



A QUALITY MANAGEMENT SYSTEM FOR AN ONLINE LEARNING
PROGRAM AT AN ACADEMIC INSTITUTION

by

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ABSTRACT

The COVID 19 pandemic had a profound impact on the education sector worldwide, prompting a rapid transition to online learning. This shift highlighted both the potential of digital education and the significant inequalities in access to technology and the internet. In addition, there was the concern of what impact the change could possibly have on the quality assurance of online learning programs. Therefore, the aim of this study was to evaluate a Quality Management System (QMS) for the online learning program at the Durban University of Technology's (DUT) Business School.

The study adopted a mixed method research approach, employing both quantitative and qualitative techniques for data collection. A survey questionnaire was administered to students at the DUT Business School to identify their challenges, needs and expectations with online learning. Interviews were conducted with experts in the field of Quality and higher education to gain insights into best practices and standards. In addition, a gap analysis was conducted on the current quality assurance protocols in place at the DUT Business School.

The study identified challenges such as technological barriers, cyber security concerns, connectivity issues and increased data costs. The students were satisfied with the program and valued the support from lecturers. The perceptions of the academics highlighted the importance of robust quality management frameworks in maintaining educational standards. The gap analysis revealed that despite having a clear vision, mission statement, and commitment to leadership and continuous improvement, the DUT Business School lacks a dedicated quality management system and other essential contributing elements.

The study proposed an ISO 21001:2018 framework enhanced by Total Quality Management (TQM) principles to serve as a guideline for educational institutions seeking to implement effective management systems. The framework is intended to establish comprehensive quality assurance measures aligned with international standards and best practices to ensure effective delivery and continuous improvement of online learning.

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DECLARATION BY CANDIDATE

I, Vishantham Aron, declare that unless otherwise indicated, this thesis is my original work, and it has not been previously submitted for any other degree at another Tertiary Institution.

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LIST OF ACRONYMS

4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
ANOVA	Analysis of Variance
CHE	Council of Higher Education
CPS	Cyber Physical Systems
DUT	Durban University of Technology
EMC	Executive Management Committee
EMOT	Emotional Factors
EOMS	Management Systems for Educational Organizations
EXT	External Factors
EXCO	Executive Committee
FMEA	Failure Mode Effects Analysis
HEI	Higher Education Institutions
HEQC	Higher Education Quality Committee
ICTs	Information and Communication Technologies
IoT	Internet of Things
ISO	International Organisation for Standardisation
IT	Information Technology
KMO	Kaiser-Meyer-Olkin Measure
LP	Learning Process
MOOC	Massive Online Open Courses
NQAF	National Quality Assurance Framework

PC	Personal Computer
PDCA	Plan–Do–Check–Act
QA	Quality Assurance
QC	Quality Control
QFD	Quality Function Deployment
QMS	Quality Management System
SA	South Africa
SAT_CD	Course Delivery Satisfaction
SAT_GEN	General Satisfaction
SDG4	Sustainable Development Goal 4
SPC	Statistical Process Control
TQM	Total Quality Management
US	United States
WEF	World Economic Forum
WHO	World Health Organisation

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CHAPTER ONE - INTRODUCTION

1.1 Introduction

The purpose of this chapter is to provide a background to this study, describe the research problem and questions and outline the significance of the study. In addition, the research aim and objectives are presented. The research methodology is described and is followed by the layout of the study.

1.2 Background to the study

In December 2019, the novel Corona virus (COVID-19) was first discovered in Wuhan, Hubei Province, China (Fauci, Lane and Redfield 2020: 1268). The World Health Organisation (WHO) declared this virus a global pandemic on 11 March 2020 and in South Africa (SA) a national lockdown was instituted on 26 March 2020 (Cucinotta and Vanelli 2020:157; Mhlanga and Moloji 2020:3). Subsequently, all sectors of the South African economy had to immediately shut down their operations, with the exception of essential service providers such as health care services and the food supply chain.

For the educational sector, this lockdown meant disruption to the 2020 academic year, forcing key stakeholders within the educational systems, such as institutions, authorities, boards, and council members to react urgently and identify possible counter measures to mitigate the impact of this risk as it unfolded (Marwala 2020:4). The stakeholder's immediate response was to incorporate digital technology systems as the most suitable means of teaching and learning (Marwala 2020:4). This meant educational institutions needed to rapidly transform from the traditional classroom teaching and learning processes, into an online, contactless process.

The urgent transformation in the education sector was supported by the South African Minister of Higher Education, Science and Innovation, Dr Blade Nzimande, who on 25 May 2020, announced in a media statement that all educational institutions and industries must adopt the theme of "saving the academic year and saving lives." In addition, the minister urged all employers from the public and private

sectors to turn their workplaces into online training spheres (Mhlanga and Moloji 2020:5).

Consequently, academic institutions previously reluctant to embrace advanced technology were now forced to change their pedagogical approach to online teaching and learning, as indicated by Seke (2020:71). However, the education sector in SA needed to be cautious in their sudden transition to online teaching and learning platforms, due to the country's poor digital infrastructure, limited technology access, inferior education systems and limited research conducted in this specific area (Dube 2020:138; Mhlanga and Moloji 2020:3; Ndung'u 2020:73). In addition, Seyfried and Pohlenz (2018:261) state that a sudden change in the process of teaching and learning may have severe consequences on the quality assurance (QA) of the course programme. This is supported by Silaeva and Semenov (2018:71) and Naveed Bin Rais *et al.* (2021:5), who maintain QA is a vital tool that helps educational organisations to improve the quality of education by exceeding stakeholders' needs and expectations, managing their education programmes on a system level using the process approach and risk-based thinking, and providing a competitive edge to differentiate themselves from other educational institutions.

The ISO 21001:2018 standard is a QMS specifically designed for educational organisations and training centres and will be used as the guiding structure throughout this research. Implementing a Quality Management System (QMS) such as ISO 21001:2018, therefore, provides the means to assist institutions in understanding structure, procedures, processes, and other necessary resources required for the effective application of QA in their processes (Aniskina and Terekhova 2019:219). According to Zuhairi, Raymundo and Mir (2020:298), the main objective for initiating a QMS (in an educational institution) is to improve teaching and learning, or the pedagogical approach, with the ultimate goal of supporting the best outcomes for learners. The role of QA in the education sector involves the systematic review of educational programmes and processes to preserve and advance their quality, equity and efficiency.

The Durban University of Technology (DUT) Business school, which falls under the faculty of Management Sciences, offers a variety of academic programmes, short courses, as well as executive education and learning programmes, with Microsoft

Teams and Moodle as their learning platform. The purpose of this study was to evaluate a QMS for the online learning program of the Business school.

1.3 Research problem statement

Mailizar, Maulina and Bruce (2020:3) state the COVID-19 pandemic has seriously impacted students, instructors and educational institutions throughout the world. This pandemic became a motivating factor towards digital transformation, thereby forcing universities and other educational organisations to switch exclusively to online teaching and learning (Mhlanga and Moloji 2020:3).

Since June 2020, the online training program at the DUT Business school is implemented through Microsoft Teams and Moodle but there has been no evaluation conducted thus far to validate whether the transition is effectively meeting all stakeholder expectations. Adnan (2020:46) and Mukhtar *et al.* (2020:28) confirm migrating from an environment of conventional education to an online learning program, would not materialise without obstacles or challenges. In addition, Silaeva and Semenov (2018:72) state a QMS for educational organisations, using the process approach and risk-based thinking can be considered as a tool for QA in this online learning program.

1.4 Aims and objectives

The aim of this study was to evaluate a QMS at the DUT Business School for an online learning program.

The objectives of this study were:

- To conduct a GAP analysis on the current QA protocols in place at the DUT Business School.
- To determine the challenges faced and establish the needs and expectations of all relevant stakeholders of the online learning program.

- To ascertain the perceptions of academics specialising in the field of higher education and Quality Management regarding Quality Management Systems (QMS) and online learning.
- To adapt the current QMS framework to align with the ISO 21001:2018 standard that is enhanced by Total Quality Management (TQM).

1.5 Research questions

- What are the gaps in the current QA protocols at the DUT Business School?
- What are the challenges faced by stakeholders of the online learning program, and what are their needs and expectations?
- How do academics specialising in higher education and Quality Management perceive QMS's and online learning?
- How can the current QMS framework be adapted to align with the ISO 21001:2018 standard and be enhanced by TQM?

1.6 Research methodology

For this study, a mixed methodology was selected to provide a better understanding of the research problem and effectively address the study objectives. Therefore, a survey questionnaire served as the quantitative aspect of the study, while interviews in a focus group served as the qualitative aspect of the study. Since this study investigated new boundaries of teaching and learning, it adopted an exploratory case study research approach.

The target population for the quantitative part of the study were all learners attending the DUT business school online learning program; 145 students. Pandey and Pandey (2021:40) indicate a sample represents a specific group from a target population. The sample size for this part of the study consisted of 106 students, based on a 95 percent confidence level, with a five percent margin of error, as recommended by Lakens (2022:5) to ensure accuracy.

A purposive sampling technique was selected for the quantitative part of the study, as Sharma (2017:749) reported purposive sampling provides the researcher with

the justification to make generalisations from the sample being studied. This approach was chosen to ensure that the sample closely matched the specific characteristics relevant to the study, thereby enhancing the applicability of the findings.

The target population of the qualitative part of the study were experts in the fields of Quality and higher education. According to Gundumogula and Gundumogula (2020:300), focus groups are an informal consultation intended to yield information on a specific topic from a selected population.

The primary data were collected by administering a survey questionnaire to all learners involved with the online program at the DUT business school and conducting interviews with the experts in the field of Quality and Higher Education. The survey questionnaire and interview questions were developed by reviewing literature and the ISO 9001 and ISO 21001 standards. Additionally, the measuring instrument incorporated key TQM principles and concepts, as recommended by Jasti, Venkateswaran and Kota (2022:1250) .

For the pilot study, the survey questionnaire was administered to 10 participants from the target population to detect whether there were any flaws in the questionnaire. The results from the pilot study were analysed and the questionnaire improved accordingly. Respondents from the pilot study were excluded from the main study.

Taber (2018:1273) highlights that while validity, on the one hand, examines the extent to which the questionnaire measures what we want to measure, reliability, on the other hand, is a statistical measure of how consistent the questionnaire is. The reliability of the questionnaire was ensured through the statistical Cronbach coefficient alpha value. According to Sürücü and Maslakci (2020:2695), validity is the amount of systematic error in the questionnaire. Therefore, for the purpose of this study, construct validity was used to ensure the indicators and measurements were carefully developed, based on relevant, existing knowledge from a review of literature (Taber 2018:1280). The validity was assessed by confirming how well the results aligned with established theories and the baseline of TQM principles.

Data were collected by administering the survey questionnaire through email to the respondents in the quantitative part of the study. Interviews were conducted through

Microsoft Teams and meetings scheduled by the researcher with participants by means of telephonic or video calls for the qualitative part of the study. All interviews were recorded, and transcripts filed. In addition, a gap analysis was conducted on the current QA protocols in place at the DUT Business School.

Nvivo software was used to evaluate the qualitative data through content analysis, which determines the presence of certain words, themes or concepts within given qualitative data. This data analysis method is considered most suitable for responses from interviews, as described by Crowe *et al.* (2017:644). The quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) software (Version 27), employing both descriptive and inferential statistics.

Anonymity and confidentiality were maintained by ensuring the identities of participants were protected at all times. The results and findings of the study have excluded the participants identities.

All participants in this study were provided sufficient information with respect to the scope and purpose of this research. Participants were not forced to answer any questions and were advised they could withdraw from the study at any time should they wish to. Informed consent was sought in the administration of all questionnaires and interviews.

1.7 Significance of the study

The 2030 Agenda for Sustainable Development provides a shared master plan for the peace and prosperity of people and the planet (Ayoko 2024:8). The core of this agenda focuses on 17 SDGs that provide an urgent call-to-action for all countries (developed and developing) in a global partnership. These goals recognise eradicating poverty and other deprivations requires strategies that improve health and education, reduce inequality and stimulate economic growth (Ferguson and Roofe 2020:960).

HEIs are noted by Ferguson and Roofe (2020:960) to play a critical role in the achievement of SDGs, particularly SDG4, which is to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. Nakidien, Singh and Sayed (2021:66) claim the SDG4 highlights the achievement

of the synchrony through inclusive and equitable quality education and opportunities for lifelong learning for all, through the achievement of 10 targets. These 10 targets are presented in Figure 1.1 below.

4.1	• Quality primary/ secondary education for all
4.2	• Early childhood and preprimary education
4.3	• Equal access to TVET and higher education
4.4	• Skills for decent work
4.5	• Gender equality and equal access for all
4.6	• Youth and adult literacy
4.7	• Sustainable development & Global citizenship
4a	• Safe and inclusive learning environments
4b	• Scholarships for higher education
4c	• Professional development of teachers

Figure 1.1: Ten targets of SDG 4

Source: Adapted from Ferguson and Roofe (2020:960)

As illustrated in Figure 1.1, target 4.3 focuses on higher education and explicitly indicates by 2030, countries across the world should “ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.” Hoosain, Paul and Ramakrishna (2020:12) suggest this target seeks to ensure that higher education is not only provided but also accessible and of the highest quality, to both men and women.

Technological innovation has the ability to support and revolutionise the education sector and the capability to expedite the process towards attaining SDG4. Embracing online learning and digital innovation can enhance the accessibility to global educational opportunities, thereby encouraging inclusion and delivering quality online teaching and learning (Ayoko 2024:6). Therefore, by focusing on embracing and accepting the online learning paradigm, countries can make

significant strides in the process of achieving SDG4, which is to provide quality education for all.

1.8 Layout of research project

The dissertation is divided into five chapters. A brief outline of the contents of each chapter is as follows:

Chapter 1: Context of research - this chapter provided a background to the study, outlined the problem statement and clearly defined the research aim and objectives. It also detailed the research methodology of the study and concludes with an outline of the subsequent chapters.

Chapter 2: The literature review provides an extensive analysis and evaluation of the existing literature on online learning, and QA for higher education. The chapter begins with the impact of the fourth industrial revolution (4IR) on higher education, followed by the Covid-19 impact on the education sector. The history of online learning is reviewed, and QA in higher education analysed. The chapter seeks to identify TQM philosophies and core principles that will aid in the development of a QMS for an online learning program.

Chapter 3: Chapter three describes the research methodology of this study, outlining the research design, population, sample size, and data collection, as well as analysis methods. The reliability and validity of the study are also discussed.

Chapter 4: This chapter begins with an examination of the results and discussion of the study. The results are used as a basis to develop a QMS framework that is aligned to the ISO 21001: 2018 standard which is enhanced by TQM principles.

Chapter 5: Conclusions and recommendations form the basis of the final chapter of this study. It also identifies limitations and presents recommendations and suggestions for future research.

1.9 Summary of chapter

The background and problem statement of this study outlined in this chapter provide evidence of the urgent need to enhance the QA of online learning programs. This chapter also introduced the research methodology and layout of the study. The next chapter will review, analyse, and present existing literature in this field of study.

CHAPTER TWO – REVIEW OF LITERATURE

2.1 Introduction

Booth (2021) describes the literature review as a critical component of research that establishes the context of a study and demonstrates the gaps in existing literature. In order for this study to determine a QMS for an online learning program at an academic institution, an extensive analysis and evaluation of the existing literature, with regard to online learning, and QA for higher education, was undertaken.

This chapter begins with the impact of the 4IR on the education sector. The systematic review of literature culminates in the comparison of ISO 9001:2015 and ISO 21001:2018.

2.2 The fourth industrial revolution (4IR)

2.2.1 What is the 4IR?

Widely acknowledged as a transformative concept in all industries and spheres of life (Schwab 2017:14), the 4IR signifies the ongoing integration of cutting-edge digital technologies such as Artificial Intelligence (AI), Cyber Physical Systems (CPS) and Big Data as represented in Figure 2.1. The first industrial revolution, in approximately 1765, harnessed the power of steam and water to mechanise production. The second industrial revolution, circa 1870, utilised the development of electricity to transform the mechanisation process onto a mass scale. The third industrial revolution, from roughly 1969, harnessed the power of Information Technology (IT) and the internet to digitalise service, production, distribution and education. This transition laid the groundwork for the 4IR, as indicated by Brynjolfsson and McAfee (2016:3), Kayembe and Nel (2019:90) and Aziz Hussin (2018:92). The 4IR represents an amalgamation of digital services, smart factories, human brain modifications, and intelligent robots, as well as autonomous vehicles and digital or online learning, as expounded by Schwab (2017:14).

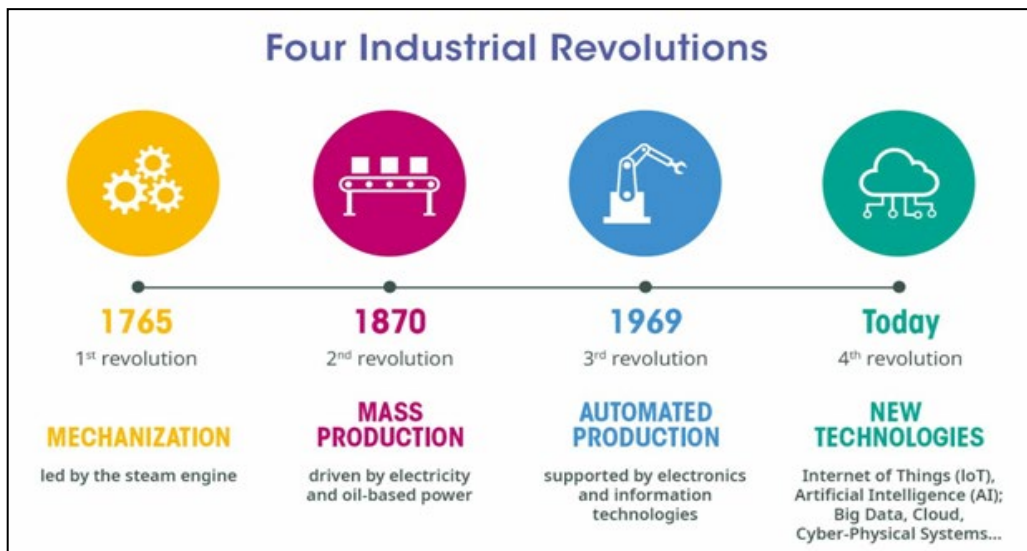


Figure 2.1: The industrial revolution timeline

Source: Adapted from Brynjolfsson and McAfee (2016:3)

From Figure 2.1, the Internet of Things (IoT); AI; Big Data; Cloud Computing; Robotics and CPS can be seen to have recently infiltrated all facets of life, from industrial production, agriculture, and health care, to tourism and education, according to Ilori and Ajagunna (2020:8). Oke and Fernandes (2020:5) suggest while the first three industrial revolutions were characterised by technological advancements, the 4IR has demonstrated unprecedented exponential development, implementation and use of technology.

The 4IR is characterised by a variety of new technologies merging the physical, biological and digital sectors impacting all industries, economies and disciplines (Penprase 2018:207; Legg-Jack 2021:15; Schwab 2017:15). Consequently, Ilori and Ajagunna (2020:5) argue 4IR is affecting nearly every aspect of our everyday lives, influencing how people interact with technology and altering where and how work is done.

The advantages and disadvantages of 4IR are presented below in Table 2.1

Table 2.1: Advantages and disadvantages of 4IR

Advantages	Disadvantages
<p>Higher productivity - This appears to happen with each industrial revolution, with each era's production increasing by 50 times over the previous one. Productivity is expected to improve by 5-8 percent during the next 5-10 years. This is primarily due to an increase in automation.</p>	<p>Inequality – Technology is one of the main reasons why incomes have decreased because the demand for highly skilled workers has increased while the demand for workers with less education and lower skills has decreased. This leads to potential job losses.</p>
<p>Improved quality of life - New products and services are now more feasible and easily accessible by technological advancements that can increase efficiency and enjoyment of our personal lives.</p>	<p>Cyber security risk - Risk of hacking and tampering with data for malicious intent is now more prevalent. Security breaches, identity and privacy breaches are more prevalent with the increased use of machine learning and data analytics.</p>
<p>New markets – The merging of physical biological and digital spheres is creating new markets and growth opportunities.</p>	<p>Ethical issues - With advances in AI, genetic engineering, and automation, new ethical problems and questions of morality have arisen, which already varied widely from person to person.</p>

Source: Adapted from Ilori and Ajagunna (2020:4), Penprase (2018:209) and Schwab (2017:15)

As noted in Table 2.1, the 4IR carries with it, a slew of benefits and drawbacks for the global community. According to Penprase (2018:208), while the advantages of the industrial revolutions may have created an improved standard of living, the negative impact these industrial revolutions have had on the planet and environment are still unfolding.

Klaus Schwab, the founder and executive chairman of the World Economic Forum (WEF), is credited for not only coining the term “The Fourth Industrial Revolution”, but also conceptualising a set of “cyber physical systems” (CPS) that define 4IR (Ilori and Ajagunna 2020:5). The “single planetary technical system” is a tributary of

the cyber physical interface of multiple systems and facilitates real-time interaction between individuals, irrespective of the physical distance between them. Schwab (2017:10) posits, due to the interconnected nature of this phenomenon, the higher education sector is allowed the affordances and agency to undertake the cause of social transformation on a massive scale.

2.2.2 The industrial revolutions within the education sector

The preceding three industrial revolutions' social and educational transformations can serve as a springboard for thinking regarding the 4IR's potential for higher education transformations.

After the first industrial revolution, with more diverse degree possibilities and new general education programmes aimed to generate breadth of study through the choice of a variety of elective courses, a vision for a new sort of curriculum began to develop (Ilori and Ajagunna 2020:4). This shift marked a significant departure from the classical curriculum, giving rise to what was later described as the “New Education” (Penprase 2018:207). University graduate education across the world was remodelled by a universal adoption of the German university model for post graduate research. This facilitated the development of research universities across the globe (Kayembe and Nel 2019:80).

The second industrial revolution is representative of an era with new manufacturing technologies broadly based on electricity, which prompted additional changes launching a “New Economy”. In the United States (US) and Europe, increased access to higher education and the development of various types of higher education institutions (HEIs) sparked an urgency in discovery, which helped to consolidate and accelerate the growth spurred by powerful new technologies (Ilori and Ajagunna 2020:5). This resulted in an influx of innovative new educational institutions that intended to increase educational opportunities for the “industrial classes” and make higher education available for all, including the “working class” (Schwab 2017:11). Although these institutions took several decades to become fully established, they played a crucial role in creating newly trained technicians and

engineers capable of adapting to industries such as railroads, oil, and steel (Penprase 2018:208).

Access to higher education became even more prominent during the third industrial revolution, which, as Aziz Hussin (2018:92) discussed, was due to increased diversity on campuses and the globalisation of academic research, accelerated by online technologies. Increased global commitment to large-scale higher education resulted in increased rates of participation in higher education in India, China, and the US (Kayembe and Nel 2019:90). Schwab (2017:11) posits the shift toward online education was one of the most significant effects of the third industrial revolution. Ali (2020:17) suggests massive online open courses (MOOC) were predicted to replace traditional higher education and expand university education access to students previously not catered for around the world.

As Mhlanga (2024:10) points out, the 4IR created both opportunities and challenges for the education sector. Legg-Jack (2021:15) suggests educators are now in an environment where information is readily available and free; as a result, students not only have access to a wider range of information, but technologies such as AI enable customised learning experiences that cater to individual student needs and expectations. An example of such technologies is Chat GPT, developed by Open AI and released in 2022 (Sun and Hoelscher 2023:119).

Oke and Fernandes (2020:5) further reported there is now compelling evidence that technology transformation has the potential to disrupt business and human activities, for example, in the education sector, and more particularly, the facilitation of teaching and learning. In addition, platforms such as LinkedIn and MOOC are revolutionising the way professional information, including teaching and learning, is being utilised (Oke and Fernandes 2020:4). Ally and Wark (2020:4) confirm the ethical, pedagogical and epistemological implications of 4IR remain questionable, despite the rate at which technology is diffusing in the education sector.

While in many sectors existing 4IR knowledge and understanding is at a basic level, it has recently gained traction as a buzz word across different sectors of the economy (Ally and Wark 2020:5). Kayembe and Nel (2019:90) point out while this concept is rapidly gaining attention from policymakers, business practitioners and

academics, there is still no definite consensus on what it entails, or a specific definition of its attributes, despite the concept being in existence from the start of the 21 century. Kayembe and Nel (2019:80) further acknowledge the education sector has been circumspect in adapting new technologies in the facilitation of teaching and learning, notwithstanding technological advancements.

According to Haleem *et al.* (2022:280), the utilisation of robots in the education sector, more specifically teaching science, technology, engineering, and mathematics (STEM) has been in existence since 1980. The use of technology in teaching and learning has been primarily limited to a didactic approach, in which teaching is facilitated by the use of a Personal Computer (PC) and the provision of electronic teaching materials (Oke and Fernandes 2020:6). In contrast, Kayembe and Nel (2019:80) argue for 4IR to be effective in enhancing students' learning experiences, the digital technology underpinning it must go beyond the use of computers and e-materials and must be compatible with a learner-centred approach.

Ally and Wark (2020:4) suggest the introduction of technological innovations, for example, the use of smart devices for various purposes, such as online learning or social media, may reduce face-to-face social interactions and impact the acquisition of suitable skills. Sangeeta and Tandon (2021:2503) confirm this may limit the ability to acquire and develop relevant soft skills, such as emotional intelligence, communication skills, and interpersonal skills, particularly among the younger population.

As described by the WEF, due to automation and the digitalisation of operational processes, 4IR will result in a significant decrease in demand for many employment opportunities including those requiring manual skills and physical abilities (Oke and Fernandes 2020:4). Furthermore, Table 2.2 demonstrates the declining trend of quality control and safety awareness, which emphasises the importance of implementing quality initiatives in the education sector.

Table 2.2: Skills demand across sectors

2018	Trending 2022	Declining 2022
Analytical thinking and innovation	Analytical thinking and innovation	Manual dexterity, endurance and precision
Complex problem solving	Active learning and learning strategies	Memory verbal, auditory and spatial abilities
Critical thinking and analysis	Creativity originality and initiative	Management of financial, material resources
Active learning and learning strategies	Technology design and programming	Technology installation and maintenance
Creativity originality and initiative	Critical thinking and analysis	Reading writing math and active listening
Attention to detail, trustworthiness	Complex problem solving	Management of personnel
Emotional intelligence	Leadership and social influence	Quality control (QC) and safety awareness
Reasoning, problem solving and ideation	Emotional intelligence	Coordination and time management
Leadership and social influence	Reasoning, problem solving and ideation	Visual auditory and speech abilities
Coordination and time management	Systems analysis and evaluation	Technology use, monitoring and control

Source: Oke and Fernandes (2020:6)

Ally and Wark (2020:4) reported technology acceptance in the education sector is considerably subpar and its effectiveness is not well documented, which is due to high costs, perceived limited application, and lack of training. According to the current categorisations in literature (Ally and Wark 2020:5; Oke and Fernandes 2020:5; Sangeeta and Tandon 2021:2503), to understand the relevance and role of 4IR in facilitating teaching and learning practices, is to have adequate understanding of the various 4IR components. Oke and Fernandes (2020:5) expound the nine pillars of digital innovation, represented in Figure 2.2 below.



Figure 2.2: Nine pillars of digital innovation and 4IR

Source: Russman et al.2015 cited in Oke and Fernandes (2020:4)

As illustrated (Figure 2.2), Oke and Fernandes (2020:6) suggest 4IR adoption is not necessarily restricted to the use of a computer, particularly in the education sector. Ally and Wark (2020:4) confirm it might be feasible to involve other opportunities, such as the development of an ecosystem that will promote sharing of learning materials and data analytics, to comprehend the teaching requirements of learners.

Kayembe and Nel (2019:92) posit there is substantial evidence indicating the 4IR will disrupt and change the current approach to many operational processes, particularly the manner in which business is conducted and services delivered, while also providing an opportunity to improve how we teach, learn, work and interact.

2.2.3 Education 4.0

The process of applying 4IR technologies to the teaching and learning process is referred to as Education 4.0 (Keser and Semerci 2019:40; Oliveira and De Souza

2022:283). It is a direct response to the needs of 4IR, in which humans and technology collaborate to create new possibilities (Aziz Hussin 2018:92). Education systems must, therefore, be altered to satisfy the qualified manpower requirements of this dynamic process, in order to fully harness the potential of smart products, services, and commercial prospects likely to be widely used in all industries in the near future (Ersoy 2021:120).

According to Miranda *et al.* (2021:93), education 4.0 is the existing timeframe in which HEIs administer innovative learning methods, management tools, and sustainable infrastructure, supplemented by novel and emerging Information and Communication Technologies (ICTs) to improve knowledge generation and information transfer processes. Ersoy (2021:120) suggests the four key components that define education 4.0 are:

- Competencies - Training and development of desirable critical competencies;
- Learning methods - incorporation of new and innovative learning methods;
- ICTs - implementation of new and emerging ICTs;
- Infrastructure - use of innovative infrastructure to improve the learning process.

Aboderin and Havenga (2024:25) suggest HEIs that neglect to integrate these four components face heightened risk of falling behind. Consequently, students may find themselves lacking the essential skills needed to meet the evolving labour market and industry demands (Gang *et al.* 2020:20).

2.2.4 Smart campuses

Alnoman (2022:2) suggests the exponential growth of smart applications and technologies in the education sector has led researchers and educators to consider implementing a smart learning paradigm, known as the smart campus. This concurs with Fernández-Caramés and Fraga-Lamas (2019:9), who report smart campuses and universities utilise IT infrastructure, the IoT and cloud computing to control and operate the multiple HEI systems.

The symbiotic relationship between the industrial and education timeframes gives rise to new professions that demand specialised skills (Keser and Semerci 2019:40). A few examples of these are, AI specialist, cloud computing manager and cyber security specialist. HEIs will now have to adapt new educational paradigms and pedagogies to accommodate the dynamic and transitional nature of industries and labour market requirements. In this regard, Keser and Semerci (2019:40) propose educational institutions must prepare students to fulfil the expectations of modern society and to adapt to and use new advancements in technology. In order to satisfy the demands of the technology-intensive labour market, HEIs must train highly competent workers (Gang *et al.* 2020:20)

It is observed that 4IR technologies in the education sector are transforming online learning by creating more interactive and immersive learning platforms and collaborative learning communities. In line with this, the integration of 4IR technologies and online learning allows HEIs to use the large amounts of data generated from online learning platforms, which can be analysed and used to inform and improve curriculum, pedagogies and student perceptions.

2.3 Online learning, distance learning, or web based learning

2.3.1 History of online education

In order to improve educational quality, it is necessary to investigate and comprehend the progression and advancements in educational technology, as well as the variety of methods used to deliver knowledge (Kentnor 2015:25). As learning technology and its related fields expand and evolve, practitioners and academics have yet to reach an agreement on common definitions and terminologies (Moore, Dickson-Deane and Galyen 2011:129). This confusion leads to misunderstandings and conflicting findings with regard to distance learning, e-Learning and online learning environments. Wallace (2003:241) found the terms can be interchangeable without meaningful definitions.

Moore *et al.* (2011:129) and (Wallace 2003:241) claim distance education has a nearly two century history, with the first entirely online course offered in 1981. This time period marks significant shifts in the way education was facilitated and

communicated. As stated by Kentnor (2015:25), distance education is a method of teaching in which the student and teacher are geographically distant. Kentnor (2015:25) defined distance education as “a method of providing education for the non-resident students, primarily adults who receive lessons and exercises through the mail or some other device, and upon completion, return them for analysis, criticism, and grading.”

Dumford and Miller (2018:455) suggest the evolution and progression of education over the last 300 years have paralleled that of communications technology. As new technologies emerged, learning appeared to be the focus of all types of instruction and the term “distance learning” was reintroduced to emphasise the limitations associated with distance, which is time and place (Moore *et al.* 2011:129). Wallace (2003:241) posits the term was then expanded to include other types of learning, such as online learning, e-Learning, and virtual learning, as communication and technology evolved. E-learning can be defined as the use of IT to improve educational quality (Bączek *et al.* 2021:100).

2.3.2 Types of online learning

Panigrahi, Srivastava and Sharma (2018:3) expounded that online learning can mainly be presented either in a synchronous or an asynchronous environment. As Moorhouse and Wong (2022:105) explain, synchronous learning can also be called real-time learning and is usually attended through an online platform. In this instance, learning occurs in a virtual classroom, where every student learns in a synchronic method. Hrastinski (2008:10) suggests one of the primary benefits of synchronous online learning, is any course material problems can be resolved at the same time. It simulates a real classroom or virtual training room, where people are gathered to learn, and a facilitator is present to guide them.

Conversely, as described by Hrastinski (2008:10), asynchronous online learning refers to pre-created courses or learning materials, available in various forms on the internet. When there are time constraints or a desire for flexibility in learning, this type of learning is used, since learners can download or attend an online session whenever they want. Synchronous learning is similar to online distance learning, in

that it takes place in real-time, whereas asynchronous learning takes place through online channels, with real-time interaction (Moorhouse and Wong 2022:105).

