

**ASSESSING THE DIGITAL READINESS OF ACADEMIC
STAFF IN THE FACULTY OF HEALTH AND
ENVIRONMENT SCIENCES AT CENTRAL UNIVERSITY
OF TECHNOLOGY**

BY

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DECLARATION

“I declare that the field study hereby handed in for the qualification Master’s in Business Administration at the UFS Business School at the University of the Free State is my own independent work and that I have not previously submitted the same work, either as a whole or in part, for a qualification at/in another university/faculty. I, furthermore, cede copyright for the field study in favour of the University of the Free State.”

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ABSTRACT

This study examines the digital readiness of academic personnel in the Faculty of Health and Environmental Sciences at the Central University of Technology (CUT) in South Africa against the backdrop of swift technological progress and the increasing necessity for digital transformation in educational institutions. Utilising the Technology Acceptance Model (TAM), the study examines three essential elements: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioural Intention to Use (BI) with CUT Digital Tools implemented to improve teaching and learning.

A quantitative research approach was employed, utilising a structured questionnaire to collect data from academic staff of varying ranks and experience levels. Data analysis, conducted using SPSS, included descriptive and inferential statistics to examine differences in perceptions based on academic rank and years of experience. Results indicate that senior academic staff and those with more experience generally perceive digital tools as beneficial and easy to use. They are more inclined to integrate these tools into their academic activities. Conversely, junior and part-time staff and those with fewer years of experience display more neutral or negative attitudes, particularly regarding the ease of use and intention to adopt these tools regularly.

These findings highlight a potential gap in digital readiness within the faculty, suggesting a need for targeted support and training initiatives to improve digital adoption across all academic ranks and experience levels. The study concludes with recommendations to enhance digital readiness through structured training programs, onboarding support for new staff, and collaborative efforts between the Centre for Innovation in Learning and Teaching (CILT) and ICT support units. This research provides valuable insights for CUT and other higher education institutions aiming to foster digital competency among their faculty members, ultimately supporting a successful digital transformation aligned with the demands of the Fourth Industrial Revolution.

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CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

By November 2020, the COVID-19 pandemic had already caused the deaths of more than 1.25 million people worldwide, affecting more than 50 million individuals. More than half of the people on this globe have had personal experience with confinement and stringent control measures (OECD, 2020).

The World Health Organization (2021) instituted measures such as mandatory mask use and social isolation to slow the spread of the illness (World Health Organization 2021). The South African government adopted these measures and set regulations to slow the spread of the virus. These measures directly impacted movements and physical contact for industries, companies, and higher education institutions, which were forced to close office doors and work remotely (Government of South Africa, 2020).

Most institutions were required to adopt digital technologies to ensure sustainability and relevance. There was an increase in digital technologies, including video conferencing, collaboration, paperless transactions, and various other platforms (De, Pandey and Pal, 2020).

The pandemic became a catalyst for the increased use of digital platforms. This is especially true when considering higher education institutions as previously disadvantaged and could close some gaps with more established institutions (Simbarashe Kativhu, 2021).

To maintain academic programs, higher education institutions were forced to switch from traditional in-person instruction to the use of digital resources like online learning management systems (Mhlanga, Varaidzo Denhere and Tankiso Moloji, 2022).

Institutions with a roadmap or strategy for digital transformation already in progress were better prepared to leverage digital technologies for remote working when the lockdown restrictions imposed restrictions (Alenezi 2021:10).

If implemented, digital transformation is predicted to impact nations' economies significantly. It should decrease bureaucracy, increase transparency, reduce corruption, and facilitate business transactions (Turarkyzy & Nurtaza 2019:10).

Higher education institutions should prioritise digital transformation by integrating digital transformation initiatives and 4th Industrial Revolution (4IR) Technologies to establish modern, highly relevant universities (Weerawardane, 2021). The 4IR or Industry 4.0, refers to the ongoing shift towards a more automated, interconnected, and data-driven manner of life. Artificial intelligence (AI), robotics, 3D printing, the Internet of Things (IoT), and data analytics are some of the cutting-edge technologies that will be ubiquitous in the future (George and George, 2024). The 4IR will have far-reaching effects on many facets of society, including but not limited to, the economy, the workforce, education, healthcare, and interpersonal relationships (Lavopa and Delera, 2021).

One of the critical features of the 4IR was the rapid development and deployment of new technologies (World Economic Forum, 2019). Advancements in AI and robotics enable machines to perform tasks that were once the exclusive domain of humans. This can transform many industries, including manufacturing, logistics, healthcare, and education, by increasing efficiency and reducing costs. However, it also raises concerns about job displacement and the need for workers to adapt to new roles (Khogali and Mekid, 2023).

The 4IR also influenced the kinds of expertise employers seek in their employees. There is an increasing need for individuals with highly technical abilities, such as data analysis and programming, as machines take over increasingly mundane duties (Khogali and Mekid, 2023). (However, workers with "soft skills" like creativity, critical thinking, and cooperation are also in high demand. This affects how we conceptualise education, job choices, and ongoing education (Alhloul & Kiss 2022:13).

The 4IR presents both challenges and opportunities for academia. On the one hand, the demand for graduates with technical skills (such as data analysis and programming) is increasing. On the other hand, graduates with soft skills such as critical thinking and communication, interdisciplinary knowledge, and the ability to work in teams are also in demand (Elayyan, 2021).

The usage of Large Language Models (LLMs) is experiencing an upward trend within the domain of AI. These models are designed to interpret and generate readily comprehensible information for human readers. These models utilise deep learning techniques and are trained using enormous amounts of contextual data. Language models exhibit the capacity to predict the next word in a sentence, enabling them to generate responses to prompts, engage in conversations, and offer solutions to queries. Multiple examples of LLMs include OpenAI's GPT model series, which includes ChatGPT and Google's Language Model for Dialogue Applications (LaMDA). ChatGPT is a technology that can provide personalised recommendations to students, enhance cooperation and communication, and enhance student learning outcomes (Wei et al., 2022).

The degree of preparedness inside an organisation undergoing a technological transformation or digitisation process is known as digital readiness. It includes employees' cognitive, behavioural, and digital skills that allow them to adjust to and successfully oversee the digital transformation process (Mercer Mettl, 2021).

Competencies pertinent to digital readiness can be categorised into four main types according to Erceg and Zoranović (2020).

- **Technical Competencies:** These are occupation-specific skills that include process comprehension and knowledge management abilities.

- **Methodological Competencies:** This category encompasses critical skills such as proactive thinking, research proficiency, analytical acumen, problem-solving ability, and decision-making expertise.
- **Social Competencies:** These involve communication skills, teamwork capabilities, leadership qualities, and the ability to share and transfer knowledge effectively.
- **Individual Competencies:** This includes adaptability, intrinsic motivation for continuous professional development, and the ability to perform efficiently under high-stress conditions .

The incorporation of technology in educational settings is influenced by various factors, including attitudes, social situations, cultural environment, and instructional approaches, as evidenced by research findings (Mac Callum, Jeffrey and NA, 2014). Previous research has demonstrated a positive correlation between technology integration and enhanced academic performance among students (Durff and Carter, 2019).

Higher education institutions play a crucial role in equipping the future workforce with the skills required to navigate an ever-evolving world shaped by rapid technological advancements. Recent research by the World Economic Forum (2023) the adoption of frontier technologies, such as AI and automation, is expected to drive transformative changes in nearly 85% of companies worldwide over the coming years. This trend emphasises the urgent need for workforce skill evolution, highlighting the importance of a robust foundation in knowledge, technical competencies, and adaptable mindsets. These competencies are essential for individuals to thrive in the demands of a digitally transformed workplace (World Economic Forum, 2023).

The higher education sector in South Africa comprises 26 public universities, 50 public TVET colleges, and numerous private institutions. The student enrolment in 2017 reached

nearly one million in public universities, 700,000 in TVET colleges, and 90,000 in private institutions (Mhlanga, Denhere and Moloi, 2022)

1.2 BACKGROUND INFORMATION: CENTRAL UNIVERSITY OF TECHNOLOGY

The Central University of Technology (known as “CUT”) is a University of Technology (UoT) located in the Free State, with campuses in Bloemfontein and Welkom (CUT 2022). The university is one of the 6 UoTs in South Africa and has existed since 1981. It was previously known as “Technikon Free State,” and in 2004, it was re-established as the Central University of Technology (CUT, 2022).

The Central University of Technology (CUT) is located in the Free State Province, which has a population of approximately 2.8 million people, according to the 2022 Census Report. The largest demographic age group within this population consists of individuals aged 15–34 (Free State Treasury, 2023). CUT is the second-largest university in the central region of South Africa. It has about 1100 employees and a student population of about 22,300 students (DHET, 2023).

In 2020, CUT announced that it aspires to become a leading University of Technology in Africa by 2030 (CUT 2020) and produce students who will lead modern society. Crucial to this vision is the transformation of the University's operation and learning outputs through digital initiatives, as outlined in its digital transformation strategy (Matube and Ngowi, 2022).

The digital transformation strategy of CUT (Matube and Ngowi, 2022) seeks to strategically position the institution to enhance the provision of user-centric services amidst evolving technology, competitive landscape, stakeholder requirements, and behavioural patterns.

According to CUT Annual Report 2020 (CUT, 2020) and CUT Annual Report 2021 (CUT, 2020), the University successfully completed two academic calendar years when the South African Government imposed various restrictions in response to the COVID-19

pandemic. The successful implementation of remote learning and working arrangements was facilitated using digital platforms, including the Learning Management System, collaboration platforms, and connection solutions (Mhlanga, Denhere and Moloji, 2022).

This study investigates the level of digital preparedness among academic staff members within CUT's Faculty of Health and Environmental Science. This faculty encompasses four distinct departments and is supported by a personnel contingent of approximately 81 academic staff.

The Centre for Innovation in Learning and Teaching (CILT) at CUT has verified that the following digital solutions were systematically introduced to academic staff in the Health and Environmental Studies Faculty between January 2023 and April 2024. This initiative aims to enhance the quality of teaching, learning, and research at CUT and include the following solutions:

- **Padlet:**

Padlet is a digital tool that allows for collaborative brainstorming and idea sharing on a virtual canvas. It's a versatile platform for collecting and organising thoughts, making it an excellent tool for group projects and creative discussions (Beltrán-Martín 2019).

- **Respondus LockDown Browser and Monitor:**

These are technologies commonly used for maintaining exam integrity in online settings. These tools offer features such as locking down the testing environment and providing virtual proctoring through webcam monitoring (Swart & Shuttleworth 2021). Institutions have implemented these tools to prevent cheating and to ensure a secure testing environment, especially during the COVID-19 pandemic (Di et al., 2022). The use of Respondus LockDown Browser and Monitor has been associated with maintaining the integrity of assessments and minimising the ability of students to obtain unauthorized assistance during tests (Hosseini, Egodawatte and Ruzgar,

2021). Additionally, these technologies have been integrated with Learning Management Systems like MOODLE to facilitate their use in online assessments (Njuguna, 2022).

- **Panopto:**

Panopto is a video content management system that facilitates recording, live streaming, and storing video content for educational purposes (Jung & Snow, 2023). It's an invaluable tool for creating, storing, and sharing instructional videos.

