken devices, do not work)
group F		
GF1		(Malfunctioning of devices, poor connection)
GF2		(Malfunctioning of devices, poor connection)
GF3		(Malfunctioning of devices, poor connection)

GF4		(Slow internet, malfunctioning devices, do not work)
GF5		(Slow internet, malfunctioning devices, do not work)

APPENDIX K: ACCUMULATIVE NEGATIVE PERCEPTION AND ISOLATION TO TECHNOLOGY FOR THEME 4

Group A		reason
GA1		(headache, back pain)
GA2		(headache, back pain)
GA3		(headache, back pain)
GA4		(headache, back pain, tiredness, weakness)
GA5		(headache, back pain)
group B		
GB1		(headache, fast heartbeat, back pain)
GB2		(headache, fast heartbeat, back pain)
GB3		(headache, fast heartbeat, back pain)
GB4		(headache, fast heartbeat, back pain)
GB5		(headache, fast heartbeat, back pain)
group C		
GC1		(palm sweat, blood is circulating fast)
GC2		(palm sweat, blood is circulating fast)
GC3		(palm sweat, blood is circulating fast)
GC4		(headache, palm sweat, blood is circulating fast)
GC5		(headache, palm sweat, blood is circulating fast)
group D		
GD1		(headache, mistrust” and “dislike technology)
GD2		(headache, mistrust” and “dislike technology)
GD3		(headache, mistrust” and “dislike technology)
GD4		(headache, mistrust” and “dislike technology)
GD5		(headache, mistrust” and “dislike technology)
group E		
GE1		(headache, body shaking)
GE2		(headache, body shaking)
GE3		(headache, body shaking)
GE4		(headache, body shaking)
GE5		(headache, body shaking)
group F		
GF1		(headache, back pain, dizziness)
GF2		(headache, back pain, dizziness)
GF3		(headache, back pain, dizziness)
GF4		(headache, back pain, dizziness)
GF5		(headache, back pain, dizziness)

Group A		reason
GA1	No	(we need technology, important to today life)
GA2	No	(we need technology, important to today life)
GA3	No	(we need technology, important to today life)
GA4	No	(we need technology, important to today life)
GA5	No	(we need technology, important to today life)
group B		
GB1	No	(need technology)
GB2	No	(need technology)
GB3	No	(need technology)
GB4	No	(need technology)
GB5	Yes	(to avoid stress)
group C		
GC1	Yes	(to avoid stress)
GC2	No	(need technology)
GC3	No	(need technology)
GC4	No	(need technology)
GC5	No	(need technology)
group D		
GD1	Yes	(to avoid stress)
GD2	No	(need technology, era of technology)
GD3	No	(need technology, era of technology)
GD4	No	(need technology, era of technology)
GD5	No	(need technology, era of technology)
group E		
GE1	Yes	(to avoid stress)
GE2	Yes	(to avoid stress)
GE3	No	(need technology)
GE4	No	(need technology)
GE5	No	(need technology)
group F		
GF1	Yes	(to avoid stress)
GF2	No	(we need technology, important to today life)
GF3	No	(we need technology, important to today life)
GF4	No	(we need technology, important to today life)
GF5	No	(we need technology, important to today life)

APPENDIX L: ACCUMULATIVE MANAGEMENT STRATEGIES OF TECHNO-STRESS FOR THEME 5

Group A		reason
GA1		Manage by (seeking help) React by (frustration)
GA2		Manage by (seeking help) React by (frustration)
GA3		Manage by (seeking help) React by (frustration)
GA4		Manage by (seeking help) React by (frustration)
GA5		Manage by (seeking help) React by (frustration)
group B		
GB1		Manage by (let it go, stay away) React by (frustration and anger)
GB2		Manage by (let it go, stay away) React by (frustration and anger)
GB3		Manage by (let it go, stay away) React by (frustration and anger)
GB4		Manage by (let it go, stay away) React by (frustration and anger)
GB5		Manage by (let it go, stay away) React by (frustration and anger)
group C		
GC1		Manage by (seeking help) React by (frustration)
GC2		Manage by (seeking help) React by (frustration)
GC3		Manage by (seeking help) React by (frustration)
GC4		Manage by (seeking help) React by (frustration)
GC5		Manage by (seeking help) React by (frustration)
group D		
GD1		Manage by (seeking help) React by (frustration)
GD2		Manage by (seeking help) React by (frustration)
GD3		Manage by (seeking help) React by (frustration)
GD4		Manage by (seeking help) React by (frustration)
GD5		Manage by (seeking help) React by (frustration)
group E		
GE1		Manage by (let it go, stay away, help) React by (frustration and anger)
GE2		Manage by (let it go, stay away, help) React by (frustration and anger)
GE3		Manage by (let it go, stay away, help) React by (frustration and anger)
GE4		Manage by (let it go, stay away, help) React by (frustration and anger)

GE5		Manage by (let it go, stay away, help) React by (frustration and anger)
group F		
GF1		Manage by (seeking help) React by (frustration and anger)
GF2		Manage by (seeking help) React by (frustration and anger)
GF3		Manage by (seeking help) React by (frustration and anger)
GF4		Manage by (seeking help) React by (frustration and anger)
GF5		Manage by (seeking help) React by (frustration and anger)