Blended or hybrid learning can be defined as a method of combining online learning with traditional face-to-face learning (Yuhanna, Alexander and Kachik 2020:13). Critical challenges that can affect blended learning are outlined by Pregoner and Baguio (2024:170) to include assessments of student's academic integrity and lecturers learning to monitor and assess students through synchronous and asynchronous collaboration.

2.3.3 Benefits and challenges of online learning

Online learning is a broad construct that encompasses a wide range of teaching and learning strategies that rely solely on the use of electronic media and device tools for training, interaction and communication. These elements could pertain to educational approaches, methods, concepts or technologies (Hiranrithikorn 2019:11). Mailizar *et al.* (2020:4) propose the benefits and limitations of online learning can be categorised as flexibility, commuting, diverse learning aids, and cost (benefits) and costs, time, distractions, hard- and software, as well as social implications (limitations), briefly discussed below.

Benefits of online learning:

- Flexibility – According to Sadeghi (2019:81), online learning offers students the flexibility to learn while they earn. Hiranrithikorn (2019:10) suggests the flexibility of online learning allows students to learn at their own pace. Students have the flexibility to study online at any university or HEI around the world (Yuhanna *et al.* 2020:14). Online learning has the possibility of reaching a wider range of students from different backgrounds (Dumford and Miller 2018:450). Similarly, Yuhanna *et al.* (2020:13) agree online learning allows a wider area for exchanging of ideas and communication.
- Commuting - Hiranrithikorn (2019:10) argues online learning allows students to save time and money on commuting to and from HEIs. Sadeghi (2019:80) agrees not only would you save time and money with online learning, but also noted online learning reduces the impact of commuting on the environment.

- Diverse learning aids - Yuhanna *et al.* (2020:13) reported online learning allows facilitators and lecturers to utilise various types of media, including audio, video, animation, and text, as well as graphics, different software, and various apps to aid in their pedagogies. Alshamrani (2019:5) suggests online learning allows students access to a range of information instantaneously from all over the world.
- Cost - Sadeghi (2019:81) claims online learning can be more cost effective for students, as students are able to obtain their qualifications without having to relocate to larger cities or towns. Yuhanna *et al.* (2020:14) agree and further confirm the cost of internet, hardware and software are declining and becoming more easily available as technology is changing so rapidly.

Challenges of online learning:

- Costs – Yuhanna *et al.* (2020:13) argue hardware and software requirements, online learning program fees, and tuition fees, contribute to the higher costs of online learning. High data, internet and electricity costs are regarded as challenges for online learning (Mukhtar *et al.* 2020:27). Alshamrani (2019:8) suggests health issues incurred from spending long hours in front of computers and other devices can be regarded as a cost to health of online learners.
- Time - Dumford and Miller (2018:450) reported online learning can be more time-consuming, as it takes a longer time to respond to multiple student queries than making one announcement to an entire class. Alshamrani (2019:9) also noted online learning programs require more time from facilitators to explain difficult concepts and finishing the curriculum during allocated online time.
- Distractions - Sadeghi (2019:80) points out without one-on-one interaction from faculty and no class mates to help with constant reminders regarding pending assignments, the chances of becoming distracted and forgetting deadlines or tests/examinations are high. Alshamrani (2019:9) posits online learning presents a challenge for students to stick to schedules and is further exacerbated by the lack of face-to-face interaction and the insufficiency of follow-up from instructors. Dumford and Miller (2018:450) and Alshamrani (2019:5) concur a lack of motivation and self-discipline can be a limitation for students attending an online learning program.
- Hardware and software - Dumford and Miller (2018:451) acknowledge the significance of the logistical component of online learning, implying that

malfunctioning devices or technology can impede learning and engagement. Alshamrani (2019:6) accentuates online learning is completely reliant on a stable internet connection and signal strength that can impact the delivery, which will affect the efficacy of the online learning program. Moreover, Sadeghi (2019:80) found without proper technical support and management, problems with the technology can paralyse and disrupt the entire lesson.

- Social implications - according to Dumford and Miller (2018:455), another factor to consider when evaluating online learning programs is that students often lack social interaction and a sense of isolation can negatively impact a student's perception of an online learning program. Sadeghi (2019:81) argues online learning programs make it difficult to communicate with facilitators and instructors and often hinder collaborative learning.

It is crucial to investigate existing issues and challenges with online learning in higher education, in order to provide a better framework for continuous improvement of the online learning program (Dumford and Miller 2018:453). In a recent study, Mukhtar *et al.* (2020:27) argued while online learning was advantageous during the recent Covid pandemic, students expressed difficulty in learning practical and clinical work. Furthermore, the distinct lack of face-to-face interaction disrupted the feedback loop between facilitators and learners. Dumford and Miller (2018:455) agree facilitators and instructors sometimes find it difficult to gauge the level of understanding of students with certain subject matter.

2.3.4 Online pedagogy

Sobko *et al.* (2020:36) report the method and practice of teaching are referred to as pedagogy. Online pedagogy is the academic study of how knowledge, skills, and professional practices are delivered in an educational setting through the use of the internet and related tools. Many practitioners and theorists acknowledge online learning as a subdivision of learning in general (Sadeghi 2019:80).

In the view of Sailin and Mahmor (2018:143), effective online pedagogy revolves around three essential components: prioritising student engagement to ensure they undertake the majority of the learning tasks, recognising interaction and interactivity

as fundamental to effective asynchronous learning, and striving to establish a robust presence across social, cognitive, and instructional dimensions. Complementing this framework, Ersoy (2021:120) identifies four main categories associated with online pedagogies: Associative, which focuses on traditional associative and reinforcement-based instruction; Cognitive, which emphasises dynamic, task-based learning and information scrutiny; Situative, prioritising social presence, interaction, and self-paced learning; and Connectivist, advocating for networked learning and engagement within learning communities.

As technology advances, there is a greater demand for innovative methods of delivering education, which has resulted in changes in learning and teaching methods (Sadeghi 2019:80). Meylani (2024:30) argues it is vital to identify effective strategies for online pedagogies, to ensure the success of student learning and the online learning program. A review of literature (Pardino *et al.* 2018:1123; Steele, Holbeck and Mandernach 2019:6; Singh, Singh and Chhikara 2024:59) suggests effective online pedagogy is dependent on a few key factors:

- Technological Infrastructure - This refers to the software applications, hardware and devices, networks and connectivity components related to online learning. Bahasoan *et al.* (2020:101) reported effective online learning cannot be achieved when the students are interrupted with connectivity issues or have limited access to the hardware and software applications required.
- Instructional Design – for online learning to be considered effective, Castro and Tumibay (2021:1371) suggest the online program format needs to have a well organised course layout, have innovative and engaging course material and the curriculum needs to be current and relevant to the program.
- Learner characteristics and engagement - Bruna *et al.* (2024:34) claim time management, home environment, and emotional factors (for example, stress and feelings of isolation) tend to impact the effectiveness of an online pedagogy.
- Assessment and feedback –Meylani (2024:30) asserts, for an online pedagogy to be effective, students need to be satisfied with their grades and assessments, and the lecturers should display good communication skills and knowledge of subject material to be able to provide feedback to students.

Within the online learning paradigm, an effective online pedagogy is critical to meeting learning objectives, as well as student needs and expectations.

2.3.5 Proctoring and assessment

In a recent study, Daumiller *et al.* (2021:118) argued the COVID–19 pandemic compelled many HEIs around the world to implement online methods of assessment and testing, in order to reduce health risks for instructors and students. Dendir and Maxwell (2020:2) highlight the academic integrity of online examinations have been brought into question, because students allegedly have more opportunities to cheat and plagiarise in an online environment, as opposed to when receiving instruction or being examined in a brick-and-mortar building.

According to Hussein *et al.* (2020:510), adoption of online proctoring or invigilation tools for assessment is one of the most effective methods of addressing some of these issues. Dendir and Maxwell (2020:2) and Hussein *et al.* (2020:510) categorise online proctoring into three methods:

- Live proctoring - Real time proctoring occurs during the assessment, with a human proctor monitoring/supervising the exam virtually, online. These are trained professionals who look for red flags, such as suspicious facial movements or the appearance of an unverified device that could indicate possible cheating.
- Recorded proctoring - This entails videotaping camera images and logs of a student taking an online proctored examination, after which the proctor reviews the recording and evaluates the exam's integrity.
- Automated proctoring - instead of human proctors monitoring the entire exam, the proctoring system identifies key events of possible fraud. The proctor is notified to review these events and determine whether the student did indeed commit fraud or cheating.

In a recent study, Nicola-Richmond, Dawson and Partridge (2024:392) claim although online proctoring was used before the pandemic, the sudden lockdown forced all education institutions to adopt online proctoring at an accelerated rate. As outlined by Reedy *et al.* (2021:17), the advantages of online proctoring are flexibility,

better exam conditions, less administration costs for universities and an opportunity to offer the exam to international students and increase revenue. In contrast, Daumiller *et al.* (2021:118) claim online proctoring can be disadvantageous, due to technical and infrastructure issues with students. In addition, there have also been many concerns regarding online proctoring and assessment susceptibility to cheating and plagiarism (Daumiller *et al.* 2021:118). Another common challenge for online proctoring is the concern with privacy and potential for bias (Dawson 2024:1515).

Online proctoring and assessment is arguably one of the most divisive aspects of online learning. In order to maintain academic integrity, it is crucial to have methods and techniques for identifying copying and, subsequently, creating procedures to prevent this from occurring.

Some new trends in online assessments Djumabayevna (2024:40) calls attention to, are:

- Competency-based Education – this form of assessment concentrates on a student perfecting a special skill or competency, as opposed to following a set curriculum.
- Project-based assessments – learners will prove their comprehension of the subject matter through innovative projects that encourage team work, critical thinking and problem solving. With this form of assessment there are tangible outcomes in the form of prototypes and presentations.
- E Portfolios – with this type of assessment, students are required to present an electronic collection of their work that displays their skills and achievements over a period of time.
- AI-powered assessment tools – AI is applied to develop advanced assessment technologies able to reveal learning patterns and insights into student performance, and achieving their learning objectives.
- Peer and self-assessment – students are encouraged to assess their own work or that of their peers. This form of assessment develops a deeper comprehension of subject matter, encourages team work and creates a learning community.

- Real-time feedback systems – with these assessments students are given feedback and responses immediately. This allows students to learn from their mistakes through real-time assessment and feedback.

Dawson (2024:1515) suggests keeping abreast of current trends and developments in the field of online pedagogy and assessments will ensure HEIs implement the most effective proctoring and assessment.

2.3.6 Perceptions of online learning

It is impossible to ignore the impact IT has on our lives in a variety of ways, particularly considering its value in the field of education (Akuratiya and Meddage 2020 :756). Due to the ubiquitous nature of online learning, coupled with the recent Covid-19 pandemic, both Akuratiya and Meddage (2020:755) and Abbasi *et al.* (2020:57) agree it is imperative to determine student perceptions, opinions and viewpoints regarding the virtual approach to online learning and teaching.

The importance and effectiveness of online learning implementation has been the subject of numerous studies, promoted as a teaching strategy by several HEIs around the world (Abbasi *et al.* 2020:57). Although online learning has been very popular around the world, in countries such as Sri Lanka, Pakistan and Indonesia, it only became a major part of the formal education sector after the COVID-19 pandemic (Abbasi *et al.* 2020:60; Akuratiya and Meddage 2020:755; Maru *et al.* 2022:321).

According to Abbasi *et al.* (2020:60), the transition to the new system is still being processed by both students and facilitators and this migration will most likely present challenges to the implementation of the online learning program. However, Akuratiya and Meddage (2020:755) maintain most students are digital natives and stylise different forms of technology throughout their everyday lives. Therefore, digital natives should be more accustomed to online learning as a new medium. In addition, Akuratiya and Meddage (2020:755) reported, in order to provide uninterrupted education, various countries such as China, Bulgaria and Finland, implemented diverse learning methods and introduced online learning systems and environments, as a means to provide uninterrupted learning opportunities.

Numerous research investigations have been conducted throughout the world to determine how students and educators perceive online learning. Table 2.3 below offers a summary of various studies and their findings.

Table 2.3: Global perceptions of online learning

No	Title	Country	Year	Findings/ Comments	Reference
1	Faculty's and students' perceptions of online learning during COVID-19	Jordan	2021	<ul style="list-style-type: none"> Students and faculty had a favourable perception of online learning but found it less effective than face-to-face learning. agreed the benefits were self-learning, cost effectiveness, convenience and flexibility. Challenges were, adapting to online learning, discrimination against deaf and hard-of-hearing students, lack of interaction and motivation, data privacy and security. 	(Almahasees, Mohsen and Amin 2021)
2	Students' Perception towards Online Learning across Multiple Disciplinary Courses in India—A Qualitative Analysis	India	2024	<ul style="list-style-type: none"> Majority students support online learning Students' economic situation impacts their preference for online learning Female students prefer online learning Having a smart device and internet access influences the decision to use online learning 	(Urkude 2024)
3	Exploring Vietnamese EFL learners' perceptions towards online learning at university education	Vietnam	2024	<ul style="list-style-type: none"> Online learning has allowed students to improve their ability to interact and converse with other students. Online learning does not impede group collaboration amongst students Most students were self-disciplined and no issues with time management. Interaction with lecturer is critical Both male and female students have had positive experiences with online learning. 	(Huynh and Nguyen 2024)
4	Students' perception of attending online learning sessions post-pandemic	India	2024	<ul style="list-style-type: none"> Students had a positive perception of online learning Online learning platforms were beneficial Students received technical support whenever needed Course content well designed and relevant 	(Giday and Perumal 2024)
5	Perception of young adults in higher education: a case study of Caribbean students in the online learning environment	Caribbean	2024	<ul style="list-style-type: none"> Positive perceptions of online learning Challenges faced include, no assistance from instructors, Online learning might be engaging and the use of multimedia and innovative course materials improves the understanding of concepts in the online class. 	(Greaves 2024)

				<ul style="list-style-type: none"> Despite positive perceptions, majority of students would still prefer face-to-face classes over online. 	
6	Undergraduates' perception, engagement and learning experience in online learning amid Covid-19 pandemic	Malaysia	2024	<ul style="list-style-type: none"> Student perceptions and engagements of online learning affect their online learning experience Students were more engaged when digital tools and multimedia are used Interaction between students and lecturers enhanced online learning experience Positive correlation between student perceptions and student engagement 	(Tan <i>et al.</i> 2024)
7	Exploring Learners' Experience And Perceptions Of Online And Autonomous Learning: A Case Study Of Algerian Master 1 Students In Abou Al KACEM Saadallah University	Algeria	2024	<ul style="list-style-type: none"> Online learning improved student autonomy Negative perceptions of online learning for students and teachers Lectures complained of time constraints. 	(OUAFI 2024)
8	Conceptualising engineering student perceptions of synchronous and asynchronous online learning	UK	2024	<ul style="list-style-type: none"> Lack of connectivity with other students and lecturers affects perceptions of online learning Synchronous online delivery shows a higher cognitive presence 	(Mohammad Zadeh <i>et al.</i> 2024)
9	Sustaining college students' continuance intention toward online learning in the post-COVID-19 era	China	2024	<ul style="list-style-type: none"> Perception of online learning is directly related continuance intention to use online learning. Innovated teaching methods impacted whether a student perceives online learning as useful. 	(He, Qin and Tang 2024)
10	Empowering e-Tutors for Effective Online Teaching and Learning: E-tutors' Challenges and Perceptions	South Africa	2024	<ul style="list-style-type: none"> Instructors and lecturers are crucial to the success of online learning program. Need for instructors to be trained in communications skills and technology tools Internet connectivity and infrastructure impacted the effectiveness of online instructors 	(Enwereji <i>et al.</i> 2024)

With regard to the perception of online learning, Table 2.3 shows that Urkude (2024:18) points out the perceived usefulness and ease of use for online learning greatly impact student behaviour and engagement to subject matter. Tan *et al.* (2024:401) posit that perceptions of online learning can affect the success of an online learning program, by influencing enrolment numbers and the completion and retention of the course content. In addition, He *et al.* (2024:123) claim learners who have positive perceptions of online learning are more likely to actively participate

and engage with lecturers and other students. In a recent study, Enwereji *et al.* (2024:380) acknowledge favourable perceptions of online learning can encourage a symbiotic relationship between student and lecturer.

In determining the perceptions and challenges faced by students attending an online learning program, valuable insights will be provided by this study, to assist HEIs in improving the effectiveness and usage of their online education platforms.

2.4 Quality in higher education

Quality in higher education is important to not only the individual, but society as a whole. According to Tan *et al.* (2024:401), it is a commonly accepted truism that the future of a nation is in the hands of its students. Therefore, building quality into education creates a fertile environment for groundbreaking research, where technological advancements and creative pursuits will ensure economic growth.

In the context of higher education, QA, Quality Control (QC) and QMS are fundamental components that influence the delivery and maintenance of high-quality education.

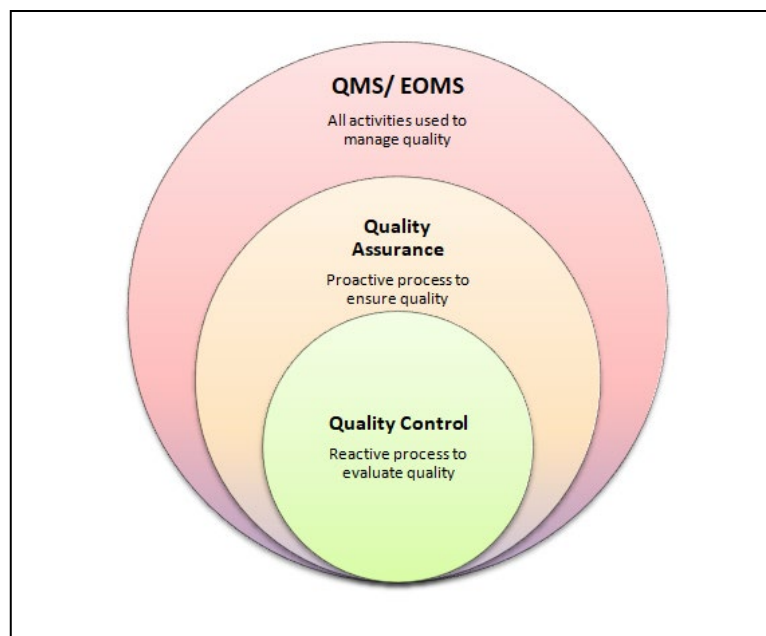


Figure 2.3: Schematic representation of a QMS, QA and QC

Source: Adapted from International Standards Organization (ISO 2018)

From Figure 2.3, QA is, by definition, “a part of quality management focused on providing confidence that quality requirements will be fulfilled,” while QC is defined as the “part of quality management that is focused on fulfilling quality requirements” (ISO 2018).

Ensuring an educational institution complies with the pre-defined standards and requirements, while cultivating a culture of excellence and continuous improvement, is a fundamental objective of QA in the educational sector (Nishal *et al.* 2024:297). While QA in higher education focuses on continuous improvement, QC focuses on accreditation, program assessments, and faculty evaluation; where the emphasis is on inspections, evaluations and correcting non-conformances (Lalendle, Tsephe and Naidoo 2022:5816). Similarly the focus of QMS is to develop, implement and continuously improve the processes and practices that ensure quality objectives and stakeholder expectations are met (Nishal *et al.* 2024:297). A QMS provides an overarching framework that integrates QA and QC activities to manage and enhance quality across all processes. The ISO 9001:2015 standard specifies the requirements for a QMS, guiding its implementation and effectiveness.

2.4.1 QA in higher education

The goal and responsibility of all educational programmes is to provide quality learning experiences that ensure the success of students, faculty and programmes. As online education evolves, new questions regarding how to develop effective teaching and learning methods arise (Lalendle *et al.* 2022:5816). QA is defined by the International Organisation for Standardisation (ISO) as “that part of quality management focused on providing confidence that quality requirements are being fulfilled” (Abdous 2009:281).

In the educational sector, Silaeva and Semenov (2018:72) expound QA as a “planned and systematic review process of an institution or program to determine that acceptable standards of education, scholarship and infrastructure are being maintained and enhanced.” Africano, Rodrigues and Santos (2019) argue continuous development of QA in HEIs is driven, on the one hand, by competition and, on the other hand, growing requirements of stakeholders.

Prisacariu and Shah (2016:152) reported there are currently three working definitions of quality in education at the level of the National Quality Assurance Framework (NQAF) which are:

- The technical and regulatory definition (provided by Law 87/2006) - “*the quality of education is the set of characteristics of a study program and its provider which fulfils the expectations of the beneficiaries as well as the quality standards.*”
- The definition formulated in the European Quality Assurance Framework in Education and Vocational Training - “*quality in education and training is not only a technical aspect, it depends on the specific political, institutional and individual goals and goals achievable in different time units.*”
- The definition adopted in the EU Phase programs for the modernisation of vocational and technical education – “*level of satisfaction in relation to the offer of education and training, determined by compliance with the standards and achieving the expected level of excellence made by beneficiaries and other stakeholders.*”

Within the South African context, when it comes to delivering and overseeing education and training, quality is defined as satisfying the requirements of nationally recognized outcomes and performance/assessment criteria. The National Qualifications Framework (NQF) is being developed further and is being implemented under the direction of the South African Qualifications Authority (SAQA).

As stated by Aniskina and Terekhova (2019:219), education quality is one of today’s most critical concerns in the higher education sectors and several studies have been conducted on this subject. Further to this, QA models for HEIs are generally characterised by the Plan–Do–Check–Act cycle or its corresponding Planning–Implementation–Evaluation–Review cycle, in conjunction with common quality management principles (Aniskina and Terekhova 2019:219).

In the view of Simunich *et al.* (2022:36), despite its growing popularity in higher education policy and practice, quality is a “slippery and ambiguous” concept for which there is still little agreement on a single definition. Sorour *et al.* (2020:2) claim HEIs are focusing more on QA to assure their interested parties they are functioning effectively and their mission and objectives are meeting their expectations. Zuhairi

et al. (2020:297) posit quality in higher education can be defined in terms of value systems, namely: process control, continuous improvement, commitment and breakthrough.

In contrast, Cheong Cheng and Ming Tam (1997:25) proposes the best way to define quality in higher education is through the seven models of quality in higher education. These can be described as:

1. Goal and specification model - According to this model, education quality is defined as the achievement of stated goals and conformance to prescribed specifications. The goal and specification model are frequently used in assessing the educational quality of individual institutions or education systems in a country.
2. Resource input model – Quality education is defined not by the outputs of the institution, but rather the inputs. These comprise high quality student intake, great amenities and equipment, more qualified staff recruited, and more financial support obtained, as examples of education quality indicators.
3. Process model - According to the process model, an educational institution is of high quality when its internal performance is smooth and efficient. Internal activities are regarded as educational quality indicators.
4. Satisfaction model –the level of satisfaction of strategic constituencies defines education quality. Indicators of education quality are the extent to which a HEI can satisfy the needs and expectations of their stakeholders.
5. Legitimacy model - Education quality is identified as the achievement of a legitimate position or reputation. The acceptance and support, as well as the public relations of the HEI, are regarded as educational quality indicators.
6. Absence of problem model - The absence of a problem model suggests when an educational institution is free from defects, dysfunction, difficulties, troubles or problems, it is of high educational quality. Should no obvious problems arise from its operation, the HEI is assumed to achieve its education objectives.
7. The organisation learning model - According to this model, educational quality is a dynamic concept involving continuous improvement and developing the HEI's processes and practices.

Cheong Cheng and Ming Tam (1997:25) point out the seven models each have their advantages and disadvantages, focusing on different aspects of the process of pursuing quality in education. Their applicability is not universal, and their utility is frequently limited by contextual factors.

QA initiatives in higher education are stated by Simunich *et al.* (2022:37) to be impacted by the successful implementation of resources, tools and processes created to meet the organisation's quality objectives. Within the context of QA in online learning, the emphasis is not only on maintaining standards, but enhancing learning outcomes through continuous improvement (Asiyai 2022:844). In addition, Simunich *et al.* (2022:36) claim one objective of HEIs is to ensure the online learning programs offered are on par with traditional face-to-face programmes.

Simunich *et al.* (2022:36) further explain the key components of online QA mechanisms as:

- Quality Standards and benchmarks - Used for determining clear and measurable quality objectives for course design, content, and delivery within the context of online learning. HEIs need to gauge the extent to which the online learning program satisfies the quality objectives of the institution and benchmark it against global best practices (Khawaja and Khan 2022:480).
- Course format and instructional quality – Utilised for designing curricula relevant and aligned to learning outcomes of the online learning program and for providing training to staff in innovative online pedagogies, new technologies, proctoring and assessment methods for online learning (Laamanen *et al.* 2021:18).
- Technical and administrative support - Provide immediate support for all course content and multimedia accessible to students with disabilities, while also offering assistance with technical issues and ensuring resource availability (Al-ramahi *et al.* 2024:254).
- Hardware and software - utilising reliable and current online learning platforms and appropriate software to enable stable internet connectivity and ensuring privacy and security of student information (Al-ramahi *et al.* 2024:254).

- Assessments and evaluations - developing reliable assessment and proctoring methods and applications, particularly for online learning and comparing learning outcomes to traditional settings (Lin, Fong and Chen 2023:5).
- Communication and feedback - the outcomes of QA initiatives to be communicated to all interested parties and external bodies to ensure transparency regarding the results of quality evaluations (Edge *et al.* 2022:55).

QA for online learning is a comprehensive strategy that encompasses all processes and procedures in higher education and due to the holistic nature of QA, its success largely depends on strong leadership and support from management. For an online learning program to be effective, a combination of TQM and QA mechanisms should be incorporated in the strategic and operational plan.

2.4.2 TQM in higher education

According to Jasti *et al.* (2022:1250), over the last 30 years, there has been growing realisation of a clear correlation between a nation's long-term economic prosperity and competitiveness, and the quality of higher education provided to its citizens. In developing countries, private organisations were encouraged to establish and prioritise HEIs, in order to impart skills and exponentially increase skilled labour availability. As a result of this rapid growth, developing countries are experiencing issues with the quality of education provided, which has resulted in serious introspection among HEIs with regard to how to improve quality (Rodriguez, Valenzuela and Ayuyao 2018:101).

TQM is a term commonly used to describe a systematic approach of an organisation to achieve customer satisfaction through product, service and organisational culture improvement (Bakator and Boric 2018:18). In this regard, Maimuna (2024:415) find TQM seems to be one of the most effective strategies in dealing with evolving technologies and ongoing challenges in the educational sector.

Jasti *et al.* (2022:1250) indicated a modified TQM framework can be applied to HEIs by acknowledging it is, in essence, a service industry with no tangible product and it has multiple customers. TQM defines product and service quality in terms of

customer focus. This necessitates the use of TQM to establish a quality culture, with the key initiative being continuous improvement in this context (Maimuna 2024:415). The TQM framework is broadly based on eight principles, as described by Bakator and Boric (2018:17) in Figure 2.4.



Figure 2.4: Principles of TQM framework for the education sector

Source: Adapted from Bakator and Boric (2018:17)

It is evident from Figure 2.4 that the basic principles of TQM are intended to achieve continuous organisational improvement, through the participation and commitment of all its employees, and focus on ensuring all the resources of an organisation are employed strategically, towards meeting and exceeding both internal and external customer expectations (Zouhir and Bouaouine 2018:5).

The principles of TQM facilitate an ideal environment that can be aligned to a QMS as follows (Bakator and Boric 2018:17):

Customer Focus - Understanding the needs and expectations of your customers is a crucial aspect of developing customer loyalty and exceeding their expectations

(Nurmanov 2020:5). Susiati *et al.* (2024) point out communicating with customers to measure their satisfaction allows use of the results to improve processes and better manage customer relationships. In terms of academia, the “customer” can vary, depending on the context of the education sector. While students are the primary beneficiaries of the service provided by academic institutions, other key stakeholders are parents and guardians, government and regulatory bodies, along with labour markets (Kovalenko *et al.* 2020:5).

Leadership - Effective academic leadership assists educational institutions to navigate the evolving technologies, ensuring accountability, transparency and value for money for those who invest in an educational qualification (Rodriguez *et al.* 2018:101). Nurmanov (2020:5) reported efficient leadership in an educational institution would also ensure quality is managed and maintained.

Involvement of people - Bakator and Boric (2018:19) describe this principle as cultivating an environment that encourages employees to directly help the organisation fulfil its vision and mission and meet its objectives, by applying their ideas, expertise and efforts towards problem solving and decision-making. Rodriguez *et al.* (2018:101) confirm employee empowerment is a major contributing factor to greater job satisfaction, increased creativity and assiduous employees. These factors are imperative when implementing a new initiative, which in this case, is new technologies in the education sector (Aniskina and Terekhova 2019:219).

Process approach - This approach is one of the most important ways to understand the organisation as a system by which internal and external components are connected and interrelated (Fleacă, Fleacă and Maiduc 2018:10). Identifying processes in a management system allows an organisation to clearly define the sequence and interaction, of all required inputs and outputs, identify process risks and opportunities and assign responsibilities and authorities for each process (Jasti *et al.* 2022:1255)

Systems approach to management - According to Fleacă *et al.* (2018:10), the systems approach to management is the foundation of organisational development. It allows the educational institution to be viewed as a unified singular system made up of sub–systems (Bakator and Boric 2018:19). The application of this principle in educational institutions presents an opportunity for the organisation to assess the

overall effectiveness of the system, rather than the effectiveness of the sub-systems. This, as described by Maimuna (2024:416), suggests decisions and actions taken by one organisational area will affect the organisation as a whole.

Continual improvement - Susiati *et al.* (2024) reported continuous improvement principles and practices can be applied to both academic services and administrative processes. According to Aniskina and Terekhova (2019:219), it is an effective way to address new demands on educational institutions and keep abreast of current and evolving technologies.

Factual approach to decision-making - Mittal and Gupta (2024:148) suggest the principle of factual approach to decision-making implies effective decisions are based on the analysis of data and information. Educational institutions should define, plan and implement the measurement and monitoring of activities necessary to ensure conformity to requirements and that continuous improvement initiatives are met (Zouhir and Bouaouine 2018:5). Nurmanov (2020:6) confirms collecting accurate and reliable data from processes, in addition to employing appropriate statistical methods for data collection and analysis, ensures management use the analysed data for decision-making.

Mutual beneficial supplier relationship - As Fleacă *et al.* (2018:10) explain, an organisation and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both entities to create value. Zouhir and Bouaouine (2018:6) claim by effectively managing supplier relationships, educational institutions will not only benefit from the long-term cost savings, but also from the improved availability and consistency in the supply of goods or services.

TQM application as a viable methodology in higher education is widely recognised all over the world and a number of studies have been conducted globally to explore how it is effectively applied to enhance educational processes and end-results (Jasti *et al.* 2022:1250). A review of several studies (Rodriguez *et al.* 2018:101; Vijayan Gurusurthy 2018:546; Nurmanov 2020:4; Saikat *et al.* 2021:459; Mittal and Gupta 2024:148; Susiati *et al.* 2024) revealed some benefits of TQM in online learning are:

- Improved educational quality - The main focus of TQM, within the context of online learning, is continual improvement in educational processes, which leads to improved processes and enhanced teaching and learning experiences.

- Customer satisfaction – with TQM the emphasis is on exceeding the expectations of not only the students, but all stakeholders. It promotes a culture of “customer focus”, which results in increased satisfaction, customer loyalty and favourable word-of-mouth. Within the context of online learning, “customer “ refers to student.
- Effective use of resources - TQM promotes the effective use of all resources by eliminating waste, streamlining processes and increasing productivity. It also encourages institutions to allocate resources appropriately, to ensure educational quality and institutional success.
- Continual improvement – within the context of online learning, applying TQM principles allows HEIs to seamlessly adapt to changing educational landscapes, innovative technologies, and the needs and expectations of interested parties.
- Empowerment of interested parties – the application of TQM principles encourages participation and empowerment of staff, students and all interested parties. Fostering responsibility and commitment amongst stakeholders leads to increased engagement and collaboration.

As beneficial as TQM is, it is however, not without its challenges. Jasti *et al.* (2022:1250) draw attention to some of the disadvantages and barriers of the TQM approach to online learning, which include:

- Challenges with implementation – due to the considerable changes in organisational culture, process design, and training, HEIs can face resistance to change, lack of leadership and insufficient resources that inhibit successful implantation.
- Prioritising quantitative methods – TQM usually focuses on quantitative measures and performance indicators, and these cannot fully represent the multi-dimensional nature of higher education. This may result in an excessive dependence on metrics and standardised tests, which would result in the neglect of qualitative aspects of learning, such as creativity and critical thinking.
- Superficial compliance – Implementing TQM as a box ticking exercise can create significant difficulties, due to bureaucratic inefficiencies. Institutions, nonetheless, typically focus more on the procedural aspects and audits, rather than understanding the science and philosophy behind TQM.

- Resource intensive – implementation of TQM for an online program requires substantial investment in new technologies, infrastructure and training. Institutions with limited resources may struggle to maintain TQM initiatives in the long-term.
- Accountability – due to the multifaceted nature of higher education, determining clear and relevant quality indicators can be challenging. Incorrect measurement indicators can affect the efficacy of the TQM application.