- **MagicSlides:**

MagicSlides is an AI-powered Google Slides extension that facilitates the automatic generation and formatting of presentations. This versatile tool allows users to create slide decks from various sources, including YouTube videos, PDFs, and web page URLs. MagicSlides is an AI-powered tool designed to streamline the creation of presentations by offering multiple tools: prompt-based generation, topic summaries, text conversion, and AI-generated charts. While MagicSlides is praised for its user-friendly interface and rapid response time, some users have noted that the generated content and graphics may occasionally lack depth and not fully align with the specific subject matter (Fareedi, 2022). Nonetheless, MagicSlides remains a valuable asset for quickly developing structured presentations within Google Slides.

- **Turnitin:**

Turnitin is a popular plagiarism detection program that compares similarities or possible plagiarism in submitted writings to a large scholarly and online sources database. It is crucial in promoting academic integrity, improving referencing skills, and deterring plagiarism among students and researchers. For instance, Fadlalmola et al. (2022) encouraged students to use Turnitin to check the originality of their research before submission. Eva (2018) also highlighted that Turnitin compares submitted assignments with a huge database of internet sources and provides an originality report accessible to learners and instructors. Turnitin has been

instrumental in enhancing academic integrity, providing valuable feedback, and fostering a culture of originality in academic writing.

- **Jenni.ai:**

Jenni.ai is an AI-powered writing assistant designed to help users generate high-quality written content efficiently. This tool offers features such as auto-completion, content generation from prompts, and stylistic adjustments to improve the coherence and readability of text. Jenni.ai is particularly effective for blog writing, academic paper drafting, and creative writing projects. Despite its strengths, users should be aware of potential issues related to over-reliance on AI-generated content, which may sometimes lack the depth and nuance of text written by a human. Nevertheless, Jenni.ai provides a valuable resource for accelerating the writing process and enhancing productivity (Whiles, 2024).

The COVID-19 pandemic underscored the critical importance of digital preparedness to ensure an uninterrupted and efficient continuation of academic activities. This experience highlighted the essential role of digital transformation in higher education, particularly in responding to crises and meeting the demands of the 4IR. Consequently, the CUT has recognised the need to enhance the digital skills of its academic staff to adapt effectively to evolving technological environments.

1.3 PROBLEM STATEMENT

At the Central University of Technology (CUT), this transition highlighted the importance of digital readiness in ensuring continuity and effectiveness in academic delivery during crises.

Countries and institutions that had invested in preparing for blended learning before the pandemic were better equipped to adapt seamlessly (Li & Lalani, 2020). Similarly, the emergence of the 4IR and disruptive digital technologies, such as AI, Automation, and

Big Data analytics, is reshaping the landscape of work and education environments (Dimitrios Buhalis et al., 2019).

CUT has embarked on a digital transformation journey aligned with its Vision 2030 in response to these challenges and opportunities (Matube and Ngowi, 2022). While the institution has made strides in deploying digital solutions to enhance teaching and learning, there are concerns about the optimal adoption and utilisation of these technologies.

CUT leadership has raised concerns about potential unforeseen consequences arising from the proposed solutions in the digital transformation journey. However, it is essential to thoroughly examine the current state of digital readiness among academic staff before drawing any definitive conclusions.

1.4 RESEARCH QUESTIONS

Assessing the level of digital readiness among faculty members in a university setting can yield valuable insights into their proficiency at integrating digital technologies into teaching and research activities.

The following research questions were explored within this study:

- i. How prepared are academics in the Faculty of Health and Environment Sciences at Central University of Technology to use digital technologies in performing their teaching and research duties?
- ii. Does the level of digital preparedness among academics differ by academic rank and years of experience?
- iii. How do academic staff within CUT's Faculty of Health and Environmental Sciences perceive the usefulness and ease of use of digital technologies in their teaching, research, and administrative?

1.5 RESEARCH OBJECTIVES

1.5.1 PRIMARY OBJECTIVES

This study aims to evaluate the level of digital preparedness among the academic staff in the Faculty of Health and Environment Sciences at the Central University of Technology (CUT).

1.5.2 SECONDARY OBJECTIVES

- To provide an overview of the digital readiness of the academic staff in the Faculty of Health and Environment Sciences at CUT -.
- Examine whether academic staff in the Faculty of Health and Environmental Sciences at CUT differ in their digital readiness based on academic rank and years of experience.
- To assess the perspectives of academics in the Faculty of Health and Environmental Sciences on the usefulness and ease of use of currently available digital solutions for educational purposes.

1.6 RESEARCH METHODOLOGY

1.6.1 INTRODUCTION

This study focuses on the Health and Environmental Sciences Faculty at CUT, aiming to assess the digital readiness of its faculty members. This study employs a quantitative research methodology, emphasising neutrality, efficiency, and generalisability.

1.6.2 RESEARCH METHODS

This study employs quantitative research methods to collect and statistically analyse numerical data. Faculty members were invited to participate in online surveys and

questionnaires administered via Google Forms, utilising structured and closed-ended questionnaire formats, including Likert scales. Invitations were given to all academics via email, with measures in place to ensure the confidentiality of recipients' e-mail addresses.

1.6.3 RESEARCH PARADIGM

The research paradigm adopted is positivism, which ensures objectivity, credibility, and neutrality in findings—key elements for effectively assessing digital readiness in academia.

1.6.4 RESEARCH DESIGN

The selected research design is non-experimental, enabling data collection in authentic academic environments without any external intervention. As advocated by Best and Kahn (2006), this methodological approach ensures the authenticity and accuracy of representing the level of digital readiness among faculty members.

1.6.5 SAMPLING

This study utilises a census approach to ensure thorough representation and precision in data collection. This method ensures the participation of all academic staff members in CUT's Health and Environmental Sciences Faculty, enabling a comprehensive analysis of digital readiness in all departments and disciplines.

1.6.6 TARGET POPULATION

The target population includes faculty members within the four departments of the Faculty of Health and Environmental Sciences at the CUT.

1.6.7 SAMPLE SIZE

The academic staff population is estimated to be approximately 81 individuals. A larger sample size is selected to enhance statistical precision, identify subtle subgroup differences, increase statistical power, and strengthen the external validity of the research. The final sample size is determined with consideration of practical constraints.

1.6.8 DATA COLLECTION

Structured surveys as the primary data collection tools, chosen for their objectivity, standardisation, and ability to provide quantitative measurements of digital readiness. These tools facilitate efficient data collection from a large and diverse sample, enabling statistical analysis and meaningful inferences.

1.7 CHAPTER LAYOUT

The following chapter layout indicates the structure of the research document:

- **Chapter 2: Literature Review**

Chapter 2 of this study focuses on conducting a comprehensive literature review. This chapter examines academic research on digital transformation, digital preparedness, the integration of technology in higher education, and the various factors influencing academics' digital skills. It explores relevant scholarly articles, theoretical frameworks, and empirical evidence to establish a solid foundation for the study.

- **Chapter 3: Research Methodology**

This chapter outlines the research approach employed to achieve the study's objectives. The chapter content details the study's framework, the rationale for adopting a quantitative data collection method, and the utilisation of structured questionnaires and surveys. This chapter also examines the target population and

sampling strategy, emphasising the use of stratified random sampling to obtain a representative and diverse sample of academics from various departments in the faculty. To ensure the dependability and validity of the data, chapter 3 describes the process of questionnaire development and validation. Additionally, it addresses key aspects of data collection, ethical considerations, and practical measures to ensure the study's success.

- **Chapter 4: Data analysis and interpretation**

Chapter 4 focuses on the quantitative data collected in this study, Providing a comprehensive analysis and interpretation of the findings. This chapter contextualises the results derived from the data investigation, examining specific patterns and significant correlations related to academic's digital preparedness. Through logical tabulation and graphical representation, this chapter sheds light on academics' digital literacy and preparedness to integrate technology across various disciplines. This detailed analysis forms the basis for understanding the current state of digital preparedness among the faculty members at CUT.

- **Chapter 5: Conclusions and Recommendations**

Chapter 5 concludes this study by presenting its findings and recommendations, offering a comprehensive summary of its main findings and their implications. This chapter highlights the research's main contributions to understanding digital preparedness in higher education and aligns them with the research goals. Recommendations for enhancing academic digital readiness are provided, including proposals for implementing training programmes, institutional support, and advancement in technology infrastructure. This chapter also discusses the research's limitations and suggests directions for future research, emphasising the importance of advancing knowledge and practice in the digital era of academia.

1.8 SUMMARY

Chapter 1 introduced the study by contextualising the digital transformation challenges and opportunities higher education institutions face, particularly in response to the COVID-19 pandemic and the Fourth Industrial Revolution (4IR). The chapter detailed the problem statement, research questions, and objectives while emphasising the role of digital readiness in maintaining academic continuity and relevance.

The next chapter, Chapter 2, delves into the literature review, exploring foundational concepts of digital transformation, digital readiness, and the Technology Acceptance Model (TAM) as a theoretical framework for understanding the academic adoption of digital tools.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The rapidly evolving nature of digital technology has prompted higher education institutions to seek novel approaches for incorporating digital tools and platforms into their academic and research pursuits. The adoption and effective use of digital technologies by academics has become a critical factor in shaping the future of higher education, especially in the context of the 4IR. This revolution is characterised by the transformative impact of modern technologies (World Economic Forum, 2019).

The level of digital preparedness takes on heightened importance when addressing the unique requirements of equipping students for the rapidly evolving health and environmental industries, which have undergone substantial digital advancements.

Integrating teaching, research, and healthcare practices with environmental science studies is a key priority for the faculty specialising in Health and Environmental Sciences at CUT. This integration aims to enhance the digital preparedness of academics, thereby improving health science education and healthcare delivery, while addressing intricate environmental challenges in the era of digital advancements (Wong et al., 2024).

Moreover, it is essential to note that digital preparedness extends beyond academic and research settings. Health and environmental science graduates must acquire the digital competencies necessary to make impactful and innovative contributions within their respective fields.

This study seeks to evaluate the preparedness of academics within the Faculty of Health and Environmental Sciences at CUT to embrace and proficiently utilise digital technologies for teaching and research purposes. Assessing the academics' digital preparedness entails comprehending their digital proficiencies, their attitudes towards digital platforms, their experiences and the challenges they have encountered while utilising digital tools and platforms to fulfil their academic and research responsibilities.

To address this matter, the following chapter delves into the existing literature dealing with the key concepts of digitisation, digitalisation, and digital transformation.

2.2 DIGITISATION, DIGITALISATION AND DIGITAL TRANSFORMATION

Two important concepts to consider when discussing an organisation's or economic sector's digital transformation are digitisation and digitalisation.

"Digitisation" refers to the process of converting analogue data into a digital format that a computer can read and use by computers for tasks such as information transmission, reuse, and processing (Tan, Chi and Lam, 2022).

"Digitalisation", on the other hand, involves leveraging digital data to enhance or transform processes, organisations, and even society (Frenzel et al., 2021). While digitisation focuses on the conversion of data, digitalisation emphasises the application of this digital data to drive meaningful improvements and changes.

The concept of digitalisation, as defined by Bloomberg in 2018, is central to the broader digital transformation process. Daniel, Fernando and Suravut Snodvongs (2022) highlight the disruptive nature of digital transformation, describing it as a process that shifts an organisation from a traditional model to an innovative one, generating new value. This transformation is facilitated by the extensive application of digital technologies, which reshape business processes and contribute to developing new business models and revenue streams.

According to Daniel, Fernando and Suravut Snodvongs (2022), digital transformation involves rethinking how an organisation leverages technology, people, and processes to effectively adapt to potential changes in customer expectations.