Jasti *et al.* (2022:1250) found most HEIs adapted TQM mostly on non-academic functions and processes and it is not effective in managing teaching and learning in both traditional and online paradigms. An effective way to manage teaching and learning would be to develop a management system tailored for an educational institution. A combination of TQM and Quality/Educational Managements Systems would, therefore, be most advantageous and efficient when implementing a QMS for an online learning program.

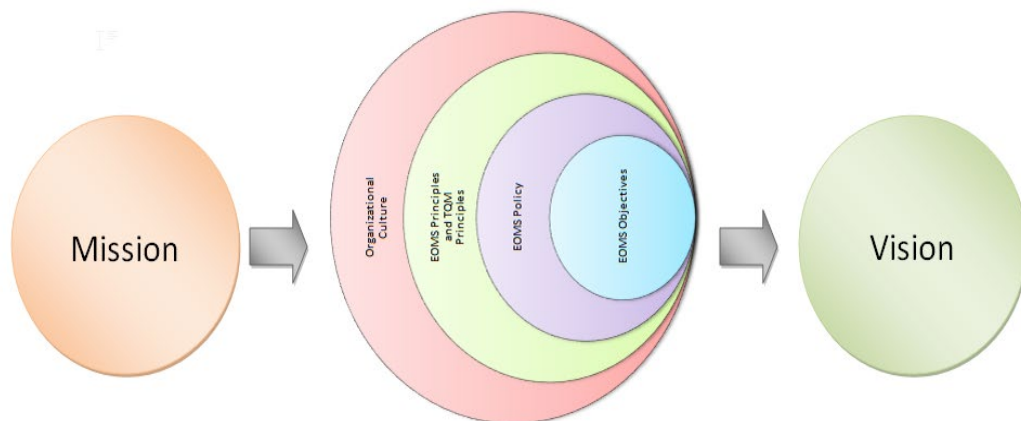


Figure 2.5: Schematic representation of a TQM enhanced Educational Organisation Management System (EOMS)

Source: Adapted from ISO 21001:2018

Figure 2.5 offers a graphical representation of an educational management system enhanced by TQM principles. As suggested by Jasti *et al.* (2022:1250), defining who the “customer” is in the educational sector, is one of the most challenging aspects of implementing TQM. Therefore, having a graphical representation of the proposed

TQM and an educational management system will assist in clarifying how both approaches can be integrated.

According to Luthra *et al.* (2020), Chen (2022) and Grossu-Leibovica (2023), the most effective tools and techniques to integrate TQM into a management system are described below:

- Benchmarking – a technique used to compare the organisation with best practices and industry leaders to identify areas of improvement.
- Quality Function Deployment (QFD) – a set of tools used to convert customer requirements into measurable targets. Within the context of higher education, this tool can be used to translate the needs and expectations of interested parties and relevant stakeholders into educational quality objectives and curriculum design.
- Cause-and-Effect Diagram - a TQM technique used to analyse root causes of problems and issues in the education industry and preventing potential problems.
- Failure Mode Effects Analysis (FMEA) - a tool used to assess potential risks and enable an educational institution to develop and implement mitigation strategies to minimise the effects of the risks and failures identified.
- Statistical Process Control (SPC) – using statistical techniques to monitor processes in an organisation to collect and analyse data for trends and abnormalities.
- Balanced Scorecard - a technique used to integrate educational metrics into a balanced scorecard to monitor different variables across multiple dimensions.
- Pareto Analysis - a TQM tool that uses the 80/20 principle, which indicates 80 percent issues are caused by 20 percent problems. It is also an effective visual tool that assists an organisation in determining from the most impactful problems to the least.
- Process Mapping - a tool used to develop detailed process flows and the interaction of different processes in an institution. This will enable the organisation to identify potential bottlenecks to improve process efficiency.
- Quality Circles - a technique used to involve employees in a structured approach to deal with quality initiatives and continuous improvement. This empowers

employees and enables them to be a part of the solution, which results in fostering a quality culture in the organisation.

- Hoshin Kanri - an effective TQM tool that uses a 7-step programme to communicate the strategic goals throughout the organisation.
- Kaizen – a TQM tool used to continuously improve all processes, functions and operations related to all relevant stakeholders.
- Cross-functional teams - a technique used to bring together a group of employees with various skillsets to achieve a common quality objective or goal. It is also used to ensure productive relationships between different teams.
- PDCA – stands for Plan, Do, Check, Act and is a four-step management tool used to ensure processes or systems are continuously reviewed and improved. The cyclical nature of the PDCA tool highlights the importance of ongoing assessment and improvement, which is pivotal for maintaining the effectiveness of a QMS.

2.4.3 QMS in higher education

Ab Wahid (2019:564) noted the issue of quality and QA in HEIs has been gaining traction and interest, not only in the business sector, but among academics and external accreditation bodies. As a result of globalisation and advancing technology, combined with an unstable labour market, a competitive graduate population is the main product of HEIs (Zouhir and Bouaouine 2018:5).

In order for HEIs to be sustainable and successful, embracing online learning is a way of becoming more adaptive and staying relevant for an evolving demographic profile, student needs and expectations, as well as increasingly diverse demands of stakeholders (Andrade *et al.* 2020:40). In addition, a preconceived notion exists that the quality of online learning is lower than traditional face-to-face learning, with Andrade *et al.* (2020:39) asserting this could be a factor that affects the institutional goal of increasing online learning enrolments.

Implementing a QMS is one strategy for increasing confidence in the quality of online learning programs, with the assumption this will guarantee effective teaching and learning, as well as consistency, across course content (Andrade *et al.*

2020:40). Africano *et al.* (2019) found the certification and implementation of a QMS is now required for any HEI to differentiate itself from other institutions.

The implementation of a QMS for HEIs represents a strategic decision that can help advance overall performance and provide a substantial framework for sustainable development initiatives (Africano *et al.* 2019). Risk-based thinking enables HEIs to regulate the issues likely to cause deviations from the expected outcomes of the QMS. In addition, risk-based thinking allows the organisation to implement preventative measures to minimise unfavourable effects and maximise opportunities for improvement that arise Rangi (2020). Therefore, the adoption of a QMS should aspire to interject the principles of quality in the institution's processes, according to ISO 9001:2015.

Jacob, Gandure and Kommula (2024:2) acknowledge implementing ISO 9001:2015 generates its own set of challenges, related to failure rates after adopting the standard. This concurs with Chountalas, Magoutas and Zografaki (2020:4), who posit most challenges that occur after implementing ISO 9001:2015 can be classified into three categories, namely financial considerations, internal dynamics, and external factors. In addition, there are several other challenges to contend with during ISO 9001:2015 implementation, which Jacob *et al.* (2024:2) highlight, namely:

- Poor leadership.
- Commitment and responsibility.
- Bureaucracy.
- Communication.
- Limited resources.

In determining the challenges involved in implementing a QMS, organisations could anticipate and mitigate potential issues HEIs may need to deal with, in order to overcome potential obstacles and achieve their quality management objectives.

2.4.4 ISO 9001:2015 vs 21001:2018

Aniskina and Terekhova (2019:218) suggest the adoption of QMS (based on ISO standards) in HEIs is becoming increasingly prevalent across various countries. Although the ISO has developed specialised standards for educational institutions such as ISO 29993:2017 (“learning services outside formal education – Service requirements”) and ISO 21001:2018 (“Educational organisations – Management systems for educational organisations – Requirements with guidance for use”), most educational institutions certify their QMS to ISO 9001:2015, in order to increase their credibility; due to the popularity and prominence of this standard.

It is highlighted by Aguenza (2024) and Ab Wahid (2019) that, over the years, many HEIs have attempted to adopt ISO 9001 from its nascent version in 1987 to the consequent versions 1994, 2000, 2008 and the latest 2015. Wibisono (2018:66) argues the terminology used in the standard, while ambiguous in the educational sector, worked perfectly for the manufacturing industry. In the context of education for example, the terms “customer” and “stakeholder” are frequently used interchangeably. One can consider students to be the customers of education, particularly when they pay tuition; however, one can also consider industries to be the actual customers of education, because they will eventually employ the “product” of education (Wibisono 2018:66).

There is an immediate similarity between ISO 9001:2015 and ISO 21001:2018, in that both standards use what is known as High Level Structure (HLS). This structure is the ISO attempt to standardise its own system; by developing standards to ensure consistency across various disciplines (Abdelaziz 2024:2). The structure has the same clauses from 1 to 10, and future ISO standards will be based on this system to not only be comparable, but for easier integration with other standards. Gilbert (2020:50) suggests while there are shared similarities, notable differences require consideration.

First, ISO 9001 is a QMS, while ISO 21001 is referred to as a Management System for an Educational Organisation (EOMS) (Gilbert 2020:50). The subsequent terms defined in clause 3 of ISO 21001:2018, are not available in ISO 9001:2015: educator, learner, course, curriculum, teaching, lifelong learning and program. Early childhood education (ECE) requirements, facilities required for daycare and learning

resources are presented in Annex A of ISO 21001:2018 (Wibisono 2018:67; Gilbert 2020:50).

Accordingly, as stated by Wibisono (2018:67) and Kovalenko *et al.* (2020:5), the clause-by-clause comparison between ISO 9001:2015 and ISO 21001:2018 is presented in Table 2.4 below:

Table 2.4: Comparison of ISO 9001:2015 and ISO 21001:2018

Clause (HLS)	ISO 9001:2015	ISO 21001:2018	Description
4 - Context of the organisation	√	√	The objective of this clause, is for the organisation to fully understand its stakeholders and their expectations. There is a more specific example of “interested parties” in ISO 21001 than ISO 9001 .
5- Leadership	√	√	In the general sub-clause of leadership, ISO 21001 presents more sub-clauses than ISO 9001. Covering a variety of issues such as learners requiring special needs, social responsibility, and a strategic plan, which is not common in industry.
6- Planning	√	√	This clause is the most similar to the other, as both the standards outline the issue of risk and opportunity and planning of changes in both the QMS and Educational Organization Management System (EOMS).
7- Support	√	√	This clause is more comprehensive in ISO 21001 than ISO 9001. Appropriate facilities for learning and teaching are stated as requirements, rather than specifying what type of infrastructure an organisation should provide.
8- Operation	√	√	ISO 21001 addresses issues of curriculum, program and assessment design and development, protection and transparency of learners data
9-Performance evaluation	√	√	ISO 21001 requires the institution to determine the acceptance criteria. In ISO 21001, staff feedback and summative assessment outcomes are considered as management review inputs.
10 – Improvement	√	√	Both standards have the same requirements, only the order has been changed in ISO 21001.

Source: Adapted from Wibisono (2018:67) and Gilbert (2020:50)

In Table 2.4 it is seen although both standards follow a high-level structure, because ISO 21001 is specifically designed for educational institutions, specialised terms are used, for example, replacing the terms "customer" with "learner" and "courses" with "curriculum" (Kovalenko *et al.* 2020:5). Wibisono (2018:68) argues ISO 21001 acknowledges and clarifies the customers of education are actively involved in the process, unlike in regular manufacturing and production industries; therefore, a greater need for communication is required between the institution as the service provider and the learner.

Another major difference between ISO 9001:2015 and ISO 21001:2018 is the management principles the standards are based on. ISO 9001:2015 is based on the following seven principles from the standard Annex B - Principles for a QMS (Panigrahi *et al.* 2018:3):

- **Customer Focus** – the predominant aim of quality management is to conform to customer requirements and to endeavour to exceed their expectations.
- **Leadership** - Leaders at all levels of the organisation maintain unity of purpose and direction, as well as circumstances in which individuals are involved in accomplishing the organisation's quality objectives
- **Engagement of people** - All employees must be competent, empowered and committed to delivering value to the organisation. The ability to create value in an organisation is enhanced by competent, empowered and engaged individuals.
- **Process approach** - When activities are identified and managed as interconnected processes that operate as a coherent system, they produce more consistent and accurate results. Understanding how the different processes relate to each other allows an organisation to manage its resources, controls and interactions to optimise performance.
- **Improvement** - Productive organisations are constantly striving for improvement.
- **Evidence-based decision-making** - Decisions based on data and information analysis and evaluation are more likely to produce the desired results.
- **Relationship management** - Organisations must manage and maintain their relationships with interested parties such as suppliers to achieve sustainability and long-term success.

ISO 21001:2018 is based on the following 11 principles from the standard (Annex B) - Principles for an EOMS:

1. **Focus on learners and other beneficiaries** - The EOMS' predominant goal is to meet and exceed the needs and expectations of learners and other beneficiaries.
2. **Visionary leadership** - Visionary leadership entails involving all learners and other beneficiaries in the development, writing, and implementation of the organisation's mission, vision, and objectives.
3. **Engagement of people** - All involved individuals must be competent, empowered, and engaged in delivering value for the organisation.
4. **Process approach** – The EOMS is made up of interconnected processes. Understanding how this system produces results allows an organisation to optimise its performance.
5. **Improvement** – Continuous improvement is imperative for sustainability and for an organisation to react to changes to create new opportunities.
6. **Evidence-based decisions** - Decisions and curriculum based on data and information analysis and evaluation are more likely to produce desired results.
7. **Relationship management** - Interested parties impact an organisations performance. Sustainability is more likely achieved when all interested parties have a common goal.
8. **Social responsibility** - An educational institution is responsible and liable for the consequences of its decisions and activities on society, the environment and economy.
9. **Accessibility and equity** – In order to focus on learners' individual and special needs, interests, abilities and backgrounds, organisations need to be inclusive, flexible transparent and accountable.
10. **Ethical conduct in education** - Ethical conduct refers to an organisation's ability to foster an ethically professional environment, in which all interested parties are treated fairly, conflicts of interest are avoided, and activities are carried out for the benefit of society.
11. **Data security and protection** - The organisation establishes an environment in which all interested parties can interact with the institution in complete trust that

they retain control over the use of their own data and the organisation will treat their information with appropriate care and confidentiality.

(ISO 2018)

From the comparison of the above principles, although both standards follow similar management principles, the key difference according to Gilbert (2020:50) is that ISO 9001 focuses on customer satisfaction, while ISO 21001 addresses the requirements of learners, government, labour markets, and parents, as well as guardians. Wibisono (2018:68) acknowledges ISO 21001 highlights the social responsibility of an educational institution, by ensuring the organisation maintains the principles of ethical conduct, equity and appropriate data security and protection.

2.5 Summary of chapter

This chapter began with the 4IR and its impact on the education sector. The history and developments of online learning were discussed, as well as the benefits and challenges. A review of the perceptions of online learning programs from around the world were analysed and discussed, with the role of quality in education within the context of online learning presented. The TQM approach, as along with QMS for both ISO 9001:2015 and ISO 21001:2018 were reviewed and critiqued. In addition, the findings from the review of literature formed the basis for the development of the ISO 2100:2018 and TQM framework that will be developed for an online learning program. The next chapter will present the methodology that was used in order to achieve the study objectives.

CHAPTER THREE - RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter outlines the research design and methodology utilised for this study. According to Pandey and Pandey (2021:41), research is a methodical, rigorous and structured procedure that continues the scientific technique of analysis.

The chapter begins with the structure of this study, followed by a diagrammatic representation of the research design that illustrates the research strategy and introduces the main study. Thereafter the target population, questionnaire design and the sampling strategies are discussed. In addition, this chapter outlines the data collection methods and describes the data analysis techniques used in this study. The ethical considerations of the study conclude this chapter.

3.2 Research design

The research design refers to the overall strategy used to conduct a study (Leavy 2022:5). It can be described as a structured plan that provides direction for gathering and interpreting data (Pandey and Pandey 2021:41; Leavy 2022:5). Furthermore, Asenahabi (2019:80) highlights a thorough examination of the problem statement, the research questions, the conceptual and theoretical framework, along with the relevant literature, complements this strategy when selecting an appropriate research design.

Referring to a good research design, Flick (2022:3) proposes it should address the following three fundamental questions,

- What is to be investigated?
- The reason for the investigation.
- How will the investigation be conducted?

These questions correspond to the research design tasks, as outlined by Blaikie and Priest (2019:2), which include defining the study focus and framing the study, selection of data types and the collection and analysis of the data. The research

design, therefore, entails the thoughtful integration of methodological, theoretical and ethical considerations, all geared towards achieving the study objectives (Blaikie and Priest 2019:2; Flick 2022:3). The study outline is presented in Figure 3.1.

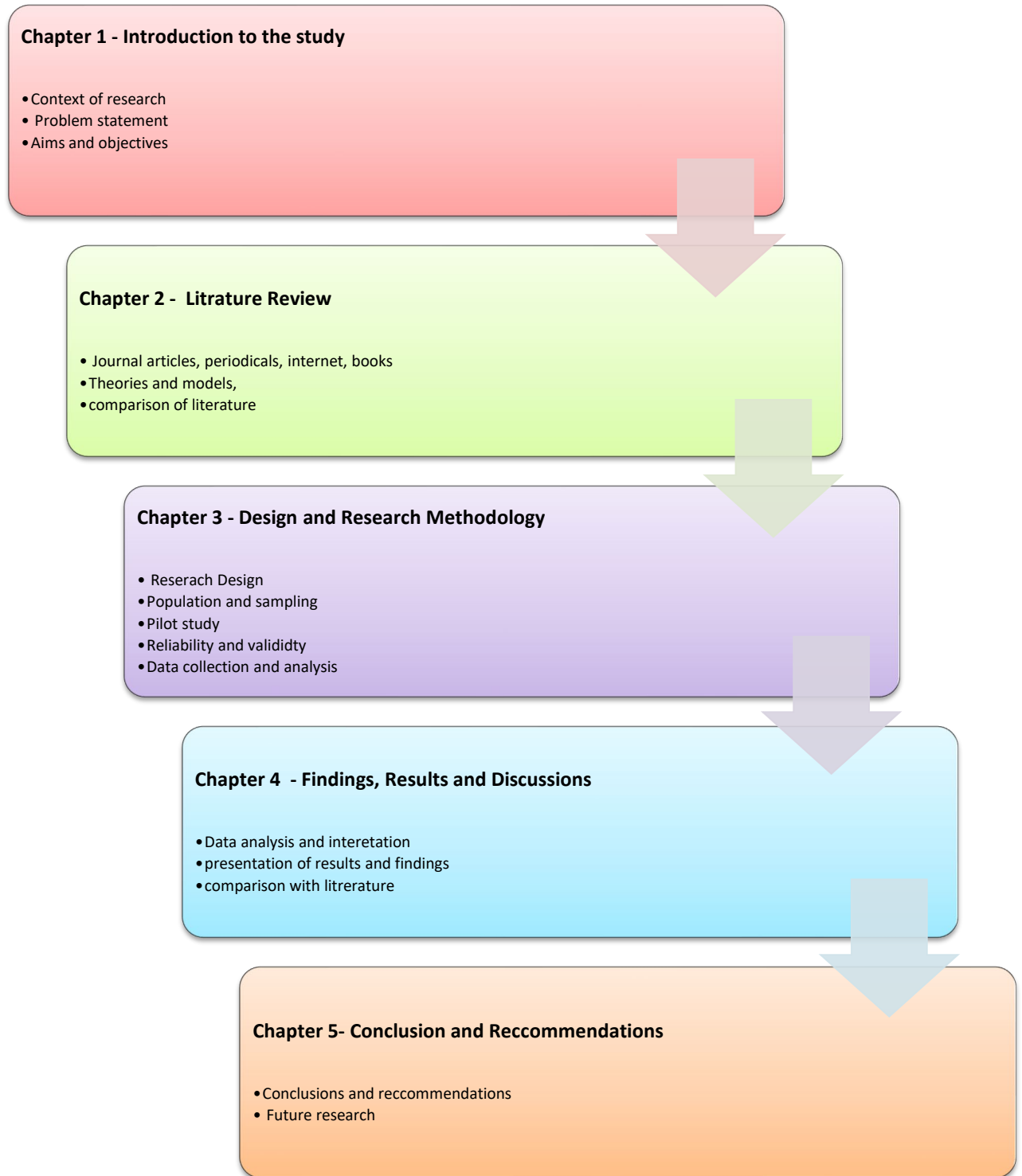


Figure 3.1: Research design

As reflected in Figure 3.1, the process begins with identifying the problem, followed by an extensive review of the most recent literature available related to online learning and QMS. Thereafter, the research design and methodology are outlined, followed by the results presentation and discussions of the main study. Lastly, conclusions and recommendations, as well as future research implications, are presented.

3.3 Research methodology

While research design is regarded as a framework for the study, the research methodology can be described as the methodical and scientific approach to the study (Asenahabi 2019:79). An effective research methodology aids in ensuring the conclusions drawn from the study are accurate, reliable and free from bias. It also assists in planning of the research process, in order to utilise data and resources available effectively (Crowe *et al.* 2017:643; Asenahabi 2019:79; Leavy 2022:5).

As Saunders (2019:10) explains, the first step in the methodology is to determine the research paradigm, followed by establishing the research approach (step 2). The third step is to select a research strategy. The final step is to determine data collection and analysis methods (Melnikovas 2018:30; Saunders 2019:10; Alturki 2021:3; Orth and Maçada 2021:741).

3.3.1 Research paradigms (Step 1)

A research paradigm refers to a viewpoint on research based on a common set of presumptions, ideas, procedures and values among researchers (McGregor 2018:3). As posited by Leavy (2022:4), selecting the appropriate research paradigm is essential, because it offers a coherent framework for conducting the study and improving the quality of the work. The three major research paradigms are, Positivism, Interpretivism, and Pragmatism (Kivunja and Kuyini 2017:30; proofed.com 2024).

- Positivism is based on the conviction that information and data can be acquired by means of impartial measurements and observations of an external reality.

Johannesson and Perjons (2014:40) state this paradigm typically makes use of numerical data; best suited to the quantitative approach.

- Interpretivism maintains reality is not independent but is instead created by the observer through their feelings and experience. This paradigm usually adopts the qualitative approach, as the data collected are representative of people’s perspectives and experience (Taherdoost 2022:53).
- Pragmatism supports a more adaptable approach that concentrates on the effectiveness and suitability of the research findings. Pandey and Pandey (2021:40) posit this paradigm incorporates both qualitative and quantitative data, which permits the researcher to cultivate a more extensive understanding of the research findings with the combination of both types of data.

Considering the nature of the research problem, as well as the aim of this study, the pragmatism paradigm was the preferred choice, because it is easier to describe and report and generalise data (Maarouf 2019:7). This approach is particularly effective as it allows for flexibility in data collection and analysis, enabling a more comprehensive and practical examination of the research questions.

3.3.2 Research approach (Step 2)

The three main types of research approach typically comprise of a qualitative, quantitative, and mixed methods approach (Crowe *et al.* 2017:640; Asenahabi 2019:78; Flick 2022:3). A comparison of the different research approaches is presented in Table 3.1 below.

Table 3.1: Comparison of research approaches

	Quantitative Approach	Qualitative Approach	Mixed Methods Approach
Scientific method	Deductive Test hypotheses and theory with data	Inductive Generate new hypotheses and theory from data collected	Deductive and inductive
Most common Research objectives	Description Explanation Prediction	Description Exploration Discovery	Multiple objectives

	Quantitative Approach	Qualitative Approach	Mixed Methods Approach
Nature of study	Study behaviour under artificially controlled conditions	Study behaviour is natural environment or context	Study behaviour is more than one context or condition
Focus	Narrow angle lens testing specific hypotheses	Wide and deep angle lenses Examine the length and breadth of a phenomenon to learn more about them	Multi lens
Form of data collected	Collect numeric data using structured and validated instruments	Collect narrative data using semi or unstructured instruments (open-ended survey items, interviews, observations, focus groups and documents)	Numeric and narrative Multiple forms
Nature of Data	Numeric variables	Words, images themes and categories	Mixture of numeric variables, words, images and themes
Data analysis	Identify statistical relationships	Holistically identify patterns, categories and themes	Statistical and holistic
Results	General findings General understanding of respondents viewpoint Researcher framed results	In-depth understanding of respondents viewpoint Respondent framed results	Corroborated findings than can be generalised
Final report	Statistical report including correlations, comparisons of means, and statistically significant findings.	Narrative report including contextual descriptions, categories, themes and supporting respondents quotes.	Statistical findings with an in-depth narrative description and identification of overall themes.

Source: Maree (2016) and Kumar (2019)

Table 3.1 illustrates a comparison of research approaches, reflecting the view of Crowe *et al.* (2017:650) that qualitative research involves collecting and analysing non-numerical data to understand opinions and experiences, whereas quantitative research involves collecting and analysing numerical data for statistical analysis. The combination of both qualitative and quantitative techniques is referred to as a mixed methodology approach (mixed methods) and is advantageous because it not

only reflects the participant's point of view, but is also useful in understanding the differences between the quantitative and qualitative findings (Brannen 2017:25; Crowe *et al.* 2017:645).

For this study, a mixed methodology approach was selected to provide a better understanding of the research problem and effectively address the objectives. Therefore, the survey questionnaire served as the quantitative aspect of the study, to provide measurable data on the effectiveness of the online learning program, while the focus group interviews intended to offer detailed qualitative insights into the experiences and perceptions of stakeholders. The decision to employ a mixed methods approach was further substantiated, as emphasised by Asenahabi (2019:77), since employing both qualitative and quantitative approaches ensures they complement each other and compensates for the disadvantage of each individual method, making it suitable for an exploratory study.

3.3.3 Research strategy (Step 3)

Research strategy introduces the essential elements of a research study, including the research problem, design and methods and refers to the plan for addressing the research problem, relating how the researcher will execute the methodology (Johannesson and Perjons 2014:40). Taherdoost (2022:55) suggests the six main research strategies are as follows:

- Experimental – this research strategy incorporates an objective, methodical, and controlled investigation, with the goal of anticipating and managing the phenomenon.
- Survey – an overall view and wide range of the research problem is provided through use of this strategy.
- Ethnography – this type of research strategy entails examining a culture by closely investigating its constituents.
- Action research – revolutionary change is pursued through this kind of strategy, by conducting study and acting concurrently, with critical reflection serving as a connecting thread.

- Ground theory – this research strategy aims to develop a theory by rigorous data collection and analysis through comparative analysis.
- Case study – a case study strategy allows for an in-depth examination of a particular subject, organisation or phenomenon. This strategy facilitates the investigation of a research problem in a specified setting using a range of data sources. McGregor (2018:3) posits researchers can find subtle nuances and levels of comprehension with a case study strategy, by concentrating on a particular instance or event they might overlook using other research approaches. In addition, Saunders (2019:10) suggests this kind of strategy is most suitable to investigate a possible problem at the preliminary stage.

This study investigated new boundaries of teaching and learning and adopted an exploratory case study research approach. Specifically, it examined the influence of innovative teaching methods on student engagement and learning outcomes within the DUT Business School. Hollweck (2016:280) states an exploratory case study strategy is generally used to investigate a distinct research problem at a preliminary stage and provide a better understanding of the research area (Leavy 2022:3).

3.4 Sources of data

Data collection is the procedure for collecting and analysing data on relevant factors in a predetermined, methodical way, in order to address research questions, test hypotheses, and assess results (Lobe, Morgan and Hoffman 2020:19). Archibald *et al.* (2019:19) state the reason data collection is important, is the investigation or study would not be done without the specific information being gathered. It is asserted by Kabir (2016:220) that data collection can be divided into primary and secondary collection methods and can involve quantitative and qualitative approaches to the collection of data.

3.4.1 Primary data

Mazhar *et al.* (2021:7) claim the collection of primary data entails gathering original data directly from the source or by interviewing the respondents. This is supported

by Lobe *et al.* (2020:19), who note primary data enable researchers to acquire first-hand information particularly pertinent to their research problem. There are several methods of collecting primary data, as presented in Table 3.2 below.

Table 3.2: Primary data collection methods

Data Collection method	Description
Surveys and Questionnaires	The structured questionnaires or surveys are designed to collect data from individuals or groups. These can be conducted through face-to-face interviews, telephone calls, email, or online platforms.
Interviews	Interviews involve direct interaction between the researcher and the respondent. They can be conducted in-person, telephonically, or through video conferencing. Interviews can be structured (with predefined questions), semi-structured (allowing flexibility), or unstructured (more conversational).
Observations	Researchers observe and record behaviours, actions, or events in their natural setting. This method is useful for gathering data on human behaviour, interactions, or phenomena without direct intervention.
Experiments	Experimental studies involve the manipulation of variables to observe their impact on the outcome. Researchers control the conditions and collect data to draw conclusions on cause-and-effect relationships.
Focus groups	Focus groups bring together a small group of individuals who discuss specific topics in a moderated setting. This method helps in understanding opinions, perceptions, and experiences shared by the participants.

Source: Lobe *et al.* (2020:19) and Mazhar *et al.* (2021:7)

As shown in Table 3.2, Mazhar *et al.* (2021:7) explain typical techniques for gathering data can include observations, focus groups, interviews, and experiments, as well as survey questionnaires. According to Lobe *et al.* (2020:19) combining several data collection methods yields better results, enabling conclusions to be drawn with some degree of certainty. Archibald *et al.* (2019:18) confirm one of the most trusted ways for researchers to collect data is through a questionnaire.

The primary data for this study were collected through questionnaires and interviews. The questionnaires were emailed to participants, who were given one month to respond. The email addresses for participants were obtained from the DUT Business School. A follow-up reminder email was sent to participants after one month.

Interviews with the participants were conducted through Microsoft Teams. An introductory email was sent to participants, followed by a MS Teams meeting invite. Meetings were scheduled by the researcher with participants by means of telephonic or video calls. All interviews were recorded and transcripts filed. All electronic documents and recordings are kept in a password protected folder and will be stored for a period of five years; thereafter, all will be deleted from the relevant storage locations. Participant details were accessed through DUT and no other personal details were accessed through student numbers.

3.4.2 Secondary data

The collection of secondary data, as Kabir (2016:220) points out, entails utilising data already obtained by another party, for a purpose other than the original plan. Lynn Silipigni and Marie (2017:20) argue the researcher has no influence over the technique used to acquire the data or restrictions in their use, when using secondary data. In contrast, utilising secondary data can be cost- and time-effective (Barrett and Twycross 2018:3).

For this study, the main sources of secondary data were articles published in academic journals and textbooks and this provided the groundwork for the chapter 2 literature review. Secondary data were also used in the preliminary work and gap analysis (reviewing of policies and procedures at the DUT Business School), which served as an introduction for data collection in chapter 3. Additionally, secondary data supported the research findings and outcomes.

3.4.3 Gap analysis

A gap analysis is a process of establishing the current situation based on the target's desire or need and the cause of the gap between the two (Syahrullah *et al.* 2022:68). Furthermore, it is suggested a gap exists between "what you want" and "what you have". The gap is defined as the relationship between what is considered important and the resulting difference between performance and expectations (Syahrullah *et al.* 2022:67).

For this study, a gap analysis of the current QA protocols at the DUT Business School was conducted through an interview with the HOD. The ISO 21001:2018 standard was used as the guiding benchmark to generate the assessment criteria for the gap analysis investigation. This approach aligns with the recommendation posited by Syahrullah *et al.* (2022:67) that conducting a gap analysis on current quality protocols, using ISO 21001:2018, will not only assist in determining the current state of the QMS but will also be beneficial to identify the needs and expectations for its implementation.

3.4.4 Characteristics of a questionnaire

As explained by Brace (2018:2), Honey-Rosés *et al.* (2021:270) and Lohr (2021:4), a good questionnaire should be developed within the appropriate conceptual framework. In addition, each question should be carefully reviewed for relevancy and clarity, with respect to the research problem. Furthermore, when designing the questionnaire, the following characteristics should be considered:

- The questions should be short and focused and should be time-consuming.
- It should be simple, with easy-to-follow questions.
- The questionnaire should avoid the respondents having to do any calculations.
- It should not be vague and ambiguous in nature.
- It should be made clear in the questionnaire that the respondents' responses are confidential, and their privacy is protected.
- The questions should address the research problem.

The characteristics discussed (Brace 2018:2; Kalton 2020:5; Honey-Rosés *et al.* 2021:270; Lohr 2021:5) were incorporated in the design of the questionnaire for this study. The questionnaire was informed by TQM principles, online and teaching practices and the ISO 9001:2015 and ISO 21001:2018 QMS standards.

Krosnick (2018:440) defines a questionnaire as a collection of deliberately designed questions, aimed at collecting particular data, and producing accurate answers. Brace (2018:2) points out questionnaires can be either self-or researcher-administered. This is supported by Krosnick (2018:440), who claims while self-administered questionnaires are more cost-effective, researcher-administered questionnaires offer a more comprehensive understanding of the collected data.

The three points of focus when designing a questionnaire are the wording, coding and appearance of the questionnaire (Honey-Rosés *et al.* 2021:270). In addition, Brace (2018:5) suggests in order for the data to be categorised, quantified and statistically analysed, the questionnaire should be developed to collect data in a methodical and structured way. This served as the foundation of the questionnaire developed for this study.

3.4.5 Types of questions and measuring scales

Kalton (2020:5) states knowing the distinction between open- and closed-ended questions enables the researcher to formulate appropriate questions that will answer the research problem effectively. A comparison of open-ended vs closed-ended questions is presented in Figure 3.2 below.