In the context of higher education, digital transformation represents a unique opportunity to create new business models, explore innovative research directions, and revolutionise educational practices. It allows institutions to transcend the limitations of traditional

classrooms and laboratories, ultimately contributing to a higher level of student knowledge and academic achievement (Mamaeva et al., 2020).

Fusaro (2023) describes the concepts of digitisation (i), digitalisation (ii), and digital transformation (iii) in the following manner:

i. Digitisation:

The process of converting analogue information into digital formats that computer systems can process. This process spans a wide range of domains, including the conversion of paper-based contracts, invoices, historical newspapers, books, artwork, analogue audio, video recordings and film archives. It also includes extracting data from sensors embedded in various machinery and equipment across sectors such as manufacturing, aviation, automotive, medical, weather, and environmental industries.

ii. Digitalisation:

Digitalisation entails incorporating digital technologies into processes, services, and interactions to augment efficiency, generate new opportunities, and enhance user experiences. According to Gartner (2020), digitisation is the conversion of current business models and operations via digital technologies, which optimise processes and allow businesses to maintain competitiveness in a progressively technology-oriented environment. Parviainen et al. (2017) contend that digitisation transcends the mere transformation of analogue processes into digital formats. It entails the development of creative solutions that fundamentally alter operations and consumer interaction. Implementing electronic health records (EHRs) has markedly enhanced collaboration among healthcare teams, diminished prescription errors, and facilitated swifter and more precise diagnoses (Gates et al., 2020). Likewise, blockchain technology has transformed financial transactions, providing unmatched transparency and security in a hitherto obscure field (Turarkyzy & Nurtaza, 2019).

Augmented reality (AR) tools are utilised in sectors like automotive repair and manufacturing, aiding technicians in diagnosing and addressing problems with enhanced accuracy and efficiency (Erceg & Zoranović, 2020). Notwithstanding its considerable potential, the execution of digitisation faces numerous problems. Mercer (2021) emphasises that businesses must provide resources to digital infrastructure, offer comprehensive training, and rectify deficiencies in digital literacy to facilitate a successful transition. Lavopa and Delera (2021) warn that digitalisation must balance creativity and pragmatism to meet the varied needs of stakeholders while mitigating hazards like excessive dependence on technology.

iii. **Digital transformation:**

A comprehensive shift that integrates digital technologies across all areas of an organisation, fundamentally altering its operations and delivering enhanced value to stakeholders. This transformation spans multiple domains. For instance, online and mobile banking solutions streamline transactional banking while using telehealth technology enables remote consultations and diagnosis. Automating machines and robotics through computer numerical control (CNC) optimises production. E-commerce and marketing platforms like Amazon and Alibaba are leveraged for product promotion. Concerning customer service, chatbots and AI tools answer customer queries and concerns efficiently. Digital identification solutions enhance service security and usability. Digital platforms such as Uber and Airbnb provide innovative solutions for the transportation and housing industries, respectively. Moreover, advanced data analytic tools uncover insights, improve services, and identify potential issues.

A nuanced understanding of the distinctions between digitisation, digitalisation, and digital transformation is essential in higher education. Digitisation lays the foundation by converting analogue resources into digital formats, such as transforming physical lecture notes, textbooks, and student records into electronic versions accessible via Learning Management Systems (LMS) (Mhlanga et al., 2022). Digitalisation goes a step further by incorporating these digitised resources into teaching and administrative workflows to

enhance efficiency and engagement. For instance, the use of online assessments, automated grading systems, and collaborative digital tools such as Padlet or Panopto has enabled institutions to optimise academic delivery and interactions (Parviainen et al., 2017; Mercer, 2021). Digital transformation, however, represents a holistic and strategic shift, where institutions adopt a fully technology-driven approach to redefine how education is delivered and accessed. Examples include the adoption of virtual learning environments, AI-powered adaptive learning systems, and augmented reality tools that create immersive learning experiences, allowing institutions to meet the demands of a rapidly evolving digital age (Melo, 2022; Alenezi, 2021).

These concepts are particularly relevant to higher education institutions striving to modernise their teaching, research, and administrative processes. Digital transformation, in particular, has proven to be a key enabler in adapting to global challenges like the COVID-19 pandemic, accelerating the integration of digital tools to sustain academic activities (Kativhu, 2021). The following section explores the phenomenon of digital transformation within higher education, delving deeper into its applications, challenges, and implications for academic institutions.

2.3 DIGITAL TRANSFORMATION IN HIGHER EDUCATION

The COVID-19 pandemic brought about an unprecedented disruption in higher education, necessitating the rapid adoption of digital technologies to enable remote teaching and learning (Hodges et al., 2020).

According to UNESCO reports, the global closure of schools and universities due to the COVID-19 pandemic affected more than 1.5 billion learners across various age groups (Tadesse and Muluye, 2020).

As a result, there has been a global rise in online tools like LMS to enhance the educational process and ensure that universities and colleges can complete their academic responsibilities within the specified academic calendar (Mamaeva et al., 2020)..

In South Africa, the pandemic period catalysed digital transformation as the government, telecommunications companies, and institutions of higher learning collaborated to provide widespread connectivity, enabling students to study remotely, regardless of their location (Kativhu, 2021).

Before the COVID-19 pandemic, South Africa's higher education institutions faced significant disruptions due to the "Fees Must Fall" movement, which emerged in South Africa in 2015, representing a significant social and political response to the escalating costs of higher education and the broader issues of decolonisation of education within academic institutions (Ejoke, Enwereji and Chukwuere 2019). During this time, discussions about digital transformation primarily focused on emerging technologies such as big data, machine learning, and the IoT. However, the pandemic shifted the focus to e-learning, video-assisted learning, learning analytics, online assessment aid tools, and video conference platforms, fundamentally altering the trajectory of digital transformation in education (Mhlanga, Denhere and Moloj, 2022).

The influence of the COVID-19 epidemic on education was profound, making the adoption of digital transformation imperative. The following section expands upon the literature discussing the disruptions caused by the pandemic and the swift shift toward online solutions. It delves into the practical applications of digital technologies within higher education institutions, highlighting their role in adapting to the challenges of the digital era.

2.4 USE OF DIGITAL TECHNOLOGY IN HIGHER EDUCATION INSTITUTES

The COVID-19 pandemic significantly disrupted the higher education sector, forcing universities worldwide to adopt digital solutions at an unprecedented pace. The abrupt transition from in-person to remote learning revealed both opportunities and challenges associated with digital transformation in higher education. Institutions had to rapidly implement online learning platforms, virtual collaboration tools, and digital assessments to ensure the continuity of academic activities (Dhawan, 2020).

During this period, universities increasingly relied on Learning Management Systems (LMS), video conferencing tools (e.g., Zoom, Microsoft Teams, Google Meet), and cloud-based platforms to facilitate remote instruction (Crawford et al., 2020). These technologies enabled the continuation of teaching and learning, despite the physical closure of campuses. However, the sudden nature of the shift highlighted gaps in digital preparedness, particularly among faculty and students who lacked adequate training and access to necessary resources (Zhang et al., 2020).

One of the major challenges that emerged was the digital divide. While well-resourced institutions in developed countries adapted relatively quickly, universities in developing regions struggled due to limited internet connectivity, lack of digital infrastructure, and financial constraints (Bali, 2020). The pandemic exposed inequalities in access to technology, with many students facing difficulties in engaging with online learning due to unreliable internet connections and inadequate devices (Czerniewicz et al., 2020).

In today's rapidly evolving educational landscape, the integration of digital technology has revolutionised higher education. This section discusses several key aspects of this transformation, highlighting the practical implementations of various technologies:

2.4.1 Big Data

Big Data refers to the massive and complex sets of data generated at high velocity, which often require advanced computational tools for effective processing and analysis (Lutkevich 2023). It is commonly characterised by three key dimensions: volume, referring to the sheer scale of data; velocity, describing the rapid speed at which data is generated and processed; and variety, which captures the diverse formats and types of data, such as text, audio, video, and structured or unstructured content (Gandomi & Haider 2015). These characteristics enable Big Data to reveal valuable patterns, trends, and insights that are otherwise difficult to uncover using traditional data analysis methods.

In higher education, Big Data has proven transformative by enhancing various teaching, learning, and institutional management aspects. For example, learning analytics powered by big data enable the analysis of students' behaviours and interactions with digital platforms to understand better their learning preferences and challenges (Attaran, Stark & Stotler 2018). Educators can leverage this information to design more personalised learning experiences, such as identifying peak engagement periods, challenging topics, or navigation difficulties in digital resources. By doing so, they can make data-driven adjustments to their teaching methods, improving overall student outcomes.

2.4.2 Artificial Intelligence (AI)

Artificial Intelligence (AI) is the simulation of human intelligence processes by machines, particularly computer systems. These processes include learning (acquiring information and rules for using it), reasoning (using rules to reach conclusions), and self-correction (Soldatenko, 2020). Historically, AI has evolved from its conceptual inception in the 1950s to the development of machine learning algorithms, natural language processing (NLP), and advanced neural networks. The evolution of AI has been marked by significant milestones, such as the creation of expert systems in the 1970s, the rise of machine learning in the 1990s, and the proliferation of AI applications across industries in recent decades (Russell & Norvig, 2021).

AI has emerged as a transformative tool with far-reaching implications for teaching, learning, and administrative processes in education. Recent studies highlight the role of AI in providing personalised learning experiences, automating routine administrative tasks, and enabling data-driven decision-making in educational institutions (Panigrahi & Joshi, 2020). AI technologies such as machine learning, natural language processing, and computer vision are being leveraged to address challenges in education and enhance efficiency and outcomes.

One of AI's most significant contributions to higher education is the ability to deliver individualised instruction. Adaptive learning systems use machine learning algorithms to

analyse students' performance and behavioural data, tailoring educational content to suit individual needs, strengths, and weaknesses. For example, platforms like DreamBox and Carnegie Learning utilise AI to offer personalised mathematics instruction, adjusting the difficulty level and pace based on a student's mastery of topics (Woolf et al., 2013).

AI also plays a vital role in analysing behavioural patterns to improve student engagement and retention. By examining large datasets, AI systems can identify students at risk of dropping out or underperforming and recommend timely interventions. AI-powered chatbots, such as IBM's Watson, are being implemented to provide 24/7 support to students, addressing queries related to coursework, schedules, and administrative procedures (Luckin et al., 2016).

In addition to improving the learning experience, AI facilitates administrative efficiency in higher education. Automated systems streamline course scheduling, resource allocation, and grading tasks. AI tools can also support academic advisors by recommending career tracks, academic majors, and course selections based on a student's interests, abilities, and career aspirations (Panigrahi & Joshi, 2020).

2.4.3 Cloud Computing

Cloud computing refers to the delivery of computing services—such as storage, processing power, software, and databases—over the internet ("the cloud") rather than relying on local hardware and infrastructure (Mell & Grance, 2011). These services enable users to access resources on-demand, scale operations flexibly, and pay only for the resources they consume. The concept of cloud computing emerged in the early 2000s, with the introduction of platforms like Amazon Web Services (AWS), and has since revolutionised how organisations manage data and processes (Buyya et al., 2018).

2.4.3.1 Three key service models underpin cloud computing:

- I. Infrastructure as a Service (IaaS): Provides virtualised computing resources such as storage and servers. Examples include Amazon EC2 and Microsoft Azure.
- II. Platform as a Service (PaaS): Delivers a framework for developing and deploying applications without the complexity of managing the underlying infrastructure. Examples include Google App Engine and Microsoft Azure.
- III. Software as a Service (SaaS): Offers software applications over the internet on a subscription basis. Examples include Google Workspace, Microsoft 365, and Canvas (Armbrust et al., 2010).