Closed-Ended	Open-Ended
<ul style="list-style-type: none"> • Limited answer options • Common types of closed-ended questions are answered with yes/no or multiple choice options • Can be used to collect quantitative data • Completed in a shorter time-frame because the answers are straight and to-the-point • Surveys, polls, questionnaires are common data collection methods 	<ul style="list-style-type: none"> • Allows free-form answers • Questions include words such as what, how, where, when, etc. • Can be used to collect qualitative data • Takes longer to gather information from respondents because they need to elaborate and explain their responses • Observations, jobs to be done, interviews, and focus group are common data collection methods

Figure 3.2: Comparison of closed- and open-ended questions

Source: Kalton (2020:5) and Lohr (2021:4)

From the comparison in Figure 3.2, Lohr (2021:4) argues while closed-ended questions force respondents to select from a list of options provided, open-ended questions aim to obtain an opinion from the respondent. In addition, Lohr (2021:4) suggests closed-ended questions, due to their standardised nature, are simpler to analyse statistically.

Creamer (2017:5) highlights a measuring instrument is a method through which primary data can be obtained from respondents by administering a questionnaire or personal interviews. According to Mohamad *et al.* (2015:164), a survey questionnaire is advantageous for its economical nature and wide coverage. Langley (2020:371) suggests that interviews are beneficial and appropriate when targeting detailed perceptions, opinions and attitudes.

This study utilised both open- and closed-ended questions (Appendix F and G). One of the study objectives was to determine the challenges faced and needs and expectations of the relevant stakeholders of the online learning program. To achieve this objective, it was important to use scales to measure the attitudes and intensity of feelings (Honey-Rosés *et al.* 2021:270). For this study, a 5-point Likert scale was

selected. Braun *et al.* (2021:645) state this scale permits respondents to self-report the degree of their feelings, namely strongly agree, agree, remain neutral, disagree and strongly disagree. Krosnick (2018:440) claims the Likert scale is more reliable than most other scales, as it permits a broad range of responses.

3.5 Target population and sample size

Alvi (2016:13) and Oh and Pyrczak (2023:6) contend it is crucial for the researcher to distinguish between the population and the target population, as these constitute the foundation of any study. Lohr (2021:5) characterises a population as the collection of people confined to a certain area of particular geography. However, Asiamah, Mensah and Oteng-Abayie (2017:1608) claim the target population can be described as every participant who satisfies the requirements for a research study.

For the purpose of this study, the target population thus consisted of all learners registered at the DUT business school online learning program for the year 2023. A total of 145 students were enrolled in the online learning program. Alvi (2016:14) indicates a sample represents a specific group from a target population, which the data will constitute. According to the Sample Size Calculator (Appendix C), a population of 145 requires a sample of 106. This meant the sample size was set at 106 for the quantitative part of the study. The sample size was based on a 95 percent confidence level, with a five percent margin of error, as recommended by Stratton (2021:373). The number of respondents that completed the survey was 96, which indicates the study achieved a response rate of 90.5 percent.

The target population of the interviews consisted of academics specialising in the field of higher education and quality management. Lohr (2021:4) confirms a sample size of four participants or more is deemed appropriate to form a focus group in a research study. Therefore, for this study, 11 academics in the field of higher education and quality management were interviewed. This number was deemed suitable to represent the sample size for the qualitative part of the study.

3.5.1 Sampling techniques

Lohr (2021:5) claims selecting the incorrect sampling method can affect the validity of the research. As highlighted by Etikan and Bala (2017:5), there are two types of sampling methods, namely probability and non-probability sampling. Willie (2022:9) explains probability sampling is when the researcher chooses a limited criterion and selects individuals randomly from a population. Taherdoost (2022:53) concurs and states probability sampling allows all participants to have an equal chance of being included in a study.

The different types of probability sampling include simple random sampling, systematic sampling, stratified sampling and cluster sampling (Gliner *et al.* 2001:486).

According to Asiamah *et al.* (2017:1608), the non-probability sampling method involves non-random selection of participants based on convenience or other criteria, allowing easy collection of data. Stratton (2021:373) posits non-probability sampling is customised by the researcher and selection bias maybe present. However, Etikan and Bala (2017:6) argue non-probability sampling is advantageous, as it is cost-effective and convenient. In addition, Singh and Masuku (2014:10) claim this type of sampling is more effective for exploratory research.

The different types of non-probability sampling are described by Alvi (2016:15), Asiamah *et al.* (2017:1608), Lind, Marchal and Wathen (2019:6), Stratton (2021:373) and Oh and Pyrczak (2023:6), as:

- Convenience Sampling - this method depends on accessibility of respondents and is selected based on proximity, instead of representation.
- Snowball sampling - this technique is applied when the respondents might be difficult to find, leading the researcher to enlist existing study participants in recruiting potential future subjects, to derive results for highly sensitive information.
- Volunteer sampling - In this type of sampling, the decision to participate in the study or not is dependent on the respondent.

- Purposive/Judgmental sampling - this sampling is carried out using prior theories with regard to behaviour and characteristics of the target population. It is the preferred method to use when selecting focus group participants.

The non-probability purposive sampling technique was selected for this study, as Sharma (2017:749) reported that purposive sampling provides the researcher with the justification to make generalisations from the sample being studied. These generalisations can be theoretical, analytical and logical in nature. For this study, the questionnaire was administered to the entire target population to enhance the accuracy and reliability of the data and compensate for non-responses from the calculated sample size of 106 (Heiervang et al. 2011:69).

3.6 Data analysis

Creamer (2017:6) acknowledges data analysis is one of the most important components of research. It is, therefore, imperative the correct data analysis methods are used to ensure the findings are insightful and actionable.

3.6.1 Quantitative data analysis

Willie (2022:8) is of the view quantitative data analysis is typically used when the researcher needs to determine variations between groups, test hypotheses, or evaluate the cause-and-effect between variables. Statistical analysis is commonly performed on quantitative data to detect correlations and relationships between variables (Mazhar *et al.* 2021:7). Two primary types of statistical analysis are described by Etikan and Bala (2017:5), namely descriptive and inferential statistics. Oh and Pyrczak (2023:5) note descriptive statistics refer to the graphical representations of data, whereas inferential statistics allow the researcher to make inferences with regard to a population based on the data.

According to Guetterman (2019:7), Mishra *et al.* (2019:67) and Oh and Pyrczak (2023:5), the following inferential statistics are used in quantitative data analysis.

- Factor Analysis - this technique is used to convert large numbers of variables into simplified factors. The variances from all the variables are presented as a

common score. Willie (2022:8) suggests factor analysis is mainly utilised for Likert scale questions.

- Correlation – the technique is most often used to determine the extent of a linear relationship between variables. The correlation of variables can be either negative or positive.
- Analysis of variance (ANOVA) – can be used to analyse the variance of a dependent variable. Usually compares two mean values.
- Regression analysis - used for investigating the type of relationship between independent and dependent variables and using this technique is recommended to determine levels of satisfaction.
- Kaiser–Meyer–Olkin (KMO) measure - this technique is used to evaluate the suitability of the data collected for factor analysis. Values greater than 0.5 show the sample is satisfactory.
- Rotated compound matrix - this technique is used to assist the researcher in deciphering what the components represent.
- Cronbach's Alpha – used to test the reliability and repeatability of a questionnaire.
- Independent samples t-test - a test that compares two independent groups of cases.
- One sample t-test - tests whether a mean score is significantly different from a scalar value.
- Bartlett's Test - used as an inferential statistical technique to verify the equality of variance in various populations (Arsham and Lovric 2011:22).

Descriptive analysis was selected as the first level of analysis that assisted in summarising and finding patterns with the data. Inferential analysis is more complex and was selected to show the correlation between multiple variables (Crowe *et al.* 2017:650). For this study, the following quantitative analysis techniques were used to interpret the data:

- Descriptive statistics, including means and standard deviations, and frequencies represented in graphs.
- ANOVA.

- Pearson's and Spearman's correlation: Spearman's correlation measures how ordinal variables or rank orders are related. Pearson's correlation coefficient is a measure of linear association.
- One sample t-test.
- Independent samples t-test.
- Cronbach's Alpha.
- Bartlett's test.

The questionnaire was used to develop the following constructs used in the statistical analysis:

Table 3.3: Description of constructs used in statistical analysis of data

Section A Questions	Construct
A1, A3, A4, A9, A13, A17	The learning process (LP)
A6, A7, A8	External factors (EXT)
A2, A5, A12, A15, A16	Emotional factors (EMOT)
A10, A11	Assistance (ASS)
Section B and C Questions	Construct
B1, B2, B3, B4, B5, B6, B7,	General (SAT_GEN)
C1, C2, C3, C4, C5, C6, C7	The course delivery (SAT_CD)

Table 3.3 describes the breakdown of each construct from sections A, B and C of the questionnaire. These constructs are crucial in statistical analysis, because they assist in understanding complex and abstract concepts that are frequently difficult to measure (Taherdoost 2016:40).

3.6.2 Qualitative data analysis

Lester, Cho and Lochmiller (2020:95) define qualitative data analysis as the method of analysing, interpreting and organising qualitative data, that is, non-numeric conceptual information. However, Jackson, Bazeley and Bazeley (2019:3) point out there are six main qualitative data analysis techniques, namely:

- Content Analysis - determines the frequency of specific words, topics, ideas in texts, and images, as well as videos or audio transmissions.
- Narrative Analysis - can be used to analyse personal stories and testimonials of participants, case studies and focus groups.
- Thematic Analysis - Determines, classifies, examines, and evaluates trends in the data from qualitative research.
- Discourse Analysis - this technique is used to determine the hidden meaning behind the qualitative data by observations and the study of relationships, texts, audio and video.
- Framework Analysis- is primarily used for social research to ensure quality standards in qualitative data analysis. It allows the researcher to systematically analyse data and present it in matrix output that enables a comparison and evaluation of participants and themes.
- Grounded Theory – the technique of analysing data that allows the researcher to create hypotheses and theories through qualitative data analysis and real-world data.

The Nvivo software was used to evaluate the qualitative data through thematic analysis, which determines the presence of certain words, themes or concepts within given qualitative data. This data analysis method is most suitable for responses from interviews, as described by Crowe *et al.* (2017:645).

3.7 Validity

Taber (2018:1273) argues validity examines the extent to which the questionnaire measures what we want to measure. According to Bolarinwa (2015:198), validity is the amount of systematic error in the questionnaire. The different types of validity checks include: construct validity, which is the adherence of a measure to existing theory and knowledge of the concept being measured; content validity, which refers to the extent to which the measurement covers all aspects of the concept being measured and; criterion validity, which is the extent to which the result of a measure corresponds to other valid measures of the same concept (Mohamad *et al.* 2015:164).

A comparison of the different types of validity is presented in Figure 3.3 below:

Construct	Content	Criterion
<ul style="list-style-type: none"> • The degree to which the questionnaire measures theoretical constructs that were intended • Does the questionnaire measure what it is supposed to? 	<ul style="list-style-type: none"> • The degree to which the constructs in the questionnaire represent all aspects of the variable being measured • The questionnaire measures content according to an expert based on theory 	<ul style="list-style-type: none"> • The degree to which the questionnaire is related to the independent measure of the relevant criteria • Does the measure differentiate in a manner that helps to predict a criterion variable?

Figure 3.3: Comparison of validity types

Source: Sürücü and Maslakci (2020:2694)

It is stated by Willie (2022:8) that testing the validity of the qualitative aspect of the study, refers to verifying the truthfulness and accuracy of the findings. Therefore, the word frequency function in the Nvivo software was executed to accurately determine the most common words emanating from the interview transcripts that presented the themes and major concepts from the qualitative data. Subsequently, construct validity was used to ensure the indicators and measurements were carefully developed, based on relevant existing knowledge from a review of literature (Taber 2018:1273). The validity was assessed by confirming how well the results aligned with established theories and the baseline of TQM principles.

3.8 Reliability

Reliability is a statistical measure of how consistent the questionnaire is (Sürücü and Maslakci 2020:2694). Bolarinwa (2015:198) argues reliability is the extent to which a questionnaire can consistently yield the same result. Further to this, Taherdoost (2016:40) posits reliability testing is crucial, because it evaluates how consistently a questionnaire performs across its components. According to

Mohamad *et al.* (2015:164), the four ways of evaluating reliability are; split half method, test-retest method, internal consistency and reliability coefficient.

For the purpose of this study, internal consistency was used as a measure of reliability. As explained by Sürücü and Maslakci (2020:2694), Cronbach alpha computations are most efficient to measure internal consistency in research. To measure the reliability of the questionnaire, Cronbach's alpha was computed using SPSS software. A Cronbach alpha value of 0.7 and above is suggested as acceptable by Taber (2018:1273).

3.9 Pilot study

Hassan, Schattner and Mazza (2006:70) describe a pilot study as a “small study conducted to test research protocols, data collection instruments, sample recruitment strategies and other research techniques in preparation for a larger study.” The survey questionnaire for this study was administered to 10 participants from the target population to detect whether there were any flaws, such as ambiguous, misleading or unclear questions. The results from the pilot study were analysed and found to be acceptable. However, four questions were revised for the main study, with minor changes made to questions A12, A13, A15 and A16 in section A of the questionnaire, to improve the reliability of the main study. Table 3.4 below presents the Cronbach alpha computations for the different sections of the questionnaire in the pilot study:

Table 3.4: Cronbach Alpha values for pilot test

Section	Cronbach alpha Value
A – Challenges faced with online learning	0.44
B- Needs and expectations	0.89
C- How satisfied are you with the lecturer	0.96
D- Overall Experience	0.74
E- DUT Business School	0.89

As shown in Table 3.4, sections B to E reflected a Cronbach alpha value of 0.7 and more. This is deemed acceptable according to Sürücü and Maslakci (2020:2694).

3.10 Exclusion and inclusion criteria

Patino and Ferreira (2018:84) state, on the one hand, inclusion criteria can be described as the key characteristics of the target population that the researchers will utilise to answer the research question. On the other hand, exclusion criteria are defined as key characteristics of participants that meet the inclusion criteria but have additional features that could interfere with the success of the study.

This study was applicable to students enrolled for the online program at the DUT Business School. Facilitators, administrators and technical staff were excluded. In addition, respondents from the pilot study were also excluded from the main study. The inclusion criterion for the focus group was experts in the quality and higher education sectors.

3.11 Anonymity and confidentiality

Anonymity is important in order that stakeholders can fully participate in research activities without fear or favour. Confidentiality is vital, because stakeholders need to be reassured the personal views, opinions and perceptions expressed in the data collection processes will not be shared without their consent, since sharing such information may prejudice their employment, academic, professional and personal relationships (Bos 2020:149). For this study, anonymity and confidentiality were maintained by ensuring the identities of participants were protected at all times. The results and findings of the study excluded participant identities.

3.12 Ethical considerations

All participants in this study were provided with sufficient information concerning the scope and purpose of this research. Participants were not forced to answer any questions that may be viewed as offensive, too sensitive, personal or views they wished to keep private. Informed consent was sought in the administration of all questionnaires, observations and focus groups. An informed consent letter was distributed to the participants highlighting the purpose of the study and it informed

the participants their taking part in the study was voluntary and they were free to withdraw at any time. The researcher has the responsibility to ensure the research study is conducted in an ethical manner and the participants involved are not harmed (Suri 2020:41).

3.13 Summary of chapter

The overall approach and research design adopted for this study, as well as the research methodology, target population and sampling methods were described in this chapter. Furthermore, an outline of the measuring instrument, reliability and validity, and data collection methods was presented, along with the exclusion and inclusion criteria, anonymity and confidentiality, as well as the ethical considerations. In addition, the pilot study was analysed and presented. The qualitative and quantitative techniques outlined in this chapter served as the foundation for the data analysis, with the next chapter presenting the findings, results and discussions.

CHAPTER FOUR - RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results and discusses the findings obtained from the gap analysis investigation, quantitative survey questionnaire and qualitative method interviews. These research instruments were designed to gather empirical information on the first two study objectives. The first objective was to conduct a gap analysis on the organisation's current quality initiatives, in relation to their online learning program. The second objective was to determine the challenges faced and the needs and expectations of students attending the online learning.

The survey questionnaire was administered to students that attended the online learning program at DUT Business School, with SPSS Software used to analyse the quantitative data, presented using both descriptive and inferential statistics. The interviews were conducted on MS Teams and the corresponding qualitative data were analysed using NVIVO software for thematic analysis.

4.2 Results of the gap analysis

To successfully implement a QMS in higher education, the organisation needs to first determine and perform a current state analysis, which will in turn, identify any gaps that will then inform an effective implementation plan (Aguenza 2024). Each clause in the GAP analysis report is presented individually below offering a comprehensive overview of the findings.

4.2.1 Clause 4 – Context of the organisation

The results of the gap analysis for clause 4 is presented in Table 4.1. This clause focuses on understanding the context of the organisation to effectively implement the management system.

Table 4.1: Gap analysis of clause 4 - Context of the organisation

GAP ANALYSIS REPORT			
No	Description	Yes/ No	Comment
Clause 4	4.1 Understanding organisation and its context	Yes	Organisation has a vision and mission statement
	4.2 Understanding needs and expectations of Interested parties	Yes	Studies are being conducted currently to determine the needs and expectations of interested parties
	4.3 Scope of EOMS	No	There is no documented scope of the EOMS
	4.4 EOMS	No	There is no dedicated Quality Management System

As seen in Table 4.1, the results for clause 4.1 highlight the DUT Business School does have a vision and mission statement, which is currently displayed on the website, and it clearly outlines the organisation and defines its context. According to Breznik and Law (2019:1365), vision and mission statements are crucial tools that assist universities and HEIs in establishing and achieving their strategic goals and objectives.

With reference to clause 4.2, it was noted studies are currently being conducted to determine the needs and expectations of the students registered at the DUT Business School. Makoe and Nsamba (2019:133) suggest, due to the geographical separation of lecturer and student through online learning, it is imperative the educational institution determines the needs and expectations of its students, thereby bridging the pedagogical gap that occurs with online learning.

Clause 4.3 reveals the DUT Business school lacks a documented scope for an EOMS. Khawaja and Khan (2022:480) argue an organisation lacking a clearly defined documented scope may heighten the risks of quality issues going unnoticed, potentially resulting in customer dissatisfaction and non-compliance with regulations. In relation to clause 4.4, the absence of a formal QMS at the DUT

Business school, suggests the organisation could potentially face numerous quality challenges, thereby diminishing its competitiveness (Vijayan Gurumurthy 2018:546).

4.2.2 Clause 5 – Leadership

Clause 5 of ISO 21001:2018 focuses on the leadership and commitment required from top management in educational organisations. Table 4.2 below presents the gap analysis results of this clause.

Table 4.2: Gap analysis of clause 5 - Leadership

No	Description	Yes/No	Comment
Clause 5	5.1 Leadership and commitment	Yes	Organisation has demonstrated commitment to developing a strategic plan
	5.2 Policy	No	There is no Quality Policy
	5.3 Organisation roles and responsibilities	No	No evidence of an organogram

Strategic planning is described by Williams (2021:1205) as a vital instrument in achieving the objectives outlined in the organisation’s vision and mission statements. Table 4.2 reveals for clause 5.1, the leadership at the DUT Business School has demonstrated their commitment to effective leadership, by having regular strategic planning meetings and Executive Committee (EXCO) Meetings.

It is, however, noteworthy that there is no documented quality policy at the DUT Business School (clause 5.2). Andrade *et al.* (2020:39) reported an absence of a quality policy at a business school can have a negative impact on their reputation and enrolment numbers. Furthermore, a business school offering online learning courses, without a quality policy, is at risk of losing its accreditation, which directly affects the credibility of the qualifications received from the institution (Andrade *et al.* 2020:39). Within the context of clause 5.3, the DUT Business school does not have an organogram.

Sukkar (2017:10) notes it is imperative to have an organogram in any HEI that clearly defines the roles and responsibilities of all employees. Furthermore, Van der

Vyver (2020:5) suggests a lack of organisational structure (or organogram) can result in poor communication and a lack of clarity regarding roles and responsibilities.

4.2.3 Clause 6 – Planning

Clause 6 of ISO 21001:2018 addresses planning within the management system for educational organisations. Table 4.3 below demonstrates the gap analysis results of this clause.

Table 4.3: Gap analysis of clause 6 - Planning

No	Description	Yes/No	Comment
Clause 6	6.1 Actions to address risks and opportunities	Yes	SWOT (Strength Weaknesses, Opportunities and Threats) analysis conducted in conjunction with the strategic plan
	6.2 EOMS objectives and planning for them	Yes	Organisation is currently in the process of planning and determining EOMS objectives
	6.3 Planning of changes	No	Considering the absence of a documented EOMS, there is no planning of changes to the EOMS

The outcome pertaining to clause 6.1, illustrated in Table 4.3, highlights that the organisation conducted a SWOT analysis to determine the risks and opportunities for the business school. Al Kadri and Widiawati (2020:324) suggest utilising a SWOT analysis results in more informed decisions, which will impact the growth of the business school. Clause 6.2 shows the DUT Business School currently has plans in place to implement a QMS and determine its objectives by utilising an external service provider. In a recent study, LN and Saxena (2023:13) found planning of changes to a QMS is important, as it allows the organisation to readily adapt to sudden changes, manage risks, and keep up with evolving technology and changes in industry standards (clause 6.3).

4.2.4 Clause 7 – Support

Clause 7 of ISO 21001:2018 focuses on support, detailing the resources and infrastructure necessary for an effective management system for an educational organisation. Table 4.4 below presents the gap analysis results for this clause.

Table 4.4: Gap analysis of clause 7 - Support

No	Description	Yes/No	Comment
Clause 7	7.1 Resources	yes	Organisation uses DUT policies for resource allocation and control
	7.2 Competence	Yes	Organisation uses DUT policies for Human Resources
	7.3 Awareness	Yes	Organisation has communicated quality initiatives to staff
	7.4 Communication	No	There is no communication policy
	7.5 Documented information	Yes	Academic records, curriculum changes are all documented

As seen in Table 4.4, the results for clause 7.1 indicate the DUT Business School utilises institutional level policies. Aburizaizah (2022:2) posits a resource allocation policy is an effective strategic tool that allows an organisation to manage and control its resources, enabling them to efficiently allocate digital and technological resources for continuous improvement initiatives. Clause 7.2 highlights that the DUT Business School falls under the Faculty of Management Sciences; therefore, it follows the institutional level human resource policies and procedures. Zhao, Pinto Llorente and Sánchez Gómez (2021:168) claim ensuring all staff are digitally competent directly impacts quality of education for online learning.

With respect to Clause 7.3, the management at DUT Business School ensures any quality initiatives are communicated to staff via email. As Aburizaizah (2022:2) points out, for a quality initiative to be successful, there needs to be buy-in from staff to encourage a quality culture. Clause 7.4 indicates that there is no communication policy at the DUT Business School. Van der Vyver (2020:5) claims an absence of a communication policy leads to miscommunication with staff and important information may not be relayed in a timely manner. Within the context of clause 7.5,

documented information is an important aspect of a QMS. According to LN and Saxena (2023:13), documented information is important, because it is the starting point to which all processes can be evaluated and reviewed for continuous improvement initiatives; thereby improving quality of education.

4.2.5 Clause 8 – Operation

The results of the gap analysis for clause 8 is presented in Table 4.5. This clause emphasises the need for implementing processes to monitor and control the operations.

Table 4.5: Gap analysis of clause 8- Operation

No	Description	Yes/No	Comment
Clause 8	8.1 Operational Planning and control	No	There are no process flow diagrams or documented processes.
	8.2 Requirements for educational products and services	Yes	The organisation has a procedure it follows for educational products and services and changes to these products or services are communicated effectively.
	8.3 Design and development	Yes	The organisation follows the requirements from the Higher Education Quality Committee (HEQC) and Council of Higher Education (CHE)
	8.4 Control of externally provided products and services	No	There is no dedicated procedure to control the services provided by external service providers
	8.5 Delivery of educational product and services	Yes	Pertinent information like conditions for admission is published on the organisation website and brochure
	8.6 Release of educational product and services	Yes	Organisation follows the institutional level policy for releasing results and qualifications
	8.7 Control of educational non-conforming outputs	No	There is no procedure for the control of non-conforming products and services

From Table 4.5, it is seen the finding for clause 8.1 shows no documented procedures and flow diagrams for the different processes at the DUT Business School. Castro and Tumibay (2021:1370) confirm the process approach and flow

diagrams not only provide a visual aid in documenting the processes, but also allow for new staff members to understand the different processes and how they interact with each other. The finding for clause 8.2 indicates that the organisation has a procedure that it follows for educational products and services.

Within the context of clause 8.3, although DUT Business school complies with requirements from the HEQC and CHE, there are still no provisions made for QA in online learning. Andrade *et al.* (2020:39) suggest QA for online learning has a significant impact on reputation and enrolments at business schools.

The results from clause 8.4 indicate there is no dedicated procedure to control the service provided by external service providers. Camilleri (2021:270) implies the quality of online learning services provided by HEIs could have been compromised by no control or evaluation of external service providers. Clause 8.5 indicates the DUT Business School publishes all relevant information regarding the products and services it provides. For example, the conditions for admission are easily available from the brochure and website.

With respect to clause 8.6, the result indicated the organisation follows the institutional level policy for releasing results and qualifications. Alyahyan and Düştegör (2020:17) acknowledge the success rates of students play a vital role in the quality performance of an academic institution. In regard to clause 8.7, there is no documented procedure for the control of non-conforming products and services at the DUT Business School. In terms of online learning at business schools, an essential aspect of maintaining quality standards, is having control over non-conforming products and services, which not only affects customer satisfaction but also promotes educational excellence (Andrade *et al.* 2020:38).

4.2.6 Clause 9 – Performance evaluation

Clause 9 of ISO 21001:2018 focuses on performance evaluation, requiring educational organisations to monitor, measure, analyse, and evaluate the effectiveness of their EOMS. Table 4.6 below presents the gap analysis results for this clause.

Table 4.6: Gap analysis of clause 9 - Performance evaluation

No	Description	Yes/No	Comment
Clause 9	9.1 Monitoring measurement and evaluation	Yes	Studies are being conducted to measure learner satisfaction
	9.2 Internal Audit	No	There are no internal audits conducted
	9.3 Management review	Yes	The organisation management team has regular meetings; Executive Management Committee (EMC).

As seen from Table 4.6, the results from clause 9.1 indicate there are studies being conducted at the DUT Business School to determine the satisfaction of learners. However, there are no plans in place to monitor and evaluate the needs and expectations of staff and other beneficiaries. Szromek and Wolniak (2020:4) reported the monitoring and measurement of staff satisfaction and employee empowerment impact the quality of products and services provided by academic institutions.

With respect to the findings from clause 9.2, there is no internal audit procedure at the DUT Business School. Lois *et al.* (2020:205) suggest internal audits in the digital era are not only important for accreditation purposes, they also allow the organisation to identify possible risks with online learning. Within the context of clause 9.3, the finding highlights the EMC at the DUT Business School has regular management review meetings. Alyahyan and Düştegör (2020:17) posit management review meetings are regarded as best practice when aligning organisations quality objectives and strategic plans.

4.2.7 Clause 10 – Improvement

Clause 10 of ISO 21001:2018 addresses improvement within the EOMS. Table 4.7 below presents the gap analysis results for this clause.

Table 4.7: Gap analysis of clause 10 - Improvement

No	Description	Yes/No	Comment
Clause 10	10.1 Non-conformity and corrective action	yes	The organisation is presently using the institutional level non-conformance procedure
	10.2 Continual improvement	yes	There is a project in progress that is currently being rolled out regarding implementing new proctoring software.
	10.3 Opportunities for improvement	yes	The organisation is currently looking into implementing a QMS

Table 4.7 illustrates the results of clause 10.1, which indicate the DUT Business School is using the institutional level non-conformance procedure. Aburizaizah (2022:3) reported non-conformance reporting is an important aspect of QA and impacts enhancing customer satisfaction. With respect to the findings from clause 10.2, there is currently a continuous improvement initiative being launched at the DUT Business School regarding the implementation of new proctoring software for online learning. Andrade *et al.* (2020:38) suggest continuous improvement initiatives ensure business schools are keeping up with current trends and ensuring a competitive edge, while meeting accreditation standards.

Within the context of clause 10.3, the results indicate the organisation is currently looking to engage an external service provider to design and implement a QMS for the DUT Business School. Khawaja and Khan (2022:480) state innovation and continuous improvement are essential for the organisational quality culture and will ensure sustainability of the business school.

4.3 Results of the quantitative analysis

The quantitative part of this study was administered through a survey questionnaire to students that attended the online learning program at the DUT Business School. The survey sought to determine the challenges faced and needs and expectations of interested parties.

4.3.1 Biographical data

4.3.1.1 Age of respondents

The results of the age distribution of the participants are presented in Table 4.8.

Table 4.8: Age of respondent

N	94
Mean	31.88
Std Deviation	8.5
Minimum	18
Maximum	60

Table 4.8 above indicates the breakdown of respondent ages. The mean age of the respondents was approximately 32 years (31.88), with the youngest being 18 years of age and the oldest at 60 years. Baker *et al.* (2023:25) suggest considering age in a study allows researchers to understand the intricacy of human behaviours and their relation to age, which might assist in making informed conclusions based on data collected. Furthermore, Baker *et al.* (2023:25) posit that differing age groups may have varying perceptions and experiences that can have a significant impact on the questionnaire responses.

4.3.1.2 Pearson's correlation of age and constructs

Table 4.9 below presents the Pearson's correlation of age and constructs. Pearson's correlation coefficient is commonly used to quantify relationships between variables and understand trends and patterns (Crowe *et al.* 2017:650).

Table 4.9: Pearson's correlation between age and constructs

	LP	EXT	EMOT	ASS	SAT_CD	SAT_GEN	D1	D2	D3
Pearson	.380**	-.091	-.351**	.051	.243*	.316**	.144	.050	.219*
Sig (2 tailed)	.000	.388	.001	.629	.020	.002	.171	.637	.036
N	92	92	92	92	92	93	92	91	92

Table 4.9 indicates a moderate positive correlation between age and LP (learning process), which means the older respondents scored more favourably towards the learning process ($r = 0.38, p < 0.001$). There is also significant correlation between age and satisfaction with course delivery ($r = 0.243, p = 0.02$), an indication that older respondents were more satisfied with course delivery than younger respondents. Furthermore, significant correlation was found between age and general satisfaction with the online learning program ($r = 0.316, p = 0.002$), indicating that older respondents are more satisfied with the program than the younger respondents. In addition, older respondents indicated they were more likely to recommend this online learning program to others ($r = 0.219, p = 0.036$).

In view of the above, course delivery and the learning process should be reviewed and revised to be more appealing to the younger students. According to Tan *et al.* (2024:401), innovative pedagogies and the use of multimedia in lectures increase student engagement and perceptions of online learning programs.

Notably, a significant negative correlation ($r = -0.351, p = 0.001$) was observed between age and EMOT (emotional experiences). This suggests older respondents are associated with a lower emotional score.

4.3.1.3 Demographics

The demographical breakdown of the participants in this study is presented in Figure 4.1.

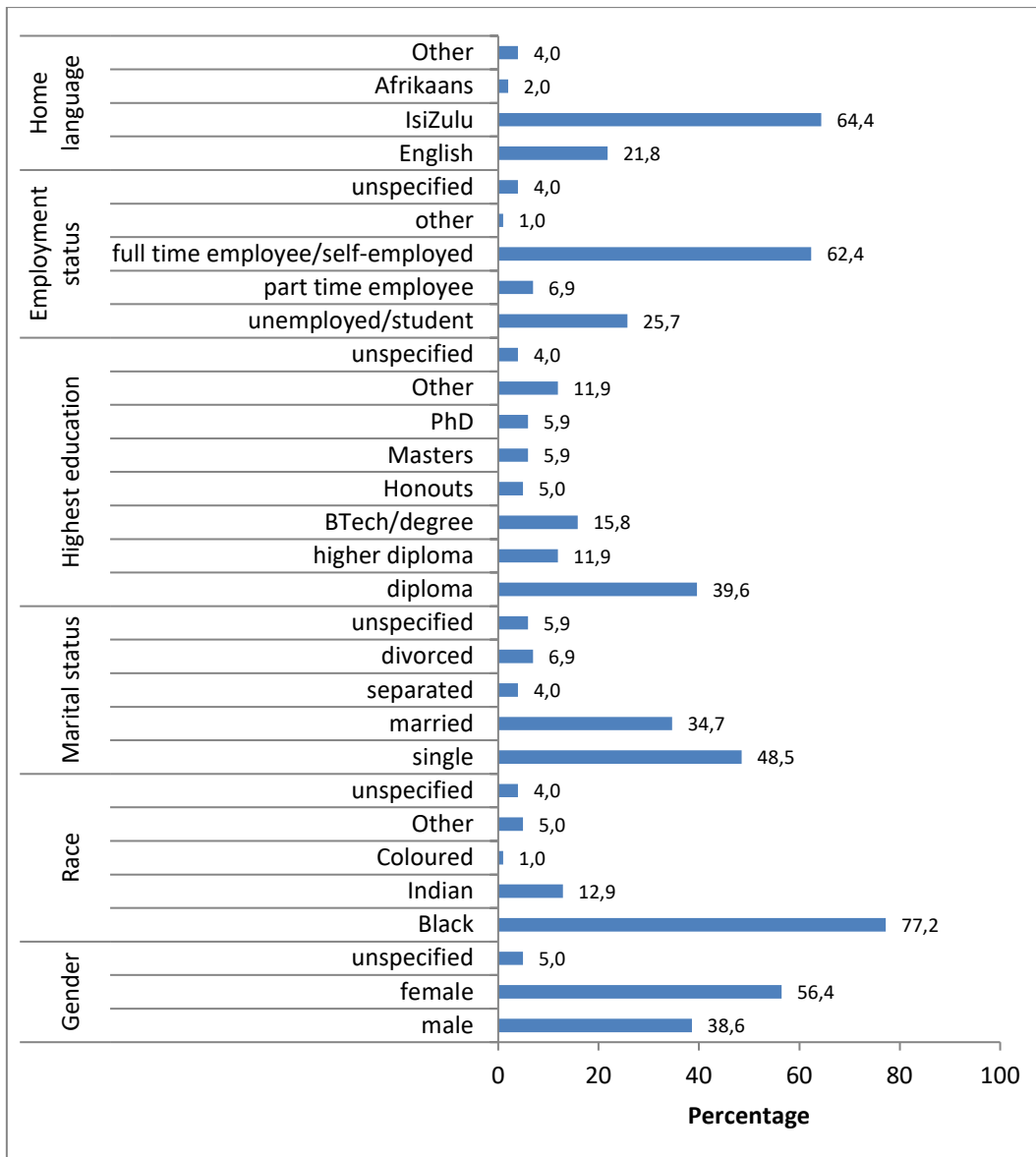


Figure 4.1: Demographic Data

From Figure 4.1 it is observed that 64 percent respondents' home language is IsiZulu, 62 percent respondents are working full-time or are self-employed. Furthermore, 77 percent respondents are Black, 56 percent respondents are female, and 49 percent are single. In addition, 39.6 percent of participants indicated that their highest qualification is a Diploma.