The deployment models of cloud computing include public, private, and hybrid clouds, allowing organisations to choose the best model to suit their needs based on scalability, security, and resource requirements (Zhang et al., 2010).

2.4.3.2 Cloud Computing in Higher Education

In the context of higher education, cloud computing has become an indispensable tool for institutions seeking to improve operational efficiency and enhance the learning experience. The shift to cloud-based platforms allows universities to replace traditional IT infrastructure with flexible, scalable, and cost-effective solutions, enabling them to allocate resources more strategically (Agrawal, 2021).

One of the primary applications of cloud computing in education is the creation of virtual classrooms. Platforms such as Google Classroom, Microsoft Teams, and Zoom provide cloud-based environments for interactive teaching and learning. These tools enable educators to share resources, conduct real-time discussions, and assign and assess coursework, fostering collaborative and engaging learning experiences (Sultan, 2010).

Cloud computing also supports the development of virtual laboratories that simulate practical experiments and research activities. For example, platforms like Labster and Virtual Lab Cloud allow students to conduct scientific experiments online, making

laboratory-based learning more accessible, especially in resource-constrained settings (Foster and Gannon 2017).

Another significant contribution of cloud computing to education is gamification, which integrates game-based elements into learning activities to improve engagement and problem-solving skills. Cloud-based gamified platforms, such as Kahoot and Quizizz, motivate students by creating an interactive and competitive learning environment (Thavi et al. 2021).

From an administrative perspective, cloud computing streamlines institutional operations by automating student registration, financial management, and course scheduling tasks. By leveraging cloud-based enterprise resource planning (ERP) systems, institutions can improve data management, enhance operational transparency, and reduce costs (Ercan 2010).

2.4.4 Internet of Things (IoT)

Internet of Things (IoT) refers to the interconnected network of physical devices, sensors, and software that collect, process, and exchange data over the Internet (Peralta and Smarsly, 2023). These devices range from everyday objects like smartphones and wearables to specialised equipment like environmental sensors, smart appliances, and industrial tools. IoT technology enables these devices to communicate seamlessly, creating opportunities for automation, optimisation, and data-driven decision-making (Atzori, Iera, & Morabito 2010).

IoT has evolved significantly since its early conceptualisation in the 1990s, with the term becoming widely recognised in the early 2000s. The growth of IoT has been driven by advances in wireless communication, data analytics, and cloud computing, which allow for real-time data collection, storage, and processing on an unprecedented scale (Gubbi et al., 2013).

2.4.4.1 IoT in Higher Education

In the context of higher education, IoT technology plays a transformative role by enabling the creation of smart campuses. These campuses integrate IoT devices and applications to enhance academic and administrative processes, improve the student experience, and optimise resource management. Some of the key applications of IoT in education include:

- I. **Smart Classrooms:** IoT-enabled devices such as interactive whiteboards, smart projectors, and IoT-integrated learning management systems facilitate interactive and personalised learning experiences. These tools can monitor student engagement and tailor content delivery based on real-time feedback (Al-Taai, Kanber, & Al-Dulaimi, 2023).
- II. **Campus Safety and Security:** IoT technology enhances campus safety through connected surveillance systems, biometric access controls, and emergency alert systems. These measures ensure a secure learning environment for students and staff (Wang, Bi and Xu, 2014).
- III. **Resource Optimisation:** IoT applications enable institutions to monitor and manage resources such as electricity, water, and HVAC systems more efficiently. For instance, IoT sensors can optimise energy usage in lecture halls by automatically adjusting lighting and temperature based on occupancy levels (Perera et al., 2014).
- IV. **Student Services:** IoT applications can streamline administrative processes and enhance student services. For example, smart ID cards integrated with IoT systems allow students to access libraries, register for classes, and make payments. IoT-driven analytics can also improve student retention by identifying at-risk students based on behavioural and academic data (Domínguez-Bolaño et al., 2024).

- V. IoT in Laboratories: IoT-connected equipment in science and engineering laboratories allows students to conduct remote experiments. Sensors and data acquisition systems provide real-time insights, enabling effective monitoring and analysis (Borgia, 2014).

2.4.5 E-Learning

E-learning, short for electronic learning, refers to using information and communication technologies (ICT) to facilitate the delivery of educational content and training programs (Abdel-Wahab 2008). It encompasses various digital platforms and tools that enable learners to access knowledge, participate in courses, and interact with educators from virtually anywhere. E-learning leverages technologies such as the Internet, mobile applications, multimedia tools, and virtual classrooms to enhance accessibility, flexibility, and efficiency in education (Clark & Mayer, 2016).

2.4.5.1 Evolution of e-Learning

E-learning originated in the late 20th century with the advent of computer-based training programs and the development of online education platforms. The concept gained significant traction with the widespread adoption of the Internet in the early 2000s, paving the way for innovations such as Learning Management Systems (LMS), virtual classrooms, and Massive Open Online Courses (MOOCs) (Smyrnova-Trybulska, 2019). Over time, e-learning has evolved to include more sophisticated technologies, such as adaptive learning systems that personalise content delivery based on individual learner performance and gamified platforms that use game-like elements to improve learner engagement (Andrade and Law, 2018).

2.4.5.2 E-Learning in Higher Education

In higher education, e-learning has become vital for enhancing teaching and learning experiences. Its applications include:

- I. **Flexible Learning Opportunities:** E-learning enables learners to access course materials, lectures, and assignments conveniently, breaking down geographical and time barriers. This flexibility particularly benefits non-traditional students, such as working professionals and individuals in remote locations (Singh, Singh and Nermend, 2022).
- II. **Interactive and Engaging Learning Environments:** Tools such as video lectures, discussion forums, and interactive quizzes facilitate active engagement, improving comprehension and retention of course content. Virtual laboratories allow students to simulate experiments and apply theoretical knowledge in a controlled digital environment (Tarhini et al. 2017).
- III. **Enhanced Accessibility:** E-learning platforms provide opportunities for previously underserved groups, such as individuals with disabilities or those in rural areas, to access quality education (Fadhil and Al-Ameen, 2016). Assistive technologies, such as screen readers and closed captioning, ensure inclusivity in online learning environments (Tarhini et al., 2017).
- IV. **Collaborative Learning:** E-learning fosters collaboration through tools like group discussion boards, shared documents, and real-time virtual meetings. Students and educators can engage in cross-disciplinary and cross-cultural collaborations, enriching the learning experience (Fadhil and Al-Ameen, 2016).
- V. **Continuous Learning and Professional Development:** Beyond formal education, e-learning platforms facilitate lifelong learning and upskilling through certifications,

webinars, and online workshops. This aligns with the demands of the Fourth Industrial Revolution, where continuous professional development is critical to staying relevant in a rapidly changing job market (Thwe and Kálmán, 2023).

2.4.6 Augmented and Virtual Reality (AR/VR)

Augmented Reality (AR) and Virtual Reality (VR) represent transformative technologies increasingly integrated into higher education to enhance learning experiences. These tools enable immersive and interactive environments that improve student engagement, understanding, and knowledge retention (Venelinova et al. 2024).

2.4.6.1 Augmented Reality (AR) in Higher Education

AR overlays digital information—images, text, or 3D models—onto the physical world, allowing students to interact with educational content in a real-world context. For instance, AR applications are used to create virtual campus tours, providing prospective students with a realistic preview of university facilities and services without requiring them to visit in person. AR can also provide holographic classroom projections, helping explain complex concepts through dynamic visualisations, such as molecular structures in chemistry or architectural designs in engineering (Radu et al. 2022).

2.4.6.2 Virtual Reality (VR) in Higher Education

VR creates entirely digital environments that immerse students in simulated learning experiences. Through VR avatars, students can participate in virtual classrooms, experience historical events, or simulate real-world scenarios in fields like medicine, architecture, or engineering (Aji and Khan, 2024). This capability fosters active learning by allowing students to engage with educational materials in a highly interactive and experiential manner. For instance, in medical education, VR can simulate surgical procedures, enabling students to practice and gain confidence in a risk-free environment (Daipah Daipah, Hanif Nurcholish Adiantika and Fitri Aprianti, 2022).

2.4.7 Chatbots

Chatbots have emerged as a transformative technology in higher education, streamlining communication and enhancing administrative efficiency. These AI-powered tools are designed to respond to student inquiries, particularly during peak enrolment periods, when administrative workloads are typically at their highest. By addressing frequently asked questions and routing complex queries to the appropriate departments, chatbots significantly reduce response times and improve the overall student experience (Weerawardane 2021:5).

Beyond administrative support, chatbots also have the potential to assist in academic settings by providing personalised learning support, offering explanations for course material, and guiding students through academic processes such as course registration or exam preparation (Pérez, Daradoumis and Puig, 2020). For example, AI chatbots can act as 24/7 virtual assistants, allowing students to access information and resources without waiting for human intervention. This accessibility promotes self-directed learning and empowers students to take greater control of their educational journey.

2.5 EMPLOYEE/ACADEMIC DIGITAL READINESS

2.5.1 WHAT IS DIGITAL READINESS?

Digital readiness encompasses the preparedness of an organisation or individual to navigate, adapt, and thrive in a rapidly evolving digital environment. It involves the capacity to understand, adopt, and implement digital technologies effectively while fostering a culture of continuous learning and adaptability. According to Mercer (2021), digital readiness entails improving workforce skills, cultivating a mindset that embraces digital transformation, and embedding digital capabilities into organisational strategies.

Erceg and Zoranović (2020) describe digital readiness as a multi-dimensional concept that includes technical, methodological, social, and individual competencies. These competencies enable employees to adapt to and oversee the digital transformation process efficiently, ensuring organisational success in the digital era. Similarly, Westerman, Bonnet, and McAfee (2014) define digital readiness as the extent to which organisations or individuals are equipped to leverage digital tools for innovation, efficiency, and competitive advantage.

Kim, Hong and Song (2019) expand on digital readiness as the ability of educators and learners to effectively engage with and integrate digital tools into teaching and learning processes. This definition highlights the critical role of digital readiness in education, where it encompasses not just technological proficiency but also the willingness and ability to adapt to new digital environments.

Digital readiness within academic institutions refers to the capacity of academics to adapt and proficiently employ digital technologies in various domains, including teaching, research, and administrative tasks (Deja, Rak and Bell, 2021).

The readiness of academics and students to embrace a new learning environment and adopt alternative technologies played a pivotal role in enhancing the quality of teaching and learning, particularly during the widespread adoption of e-learning platforms amid the COVID-19 pandemic (Majid and Yanduri, 2022).

Landa, Zhu and Sesabo (2021) propose that digital readiness encompasses the level of preparedness at both the human and organisational levels to accept and implement transformation. High levels of readiness are associated with smoother transitions, while insufficient preparation often leads to resistance to change. This state of preparedness includes personal factors, such as an individual's recognition of the necessity for change, alignment with proposed changes, and the maintenance of positive attitudes towards the transformation.

Digital readiness is essential for academic staff in today's technological era. It involves the effective use of digital tools and technologies in various aspects of academic practice, including teaching, research, communication, and administrative tasks (Iveta Mietule et al., 2021). These digital competencies enable educators to navigate and utilise digital tools and resources effectively. Academic staff with higher levels of digital readiness are more inclined to adopt and integrate digital technology into their educational practices (Scherer, Siddiq and Tondeur, 2019).