According to Baker *et al.* (2023:25), using demographic information in the education sector is regarded as a useful tool to predict behaviours and cultural influences as predictive analytics. The data illustrate a substantial student portion is currently employed full-time. As a result, this aspect is to their benefit, where one of the online learning advantages is its flexibility, which allows students to deal with their studies with consideration for their work schedules.

4.3.1.4 Type of online device used for online learning

The results pertaining to the type of device used for online learning is presented in Figure 4.2.

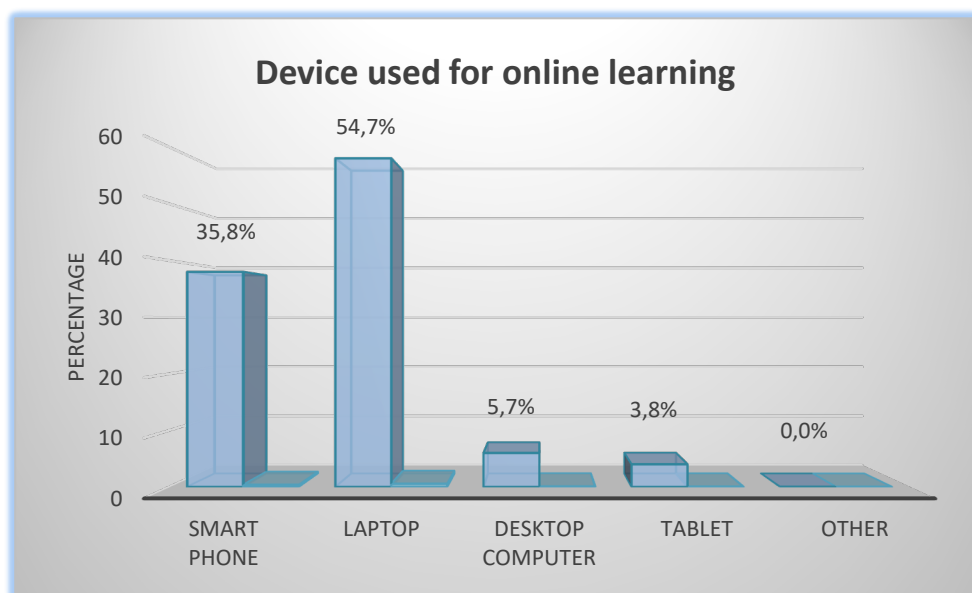


Figure 4.2: Device used for online learning

Based on the data presented in Figure 4.2, it is evident that 55 percent respondents used a laptop and 36 percent respondents used a smart phone for online learning. Milheim, Fraenza and Palermo-Kielb (2021:267) suggest smart phone devices are used for online learning, due to convenience and portability. The high number of respondents using a smart phone (36 percent) should be taken into account when considering course material design and layout.

4.3.2 Section A – Challenges Faced

The figures presented below illustrate the results pertaining to the challenges section in the study.

4.3.2.1 Effectiveness of online learning

The results pertaining to the effectiveness of online learning is presented in Figure 4.3.

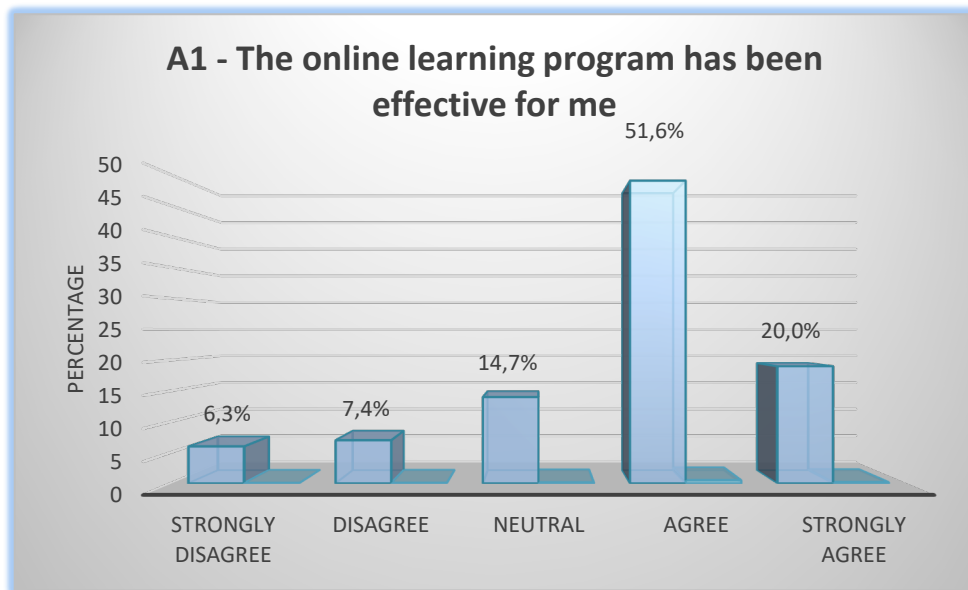


Figure 4.3: The effectiveness of the online learning program

Figure 4.3 demonstrates that the majority (52 percent) of DUT Business School students agreed and 20 percent strongly agreed that, overall, they found the online learning program effective. This is in line with the findings of Bahasoan *et al.* (2020:102), who reported numerous studies have shown statistically significant evidence that proved online learning is more effective than face-to-face learning. However, the efficacy of online learning is largely dependent on certain factors such as assessment methods, associated benefits and the design and delivery approach. HEIs should, therefore, endeavour to prioritise factors that affect the efficiency of the online learning program (Castro and Tumibay 2021:1370).

4.3.2.2 The stress with online learning

The results pertaining to the stress with online learning is presented in Figure 4.4.

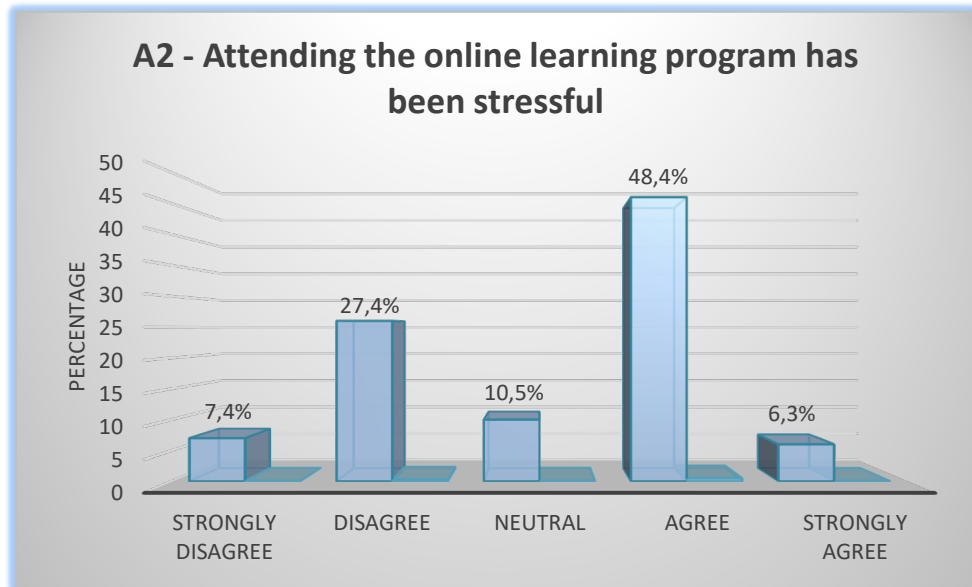


Figure 4.4: The Stress with Online Learning

Based on the data presented in Figure 4.4, it is evident that approximately 55 percent students (48.42 percent agreed and 6.32 percent strongly agreed) enrolled in the online learning program reported finding it stressful. This observation suggests online learning has the potential to elevate stress and anxiety levels among students.

According to Harjule, Rahman and Agarwal (2021:411), HEIs have registered a significant spike in reporting of mental health issues, since the sudden rise in online learning. By inference, the increased stress and anxiety levels can be attributed to students struggling to balance work, study and family responsibilities. Connectivity and technical issues also impact stress levels while learning online (Mheidly, Fares and Fares 2020:8).

4.3.2.3 Data/ internet charges

The results pertaining to data/internet charges is presented in Figure 4.5.

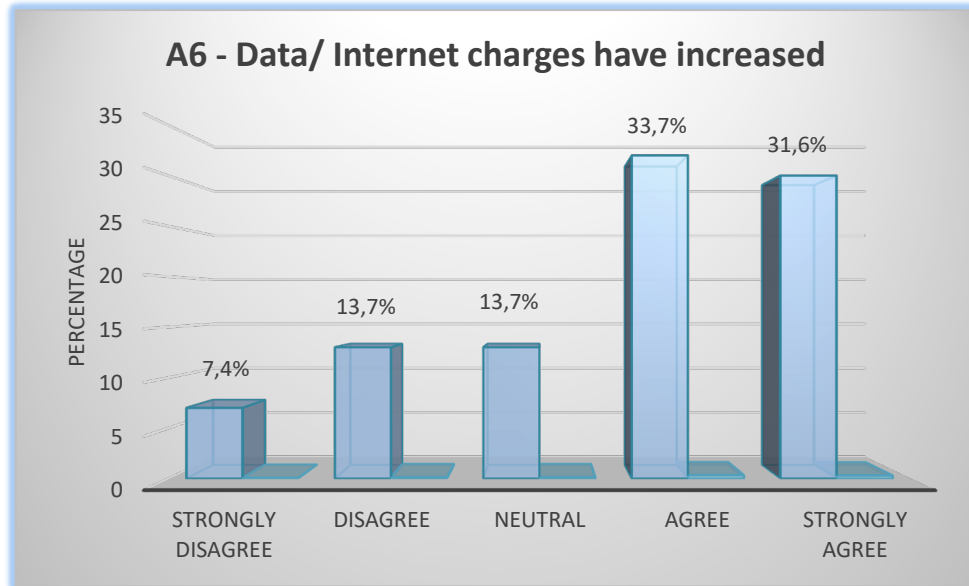


Figure 4.5: Increase in data/ internet charges

From Figure 4.5, it is evident that a significant percentage of students (34 percent agreed and 32 percent strongly agreed) indicated since they started online learning, they have noticed a substantial increase in data and internet costs. The results from this graph are consistent with Barrot, Llenares and del Rosario (2021:7322) and Simamora (2020:86), who posit technological difficulties and high internet costs are some of the main challenges students experience with online learning. In addition, Abdulhamit, Fatih and Özkan (2020:453) suggest, due to challenges faced with technology and internet costs, students from differing socio-economic backgrounds may be disadvantaged.

4.3.2.4 Electricity consumption

The results pertaining to electricity consumption is presented in Figure 4.6.

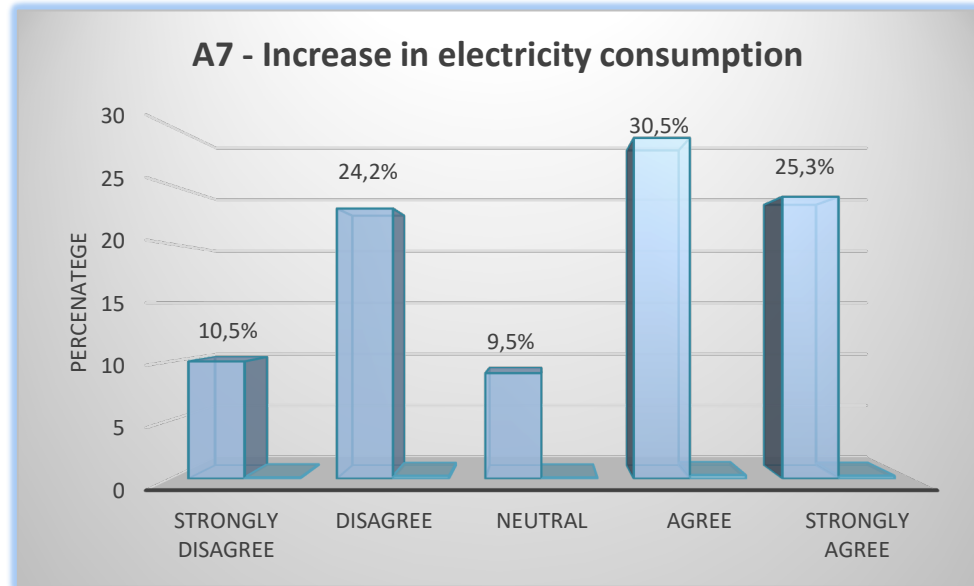


Figure 4.6: Increase in electricity consumption since online learning

Figure 4.6 shows 31 percent students agreed and 25 percent strongly agreed that they have noticed a significant increase in electricity costs since online learning was initiated. This result is consistent with Landa, Zhou and Newlin (2021:168), who state the increase in electricity costs are one of the major challenges faced by students attending online classes. It was observed that there are not only an increased number of devices being used when learning online, most online learning platforms use energy intensive technologies such as video conferencing software that require larger processing power and bandwidth. It can, therefore, be inferred regular charging of devices could also be a factor contributing to the increase in electricity consumption with online learning.

4.3.2.5 Load shedding

The results pertaining to the effect of load shedding on students is presented in Figure 4.7.

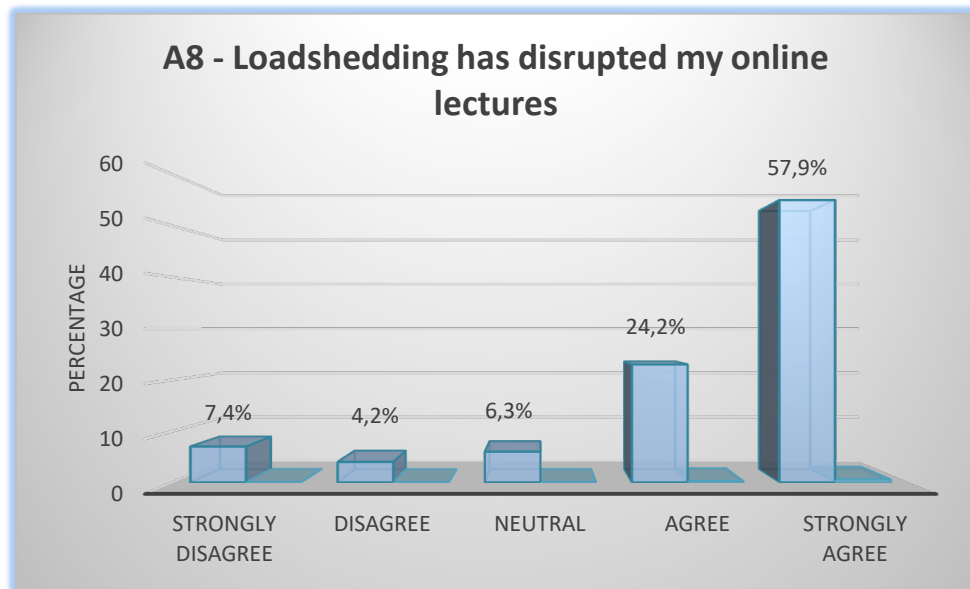


Figure 4.7: Effect of load shedding on students

It can be deduced from Figure 4.7 that 58 percent students strongly agreed and 24 percent students agreed load shedding has caused a massive disruption to their learning online. These findings correlate with Pillay (2023), who claims the severity of load shedding in SA poses a serious risk to not only the economy, but student access to education throughout the nation. A similar view is reported by Kgarose, Makhubele and Setaise (2024:90), who find regular load shedding disrupts online learning and presents a long-term risk to educational developments in HEIs.

4.3.2.6 Difficulty to change from face-to-face to online learning

The results pertaining to the difficulty of changing from face-to-face to online learning is presented in Figure 4.8.

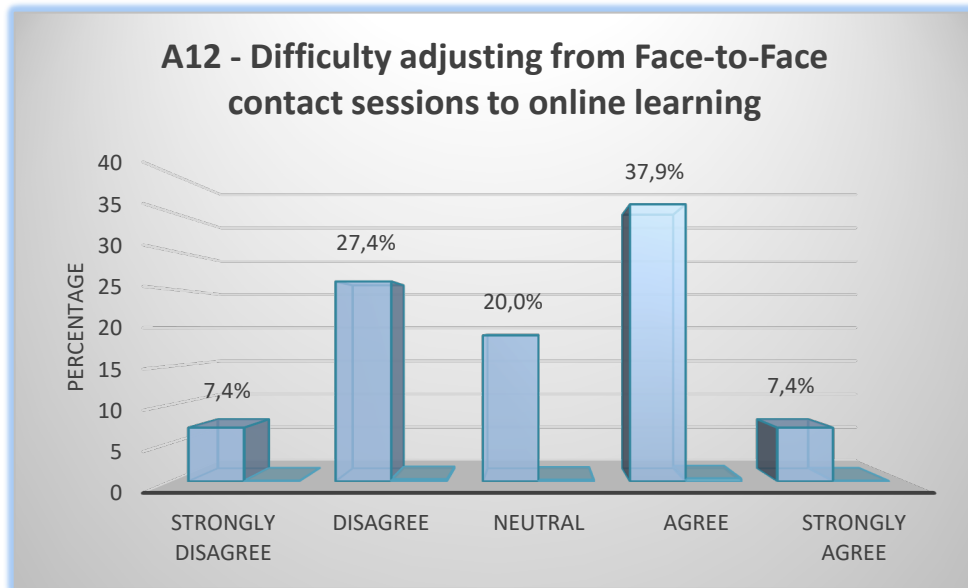


Figure 4.8: Difficulty migrating from face-to-face to online learning

The results presented in Figure 4.8 demonstrate that almost 45 percent students (37.89 percent agreed and 7.37 percent strongly agreed) experienced difficulties migrating from face-to-face to online learning. It can, therefore, be concluded that the sudden change from face-to-face to online learning was a major challenge faced by students. These findings are corroborated by Richardson and North (2020:10), who claim the sudden migration to online learning created numerous challenges for students and disrupted the flow and momentum of learning.

4.3.2.7 Cyber security

The results pertaining to cyber security is presented in Figure 4.9.

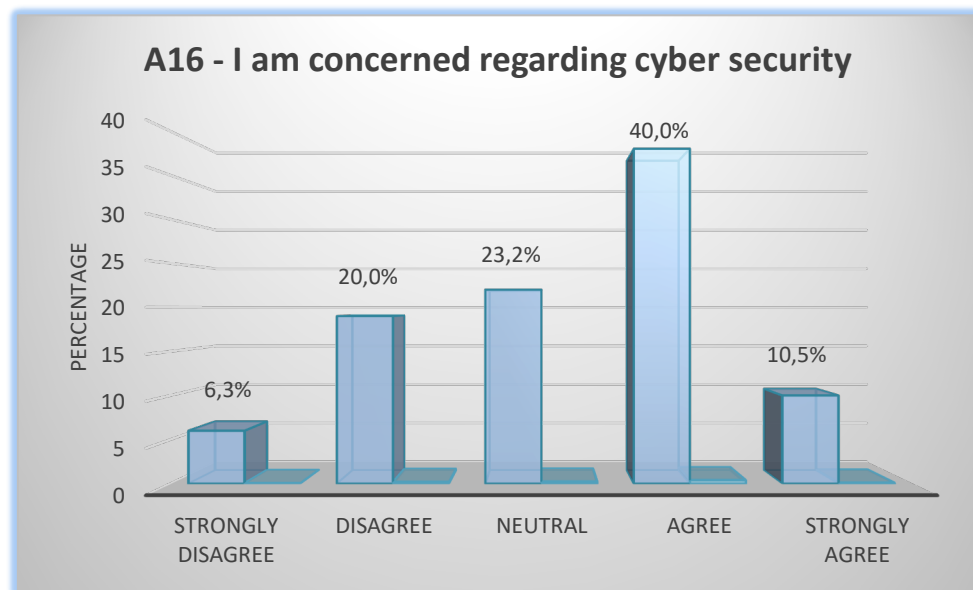


Figure 4.9: Concerns with regard to cyber security

Figure 4.9 demonstrates that 51 percent students (40 percent agreed and 11 percent strongly agreed) are concerned with regard to cyber security since they started learning online. According to Alexei and Alexei (2021:130), the risks of unauthorised data access and theft of personal data grew significantly in HEIs after the introduction of online learning classes.

Most online learning platforms archive important and sensitive student information, which makes them an easy target for cyber criminals. Furthermore, it can be inferred since students often use unsecured Wi-Fi networks, they leave their systems vulnerable to Malware viruses that could affect the integrity of educational resources. Therefore, finding ways to mitigate cyber security risks will allow HEIs to create a safe and secure online learning environment, as indicated by Buja *et al.* (2021:1730).

4.3.2.8 Learning preferences

The results pertaining to learning preferences is presented in Figure 4.10.

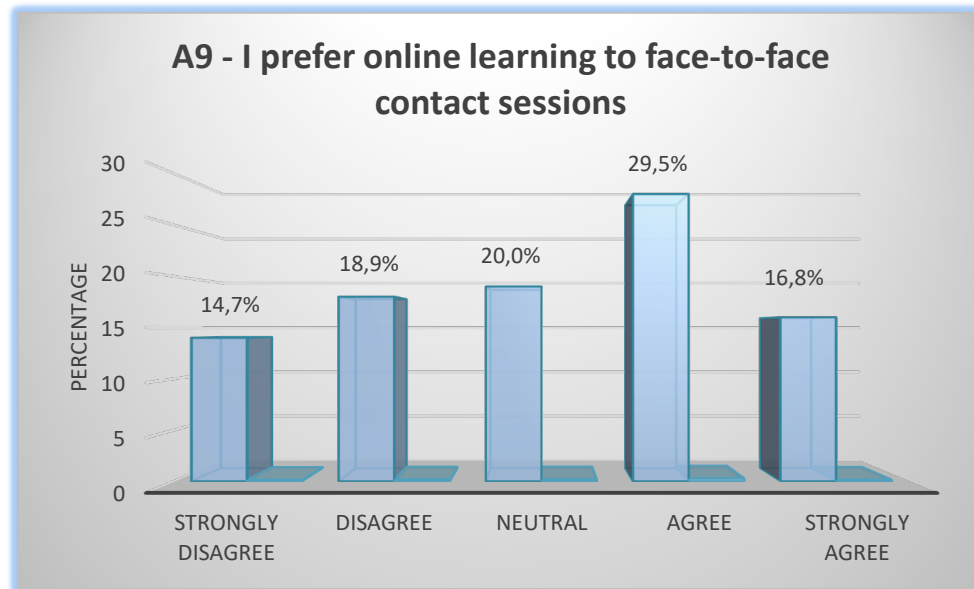


Figure 4.10: Learning preferences

Figure 4.10 indicates 34 percent students (19 percent disagreed and 15 percent strongly disagreed) prefer face-to-face lectures, while 46 percent (29 percent agreed and 17 percent strongly agreed) prefer attending online classes and 20 percent remained neutral. Numerous studies conducted globally (Pakistan, Romania, England) indicate the majority students preferred face-to-face contact sessions, rather than online learning (Adnan 2020 :45; Gherheş *et al.* 2021:13; Mali and Lim 2021:3). From the demographic data presented in Figure 4.1, 62 percent students from this study are shown as employed full-time; highlighting these students would prefer the flexibility of online learning.

4.3.2.9 Assistance from technical staff

The results pertaining to assistance from technical staff is presented in Figure 4.11.

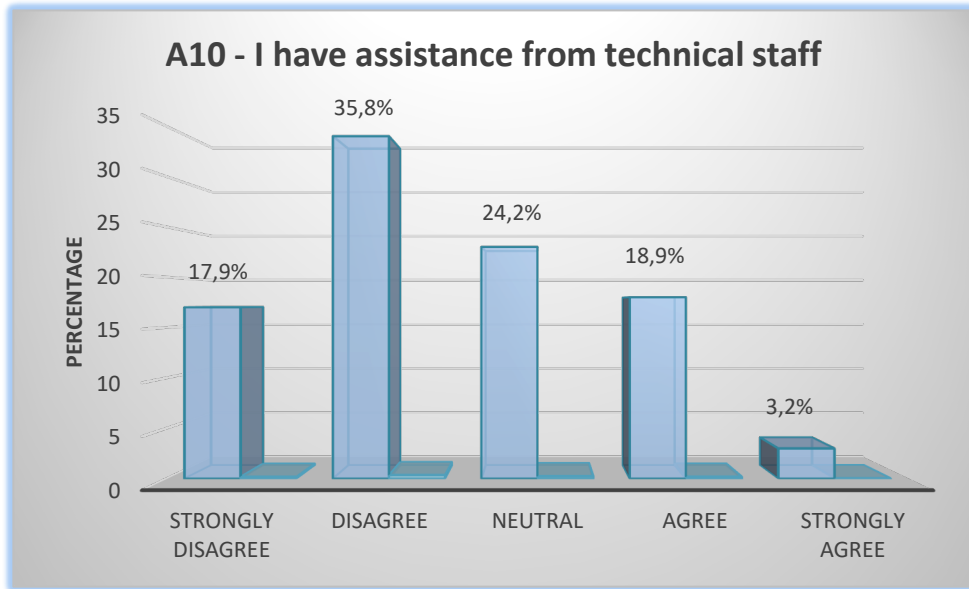


Figure 4.11: Assistance from technical staff

Figure 4.11 shows 54 percent students (36 percent disagreed and 18 percent strongly disagreed) felt they did not receive assistance from technical staff when they required it. Alqahtani and Rajkhan (2020:216) suggest assistance with connectivity and technical issues can be regarded as a critical success factor for online learning. Critical success factor is a term used in management sciences to describe any element vital for project completion (Alqahtani and Rajkhan 2020:216).

With rapidly changing software and technological advancements, online learning platforms can sometimes create several challenges for students, ranging from connectivity issues, poor audio or video quality to complex interfaces and functionalities. Therefore, it can be inferred having technical support available improves the overall quality of the student experience, which improves the effectiveness of the online learning program.

4.3.2.10 Time management for online learning

The results pertaining to time management for online learning is presented in Figure 4.12.

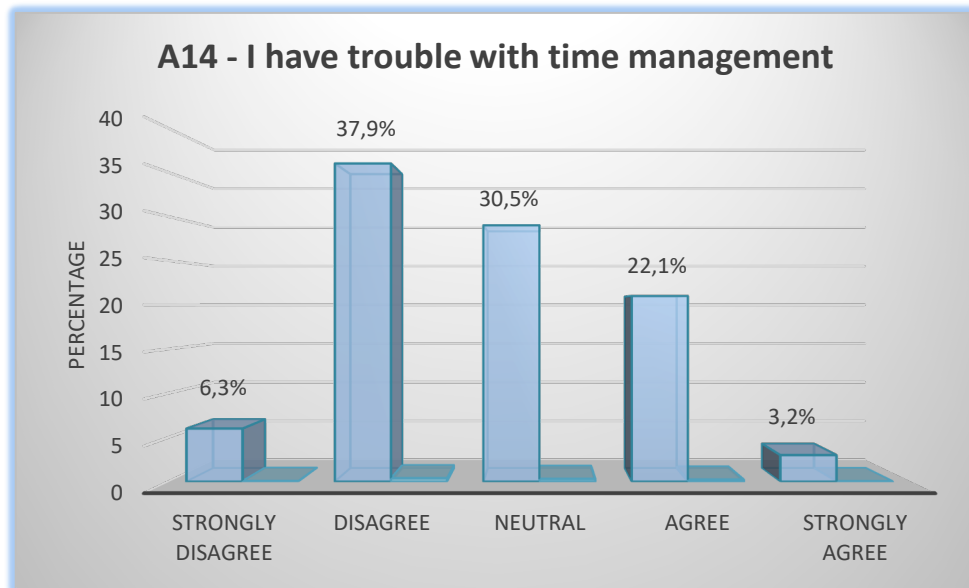


Figure 4.12: Time management and online learning

Figure 4.12 indicates 44 percent students (38 percent disagreed and six percent strongly agreed) do not have issues with time management for online learning. Furthermore, 31 percent students indicated neutral, and 25 percent agreed (22 percent agreed and three percent strongly agreed) they struggle with managing their time for their online learning.

Baker *et al.* (2019:525) posit there is a substantial correlation between academic performance and time management. Online learning often requires students to be disciplined with time allocation to ensure they meet deadlines for assignments and exams, as well as balance work and family responsibilities (Heo, Bonk and Doo 2021:1640). Therefore, students should focus on improving their time management skills as a means to optimise their learning opportunities, thereby contributing to their success rate in online learning.

4.3.2.11 Feelings of isolation

The results pertaining to feelings of isolation is presented in Figure 4.13.

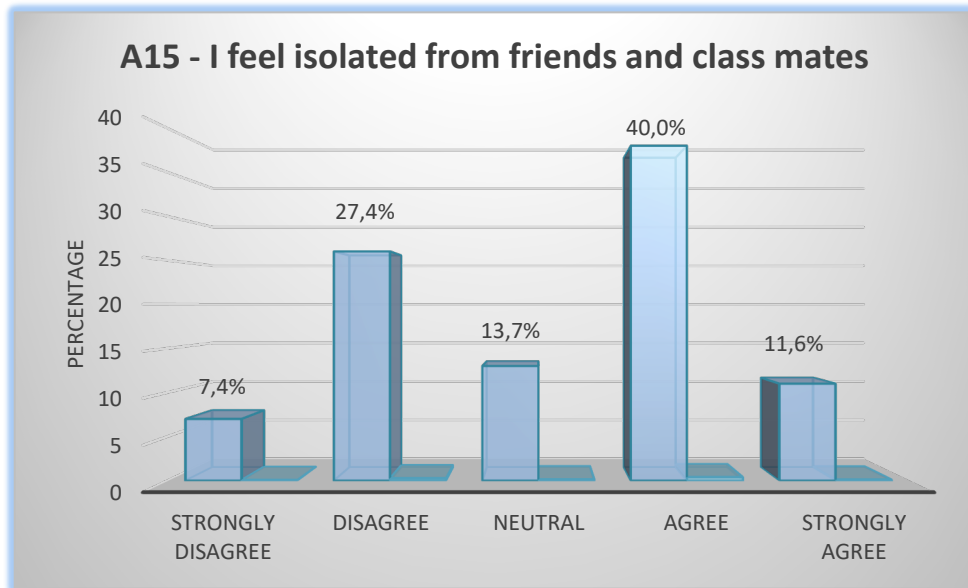


Figure 4.13: Feelings of isolation with online learning

Figure 4.13 indicates 52 percent students (40 percent agreed and 12 percent strongly agreed) felt isolated from their friends and colleagues while attending the online learning program. As explained by Chametzky (2021:1190), the online learning environment can be isolating and lonely for students. This heightened sense of isolation is a contributing factor to the increasing stress levels and anxiety among online learning students (Stoytcheva 2021:2333). Therefore, feelings of isolation seem to be a common challenge faced by students studying online, as they have limited access to support networks, colleagues and friends.

4.3.2.12 Assistance from administration staff

The results pertaining to assistance from administration staff is presented in Figure 4.14.