Similarly, digital readiness is vital for students' success in e-learning environments (Kim, Hong and Song, 2019). Students who exhibit digital enthusiasm, including confidence in using digital skills for academic purposes, are more likely to achieve academic success in online learning settings (Althubaiti et al., 2022).

Digital readiness is not confined to education but extends to other sectors, such as healthcare. In medical education, digital transformation is underway, with readiness influenced by digital competencies and skills (Althubaiti et al., 2022).

Similarly, in the United Arab Emirates, digital readiness, coupled with e-learning adoption, significantly impacts academic achievement (Fernandez et al., 2022).

2.5.2 PREPARING EMPLOYEES TO USE DIGITAL TECHNOLOGIES

Taken from the study by Nguyen and Broekhuizen (2022), Figure 2.1 below illustrates, for example, that employee preparedness depends on two key factors: their perception of the benefits derived from using the technology (attitude/digital valence) and their active involvement in its use (behaviour/digital efficacy). The framework below analyses the various dimensions of employee readiness identified by Nguyen and Broekhuizen (2022).

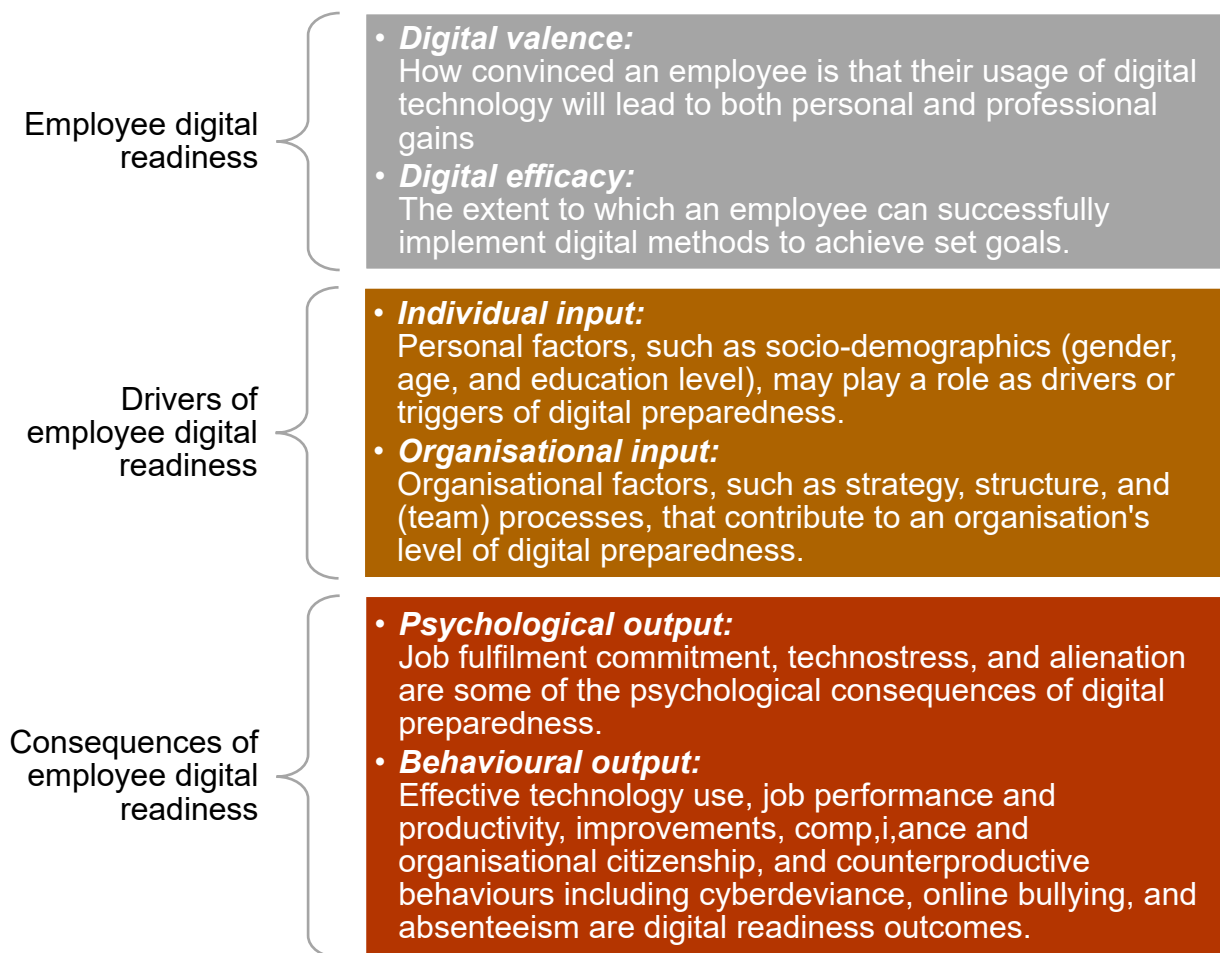


Figure 2.1: Definitions, consequences, and outcomes of digital readiness (Nguyen and Broekhuizen, 2022).

It is further supported by Landa, Zhu and Sesabo (2021) that academics with ICT competence are more likely to engage with innovative teaching and learning technologies (IITLTs). This positive correlation indicates that proficiency in using devices such as computers and various software applications increases their interest in IITLTs. This suggests that readiness for change is higher when individuals recognise the relevance and suitability of the change.

Digital transformation initiatives, including digital readiness and transitions, should be handled as a change initiative and follow change management principles.

In the rapidly evolving landscape of higher education, shaped by the imperatives of the 4IR and the demand for digital readiness, universities are at a critical juncture. They must navigate significant transformations in teaching, research, and administrative operations. Within this context, the CUT's Health and Environmental Sciences Faculty equips its academic staff to thrive in the digital era.

However, as (Bellantuono et al., 2021) suggest, digital transformation initiatives, including digital readiness and transition, should be treated as change initiatives guided by established change management principles. This approach entails creating a clear vision for change, mobilising key leaders, and ensuring effective communication within the university setting. Digital transformation not only introduces new technologies but also fundamentally alters traditional teaching, research, and administration methods, requiring a shift in how academic staff operate (Daniel, Fernando and Suravut Snodvongs, 2022).

One highly effective framework widely applied in various organisational contexts is Kotter's 8-Step Change Model (Kotter, 1996)). This model underscores the importance of creating a sense of urgency, forming a powerful coalition of leaders, and establishing a clear vision for change. Its further advocates for effectively communicating the vision, empowering individuals to act, and planning for and celebrating short-term achievements. Kotter's model also emphasises consolidating improvements, sustaining momentum for continuous change, and ultimately institutionalising new approaches as part of the organisational culture.

What makes Kotter's model particularly relevant is its alignment with the urgency and complexity of digital transformation. The rapid pace of change, driven by the 4IR, is already significantly impacting academia (Kativhu, 2021). The model's emphasis on creating a powerful coalition, establishing a clear vision, and maintaining effective communication resonates with the critical need to secure buy-in from academic staff and other stakeholders for successful digital transformation initiatives.

As CUT aims to cultivate digital readiness within its Health and Environmental Sciences Faculty, it is this researcher's opinion that applying Kotter's 8-Step Change Model to its digital transformation initiatives should be seriously considered. The model's structured approach empowers the university to address digital readiness proactively while ensuring that these changes are effectively integrated into the institution's culture, practices, and policies (Kotter, 1996).

Consequently, the ability to effectively utilise digital tools and technologies is a fundamental requirement for academics as they navigate the challenges and opportunities of the digital age. As discussed in the previous section's analysis of digital readiness within the context of academic staff, this level of preparedness also extends to students and other industries, such as healthcare. The subsequent section will explore strategies to prepare personnel with the necessary skills to utilise digital technology proficiently.

2.6 FACTORS THAT INFLUENCE TECHNOLOGY READINESS

Parasuraman (2000) offers a detailed articulation of Technology Readiness (TR), which refers to individuals' inclination to adopt and utilise new technologies to achieve personal and professional objectives. The state of TR can be measured along the following four aspects, according to Parasuraman (2000):

i. Optimism:

Optimism reflects an individual's belief in technology's ability to enhance control, efficiency, and flexibility in professional and domestic environments. Academic staff's decision to adopt digital technologies for teaching and learning can be significantly influenced by their optimistic perception of the potential benefits and advantages these technologies offer (Chang and Chen, 2021)

ii. Innovativeness:

Innovativeness represents an individual's tendency to adopt a forward-looking perspective on technology, marked by a willingness to lead in embracing technological advancements (Lin and Chang, 2011). For academic personnel, viewing digital technologies as innovative and transformative may positively impact their readiness to integrate such tools into the educational process.

iii. Insecurity:

Insecurity pertains to a lack of trust or confidence in technology, often stemming from concerns over security and privacy (Chang and Chen, 2021). Viewing digital technologies as vulnerable or unreliable can negatively affect individuals' willingness to embrace and use these tools.

iv. Discomfort:

Discomfort describes an individual's perception of having limited control over technology and feeling overwhelmed by its presence. This dimension encompasses the apprehension and anxiety some individuals may experience in the presence of new technologies (Parasuraman and Colby, 2015).

The abovementioned technology readiness construct provides a comprehensive framework for examining the various factors that influence the adoption of digital technologies. In this study, the Technology Acceptance Model (TAM) will be employed to evaluate the extent of preparedness among academics in the Faculty of Health and Environmental Sciences to adopt and effectively use digital technologies.

2.7 TECHNOLOGY ACCEPTANCE MODEL (TAM) AS FRAMEWORK FOR ASSESSING DIGITAL READINESS

A popular paradigm for comprehending how people interact with different types of technology, whether in their original or modified forms, is the Technology Acceptance Model (TAM) (Sari et al., 2022).

TAM is an extension of Ajzen and Fishbein's Theory of Reasoned Action (TRA), which focuses on the relationship between attitude and behaviour (Venkatesh and Davis, 2000). Davis (1989) defines two fundamental notions in TAM: perceived usefulness and perceived ease of use. Perceived usefulness is the degree to which a person believes that employing a particular information system will improve their job performance. Perceived ease of use refers to the notion that using a specific system needs little effort.

In later iterations of TAM, social and organisational elements were incorporated as direct influences on user intention, including factors such as subjective norms or output quality. Additionally, human characteristics, including age, gender, and experience, were introduced as moderating components (Marikyan and Papagiannidis, 2023).

2.7.1 BEHAVIOURAL INTENTION (BI)

Behavioural intention (BI) formation is contingent upon the effect of subjective attitudes, social norms, and perceived behavioural control. This construct is derived from self-efficacy, which pertains to an individual's belief in their capability to perform actions effectively in a specific context or for a future task (Marikyan and Papagiannidis, 2023).

2.7.2 PERCEIVED USEFULNESS (PU)

The impact of perceived usefulness (PU) on the intention to use technology is well-documented. Studies indicate that the perceived usefulness of technology has a statistically significant and positive impact on an individual's behavioural intention to embrace and utilise said technology (Rafique et al., 2020). When individuals perceive that

technology provides advantages or enhances their ability to complete tasks efficiently, they are more likely to embrace and use it.

This assertion is corroborated by the findings of (Tung and Chang, 2008) who demonstrated that perceived usefulness positively influences individuals' intention to participate in online courses. Similarly, Al-Suqri (2014:287) conducted an empirical study on using e-book applications in educational institutions, contributing additional evidence to the existing literature. For example, this study revealed that students who perceive e-books as a tool to enhance their studying abilities are more likely to embrace using them (Al-Suqri, 2014).

2.7.3 PERCEIVED EASE OF USE (PEOU)

Previous research by Utami et al. (2022) has indicated that perceived ease of use (PEOU) is a significant predictor of perceived usefulness, as individuals tend to view technology as advantageous when they believe it is user-friendly. This study posited that the association between PEOU and the propensity to adopt technology is mediated by the perception of its utility Utami et al. (2022).

Utami et al. (2022) further observed that PEOU does not directly impact behavioural intention to use technology. However, it indirectly affects behavioural intention by enhancing the technology's perceived usefulness. When individuals perceive technology as easy to use, they are more likely to perceive it as applicable and beneficial, ultimately influencing their decision to adopt and utilise it.

Figure 2.2 below visually illustrates the relationship between the concepts of BI, PU, and PEOU discussed above:

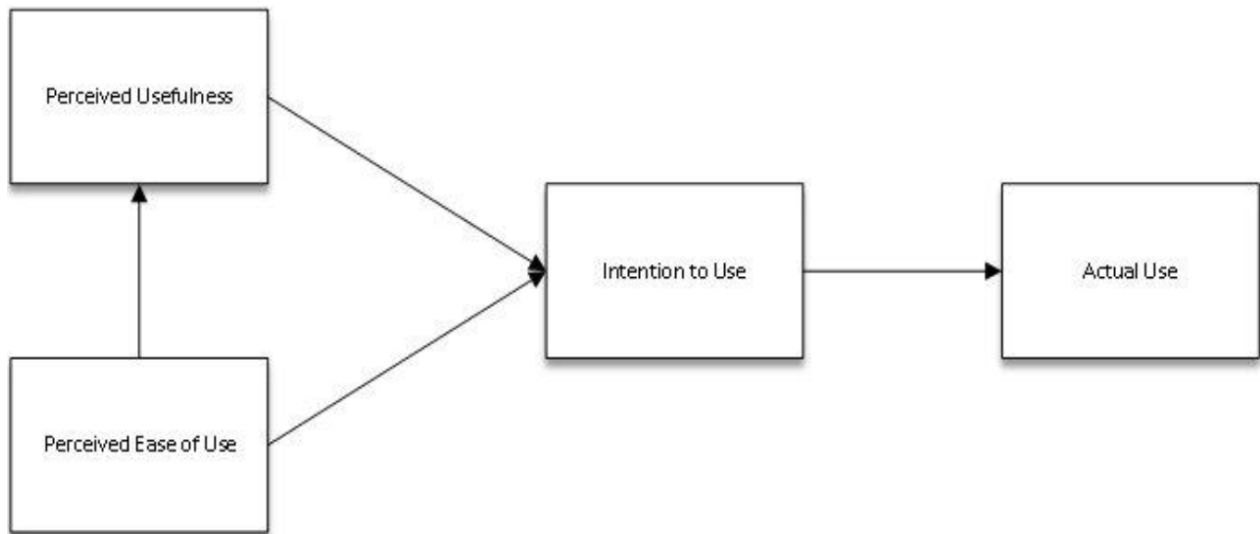


Figure 2.2: The Technology Acceptance Model (TAM)

2.7.4 APPLICATIONS OF TAM

TAM and its various modifications have been widely applied across diverse disciplines, contexts, and geographical regions, showcasing its value as a robust theoretical framework for predicting user behaviour (Marikyan and Papagiannidis, 2023). Its flexibility has allowed researchers to adapt and extend the model to suit different contexts and technologies.

For instance, Sohn and Kwon (2020) employed TAM to examine consumer acceptance of AI products in South Korea, highlighting the influence of perceived usefulness and ease of use on behavioural intention. Kamal, Shafiq, and Kaktria (2020) applied TAM in a healthcare context, investigating the adoption of telemedicine during the COVID-19 pandemic in Pakistan, and found that trust in technology significantly influenced adoption.

In Africa, Ramburn and Van Belle (2011) extended TAM to study the adoption of Learning Management Systems (LMS) in South African universities, finding that perceived ease of use played a more significant role than perceived usefulness in encouraging adoption among academic staff. Similarly, Mutua and Ng'eno (2016) used TAM to explore e-

learning acceptance in Kenyan secondary schools, demonstrating how facilitating conditions and access to infrastructure were critical determinants of user behaviour.

TAM has also been applied in educational settings globally. Rafique et al. (2020) explored the adoption of mobile library applications in higher education institutions in Malaysia, revealing that perceived ease of use was a strong predictor of adoption intention. Alfadda and Mahdi (2021) utilised TAM to study Zoom usage in Saudi Arabian language courses, identifying that the platform's perceived usefulness in enhancing language skills significantly influenced its acceptance. Utami et al. (2022) examined the adoption of online learning platforms during the COVID-19 pandemic in Indonesia, identifying both positive and negative determinants of platform acceptance.

Emerging technologies have also been examined using TAM. Schmidhuber, Maresch, and Ginner (2020) investigated mobile payment adoption in Europe, linking trust and security concerns to behavioural intention. In the educational Metaverse context, Aburbeian, Owda, and Owda (2022) applied TAM to evaluate its potential integration in Palestinian education, highlighting the importance of engaging and interactive virtual spaces for student learning. Similarly, Jang, Ko, Shin, and Han (2021) utilised TAM to study the integration of augmented reality (AR) and virtual reality (VR) for learning in South Korea, finding that these immersive technologies enhanced perceived usefulness among students.

This study will use TAM to test the readiness and behavioural intention of academics in the Faculty of Health and Environmental Sciences at CUT to use digital technologies for teaching, learning, and research.

2.8 SUMMARY

In the 4IR era, marked by rapid technological advancements, the integration of digital tools in higher education is becoming indispensable. This transformation impacts not only teaching and research but also extends to healthcare and environmental sciences. Chapter 2 reviewed important ideas from the literature on digitisation, digitalisation, and

digital transformation, emphasising how these ideas could change higher education and the need for digital preparation, especially in light of the COVID-19 epidemic.

This chapter also explored various digital technologies, including Big Data, AI, IoT, and augmented reality, highlighting their potential to enhance teaching, learning, and administrative processes. Assessing the digital readiness of academic staff emerged as a crucial focus, as digital competencies are increasingly essential in education and healthcare alike.

TAM and the TR framework were created to forecast adoption behaviour and comprehend personal attitudes towards technology. These frameworks offer insightful information about the adoption and application of digital tools in a variety of fields. These frameworks will be utilised to examine the digital readiness of academic staff at the CUT's Health and Environmental Sciences Faculty.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provides a comprehensive overview of the research methodology employed to evaluate the digital preparedness of academic staff in the Faculty of Health and Environmental Sciences at CUT. It details the rationale for selecting a quantitative research design, emphasising its suitability for generating objective, data-driven insights. Key aspects such as ethical considerations, data collection methods, and statistical analysis procedures are thoroughly explained.

This chapter outlines the choice of a stratified random sampling methodology within a positivist research paradigm and the application of a non-experimental approach. It includes detailed descriptions of the target population, sample size, data collection instruments (structured surveys), and the integration of TAM as the theoretical framework. Particular attention is given to developing the questionnaire and implementing ethical safeguards, such as ensuring confidentiality and obtaining informed consent.

In summary, this chapter presents the data analysis strategies employed to derive meaningful conclusions from the quantitative data collected in this study. This structured methodology establishes a foundation for understanding the study's methodological choices and paves the way for a detailed discussion of the research findings in subsequent chapters.

3.2 RESEARCH DESIGN

This research study was conducted using empirical methods and a quantitative research design to examine the level of preparedness of academics in the Faculty of Health & Environmental Sciences at CUT to adopt and utilise digital technologies.

A quantitative approach was selected because it enabled collecting objective, measurable, and generalisable data on digital readiness, providing statistical insights into

perceived usefulness, ease of use, and behavioural intention regarding digital tools. Unlike qualitative methods, which explore subjective experiences, a quantitative design facilitates structured comparisons across academic ranks and years of experience, aligning with the study's objective of identifying trends and patterns within an academic faculty.

Furthermore, this design ensures efficiency and scalability by employing structured surveys that allow for data collection from multiple respondents (Babbie, 2015). Given the focus on technology adoption, numerical data was deemed appropriate for identifying correlations, testing hypotheses, and ensuring replicability, all of which strengthen the reliability of the study's findings (Bryman, 2016).

Using a quantitative research method provided objectivity, efficiency, and generalisability in assessing digital preparedness. Kandel (2020) emphasised that quantitative research enables numerical data collection and statistical analysis, fostering reliable and unbiased insights.

The objectivity inherent in quantitative research was crucial for making informed decisions. Newton and Rudestam (2013) highlighted the importance of quantitative methods in advocating for resources and support that enhance faculty digital literacy, further reinforcing the utility of this approach.

Furthermore, the generalisability offered by quantitative methods was invaluable for drawing broad conclusions about academics' digital readiness. The collected data and statistical analyses were a foundation for evidence-based policies, initiatives, and strategic decisions to improve academic staff's digital skills.

Quantitative results also supported evidence-based decision-making. The statistical evidence provided actionable insights to inform initiatives and policies to enhance faculty digital competencies (Newton & Rudestam 2019).

By leveraging quantitative methods, this study provides a systematic, data-driven assessment of digital preparedness, offering insights that can inform targeted interventions, training initiatives, and institutional policy improvements at CUT.

Subsequently, the following section examines the chosen research paradigm, followed by an analysis of the sampling strategy, data collection methods, ethical considerations, and the statistical analysis procedures employed within the study design. This study adopts a non-experimental research approach grounded in the positivist paradigm, elaborated in the next section.

3.3 RESEARCH PARADIGM

This study used positivism as its research paradigm and a non-experimental design.

The positivist paradigm was employed to examine digital preparedness in a structured and systematic manner, relying on empirical evidence rather than subjective interpretations (Bryman, 2016). By focusing on objective observation and measurable evidence, the positivist paradigm provides a strong framework for investigating digital preparedness in academic research while prioritising objective truth and empirical knowledge

Quantitative research methodologies within the positivist paradigm were used to assess academic digital readiness. Quantitative research approaches such as surveys and questionnaires allowed the collection of numerical data for statistical analysis (Creswell, 2014). This study employed these structured instruments to ensure data reliability while objectively evaluating academic staff's digital competencies, technology usage, attitudes, and perspectives.

The focus on impartiality and neutrality seamlessly aligned with the positivist paradigm's dedication to objectivity. By minimising researcher bias and preconceptions, the positivist approach ensures that personal viewpoints do not influence the study's findings. This

emphasis on objectivity reinforces the credibility and validity of the study's findings on academic digital readiness (Neuman, 2013).

Non-experimental designs allowed the researcher to observe participants' routine activities without interference, providing a natural and authentic depiction of behaviour. As noted by Best and Kahn (2006), non-experimental research enables data collection in real-world situations, and in this context, allows accurate depictions of academic staff's everyday actions, attitudes, and perceptions of digital technology in their professional practices. This authenticity assured that the research finding's reliability reflects the digital readiness of university faculty members.

Additionally, non-experimental approaches are cost- and time-efficient, a crucial consideration in academic research constrained by limited resources. Cross-sectional studies, such as surveys or questionnaires, afford researchers the opportunity to quickly gather data from a large number of participants (Babbie, 2015). This efficiency was particularly beneficial within academia, where tight deadlines often required prompt investigations and timely results to inform decision-making.