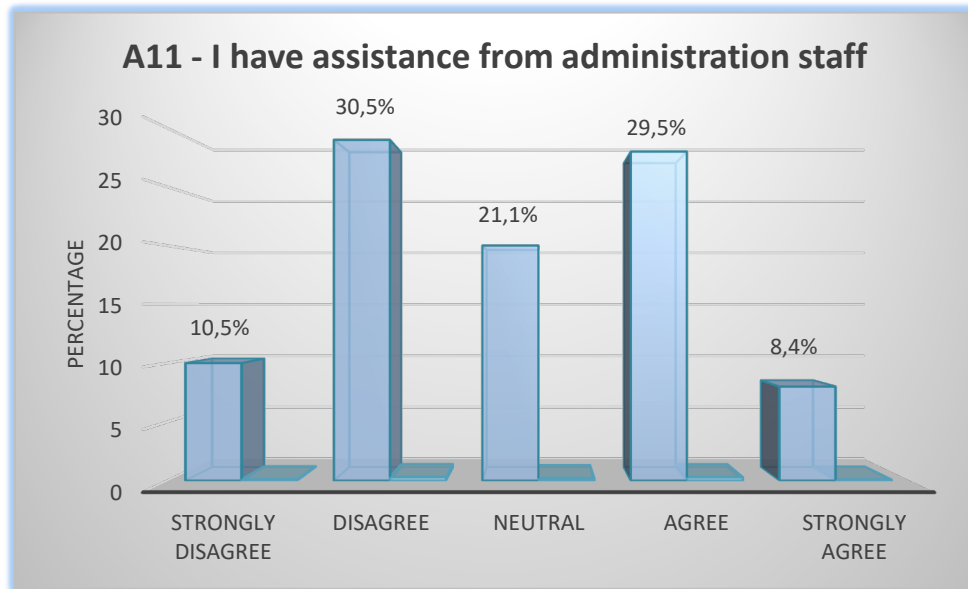


Figure 4.14: Assistance from administration staff

Figure 4.14 shows 42 percent students (31 percent disagreed and 11 percent strongly disagreed) believed they did not receive the appropriate assistance when they needed it from administration staff. In a recent study, Castro and Tumibay (2021:1370) highlighted a connection between the role an institution plays in the efficacy of an online learning program and student perception. Administration staff is responsible for assisting with the enrolment and financial aid processes, assisting students with accessing and interpreting the institution's policies and procedures. The quality of their assistance influences both the student and staff experience with online learning.

4.3.2.13 Home environment

The results pertaining to home environment is presented in Figure 4.15.

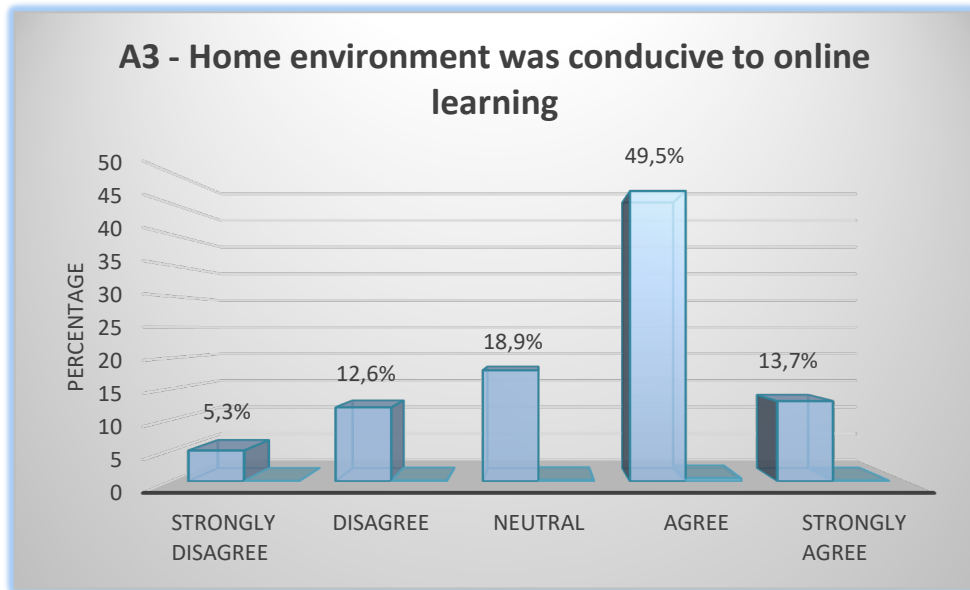


Figure 4.15: Conducive home environment

Figure 4.15 indicates 64 percent respondents (50 percent agreed and 14 percent strongly agreed) felt their home environment was conducive to online learning, while 19 percent respondents were neutral and 18 percent strongly disagreed. Ayadat *et al.* (2021:357) confirm that a comfortable and peaceful home environment impacts perceptions of online learning, emphasising the importance of a comfortable physical space, technological resources, and a quiet atmosphere. This highlights the need for support systems that help students and their families to create and maintain an optimal home environment to enhance the effectiveness of online learning.

4.3.2.14 Own device for online learning

The results pertaining to possession of online learning device is presented in Figure 4.16.

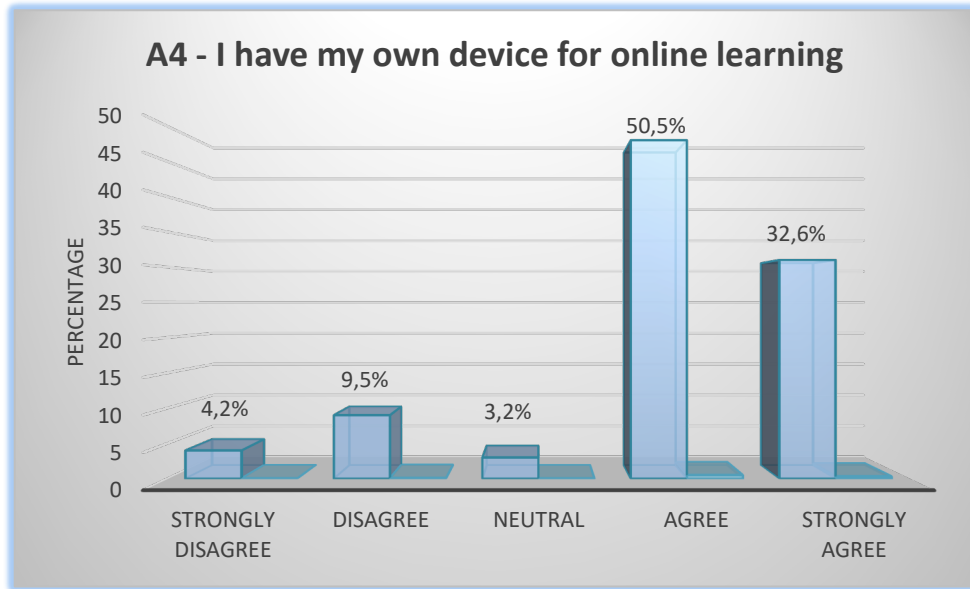


Figure 4.16: Possession of online learning device

As seen from Figure 4.16, 84 percent respondents agreed (51 percent agreed and 33 percent strongly agreed) they have their own device for online learning. The high level of positive responses highlight that in today's digital age, access to personal devices plays a pivotal role in shaping students' educational experiences. However, Ferri, Grifoni and Guzzo (2020:87) have reported that families with more than one student at the home are often forced to share devices which impacts their performance in the online learning program. This is supported by Urkude (2024:18) who suggests that the socioeconomic backgrounds of students impact their experience and perceptions of online learning.

4.3.2.15 Internet connection

The results pertaining to internet connection is presented in Figure 4.17.

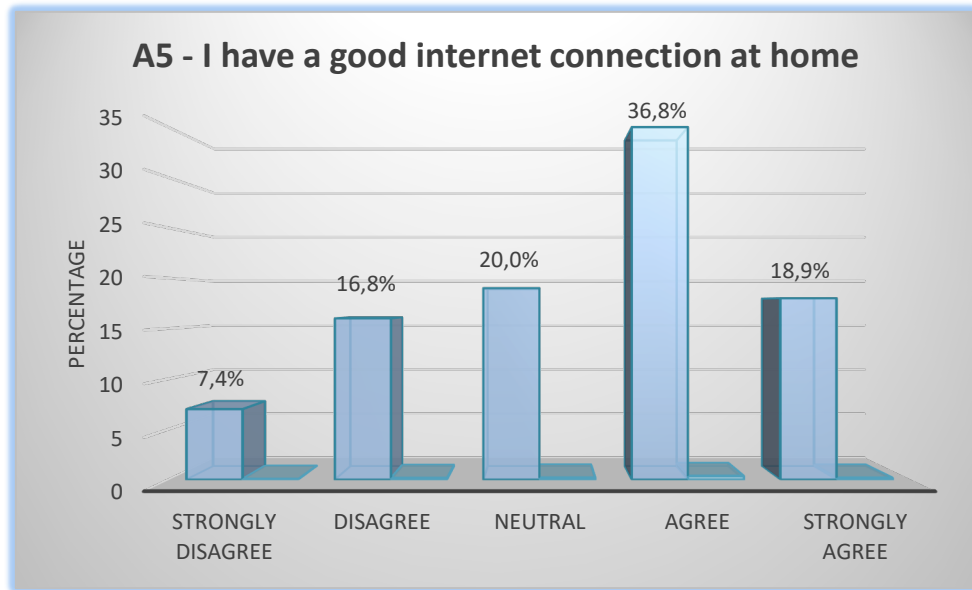


Figure 4.17: Access to good internet connection at home

Figure 4.17 reveals that 56 percent respondents believed (37 percent agreed and 19 percent strongly agreed) they have a good internet connection at their home. According to Ferri *et al.* (2020:86), inadequate bandwidth was one issue seen in every country, leading to delays or lost connections during lectures and video conferences. Additionally, the authors suggest students in rural areas have a greater challenge with connectivity, compared to students from urban areas. Within the ambit of this study, despite the majority students reporting they have a good internet connection, it should be noted students still faced challenges with connectivity due to load shedding.

4.3.2.16 Knowledge of using software and computer programs

The results pertaining to knowledge of using software and computer programs is presented in Figure 4.18.

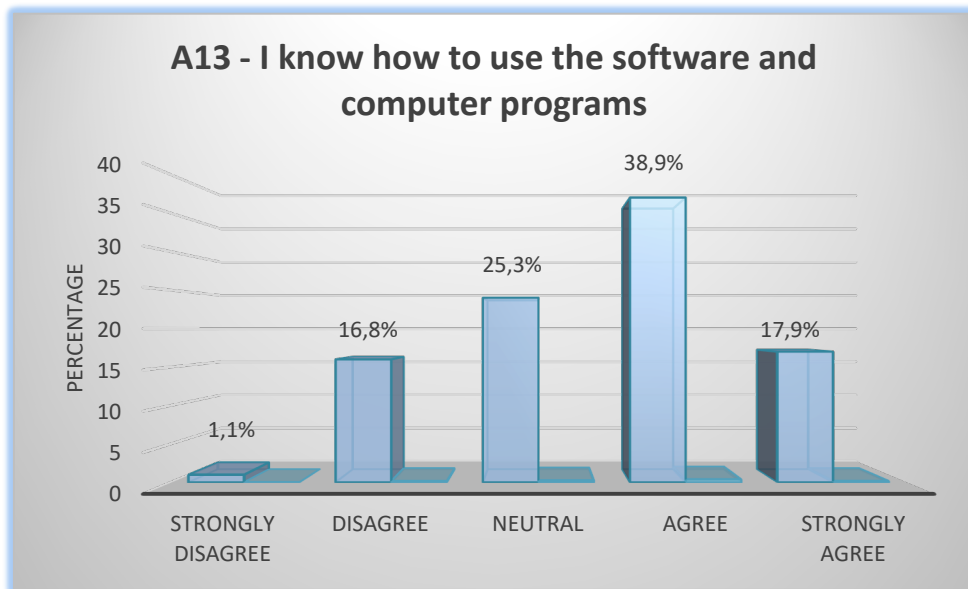


Figure 4.18: Knowledge of using software and computer programs

From Figure 4.18, it is evident that 57 percent respondents are familiar (39 percent agreed and 18 percent strongly agreed) with the software used for online learning. In a recent study, Enwereji *et al.* (2024:381) found proficiency with software used for online learning enhances the educational experience and improves the effectiveness of the online learning program. Therefore, it is important for institutions to provide comprehensive training and resources to ensure that all students are skilled with the necessary software used for online learning.

4.3.2.17 Organisation of the class

The results pertaining to organisation of the class is presented in Figure 4.19.

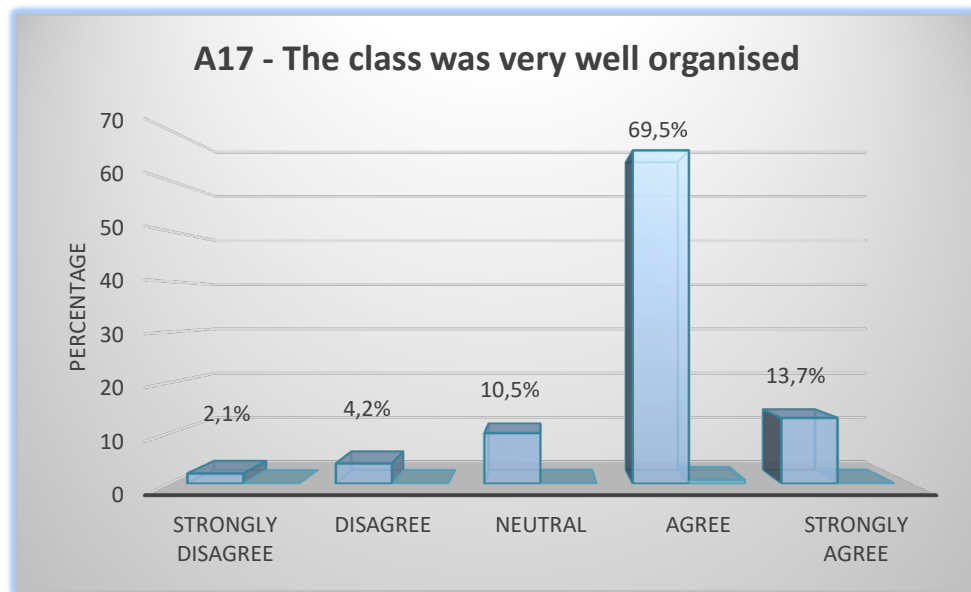


Figure 4.19: Well organisation of the class

Figure 4.19 above indicates 84 percent respondents (70 percent agreed and 14 percent strongly agreed) felt the class was very well organised. The high level of agreement confirms that the DUT business school has a structured and arranged classroom that enhances the student comprehension and promotes a sense of security and belonging. This is aligned with Valantinaitė and Sederevičiūtė-Pačiauskienė (2020:5), that a well-organised class creates an environment that is conducive for learning, and increases student engagement.

4.3.2.18 One sample T-test

Table 4.10 below presents the results for one sample T test.

Table 4.10: Results for one sample T-test

Construct	n	Mean	Standard Deviation	t	df	p-value
A1 - The online learning program has been effective for me.	96	3.75	1.056	6.957	95	<0.001
A2- Attending the online learning program has been stressful	96	3.16	1.146	1.336	95	.185
A3 -My environment at home was conducive to the learning process. (noise levels, family or pet disturbances)	96	3.55	1.055	5.127	95	<0.001
A4- I have my own device to attend the online learning program(not sharing with family members)	96	4.00	1.056	9.276	95	<0.001
A5 - I have a good internet connection at home	96	3.42	1.194	3.420	95	<0.001
A6 - Data/ Internet charges have increased since I started online learning.	96	3.67	1.262	5.175	95	<0.001
A7 - I have noticed an increase the electricity consumption since I started online learning	96	3.30	1.377	2.149	95	.034
A8 - Load shedding has disrupted my online lectures.	96	4.22	1.198	9.965	95	<0.001
A9 - I prefer online learning to face to face contact sessions.	96	3.14	1.319	1.006	95	.317
A10 - I have assistance from technical staff when I have connection issues.	96	2.53	1.105	-4.158	95	<0.001
A11 - I have assistance from administration staff when needed.	96	2.94	1.195	-.513	95	.609
A12 - It was difficult for me to change from traditional face to face classroom learning to an online learning platform.	96	3.06	1.131	.541	95	.590
A13 - I know how to use the software and computer programs for online learning.	96	3.55	1.004	5.388	95	<0.001
A14 - I have trouble with time management for online learning.	96	2.75	0.984	-2.489	95	.015

Construct	n	Mean	Standard Deviation	t	df	p-value
A15 - I feel isolated from friends and colleagues when I am learning online.	96	3.21	1.187	1.720	95	.089
A16 - I am concerned about having my personal information online.	96	3.27	1.119	2.371	95	.020
A17 - The class was very well organised	96	3.89	0.766	11.326	95	<0.001

Table 4.10 indicates significant agreement with questions A1, A3, A4, A5, A6, A7, A8, A13, A16, A17 and significant disagreement with questions A10 and A14. For this test, the average agreement score was tested against the central score of '3' to determine whether it differs significantly from '3'. The 'P' values indicate a significant difference ($p < 0.05$). When the mean values are greater than 3, the results can be interpreted as significant agreement and when the mean values are less than 3, the results can be determined as significant disagreement.

The results from Table 4.10 correlate with the descriptive statistics and frequency graphs presented above.

4.3.2.19 Factor analysis

The extracted factors and loading for section A is presented in Table 4.11.

Table 4.11: Extracted factors and loading for section A

	Factor			
	1	2	3	4
A17- The class was very well organised	0.766			
A1- The online learning program has been effective for me.	0.679			
A3- My environment at home was conducive to the learning process. (noise levels, family or pet disturbances)	0.616			
A9- I prefer online learning to face to face contact sessions.	0.581			
A4- I have my own device to attend the online learning program(not sharing with family members)	0.442			
A13- I know how to use the software and computer programs for online learning.	0.285			
A6- Data/ Internet charges have increased since I started online learning.		0.858		
A7- I have noticed an increase the electricity consumption since I started online learning		0.688		
A8- Load shedding has disrupted my online lectures.		0.491		
A15- I feel isolated from friends and colleagues when I am learning online.			0.728	
A16- I am concerned about having my personal information online.			0.603	
A2- Attending the online learning program has been stressful			0.504	
A5R I don't have a good internet connection at home			0.455	
A12- It was difficult for me to change from traditional face to face classroom learning to an online learning platform.			0.441	
A11- I have assistance from administration staff when needed.				0.748
A10- I have assistance from technical staff when I have connection issues.				0.697

As shown in Table 4.11, the extracted factors and item loadings are summarised with promax rotation, which was applied to these 17 items. Item 14 was dropped because it did not load strongly enough onto any factor, while item 5 was reverse coded. In addition, four factors were extracted, which accounts for 47.88 percent

variance in the data. A KMO Measure of Sampling Adequacy of 0.776 and a significant Bartlett's test indicate the data were adequate for successful and reliable extraction [$\chi^2(120df) = 532.334, p = 0.00$]. Rotation converged in seven iterations.

Table 4.12: Reliability for factor analysis

Factor	Construct	Items included	Variance extracted	Cronbach's alpha
1	The learning process (LP)	1, 3, 4, 9, 13, 17	26.24	0.762
2	External factors (EXT)	6, 7, 8	13.04	0.765
3	Emotional factors (EMOT)	2, 5, 12, 15, 16	5.01	0.741
4	Assistance (ASS)	10, 11	3.59	0.690

The reliability values from the extracted factors are presented in Table 4.12. Composite variables are formed for each factor by calculating the average of the agreement scores for all items included in a variable. The values achieved for Cronbach's alpha show good internal consistency among the items on each factor and the composite variables formed, by calculating the average of the agreement scores for all items included in a variable, are reliable.

4.3.3 Section B and C – Needs and expectations

The figures below demonstrate the results for the needs and expectations section of the study. Graphical representations of data aid in identifying trends and patterns and understanding of research findings (Divecha *et al.* 2023: 125).

4.3.3.1 Assistance from DUT Business School

The results pertaining to the assistance that is provided from the DUT business school is presented in Figure 4.20.

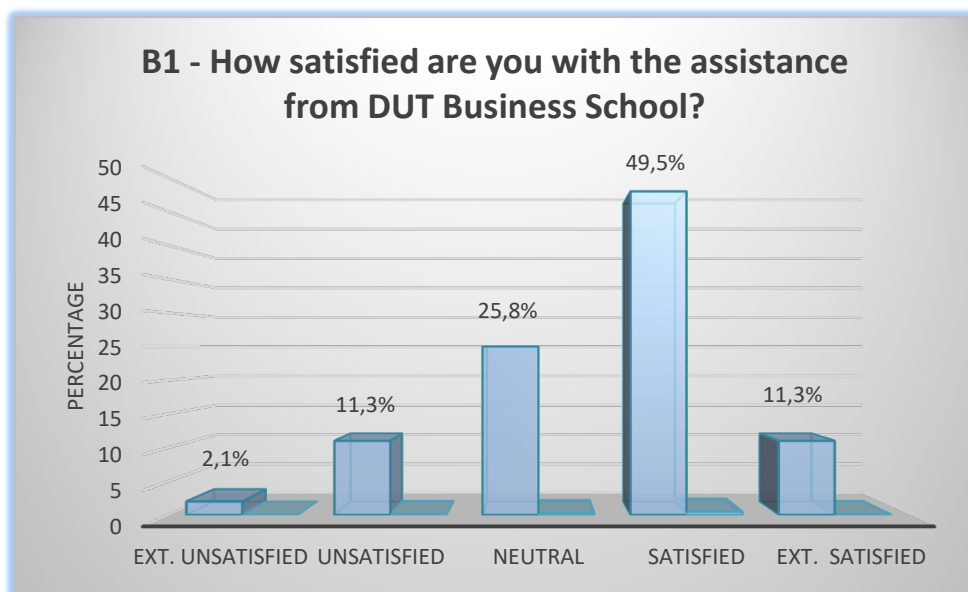


Figure 4.20: Assistance provided from DUT Business School

Figure 4.20 indicates 61 percent students were satisfied (50 percent satisfied and 11 percent extremely satisfied) with the assistance and support they received from the DUT Business School. According to Castro and Tumibay (2021:1370), institutional support, namely policies, procedures, clear strategic vision and effective management of the institution, contribute to the effectiveness of an online learning program. In a recent study, Greaves (2024:71) reported student perceptions of online learning were impacted by the assistance they received from the lecturer and institution.

4.3.3.2 Assistance from lecturer

The results pertaining to the assistance that is provided from the lecturer is presented in Figure 4.21.

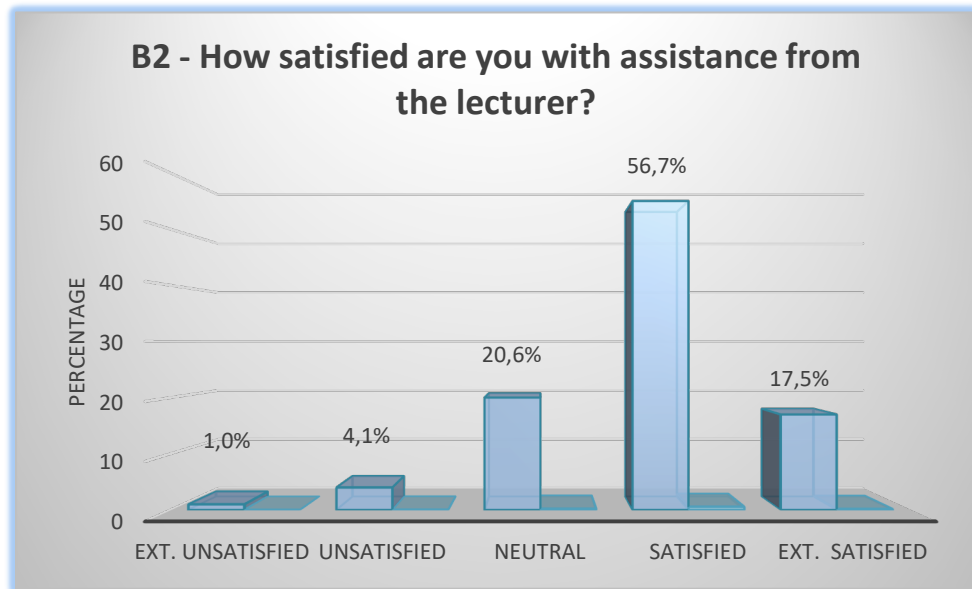


Figure 4.21: Assistance from lecturer or facilitator

Figure 4.21 demonstrates that 75 percent students were satisfied (57 percent satisfied and 18 percent extremely satisfied) with the assistance they received from their online lecturer or facilitator. Turnbull, Chugh and Luck (2021:6401) suggest the lecturer plays a vital role in the success of an online learning program. Not only are they responsible for facilitating technology integration, they are also responsible for designing and structuring online courses and assessments. Therefore, the level of assistance received from the lecturer significantly influences the overall student experience with online learning.

4.3.3.3 Software applications

The results pertaining to software applications is presented in Figure 4.22.

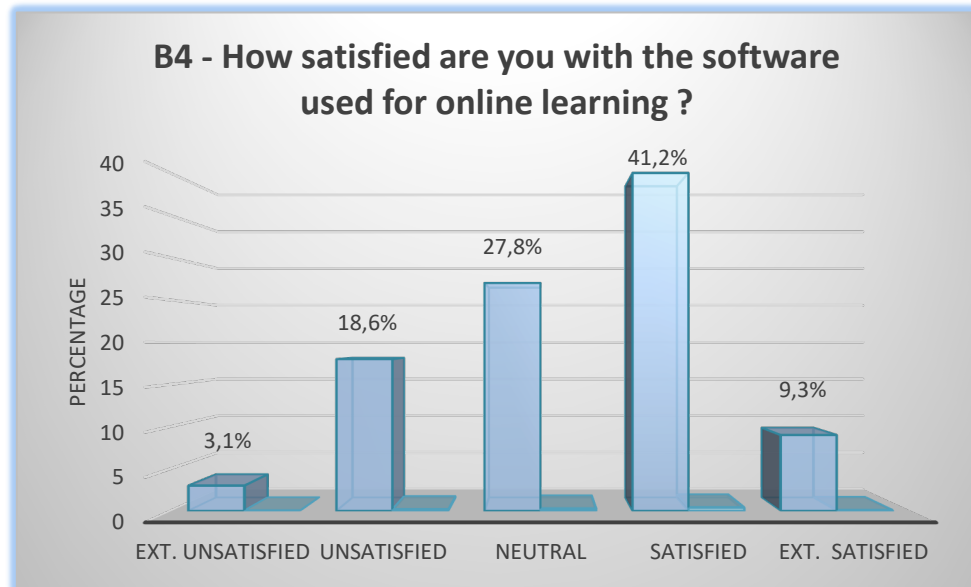


Figure 4.22: Software applications in online learning

Figure 4.22 shows 50 percent students were satisfied (41 percent agreed and nine percent was extremely satisfied) with the software used for online learning at the DUT Business School. The software being used is important, because it provides the platform for online learning to occur, and allow students to access learning materials, videos of the lectures, and course content. It also allows for flexibility in using different devices, such as smart phones and tablets, when learning online. Certain online learning software enables lecturers to create innovative and interactive multimedia presentations and exercises that add to the online learning student experience (Bahasoan *et al.* 2020:101).

4.3.3.4 Overall program format

The results pertaining to overall program format is presented in Figure 4.23.

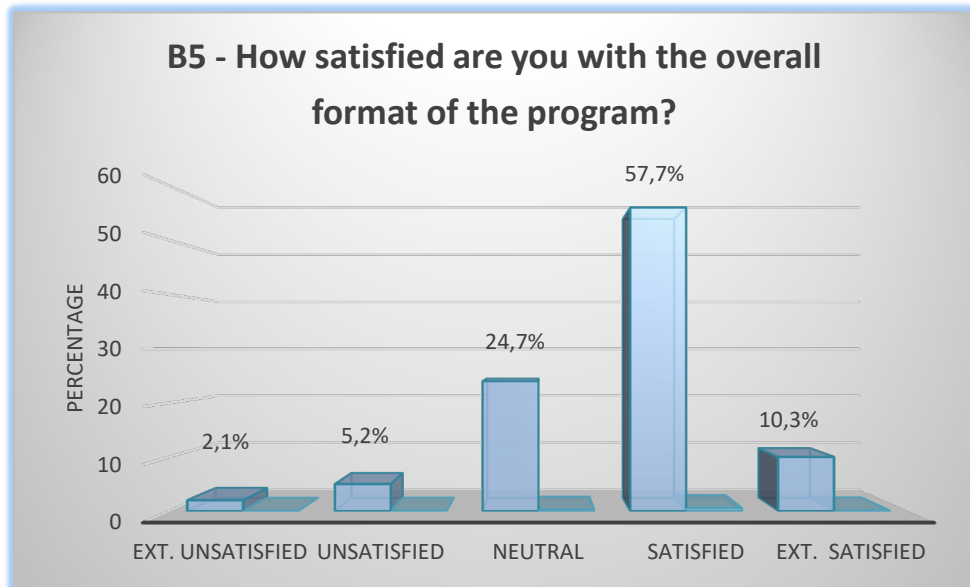


Figure 4.23: Overall format of program

Figure 4.23 indicates 68 percent students are satisfied (58 percent satisfied and 10 percent extremely satisfied) with the overall format of the online learning program. According to Giday and Perumal (2024:9), the format of an online learning program has an extensive influence on the outcome and experience of the student attending that program. Therefore, it can be inferred that the format can affect not only student access to course materials but also influence the level of student engagement and the ability to effectively communicate with lecturers and peers. Gillet-Swan (2017:10) suggests the format and course content are vital aspects when trying to engage a student in an online learning program.

4.3.3.5 Curriculum

The results pertaining to curriculum is presented in Figure 4.24.

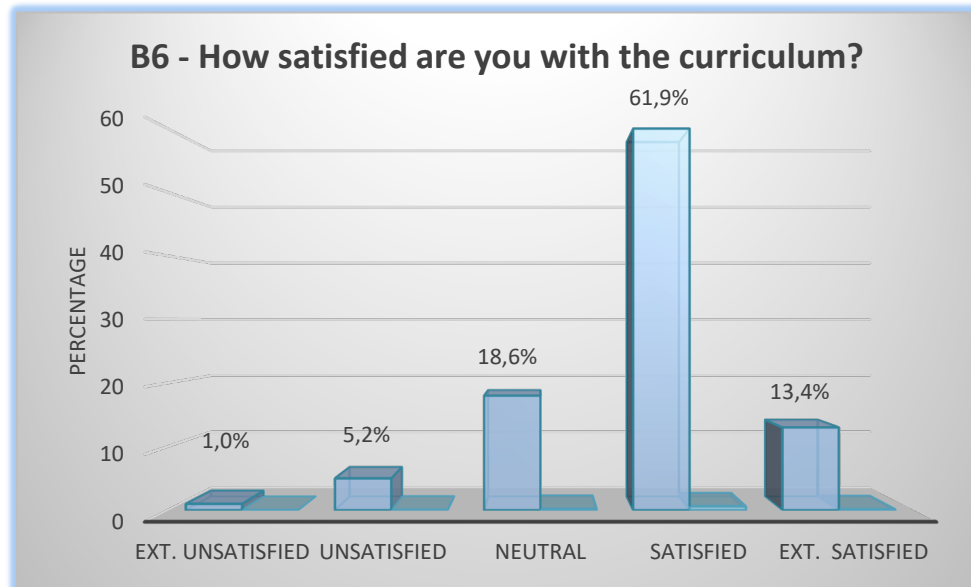


Figure 4.24: Curriculum

It is evident from Figure 4.24 that 75 percent students were satisfied (62 percent satisfied and 13 percent extremely satisfied) with the curriculum and course materials for the online learning program. As indicated by Alqahtani and Rajkhan (2020:216) and Bahasoan *et al.* (2020:101), the design of the curriculum and subject material are regarded as critical success factors in the success of an online learning program. The curriculum design and course content made available to students will impact the way a student responds to the online learning program and will, ultimately, affect their grades and success rate of the program, as indicated by Giday and Perumal (2024:9). Therefore, it is imperative for the online curriculum to be reviewed and updated regularly to ensure it is engaging and relevant to the subject matter and industry standards.

4.3.3.6 Course material

The results pertaining to course material is presented in Figure 4.25.

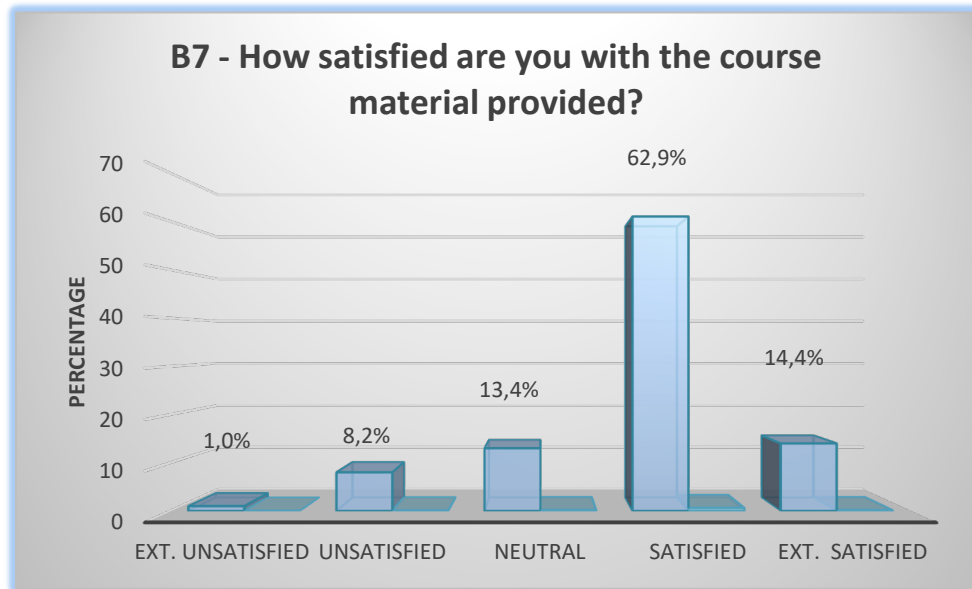


Figure 4.25: Satisfaction with the course material

From Figure 4.25 it is evident 77 percent students are satisfied (63 percent satisfied and 14 percent extremely satisfied) with the course material for the online learning program at DUT Business School. The high level of satisfaction underscores the importance of designing quality course materials in facilitating effective learning experiences in an online setting. This is supported by Greaves (2024:69) who reported that innovative course materials improves the understanding of concepts in online learning classes. The correlation between student satisfaction and the quality of course materials highlight the need for ongoing assessment and refinement of instructional resources.