The research paradigm aligns with positivism, emphasising empirical observation and objective truth. This alignment supports the objective assessment of digital preparedness, minimising potential biases and enhancing the credibility of the findings.

A non-experimental study design allows academic professionals to be observed in their authentic working environments. This approach ensured that the findings accurately reflected faculty members' digital practices, attitudes, and perspectives.

Once the research paradigm is established, the sampling method can be discussed. In this context, a stratified random sampling approach (as discussed below) was chosen to ensure adequate representation of all academic divisions within the study.

3.4 SAMPLING STRATEGY

The study adopted a census approach to comprehensively examine the level of digital preparedness among all faculty members within the Health and Environmental Sciences Faculty at CUT. This method reflects a commitment to academic rigour and the desire for thorough, inclusive results (Johnson, Onwuegbuzie and Turner, 2007).

The essence of this approach lies in its holistic nature, rendering the need for statistical inference superfluous. With a census approach, each faculty member is afforded an equal voice and representation in the research, mitigating concerns related to sampling bias. This methodology also addresses questions about sample adequacy and statistical power, as the entire academic population will be encompassed in the study (Sanders, 2023).

The census approach allows for an in-depth exploration of digital preparedness, making it particularly suitable for situations where non-parametric tests may be advocated (Whitley and Ball, 2002). By involving the entire population, the study avoids reliance on parametric assumptions about data distribution, enabling robust and reliable insights (Dongrey and Rokade, 2022).

The target population for this study consisted of academic staff members affiliated with the faculty specializing in Health and Environmental Sciences at CUT. A sample size of approximately 81 was, balancing statistical precision with practical constraints to ensure a manageable and effective analysis.

3.4.1 TARGET POPULATION

The target population consisted of faculty members within the Faculty of Health & Environmental Sciences at CUT. The study aimed to assess digital readiness among all academic staff, including permanent and part-time lecturers, senior lecturers, associate professors, professors, postdoctoral researchers, researchers, and senior researchers across the four departments within the faculty.

3.4.1.1 Survey Distribution Procedure

The questionnaire was distributed electronically via email to all faculty members to ensure broad participation. The following procedure was followed:

a) Survey Platform Selection:

The survey was created and administered using Google Forms, providing a user-friendly platform for efficient data collection. A standard Google Forms link (not a secured link) was generated, allowing unrestricted access to all faculty members who received the email.

b) Official Invitation & Communication:

The faculty administrator emailed the survey to all academic staff, postdoctoral researchers, researchers, and senior researchers within the faculty. The email included:

- A brief introduction explaining the purpose of the study.
- Assurances of confidentiality and voluntary participation.
- A clickable Google Forms link to complete the survey.

c) Follow-Up Reminders:

To enhance response rates, email reminders were sent every two weeks over an 8-week period. Additional verbal reminders were issued in faculty meetings, encouraging participation.

d) Access & Completion:

Participants could access and complete the survey anonymously without needing login credentials. The survey was self-administered, allowing respondents to complete it at their convenience within the designated timeframe.

e) Data Collection & Anonymisation:

Responses were automatically recorded on Google Sheets for subsequent analysis in SPSS. All data was fully anonymised to protect participant privacy, ensuring that responses could not be traced back to individuals.

The study ensured broad reach and participation while maintaining data privacy and confidentiality by leveraging email-based distribution, supported by regular follow-ups and faculty meeting reminders.

3.4.1.2 Sample Size

In this study, determining an appropriate sample size was essential due to the relatively small academic population. The target population included all 81 academic staff members from the four departments within the Faculty of Health and Environmental Sciences at CUT. The decision on the sample size was guided by a commitment to rigorous methodology to ensure the research's integrity, reliability, and applicability to a broader academic context.

The decision to carefully determine the sample size was based on multiple factors and demonstrates the researcher's dedication to achieving meaningful results. The rationale for selecting the sample size is outlined as follows:

Despite the modest sample size, it provided valuable insights by enabling reliable statistical analysis within the faculty. This approach facilitated a detailed digital readiness evaluation across various academic roles and experience levels. Smaller samples can yield reliable findings when carefully analysed, reducing potential errors and allowing for a focused examination of subgroup differences (Herde et al., 2019). This meticulous approach was essential for identifying subtle variations in digital preparedness among faculty members, offering a nuanced understanding of digital competencies in the academic setting.

Moreover, the study prioritised assessing effect sizes, specifically to identify subtle variations within subcategories. By carefully selecting the sample size, the research enhanced its statistical power, as postulated by Fritz, Morris and Richler (2012). This increased statistical power enhanced the likelihood of detecting significant differences and relationships, strengthening the study's ability to reveal meaningful findings and intricate patterns within the digital readiness landscape.

3.5 DATA COLLECTION

"Data collection" refers to the systematic gathering of observations or measurements. It is a critical component of commercial, governmental, and academic research, enabling the acquisition of first-hand knowledge and fresh perspectives on the issues at hand (Mohamad, Ramayah and Lo, 2020).

The data collection methodology for this research project utilises structured surveys. These instruments were distributed to all academic staff members in the Faculty Health at CUT. The primary data collection method is a census, ensuring a comprehensive representation of the academic population.

CILT confirmed that digital solutions, referred to as "CUT Digital Tools" were introduced to academic staff between January 2023 and April 2024. These tools are the focal point of this study, and TAM is employed to evaluate the readiness of academic staff to adopt these digital solutions.

The decision to use structured surveys was deliberate to align with the epistemological principles underpinning this research, as set out below:

- **Objective and Standardised Assessment Tools**

Objective and standardised assessment tools provide an unbiased and consistent evaluation of digital preparedness (Mathers, Fox & Hunn 2009). This method

guarantees that the contribution of every faculty member was thoroughly and methodically included in the research framework, fostering objectivity and uniformity.

- **Structured Surveys:**

Using structured surveys remains effective in quantitatively measuring different aspects of digital readiness (Babbie 2015). This method facilitated a comprehensive evaluation of key factors such as technology usage patterns and attitudes toward integrating technology into professional practices.

- **Data Gathering Efficiency:**

The practicality and efficiency of these instruments are vital for gathering data from a wide range of participants. This attribute is especially important while carrying out a census, where inclusivity is prioritised to ensure a holistic analysis (Dillman, Smyth and Christian, 2014).

- **Statistical Analysis:**

The dataset, encompassing the entire academic staff, underwent meticulous statistical analysis. This rigorous analytical phase enabled the detection of subtle trends, correlations, and prominent patterns within the extensive empirical data.

Adopting a census strategy for data collection underscores the research's steadfast dedication to inclusivity and methodological rigour (Mathers, Fox and Hunn, 2009). This approach ensured that every academic staff member, regardless of rank or departmental affiliation, contributed their unique perspectives. By doing so, it enriched the depth and breadth of insights into digital preparation, ultimately strengthening the research's overall conclusions.

In summary, the use of the census methodology in gathering data marks a pivotal milestone in the advancement of the research process, reflecting its unwavering

dedication to scholarly excellence. Structured surveys as the main data collection methods provide in-depth and high-quality quantitative insights into the multifaceted landscape of digital readiness within the Faculty of Health & Environmental Sciences at CUT.

In this study, data collection was conducted using structured surveys and , incorporating a Likert Scale. These instruments were administered over an online platform via Google Forms. An invitation to participate was extended to all academic staff members within the faculty, ensuring comprehensive engagement.

The following reasons motivated data collection via questionnaires and surveys:

- **Objective and Standardised Assessment:**

Surveys provide an objective approach to assessing digital readiness. By using structured questions with predefined response options, researchers minimised bias in data collection (Bowling, 2014). The standardised format ensured consistency, enabling valid comparisons and reliable analysis across academic faculties and departments.

- **Quantitative Measurement of Digital Readiness:**

Surveys and questionnaires allowed researchers to quantitatively measure digital capabilities, technology usage habits, and attitudes towards technology integration. This approach facilitated statistical analysis and provided objective conclusions based on numerical data, clearly understanding digital readiness levels.

- **Efficient Data Collection:**

Surveys and questionnaires prove to be an efficient means of collecting data from a large number of participants (Creswell, 2014). Given the need for a broad,

representative sample to assess digital readiness across diverse academic departments, these tools effectively reached a wide range of academics, ensuring inclusivity and comprehensive data collection.

- **Statistical Analysis for Inferences:**

The data collected through questionnaires and surveys were amenable to statistical analysis (Fowler, 2013). Statistical methods reveal trends, correlations, and relationships between digital readiness and other variables. These analyses provide meaningful insights into patterns of digital preparedness patterns among academic staff.

This research assesses digital readiness among university academics using surveys because of their objective and standardised assessment capabilities, ability to quantitatively measure of various dimensions, feasibility of large-scale data collection, suitability for statistical analysis, and cost-effectiveness.

3.5.1 RECRUITMENT STRATEGY

The recruitment strategy for this study is designed to ensure transparency, confidentiality, and voluntary participation. The researcher systematically recruited participants from the CUT faculty by using the following recruitment strategies to engage with the participants:

- **Dean's Office Distribution:**

To avoid any potential conflict of interest, the researcher obtained authorisation from the Faculty Dean for the Dean's office at CUT to distribute the invitation to participate in the study to all faculty members. This ensured a clear distinction between the researcher's professional role and the academic purpose of the study.

- **Email Invitation:**

The Dean's office sent the email invitation outlining the purpose of the study, participation requirements, and emphasising the voluntary and anonymous nature of response. The email highlighted that the study received ethical clearance from the University of the Free State's (UFS) Ethics Committee and that CUT had granted permission for the study. It explicitly states that the research is conducted solely for academic purposes as part of the UFS MBA programme.

- **Informed Consent:**

Before completing the survey, participants had to provide informed consent. This consent process was integrated into the survey, ensuring that all participants were fully informed about the study's purpose, their rights, and the terms of participation before proceeding.

This recruitment approach ensures that all participant data was collected and managed with the utmost respect for confidentiality and ethical standards, fostering trust and encouraging voluntary participation.

The integration of TAM in this study offers a systematic and established framework for assessing the digital preparedness of academic professionals.

3.5.2 USING THE TECHNOLOGY ACCEPTANCE MODEL (TAM)

TAM is a widely recognised and extensively utilised theoretical framework in information systems and technology adoption research. Initially proposed by Davis in 1989 and extended by Davis, Bagozzi, and Warshaw in 1992 (Marikyan and Papagiannidis, 2023) TAM aims to elucidate the factors influencing individuals' acceptance and use of new technologies.

The selection of TAM as the assessment tool for this research study is based on several compelling reasons. First, TAM provides a structured framework for assessing the digital readiness of academic staff, enabling a systematic examination of factors that influence

their willingness to embrace and employ digital technologies (Sohn and Kwon, 2020). By focusing on key constructs such as PEOU and PU, this study aims to pinpoint areas for intervention and support that could facilitate the integration of digital technologies in academic practices (Davis, 1989).

Second, TAM's proven reliability and validity make it a dependable tool for data collection. Its robustness constructs ensure consistent and accurate measurements, contributing to the overall trustworthiness of the research outcomes (Kamal, Shafiq and Priyanka Kakria, 2020). By employing such a well-established model, this study seeks to deliver precise and credible insights into the digital preparedness of academic staff.

Incorporating TAM into this study provides a structured and validated framework for investigating academics' digital readiness. This study intended to gain a better understanding of the elements that influence academics' embrace of digital technologies.