4.3.3.7 Assistance from administration staff

The results pertaining to assistance from administration staff is presented in Figure 4.26.

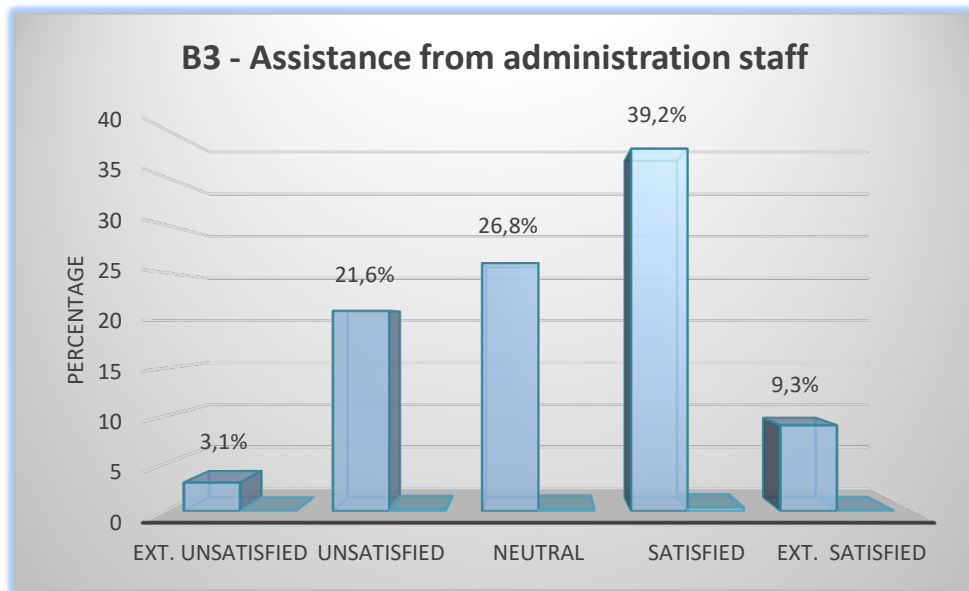


Figure 4.26: Assistance from administration staff

Figure 4.26 indicates 48 percent students are satisfied (39 percent satisfied and nine percent extremely satisfied) with their needs and expectations in terms of the assistance they receive from administration staff at DUT Business School. It should be noted that the similar question was asked in terms of the challenges they faced with online learning, and from Figure 4.14 in Section A majority of students indicated that they rarely receive assistance from administration staff. The researcher is of the opinion that the reason for the difference in feedback could be attributed to the context in which the question was asked. When students assessed their overall satisfaction with administrative support, they could have considered a broader range of interactions and services provided by the administration staff. This broader perspective could have included positive experiences related to course registration queries, student fees enquiries or even course content questions which contributed to the relatively high satisfaction levels reported in Figure 4.26.

4.3.3.8 Innovative teaching methods

The results pertaining to innovative teaching methods is presented in Figure 4.27.

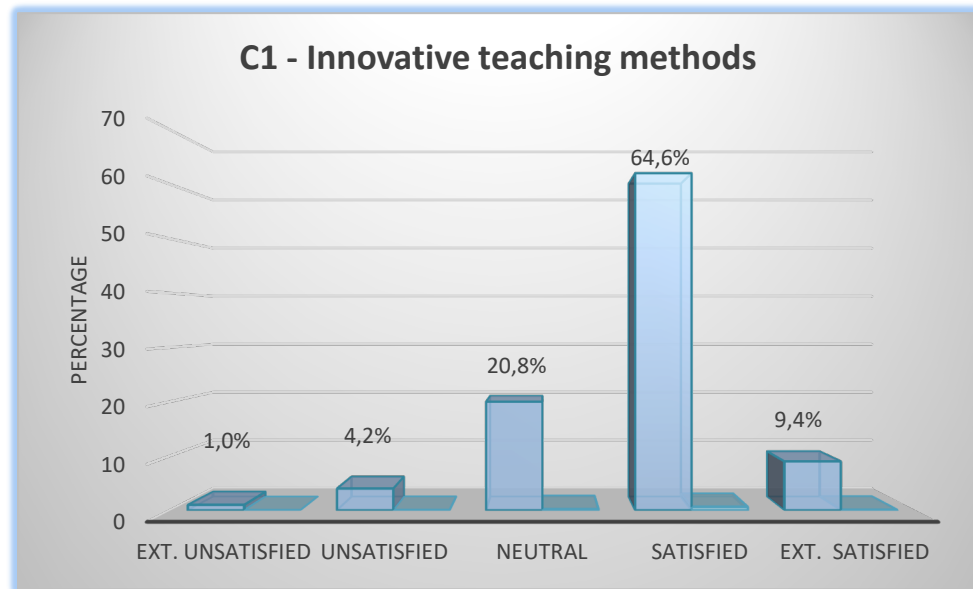


Figure 4.27: Innovative teaching methods

As can be seen in Figure 4.27, 74 percent students are satisfied (65 percent satisfied and nine percent extremely satisfied) with the innovative pedagogies used by the lecturer. Castro and Tumibay (2021:1371) indicate innovative teaching methods are a crucial aspect of any lecturer that teaches online. Therefore, as a result of rapidly changing technology, lecturers need to be continuously improving and evaluating their pedagogies to ensure they provide a quality online learning experience for students. Eli (2021:100) acknowledges innovative teaching methods are created to improve comprehension of subject material, maximise learning outcomes, encourage critical thinking and improve problem solving skills.

4.3.3.9 Knowledge of subject material

The results pertaining to knowledge of subject material is presented in Figure 4.28

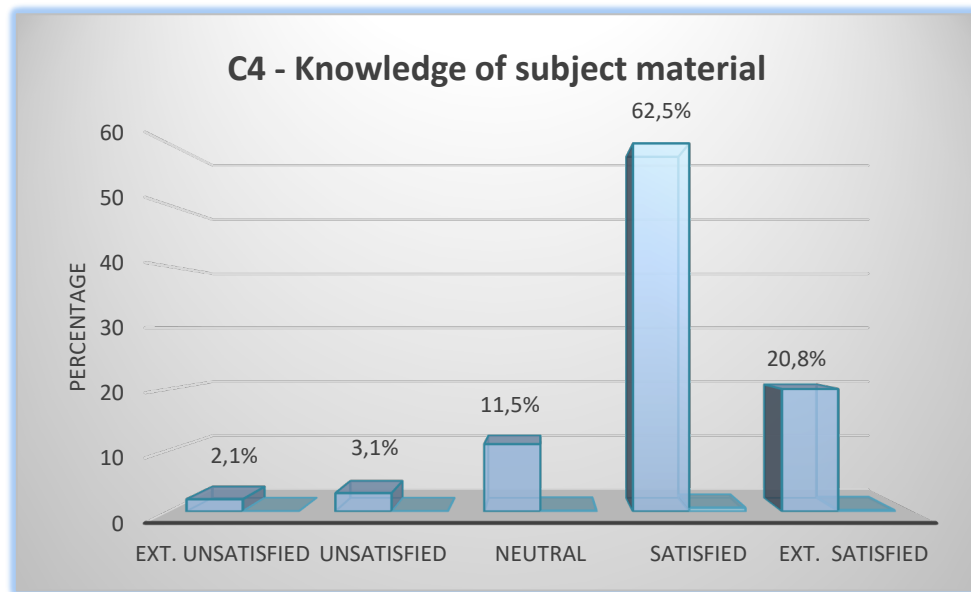


Figure 4.28: Knowledge of subject material

Figure 4.28 indicates 84 percent students are satisfied (63 percent satisfied and 21 percent extremely satisfied) with the lecturer's knowledge of subject material. In order for lecturers to deliver course content effectively, a good knowledge of subject material is essential, as indicated by Tan *et al.* (2024:401). Lecturers need to develop online learning materials and adapt to the needs of students from diverse backgrounds and different learning styles. Having good knowledge of subject material will inspire trust and confidence in students, thereby improving their online learning experience (Prodhan Mahbub Ibna *et al.* 2022:2).

4.3.3.10 Communication skills

The results pertaining to communication skills is presented in Figure 4.29.

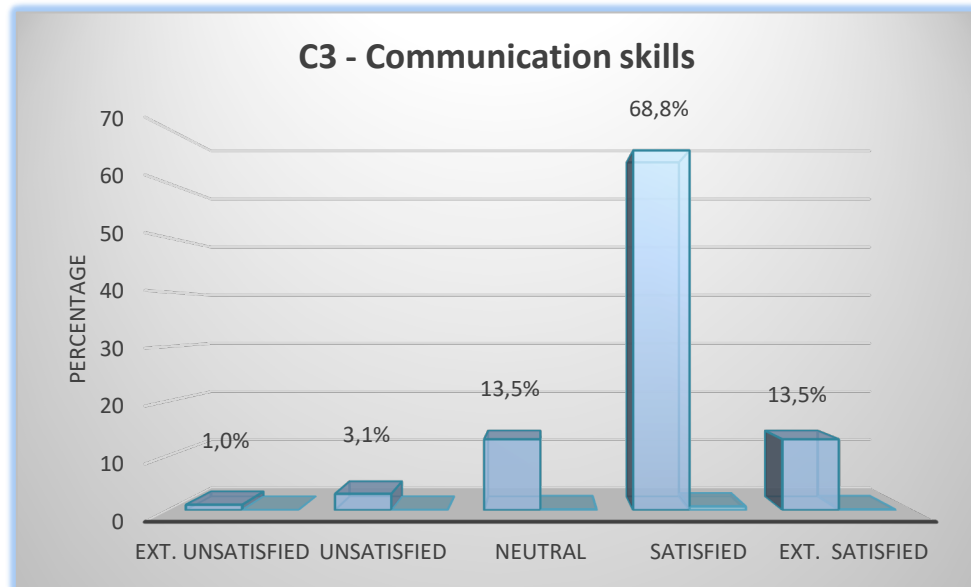


Figure 4.29: Communication skills

Figure 4.29 demonstrates that 83 percent students were satisfied (69 percent satisfied and 14 percent extremely satisfied) with the communication skills of the lecturer. According to Chametzky (2021:1190), communication skills are regarded as a critical success factor in the efficacy of online learning. Therefore, considering online students primarily engage with the lecturer's voice, effective communication becomes essential. Communication skills are important to ensure students are able to grasp subject material and different concepts and facilitate discussions among students.

4.3.3.11 Satisfaction with grades

The results pertaining to satisfaction with grades is presented in Figure 4.30.

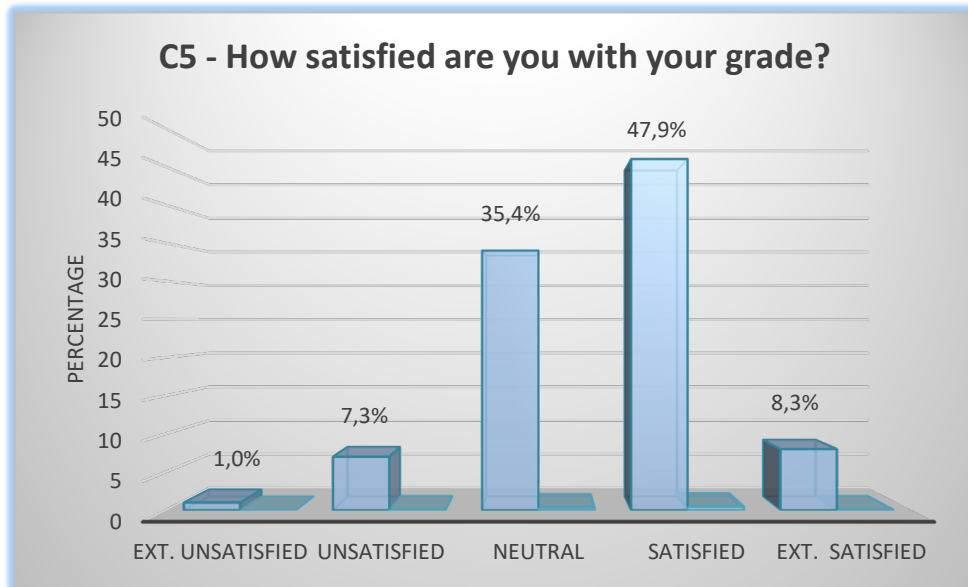


Figure 4.30: Satisfaction with grades

Figure 4.30 indicates 56 percent students were satisfied (48 percent satisfied and 8 percent extremely satisfied) with their grades. Student performance in an online learning program is often a good indicator of program efficacy, as indicated by Mohammad Zadeh *et al.* (2024:94). Castro and Tumibay (2021:1370) found students who are satisfied with their grades have a more positive online learning experience, will remain engaged longer and are more likely to further their studies.

4.3.3.12 Lecturer enthusiasm for teaching

The results pertaining to the lecturer's enthusiasm for teaching is presented in Figure 4.31.

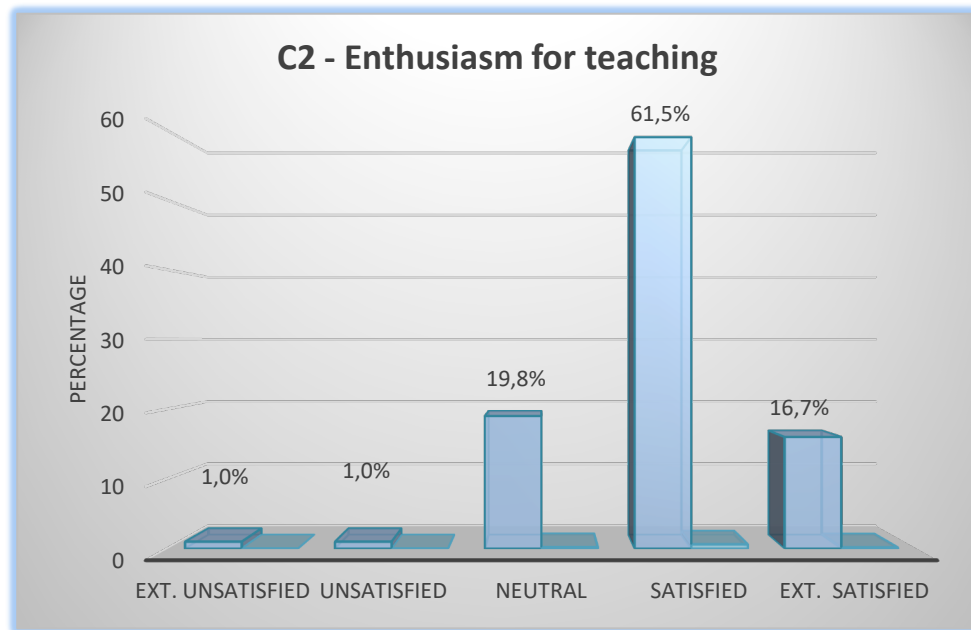


Figure 4.31: Enthusiasm for teaching

From Figure 4.31 it is evident that 79 percent respondents indicated they were satisfied (62 percent satisfied and 17 percent extremely satisfied) with the level of enthusiasm displayed by the lecturer. In this regard, He *et al.* (2024:123) find innovative teaching methods and interaction with lecturers significantly impact the perceptions of online learning. Therefore, it can be inferred that when lecturers employ creative educational approaches and actively engage with students, they create a more dynamic learning environment, which in turn enhances the students' motivation, participation, and overall satisfaction with the learning process.

4.3.3.13 Satisfaction with assessments

The results pertaining to Satisfaction with assessments is presented in Figure 4.32.

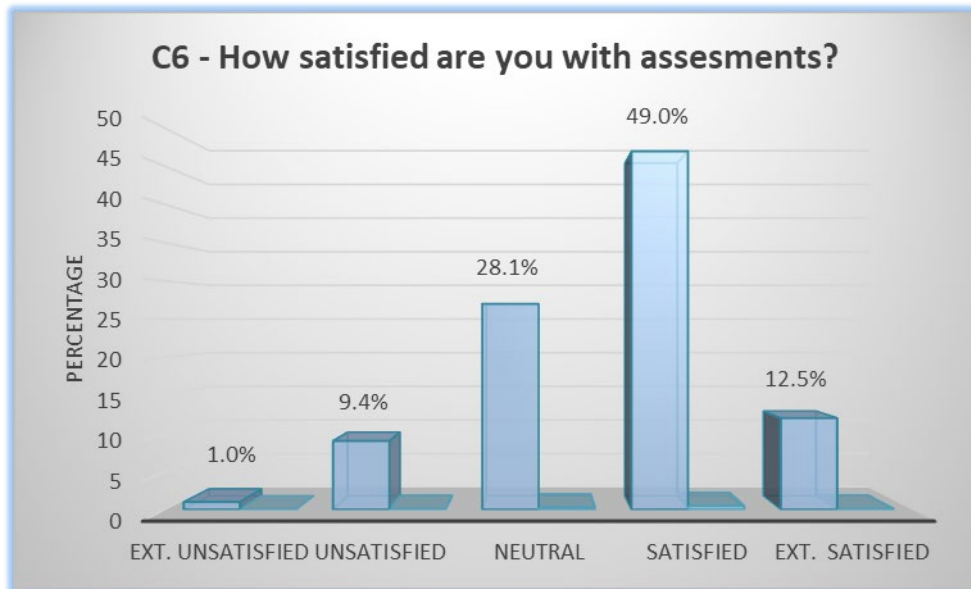


Figure 4.32: Satisfaction with assessments

Figure 4.32 shows 62 percent students were satisfied (49 percent satisfied and 13 percent were extremely satisfied) with the assessments. How a student perceives assessments directly impacts their academic performance and well-being (Freire and Rodríguez 2022:300). This means that when assessments are perceived as fair, relevant, and conducive to learning, they can inspire confidence and promote a positive attitude towards academic challenges. This observation resonates with the findings of Almossa and Alzahrani (2022:2), who suggest that fair and impartial assessments contribute to improve the credibility of the online learning program.

4.3.3.14 Overall satisfaction with lecturer

The results pertaining to overall satisfaction with lecturer is presented in Figure 4.33.

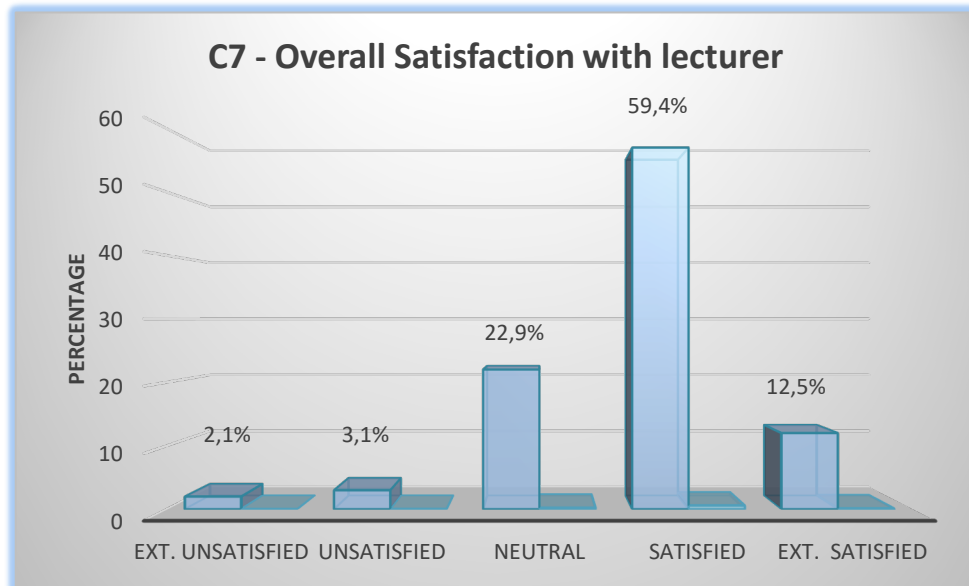


Figure 4.33: Overall satisfaction with lecturer

Figure 4.33 indicates that 72 percent respondents were satisfied (59 percent satisfied and 13 percent extremely satisfied) with the lecturer. This finding aligns with recent research by Tan *et al.* (2024:401) who reported that positive perceptions of lecturers and interaction between lecturers and students enhance the online learning experience. Additionally, Enwereji *et al.* (2024:380) claim lecturers play a critical role in the success rates of online learning. Therefore, it can be deduced that Lecturers who demonstrate enthusiasm, expertise, and responsiveness to students' needs can create a supportive and motivating learning environment conducive to academic success.

4.3.3.15 One sample T-test

Table 4.13 below demonstrates the results for the One sample T test for the needs and expectation section of the study.

Table 4.13: One sample T-test for section B and C

Construct	n	Mean	Standard deviation	t	df	p-value
B1-How satisfied are you with the assistance available from DUT Business School for online learning	97	3.57	0.912	6.125	96	<.001
B2-How satisfied are you with the assistance from facilitators/ Lecturers	97	3.86	0.790	10.662	96	<.001
B3-How satisfied are you with the assistance from the Administration staff	97	3.30	1.012	2.909	96	.004
B4-How satisfied are you with the Software that DUT Business School is using for online learning	97	3.35	0.990	3.487	96	.001
B5- How satisfied are you with the overall format of the program	97	3.69	0.808	8.416	96	<.001
B6- How satisfied are you with the curriculum	97	3.81	0.768	10.441	96	<.001
B7-How satisfied are you with the course material provided	97	3.81	0.821	9.774	96	<.001
C1-How satisfied are you with innovative methods of teaching	96	3.77	0.718	10.521	95	<.001
C2-How satisfied are you with enthusiasm for teaching	96	3.92	0.706	12.724	95	<.001
C3- How satisfied are you with communications skills	96	3.91	0.697	12.739	95	<.001
C4- How satisfied are you with knowledge of the subject material	96	3.97	0.801	11.854	95	<.001
C5-How satisfied are you with your grade	96	3.55	0.793	6.821	95	<.001
C6- How satisfied are you with the assessments	96	3.63	0.861	7.109	95	.000
C7-How satisfied are you overall	96	3.77	0.788	9.587	95	.000

From Table 4.13, it is evident all mean values from questions B1 to B7 and C1 to C7 are greater than 3. For this test, the average agreement score is compared to the central score of 3. When there is a significant difference ($p < 0.05$) it can be interpreted as significant agreement where the mean values are greater than 3 and significant disagreement should the mean values be less than 3. These sections relate to the satisfaction of the course. It can be inferred that all students showed significant satisfaction with the different course aspects.

4.3.3.16 Factor analysis

Table 4.14 indicates the extracted factors and loading for section B and C.

Table 4.14: Extracted factors and loading for section B and C

	Factor	
	1	2
C3- Communications skills	.987	
C2- Enthusiasm for teaching	.901	
C1- Innovative methods of teaching	.866	
C7- Overall	.791	
C4- Knowledge of the subject material	.697	
C6- How satisfied are you with the assessments	.552	
C5- How satisfied are you with your grade	.445	
B3- How satisfied are you with the assistance from the Administration staff		.883
B4- How satisfied are you with the Software that DUT Business School is using for online learning		.805
B1- How satisfied are you with the assistance available from DUT Business School for online learning		.691
B5- How satisfied are you with the overall format of the program		.546
B2- How satisfied are you with the assistance from facilitators/ Lecturers		.492
B7- How satisfied are you with the course material provided		.468
B6- How satisfied are you with the curriculum		.439

The extracted factors and item loadings for section B and C are summarised in Table 4.14. Factor analysis with promax rotation was applied to these 14 items. Two factors were extracted, which account for 58.85 percent of the variance in the data. The KMO index was 0.907 and Bartlett's test of sphericity reached statistical significance [$\chi^2(91df) = 910.945, p = 0.00$]. Rotation converged in three iterations.

Table 4.15: Reliability for factor analysis

Factor	Construct	Items included	Variance extracted	Cronbach's alpha
1	The course delivery (SAT_CD)	C1 – C7	51.12	0.915
2	General (SAT_GEN)	B1 – B7	7.72	0.880

The reliability results from the extracted factors for section B and C are presented in Table 4.15. Composite variables are formed for each factor by calculating the average of the agreement scores for all items included in a variable. The Cronbach alpha values are greater than 0.70, reflecting a good internal consistency for the composite variables.

4.3.4 Analysis of composite variables and correlations

Table 4.16 below displays the analysis of the one sample T test of composite variables.

Table 4.16: One Sample Test of composite variables

Construct	n	Mean	Standard deviation	t	df	p-value
The learning process (LP)	96	3.6458	.71256	8.880	95	.000
External factors (EXT)	96	3.7292	1.05666	6.761	95	.000
Emotional factors (EMOT)	96	3.0562	.81030	.680	95	.498
Assistance (ASS)	96	2.7344	1.00513	-2.589	95	.011
The course delivery (SAT_CD)	96	3.7872	.62494	12.342	95	.000
General (SAT_GEN)	97	3.6274	.66865	9.241	96	.000

As the results of the one sample test of composite variables presented in Table 4.16 show, it is evident that there was significant agreement regarding the Learning Process (construct consists of items A1, 3, 4, 9, 13, 17), External factors (construct consists of items A6, 7, 8) and Emotional factors (construct consists of items A2, 5, 12, 15, 16). The mean value of the Assistance (construct consists of items A 10, 11) construct is less than 3; this indicates significant disagreement that students received assistance.

4.4 Results for qualitative analysis

For the qualitative analysis of the study, a thematic analysis approach was selected, because it is most suitable for highlighting themes and generating unexpected insights in qualitative data (Yeung and Yau 2022:181). The process involved five steps proposed by Peel (2020:25), which consisted of the following:

- Familiarisation – the qualitative data were reviewed and studied thoroughly, and notes were made regarding information relevant to the study.
- Generating initial codes - certain parts or portions of the interview transcripts were highlighted and coded. To code this data, NVIVO software was used by creating different Nodes that represent important ideas, perceptions and experiences. The initial nodes created were “perceptions” and “challenges”. The “perceptions” node was then further coded into “online learning”, “quality in higher education”, and “ISO 21001& 9001”. The “challenges” node was further coded into “online learning” and “implementing a QMS in higher education” (See Appendix D for mind map of themes)
- Generating themes – the different nodes were analysed and examined to identify patterns and word frequencies to develop initial themes.
- Defining themes – the initial themes were reviewed and redefined to be clearer and more concise and represent the data correctly.
- Reporting – after reviewing the data several times, the final themes were selected, and the report is presented below.

4.4.1 Online learning

All respondents had a positive attitude to online learning and believed keeping up with current technology trends and innovation in higher education is the way forward. Respondents felt online learning allowed students from all areas to access HEIs. The following were some of the excerpts reported by participants:

“Online learning allows students to learn at their own pace, if there is something they don’t understand, they have access to the recordings and can watch it again.”

“It promotes innovation in Teaching and learning, encourages more flexibility and greater access to students who may be employed or reside some distance away from the University”.

As highlighted by Almahasees *et al.* (2021:2) and Shambour and Abu-Hashem (2022:3225), lecturers and faculty staff have neutral perceptions of online learning in the studies conducted at their respective universities. The findings in this study demonstrate a more positive perception of online learning. The study respondents were selected as they are deemed experts in the field of Quality and higher education; this means their perceptions to online learning were more positive, because they understand the significance of adopting new technology trends and implementing continuous improvement initiatives. The results from the interviews indicated although lecturers had an overall positive perception of online learning, they faced numerous challenges, namely:

- Load shedding - the interview findings demonstrate that load shedding was the most significant challenge faced by lecturers teaching online. This affected their ability to not only deliver the content effectively but limited their access to resources and, ultimately, affected attendance of all students. Consequently, this resulted in added pressure on lecturers to finish the syllabus on time. Furthermore, respondents reported many devices were damaged as a result of load shedding. These results triangulated well with the responses to statement A8 of the quantitative analysis, where respondents strongly agreed load shedding disrupted their online learning.

Kgarose *et al.* (2023:450) posit load shedding directly impacted increased stress levels and mental health issues of lecturers at HEIs in SA. Malik *et al.* (2022:1165) suggest load shedding has a negative impact on student punctuality, attendance and grades.

- Data Costs – increasing data costs was a common theme amongst interview respondents. The result of the interviews showed lecturers felt rising data costs affected student participation in lectures and attendance. Therefore, this made it difficult for lecturers to share teaching aids, notes and videos with students. This triangulated well with the responses to statement A6 of the quantitative analysis, where respondents strongly agreed there was a substantial increase in

data/internet charges since they started with the online program. According to Sarosa (2022:477), increased data costs, as well as additional costs of software and physical devices, created an unexpected financial burden for students who had to suddenly migrate to online learning during the pandemic.

- Adjusting to online learning – respondents indicated that the sudden migration to online learning from face-to-face learning created challenges for lecturers. They found it difficult to not only adjust to the new technologies and software, but also had to deal with technical and connectivity issues. Moreover, the respondents felt it was overwhelming to suddenly adapt their teaching materials, worksheets and pedagogies for online learning. This triangulated well with the responses to statement A12 of the quantitative analysis, where respondents strongly agreed they had difficulty adjusting from face-to-face contact sessions to online learning. Maatuk *et al.* (2022:29), Fauzi, Salim and Syafrudin (2021:168) and Alshwiah (2021:213) concur that adjusting to online learning during the pandemic created increased stress, burnout and anxiety in faculty members, as they struggled to find a healthy balance between work and life.
- Proctoring and assessments – respondents noted difficulty in controlling the integrity of examinations and preventing cheating during tests. Maintaining academic integrity is a constant challenge for most online lecturers and many respondents complained of technical issues experienced during tests and examinations. In this regard, Vazquez, Chiang and Sarmiento-Barbieri (2021:90) find the use of proctoring software raises privacy concerns, as most software involve the collection, monitoring and storing of personal information of students during a test or examination.
- Marking and assessments – almost all respondents noted marking assignments and tests as a challenge when teaching online. The process of marking online is notably more time-consuming, particularly when there are a large number of students in a class. Tuah and Naing (2021:62) and Peimani and Kamalipour (2021:633) also suggest marking online created several challenges for faculty members; therefore, institutions should provide adequate training and support, in order to maintain the integrity of assessments and improve the efficacy of online learning.

4.4.2 Quality in higher education

Every respondent had a positive perception of introducing QA in higher education and believed it is necessary to implement quality initiatives in HEIs. Many respondents felt implementing a QMS was essential for ensuring the integrity of the academic institution and improving their international reputation. The following were some of the feedback reported by the participants:

“It is absolutely necessary in order to maintain standards and to ensure that qualifications are relevant.”

“It is highly recommended that a relevant quality management system be implemented to uphold the quality and integrity of the qualifications and services provided by the organisation.”

In order to maintain high academic standards and uphold the integrity of the educational programs, QA needs to be an essential tool used by HEIs to enhance their competitive edge and retain their accreditation (Seyfried and Pohlenz 2018:258; O'Leary and O'Byrne 2021:31). Although all respondents had favourable and positive perceptions of QA in higher education, the results from the interviews indicated they believed there would be a number of challenges should they implement a formal QMS. These include:

- Bureaucracy – all respondents felt that one of the main impediments to implement an effective QMS, would be excessively complicated administrative procedures that govern their institution. For example, to implement a small policy or procedural change, is a long and arduous process. Asiyai (2022:844) argues that to achieve QA in higher education, educational administrators need to prioritise QA initiatives which include change management.
- Organisational culture - respondents believed that resistance to change in their institutions could hinder the implementation of any new quality initiatives. Faculty and staff might be hesitant due to conflicting priorities or competing interests. According to Naveed Bin Rais *et al.* (2021:6), acquiring organisational “buy in” and support is a critical success factor for the successful implementation of a QMS.

- Resource limitations- respondents are of the opinion that resource constraints and training capacity might hinder the successful implementation of the QMS. Institutions might not only lack the financial support, but also be unable and unwilling to provide adequate training to staff. Greere (2023:166) states adequate training is vital for the success of QMS implementation; not only to empower faculty and staff, but also by creating awareness of core quality principles. More training would develop a better understanding of the science behind QMS.
- Poor communication - respondents felt poor communication would hinder the implementation of a QMS. They highlighted inadequate communication policies could lead to misunderstandings and affect organisational culture adversely. Aburizaizah (2022:3) claims good communication strategies play a pivotal role to mitigate resistance to change and are essential for gaining staff support.

4.4.3 Perceptions of ISO 9001:2015 and ISO 21000:2018

All respondents felt it was important to implement a QMS. Most respondents felt ISO 21001:2018 would be the preferred standard, as it was designed for an educational institution. It was noted that most institutions currently offer programmes that fit into the NQF and are accredited by the Quality Council for Higher Education (CHE). The CHE recently launched a QA Framework (QAF), the purpose of which is to initiate a national QA system that improves the quality of higher education (Lalendle *et al.* 2022:5816). Therefore, implementation of any QMS at HEIs will need to incorporate this new QAF.

4.5 Summary of chapter

This chapter presented a Gap analysis report on current QA protocols for the DUT Business school online learning program. Furthermore, the challenges faced and needs and expectations of interested parties were determined by analysing the data collected from the survey questionnaire and presented in the form of charts, graphs and tables.

A thematic analysis was conducted on the results of the interviews with experts in the field of higher education and quality. The thematic analysis provided valuable insights into the perceptions and challenges lecturers faced with online learning, and in implementing a QMS to improve both student and lecturer experiences.

The next chapter discusses the main research findings and presents the conclusions and recommendations of this study.

CHAPTER FIVE - CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the main research findings, conclusions and recommendations. An overview of each objective of the study will be presented and discussed. The chapter will culminate with the presentation of the ISO 21001:2018 framework enhanced by TQM, developed based on the findings from the study.

The COVID-19 pandemic, coupled with rapidly advancing 4IR technology has forced many HEIs around the world, to make the transition from face-to-face contact sessions to online learning platforms. Due to the rapid and sudden transition, a number of unprecedented challenges were experienced during the transition that brought into question the quality standards of education students were receiving at the DUT Business School. An EOMS is proven to be an effective tool in QA initiatives, as indicated in the literature review discussions.

There are numerous benefits to implementing a QMS for an online learning program but so too, are the challenges. In order for HEIs to provide a better-quality education to their students, they must successfully implement a unique QMS, adapted to incorporate the multidimensional nature of HEIs. Determining the perceptions of online learning, as well as the needs, expectations and challenges, allows HEIs to make informed decisions when designing and launching the implementation plan.

5.2 Research objectives

The research was underpinned by the following objectives:

5.2.1 Objective 1:

To conduct a GAP analysis on the current QA protocols in place at the DUT Business School.

5.2.2 Objective 2:

To determine the challenges faced and establish the needs and expectations of all relevant stakeholders of the online learning program.

5.2.3 Objective 3:

To ascertain the perceptions of academics specialising in the field of higher education and quality management regarding QMS and online learning.

5.2.4 Objective 4:

To adapt the current QMS framework and align it with the ISO 21001:2018 standard, enhanced by TQM.

The gap analysis was conducted on the existing QA protocols at the DUT Business School, with results discussed in chapter 4 to fulfil objective 1. To address objective 2, a survey was deployed to identify and understand the challenges encountered in the online learning program, as well as to delineate the needs and expectations of the students involved. In terms of objective 3, the perceptions of academics specialising in the field of higher education and Quality Management regarding QMS and online learning was obtained through interviews and the results discussed in chapter 4. Last, to fulfil objective 4, the study culminates with the development of a recommended framework, aligned with the ISO 21001:2008 standard and enhanced by TQM. The design of this framework was informed by the results from the qualitative and quantitative research findings, literature review and benchmarking against best practices.

5.3 Summary of key findings

The gap analysis revealed, while the DUT Business School possesses a vision and mission statement; and conducts studies to understand student needs, it lacks a documented scope and dedicated QMS. In addition, despite demonstrating leadership commitment, there is no formal quality policy or organogram. It was also established, although the school conducts a SWOT analysis and plans EOMS objectives, it does not adequately plan for changes. Furthermore, there is no communication policy and procedures for process control and internal audits, although it addresses non-conformities and implements continual improvement initiatives.

The quantitative analysis revealed the students at DUT Business School generally find the online learning program effective, despite experiencing significant stress

levels, due to balancing multiple responsibilities and connectivity issues. Additional challenges included increased costs for data and electricity, disruptions from load shedding, and concerns regarding cyber security. It was also observed preferences for online versus face-to-face learning vary, with some students valuing the flexibility of online learning. There was a notable lack of technical and administrative support, which lead to feelings of isolation and difficulties in time management. Regarding needs and expectations, the students indicated general satisfaction with the online learning program. They appreciate assistance from the Business School and lecturers, who are highly rated for their knowledge and communication skills. While satisfaction with the software and program format was slightly lower, the curriculum, course materials, and innovative teaching methods were well received.

The qualitative analysis from the interviews highlighted a positive perception of online learning, emphasising its flexibility and accessibility, while highlighting challenges such as load shedding, rising data costs, and difficulties in adapting teaching methods. Respondents unanimously support QA in higher education, identifying potential hurdles such as bureaucracy, resistance to change, and resource constraints. They favour ISO 21001:2018 for its alignment with educational institutions but acknowledged the need to integrate national QAFs.

The quantitative and qualitative results were triangulated across three key areas: load shedding and connectivity issues, identified as the primary challenges in online learning, and were corroborated by findings from the literature review (Mohammed Zadah *et al.* 2024). Additionally, both the quantitative and qualitative data revealed consensus on the difficulty of suddenly transitioning from face-to-face to online learning, which is supported by the findings from the literature review (Almahasees *et al.* 2021:2). Furthermore, the increased costs in equipment, data and electricity, were noted by students, lecturers, and supported by existing literature (Enwereji *et al.* 2024:380).

5.4 Recommendations

As a result of the gap analysis conducted, it is evident implementing ISO 21001:2018 is an achievable target for the DUT Business School. The benefits of this standard far outweigh the possible challenges, while introducing this new system in phases will prioritise the critical policy and procedures gradually, before attempting the more complex aspects. For example phase 1 would involve:

- Developing a quality policy – this policy for DUT Business School should clearly outline their commitment to providing a quality education, exceeding the needs and expectations of interested parties and striving for continuous improvement, aligning to the vision and strategic plan of the organisation.
- Implementing a formal communications policy - One of the conclusions drawn from the study indicated good communication is vital for the success of an online learning program and implementing an official communication policy, detailing the guidelines for effective communication with students, staff, stakeholders and the public, will be beneficial to the organisation. Providing mechanisms for students and staff to communicate with the school will assist the organisation with continuous improvement initiatives and making informed decisions.
- Establishing an internal audit procedure - it is recommended that internal audits be introduced as a critical procedure, because it ensures the organisation's compliance with regulations and standards, operational efficiency, reviews QA and ensures financial integrity.

In addition, to implement the adapted version of ISO 21001:2018, it is suggested that the DUT Business School develop the following critical policies and procedures:

- Documenting the scope of the EOMS.
- Defining the organisational structure to clarify roles and responsibilities.
- Establishing a procedure for change management.
- Creating process flow diagrams depicting all processes.
- Developing a procedure for controlling external service providers.
- Establishing a procedure for managing non-conforming products and services.

Based on the survey and interviews, it is recommended that educational institutions and policymakers prioritise the following initiatives:

- Load shedding – Due to the unpredictability of the energy supply in SA, it is recommended that the DUT Business School should focus on finding ways to mitigate load shedding and connectivity challenges faced by both students and lecturers. For example, creating a more flexible lecture and examination timetable to accommodate the challenges posed by load shedding. In addition, specific areas in the Library or study spaces can be designated and equipped with back-up power sources to allow students to continue studying during load shedding.
- Adjusting to online learning – As a result of the difficulties with adjusting to online learning, it is recommended that students and staff are:
 - Offered more intensive training on technology and applications being utilised.
 - Provided with additional technological and administrative support.
 - Offered guidance with accessibility to resources, particularly students with disabilities.
- Financial implications - The financial implications of online learning were experienced by both students and lecturers. Direct costs such as increasing data and electricity expenses, as well as indirect costs, such as costs of equipment and software, are a significant challenge faced by all interested parties. It is recommended that the DUT Business School explore subsidising data costs for students. In addition, students could be provided with support to assist them in applying for government funding.

One of the findings from the literature review of the global perceptions of online learning indicated while almost all students and lecturers have positive perceptions of online learning, they still would prefer the traditional face-to-face contact sessions, considering the choice. It can be inferred, despite acknowledging the advantageous nature of online learning, it is still not deemed effective. Implementing a QMS/ EOMS will provide students with confidence in the quality of online education they are receiving. In addition, online pedagogies (format, design, delivery, course materials and so on) significantly impact student perceptions of online learning and commitment to the course (Greaves 2024:69).

This study also revealed proctoring and assessment are one of the most challenging and time-consuming tasks for an online lecturer. Ensuring integrity of assessments and examinations is a constant challenge (Dendir and Maxwell 2020:2).

Organisations need to investigate new ways of testing and assessing students. Additionally, lecturers and faculty should be offered supplementary training in all new software and applications being used.

The South African educational landscape is plagued with regular protesting, unrest and disruptions to the academic program every year (Vhumbunu 2021:4). Having an effective online learning program would neutralise disruptions to the academic timetable and curriculum.

5.5 Proposed QMS framework

Based on the findings from the literature review and the research instruments, the researcher proposes an integrated quality management system enriched with TQM principles, as presented in Figure 5.1. The ISO 21001:2018 standard is embedded within the Plan-Do-Check-Act (PDCA) cycle for educational organisations, aiming to help institutions provide consistent quality education, enhance student satisfaction, and continuously improve their educational processes (ISO 2018) (ISO 21001:2018). Therefore, the proposed framework involves adopting a systematic approach to manage educational activities, ensuring alignment with the institution's vision and strategic objectives. As elucidated by Hamadi and El-Den (2024:6), employing a structured framework facilitates the uniform application of new systems across the institution, promoting consistency and reliability.

Figure 5.1 illustrates how the proposed framework integrates TQM principles at critical junctures to optimise quality management processes, thereby enhancing organisational efficacy and improving the overall quality of educational provision. This approach is necessary, considering the evolving landscape of education, where technological advancements and shifting socio-economic conditions demand continuous adaptation and improvement (Jasti *et al.* 2022:1250).

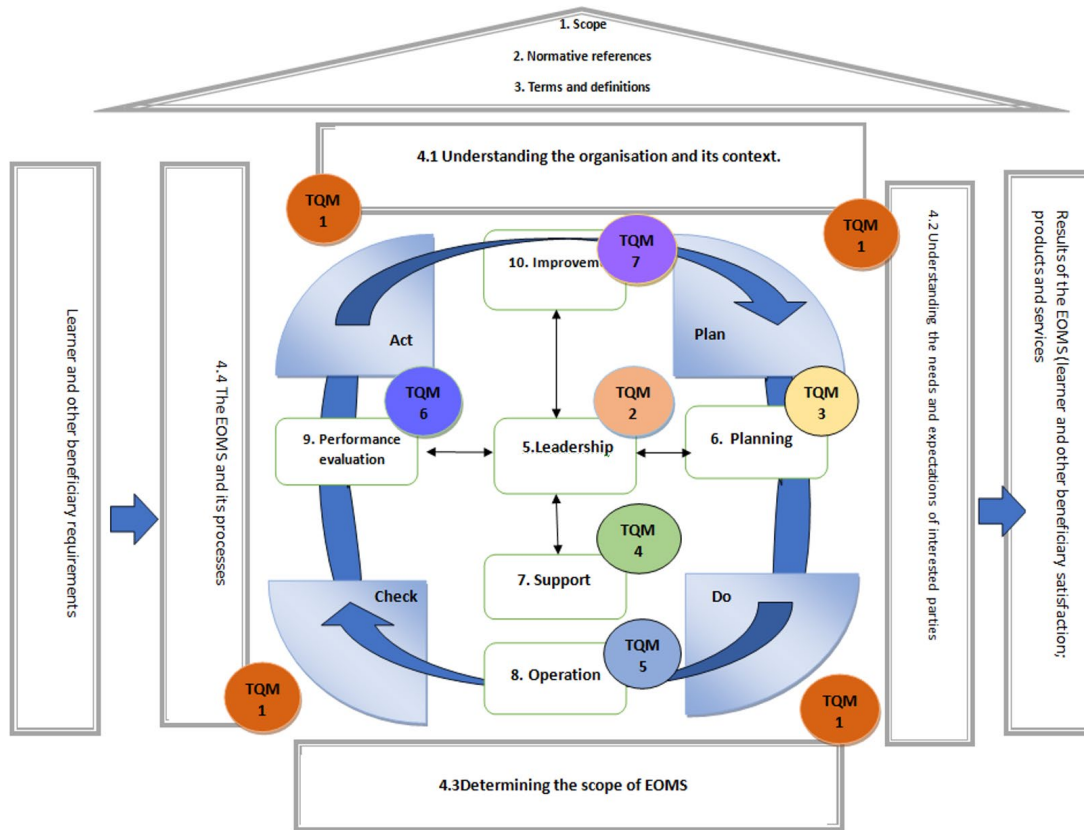


Figure 5.1: Graphical representation of ISO 21001:2018 standard enhanced by TQM principles

Diagram Key

TQM 1	System Approach to Management
TQM 2	Leadership
TQM 3	Factual Approach to decision making
TQM 4	Involvement of people
TQM 5	Process Approach
TQM 6	Customer Focus
TQM 7	Continual Improvement

Each of the TQM principles functions as follows:

- **Focus on learners and other beneficiaries (TQM 6)** - as a result of the evolving shift towards technology and innovation in the education sector, organisations need to ensure students are equipped with the necessary knowledge and skills that will allow them to adapt to the rapidly changing socio-economic landscape. Furthermore, the curriculum needs to be developed and reviewed by taking the needs and expectation of all interested parties into consideration; this includes external stakeholders and the employment industry. The TQM tool of QFD will assist the institution in deciphering student needs and expectations, by prioritising the functions critical to the relevant stakeholders.
- **Visionary leadership (TQM 2)** - management should focus on creating knowledge and skills development that aligns with educational objectives and ensure that there must be relevant educational programs and expertise with the latest technological developments such as AI. Utilising Hoshin Kanri is an effective TQM tool for leadership to communicate and deploy policies and strategic initiatives throughout the institution.
- **Engagement of people (TQM 4)** - All interested parties should be valued and their qualifications acknowledged and utilised in the appropriate manner. Consequently, as a result of technological advancements, there is a need to reorganise educational trainers and professionals to ensure they are utilised in the best capacity. Quality Circles would be an effective TQM tool to ensure active participation of all employees in the improvement process that will, ultimately, empower employees and foster a culture of teamwork and collaboration.
- **Process approach (TQM 5)** – understanding how different processes are interrelated is crucial for this approach. Accurate information with regard to the digital processes is necessary to maintain continuity and efficacy of the integrated management system. Furthermore, trouble-shooting technologies and skill set must be considered in the curriculum. Implementing the TQM technique of process mapping will enable HEIs to determine the bottlenecks and inefficiencies in their processes, thereby optimising the integrated system.
- **Improvement (TQM 7)** – improving the organisation’s culture by using latest technologies and digital tools to develop the QA initiatives, thereby encouraging commitment to continuous improvement and ensuring sustainability. Kaizen

would function well as a TQM tool for innovation and continuous improvement at every level in the institution.

- **Evidence-based decisions (TQM 3)** – online curriculum should be designed and informed by the analysis and interpretation of data concerning all aspects of the system. Data collected from relevant stakeholders should be analysed appropriately and the outcomes used to identify potential opportunities for continuous improvement. The most effective TQM technique to achieve this objective is SPC, which will enable the institution to collect and analyse data for trends and abnormalities. This analysis will help to inform decisions made by the institution.
- **Relationship management (TQM 1)** – systems should be in place for knowledge sharing and communication with relevant stakeholders and interested parties. Managing effective relationships between interested parties creates an environment that fosters transparency and enhances teamwork and collaboration among different departments in the organisation. Employing the TQM technique of cross-functional teams will enable the institution to foster good relationships and enhance communication with relevant stakeholders.
- **Social responsibility (TQM 4)** – educational institutions should be aware of their organisation’s social influence and functions in society. HEIs have a responsibility to conduct activities that demonstrate interest in finding solutions to issues afflicting society. The institution can integrate social responsibility metrics into a balanced scorecard to ensure social and environmental performance metrics are evaluated.
- **Accessibility and equity (TQM 6)** – the system ensures the institution’s resources should be available for all students, with consideration for students with special needs. Implementing a TQM tool such as Failure Mode Effect Analysis (FMEA) can be effective in assessing potential risks and impacts of accessibility and equity failures; this will enable the institution to proactively ensure consideration is provided to all relevant stakeholders.
- **Ethical conduct in education (TQM 4)** – at the centre of the institution’s regular practice, should be an ethical code of conduct that ensures all staff, students and interested parties are committed to integrity, trust and responsibilities. Benchmarking best practices and ethical considerations of industry leaders

enables the institution to identify areas that need improvement and commitment to integrity and responsibilities.

- **Data security and protection (TQM 1)** - As a result of the vast online learning platforms and software, large amounts of personal information are available online. HEIs should safeguard the information of all staff, students and interested parties by ensuring privacy and confidentiality of their personal data. An effective TQM tool to determine security risks would be the Cause-and-Effect diagrams. By systematically identifying potential security risks and threats, the organisation can determine the root cause and prevent reoccurrence.

According to Jasti *et al.* (2022:1252), notwithstanding the popularity of implementing TQM in higher education, a study of literature revealed most TQM models used were adapted from industry models and were successful on non-academic functions at HEIs. Furthermore, one of the main reasons for the failure of TQM application in HEIs is the lack of a holistic approach (Jasti *et al.* 2022:1252). This is further supported by Jacob *et al.* (2024:2), who state the reason for failure in implementation can be attributed to the lack of quality frameworks in HEIs. Moreover, Jasti *et al.* (2022:1252) suggest ISO certification will act as an effective framework. The authors state implementing TQM alone would not be an effective quality management approach, as it does not cater to the complexity of defining the customer in the higher education sector, which the ISO 21001:2018 standard does. Therefore, using TQM tools and techniques, integrated with the ISO 21001:2018 standard, would be an effective framework for the DUT Business School.

It is recommended when implementing this system, DUT Business School should:

- Consider the cultural diversity of SA and provide documents and training materials translated into the common languages spoken.
- Ensure the new integrated system is aligned with national education policies and government regulations.
- Introduce awareness campaigns by communicating the benefits of this new system to all stakeholders, which would encourage ownership and commitment.

The framework functions as a guiding tool for institutions to harmonise their practices with an internationally recognised quality benchmark, fostering a culture of continuous enhancement and accountability (Vijayan Gurusurthy 2018:546).

Therefore, the adaptable nature of the framework enables institutions to customise their quality management strategies to address their specific necessities and hurdles, thereby fostering resilience and longevity in their operations.

5.6 Limitations to the study

Despite the valuable insights from this study, there were a few limitations:

- Although the questionnaire was emailed to the student's correct email addresses, reminder emails had to be sent multiple times before they responded, which caused a delay in the study.
- The study was conducted at the DUT Business school and does not include other business schools within the country. Hence, the factors considered in this study would, therefore, be unique to the DUT Business school and the findings may not be generalised across all business schools.
- The researcher did not have an opportunity to test the proposed framework developed in this study.
- Due to the rapidly evolving technologies, software and applications, the researcher had to continuously review literature throughout the study to ensure the most recent information was used. This indicates the study findings might quickly become outdated as new tools and methods emerge, necessitating continuous updates and adaptations.

5.7 Future studies

With consideration to the limitations of the study and review of current literature, the researcher proposes the following recommendations for potential future studies:

- The practical implementation of the proposed integrated framework at the DUT Business school. Since this is a relatively new standard, there is potential to test the effectiveness of the proposed framework and build a knowledge base in the field of education management systems (EOMS).
- Further investigations of this nature should be performed in other educational sectors to compare the findings with those of this study.

- Examining the long-term health effects of online learning. These could comprise the dangers of increased screen time, including eye strain and mental fatigue.
- Evaluating the impact of technical and administrative support systems for online learning to identify best practices and areas for improvement.

5.8 Concluding remarks

The study identified the perceptions and challenges faced by students attending the online learning program at the DUT Business School. The needs and expectations of all interested parties were determined, allowing the study results, as well as an extensive literature review to form the basis for the integrated framework developed. This is among the first attempt to integrate ISO 21001:2018 with TQM principles, creating a unique education management system for an online learning program. This system offers the DUT Business School a structured approach to QA and prioritising continuous improvement. Considering only a handful of organisations are accredited to ISO 21001:2018 globally, achieving this accreditation would ensure the DUT Business School has a competitive edge and allow the organisation to be globally recognised.

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7. Appendices

7.1 Appendix A – Ethical Clearance Certificate



TRREE

Zertifikat Certificat Certificado Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate
Ce document atteste que - this document certifies that

Vishantham Aron
a complété avec succès - has successfully completed
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[REV : 20170310]

7.2 Appendix B – IREC Approval



5 July 2023

Mrs V Aron
37 Protea Road
Springfield
Durban
4091

Dear Mrs Aron

A Quality Management System for an online learning program at an academic institution

Ethics Clearance Number: IREC 132/22

The DUT-Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letter.

Please note that **FULL APPROVAL** is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.

Please note that you are required to submit a **Notification of Completion of Study** form together with an abstract to the **DUT-IREC** office on completion of your study.

Yours Sincerely

Professor J K Adam
Chairperson: DUT-IREC

7.3 Appendix C – Calculation of sample size

Sample Size Calculator

Find Out The Sample Size

This calculator computes the minimum number of necessary samples to meet the desired statistical constraints.

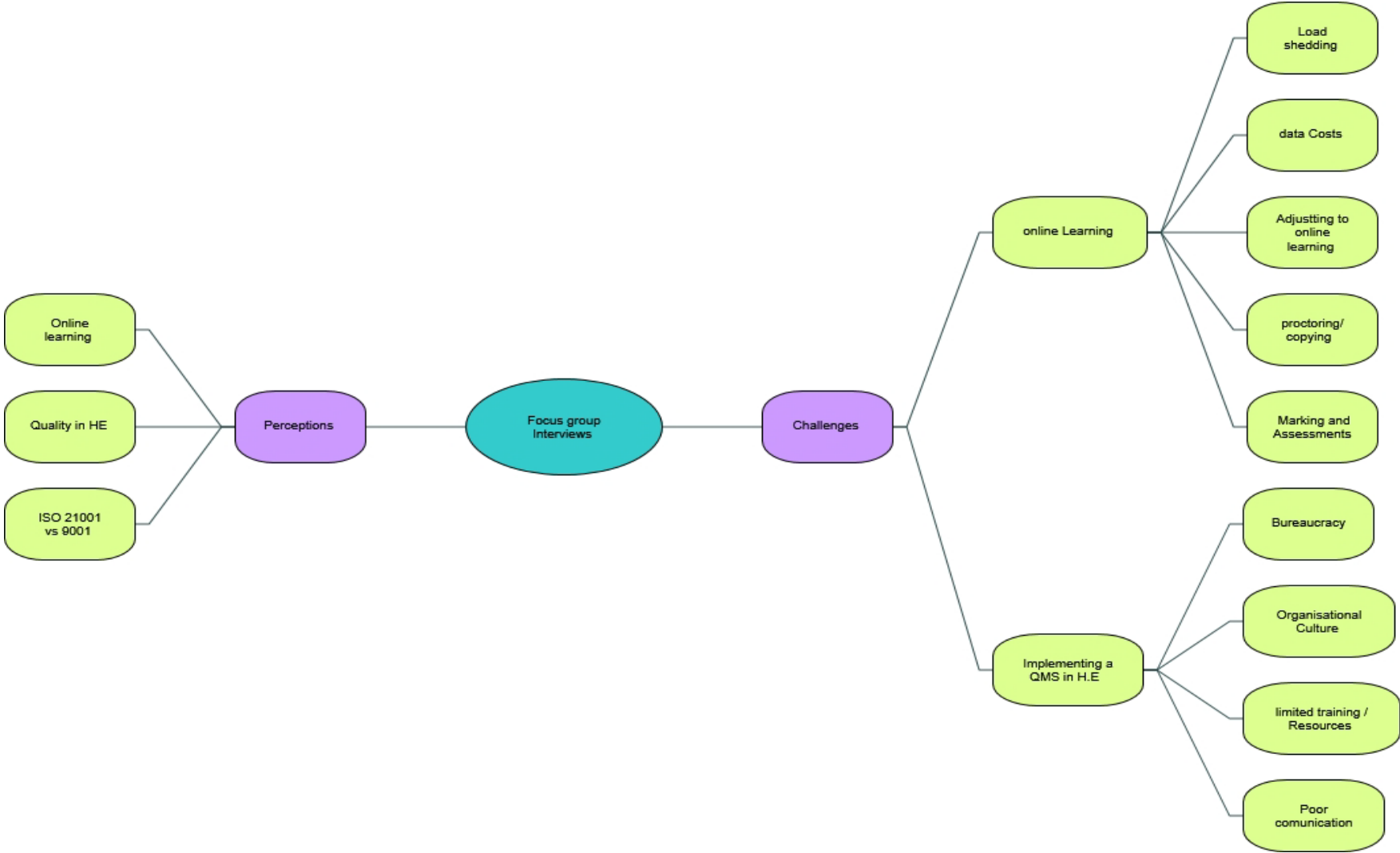
Result

Sample size: **106**

This means 106 or more measurements/surveys are needed to have a confidence level of 95% that the real value is within $\pm 5\%$ of the measured/surveyed value.

Confidence Level: ?	<input type="text" value="95%"/>	▼
Margin of Error: ?	<input type="text" value="5"/>	%
Population Proportion: ?	<input type="text" value="50"/>	% Use 50% if not sure
Population Size: ?	<input type="text" value="145"/>	Leave blank if unlimited population size.
<input type="button" value="Calculate"/> <input type="button" value="Clear"/>		

7.4 Appendix D – Mind map of themes for qualitative data



7.5 Appendix E – Survey Questionnaire

Online learning

Gender

1. Male
2. Female
3. Other _____

Age:

Ethnicity

1. Black
2. Indian
3. White
4. Multiracial
5. Other

Marital Status

1. Single or Never married
2. Married
3. Separated
4. Divorced
5. Widowed
6. Prefer not to say

Education

1. Diploma
2. Higer Diploma
3. ~~Btech~~ Degree
4. Honors
5. Masters
6. ~~Doctrate~~
7. Other _____

~~Employment~~ Status

1. Unemployed
2. Part Time Employee
3. Full Time Employee
4. Other _____

Home Language

1. English
2. Isizulu
3. Afrikaans
4. Other _____

* All responses will be strictly confidential.

Online learning

Online Learning Program

When did you start this program:(DD/MM/YYYY)

- _____

What device are you using for your online learning program:

1. Smart Phone
2. Laptop
3. Desktop Computer
4. Tablet
5. Other _____

How much time do you spend on this online learning program a week:(Hours/Days)

Section A – Challenges faced with online learning.

Select the response that best describes your experience.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
A1- The online learning program has been effective for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A2- Attending the online learning program has been <u>stressful</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A3- My environment at home was conducive to the learning process. (noise levels, family or pet disturbances)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4- I have my own device to attend the online learning program(<u>not sharing with family members</u>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A5- I have a good internet connection at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A6- Data/ Internet charges have increased since I started online learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A7- I have noticed an increase the electricity consumption since I started online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A8- Load shedding has disrupted my online lectures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A9- I prefer online learning to face to face contact sessions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A10- I have assistance from technical staff when I have connection issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* All responses will be strictly confidential.

Online learning

A11- I have assistance from administration staff when needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A12- It was difficult for me to change from <u>traditional</u> Face to face classroom learning to an online learning platform.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A13- I know how to <u>use</u> the software and computer programs for online learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A14- I have trouble with time management for online learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A15- I feel isolated from friends and <u>colleagues</u> when I am learning online.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A16- I am concerned about having my personal information online.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A17- The class was very well organized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section B –Needs and expectations

	Extremely Unsatisfied	Unsatisfied	Neutral	Satisfied	Extremely Satisfied
B1- How satisfied are you with the assistance available from Dut Business School for online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2- How satisfied are you with the assistance from <u>facilitators/ Lecturers</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B3- How satisfied are you with the assistance from the Administration staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4- How satisfied are you with the Software that Dut Business School is using for online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B5- How satisfied are you with the overall format of the program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B6- How satisfied are you with the curriculum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B7- How satisfied are you with the course material provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section C – How satisfied are you with the Facilitator/Teacher/Lecturer

	Extremely not Satisfied	Not Satisfied	Neutral	Satisfied	Extremely Satisfied
C1- Innovative methods of teaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* All responses will be strictly confidential.

Online learning

C2- Enthusiasm for teaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C3- Communications skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C4- Knowledge of the subject material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C5- How satisfied are you with your grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C6- How satisfied are you with the assessments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C7- Overall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.6 Appendix F - Qualitative questionnaire

Interview questions

1. Please can you provide the number of years you have been in the Education and Quality Management field?
2. What are your perceptions of online teaching and learning?
3. How has the COVID-19 pandemic affected your institution?
4. How has your pedagogy adapted to the new online environment?
5. As a lecturer/ facilitator/ academic in this field, what are some of the problems/ challenges you faced with teaching /marking online?
6. What is your stance on implementing quality management systems in higher education?
7. ISO 21001:2018 is a new management system for educational organisations. As an expert in this field, what is your opinion on this new standard?
8. Would you recommend this standard to your education institution?
9. What do you think are some of the challenges an education institution would face by implementing this system?
10. Compared to ISO 9001, which QMS do you think will be more effective? Why?

7.7 Appendix G – Gatekeeper Letter



Directorate for Research and Postgraduate Support
Durban University of Technology
Open House
P.O. Box 1334, Durban 4000
Tel.: 031-3732576/7
Fax: 031-3732946

21 March 2023

Mrs Vishantham Aron
c/o Department of Operations and Quality Management
Faculty of Management Sciences
Durban University of Technology

Dear Mrs Aron

PERMISSION TO CONDUCT RESEARCH AT THE DUT

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research and Innovation Committee (IRIC) has granted **Gatekeeper Permission** for you to conduct your research "A quality management system for an online learning program at an academic institution" at the Durban University of Technology. **Kindly note that this letter must be issued to the IREC for approval before you commence data collection.**

The DUT may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.

Upon completion of your research project, you are requested to share the summary of your key research findings.

Kind regards.
Yours sincerely

DR V GOVENDER
ACTING-DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT DIRECTORATE

7.8 Appendix H – Letter of Information



LETTER OF INFORMATION

Title of the Research Study : A Quality Management System for an online learning program at an academic institution.

Principal Investigator/s/researcher: Vishantham Aron, (BTech: Quality)

Co-Investigator/s/supervisor/s: Raveen Rathillal (DTech: Quality)

Brief Introduction and Purpose of the Study: Good Day, I am a student at the Durban University of Technology currently enrolled in the Masters of Philosophy: Quality Management program. To complete this qualification, I am undertaking research in Quality Management.

I would like to invite you to participate in the research. The purpose of this study is to develop a Quality Management system for the online learning program at DUT Business school. The objectives are to determine the needs and expectations of the relevant stakeholders as well as the challenges faced with this online learning program.

Outline of the Procedures:

DUT Business school participants- You will participate in a survey by completing a questionnaire on your email system. It takes approximately 15 minutes to complete the questionnaire. You are expected to complete the survey accurately and honestly.

Focus group – you will participate in a structured interview on MS teams. The interview will take approximately 1 hour so that you can provide valuable insights into this research focus area.

Risks or Discomforts to the Participant: There are no projected risks or discomfort you in this study.

Explain to the participant the reasons he/she may be withdrawn from the Study: You may withdraw from the study at anytime during this process and there will be no adverse consequences, should you choose to do so.

Benefits: This study will provide valuable data that will allow the organization (DUT Business School) to effectively and efficiently manage their online learning program. It will also contribute to the field of Quality Assurance in the education and training sector.

Remuneration: There is no remuneration for participating in this study.

Costs of the Study: All costs of this study will be paid for by the researcher.

Confidentiality: Names and contact details will not be used in this study. Confidentiality is guaranteed.

Results: The overall results will be presented in the dissertation.

Research-related Injury::The researcher does not foresee any injury to the participants in this study.

Storage of all electronic and hard copies including tape recordings All electronic documents and recordings will be kept in a password protected folder and stored for a period of 5 years. Thereafter, it will be deleted from the relevant storage locations.

Persons to contact in the Event of Any Problems or Queries:(Supervisoranddetails)Pleasecontacttheresearcher(0767782057), my supervisor(0844577265)or the Institutional ResearchEthicsAdministratoron03 I 3732375.Complaints can be reported to the Acting Director: Research and Postgraduate Support Prof K Motaungon ttidirector@dut.ac.za

Informed about the nature, conduct and risks of the above study.

_____ **Full Name of Researcher** _____ **Date** _____ **Signature**

_____ **Full Name of Witness(If applicable)** _____ **Date** _____ **Signature**

_____ **Full Name of Legal Guardian(If applicable)** _____ **Date** _____ **Signature**

7.10 Appendix J – Technical Editor Certificate

Helen Richter
Advanced Editing & Proofreading

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072 9227221

22 May 2024

To whom it may concern:

I _____
CERTIFICATE OF EDITING & AUTHENTICATION

I have proofread and language edited the Master's dissertation titled:

"A Quality Management System for an online learning program at an academic institution"

By

Vishantham Aron

The work is the author's own work, to the best of my knowledge, and is free of spelling, grammar, and structural and stylistic errors.

With thanks.

H. S. Richter (Ms)

7.11 Appendix K – Turnitin Report



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