3.5.3 QUESTIONNAIRE DEVELOPMENT

A meticulously designed structured questionnaire was created to thoroughly assess the readiness of academic staff in the Health & Environmental Sciences Faculty at CUT to integrate digital technology into teaching and learning practices. The questionnaire were developed using the widely recognised TAM framework (as described above) to gather data. TAM evaluates three constructs: perceived utility, perceived ease of use, and intention to use digital tools. To facilitate the collection of valuable quantitative data suitable for rigorous analysis, a Likert scale was employed a widely accepted method for measuring participants' levels of agreement or disagreement with specific statements (McCusker and Gunaydin, 2015).

The questionnaire's items were carefully designed to accurately measure these TAM components . Each question in the survey functioned as a precise tool for investigating respondents' nuanced beliefs and attitudes regarding the effectiveness, and user-friendliness of digital resources, and their willingness to embrace these resources for

educational support. The strategic use of the Likert scale allowed for the collection of significant insights, laying the groundwork for further quantitative analysis. This approach allowed for the careful examination of the strength and direction of relationships within the data.

Additionally, CILT at CUT confirmed the introduction of digital solutions, referred to as "CUT Digital Tools", to the academic staff between January 2023 and April 2024. The questionnaire incorporated references to these tools to ensure clarity and relevance in the responses.

Following the explanation of data collection methods, the subsequent section of this chapter explores the ethical considerations involved in this research project. This includes a discussion of the necessary ethical approvals obtained to pursue this study, emphasising the researcher's strong commitment to adhere to all relevant ethical standards, laws, and regulations governing academic research.

3.6 ETHICAL CONSIDERATIONS

This section outlines the necessary permissions obtained to conduct the research study and highlights the researcher's adherence to relevant policies and legal regulations.

3.6.1 PERMISSION FOR STUDY

The researcher adhered to CUT's policies to secure consent for the research subject and the gathering of pertinent data from its academic staff within the organisation. Research ethics encompasses a collection of fundamental principles that guide the formulation of study designs and methodologies. To mitigate potential conflicts of interest, it was imperative to consider specific ethical criteria. Researchers are expected to adhere consistently to a prescribed code of conduct when engaging with individuals and collecting data within a community (Grundy et al., 2018).

A formal request for permission was submitted to CUT during the third quarter of 2023, ensuring compliance with institutional requirements.

All the research activities were carried out diligently, and ethical clearance (UFS-HSD2024/0171) was obtained from the UFS Ethics Committee. This ethical approval ensured that the study followed established protocols and regulations, demonstrating a commitment to maintaining the integrity and ethical rigour of the research process.

3.6.2 CONFLICT OF INTEREST

Conflicts of interest in research studies can result in unintentional bias or deliberate manipulation, compromising the integrity and credibility of scientific findings. According to Bero and Grundy (2016), financial conflicts of interest, such as commercial sponsorship of research, have been shown to induce systematic biases at various stages of the research process. For instance, financial conflicts of interest are frequently associated with research outcomes that favour the sponsor's financial interests, potentially resulting in biased reporting and selective publication of findings (Bero, 2017). Moreover, industry-sponsored clinical trials are particularly susceptible to such conflicts, which can compromise the objectivity and reliability of research outcomes (Koucheiki et al., 2021).

In this study, there was a potential conflict of interest identified due to the dual role of the researcher as both an MBA student at UFS conducting this research and as a professional working at the ICT department of CUT. The researcher's professional position could have potentially influenced the research process or outcomes. Recognising the critical need to address these conflicts, the following measures were taken to ensure the objectivity and credibility of this research:

- **Use of Student Email:**

All research-related communication was conducted using the researcher's student email address (1998294902@ufs4life.ac.za). This measure distinguished research activities from the researcher's professional responsibilities at CUT.

- **Survey Distribution through Dean's Office:**

Invitations to participate in the survey were distributed to academic staff members through the Dean's office. This approach reduced the researcher's direct involvement in the process while ensuring that participants were informed that their participation was voluntary and anonymous.

- **Academic Purpose:**

The research was conducted solely for academic purposes as part of the UFS MBA programme. This was clearly communicated to all participants to differentiate the research from the researcher's professional role at CUT.

- **Independent Data Analysis:**

An independent statistician conducted the data analysis using advanced statistical analysis tools, such as Statistical Package for Social Sciences (SPSS), IBM SPSS Statistics ver 24. This measure ensured that the analysis remained objective and free from any potential bias related to the researcher's professional role.

- **Voluntary Participation:**

Participation in the study was entirely voluntary and anonymous. Participants were assured that their involvement would not affect their professional relationship with CUT. This information was emphasised in all communications, including the informed consent form, to foster trust and encourage candid responses.

Conflicts of interest in research studies are a critical concern, as they can result in unintentional bias or deliberate manipulation, compromising scientific findings' integrity and credibility. Addressing these conflicts is crucial to maintaining trust among the public and the scientific community in research endeavours. Disclosures of potential conflicts are vital as they highlight areas where bias may occur and have been associated with an

increased likelihood of reporting statistically significant results in studies (Grundy et al., 2018). It is essential to acknowledge that conflicts of interest can arise from financial and non-financial interests, influencing the research design, conduct, as interpretation and reporting of the findings (Price et al., 2017; Lehmann et al., 2012).

By taking these steps, this study sought to respect the highest ethical standards, guaranteeing the validity and reliability of its conclusions.

3.6.3 INFORMED CONSENT

Informed consent is a crucial component of ethical research involving human participants. It is imperative to ensure that individuals provide voluntary authorisation for their participation in research after comprehending the research protocol and its implications (Cacchione, 2011). The informed consent process entails disclosing pertinent information to potential participants, confirming their understanding, and enabling them to engage in the research voluntarily (Denning et al., 2015). Ethical clinical research necessitates that participants offer voluntary informed consent before any study procedures commence (Lentz et al., 2016).

Participants were informed that the research was solely for academic purposes as part of the researcher's degree requirements and was unrelated to his professional role at the Central University of Technology. This information was included as part of the terms of participating in the survey, which participants needed to agree to before proceeding.

Informed consent is a cornerstone of ethical research practices, guaranteeing that participants are fully informed, comprehend the research implications, and willingly agree to participate. Researchers must adhere to the principles of informed consent to safeguard participant autonomy and uphold ethical standards in research involving human subjects.

3.6.4 VOLUNTARY PARTICIPATION

The "voluntary participation" criterion, which states that people cannot be forced to participate in the research, was maintained in accordance with the ethical concerns of this study. By accepting the terms of the survey, participants gave their agreement to the research project (Trochim, 2020).

3.6.5 CONFIDENTIALITY AND COMPLIANCE

Participants were informed on the permission form that their information would remain confidential and would not be disclosed outside the scope of the research project. Anonymity was assured throughout the study (Trochim, 2020).

The research project adhered to regulatory frameworks, including the Personal Information Protection Act 2013, ensuring compliance with ethical standards for data handling and participant privacy.

Ethical considerations also extend to the planned statistical methodologies and data analysis. The quantitative data obtained in this study will undergo a rigorous analytical process designed to extract significant insights and support well-informed conclusions.

3.7 STATISTICAL PROCEDURE/ DATA ANALYSIS

The main objective of this study was to evaluate the academic staff's level of digital preparedness at CUT's faculty. Three important factors were assessed using a standardised questionnaire based on the Technology Acceptance Model (TAM): behavioural intention (BI) to embrace digital tools, perceived usefulness (PU), and perceived ease of use (PEOU).

Quantitative data were collected using a 7-point Likert scale, a widely recognised method for assessing participants' attitudes and perceptions towards a topic (McCusker and

Gunaydin, 2015). This scale was used to measure levels of agreement or disagreement with various statements pertaining to the three TAM components (BI, PU, PEOU).

Participants could indicate one of the following levels of agreement or disagreement with any given statement:

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neutral
- Somewhat Agree
- Agree
- Strongly Agree

The different statistical techniques and processes discussed below were used in the systematic analysis of the quantitative data in order to meet the goals of the study and guarantee the validity of the conclusions:

3.7.1 DATA ANALYSIS BY UNIVERSITY STATISTICIAN

A qualified statistician from the university conducted the data analysis for this study, who is proficient in SPSS. Using SPSS enables applying advanced statistical methods specifically tailored to the study's research objectives. The involvement of the university statistician ensured precision in analysis, adherence to rigorous data standards, and the correct application of statistical techniques to validate findings and support meaningful interpretations.

3.7.2 DESCRIPTIVE STATISTICS

Descriptive statistics were initially calculated to provide an overview of the dataset and establish a baseline understanding of respondents' demographics and perceptions. This process includes the following analyses:

- **Means and Standard Deviations:**

Calculated for continuous variables to summarise central tendencies (average responses) and variability (spread of responses). These measures provide insight into overall trends in respondents' perceptions of digital readiness.

- **Frequency Distributions:**

Generated for categorical variables, such as academic rank and years of experience, to depict the demographic composition of the sample. This analysis facilitates an understanding of the sample's diversity, and it contextualises the subsequent analyses by showing how perceptions across different demographic groups varied.

Descriptive statistics provided a foundational snapshot of the data, identifying general patterns in demographic characteristics and survey item responses. These items addressed the three key TAM components: (BI, PU, and PEOU).

3.7.3 INFERENCE STATISTICS

To examine the relationships between variables and to derive conclusions beyond the descriptive insights, several inferential statistical techniques were employed:

- **Levene's Test for Equality of Variances:**

This test assessed whether the variances across defined groups (based on academic rank and years of experience) were equal—a necessary assumption for comparing group means in t-tests. If the significance level (Sig.) was below 0.05, this indicated unequal variances, and the "Equal variances not assumed" option

was used in the t-test analysis. Conversely, if the significance level was greater than 0.05 (Sig. > 0.05), variances were considered equal, and the "Equal variances assumed" option was applied. This step was crucial to ensuring an accurate interpretation of the results of the subsequent t-test results.

- **Independent Samples t-test for Equality of Means:**

The mean responses of defined groups (such as years of experience and academic levels) for each TAM component—BI, PU, and PEOU—were compared using an independent samples t-test. This analysis aimed to determine whether views of these demographic factors varied statistically significant.

- **t Statistic, Degrees of Freedom (df), and p-values:** For each comparison, the t statistic, degrees of freedom (df), and significance levels (p-values) were reported. A two-sided p-value was primarily used to determine statistical significance, with a conventional threshold set at 0.05. In most cases, the p-values exceeded this threshold, indicating that observed differences between groups were not statistically significant and could likely be attributed to random variation rather than actual differences in perceptions.
- **Mean Difference and 95% Confidence Interval:** The analysis included the mean difference between groups and the standard error of the difference. A 95% confidence interval was computed to estimate the range within which the true mean difference likely falls. If the confidence interval included zero, it indicated that the difference was not statistically significant, aligning with the conclusions drawn from the p-values.

3.7.4 SUBGROUP ANALYSIS

Subgroup analyses were conducted to examine whether perceptions of digital readiness varied based on respondents' demographic characteristics. Specifically, responses were analysed based on the following categories:

- **Academic Rank:**
 - Professor,
 - Associate Professor,
 - Lecturer,
 - Senior Lecturer,
 - Senior Researcher,
 - Part-time Lecturer.
- **Years of Experience:**
 - less than 1 year,
 - 1-5 years,
 - 6-10 years,
 - 11-15 years,
 - and more than 15 years.

These subgroup analyses provided a deeper understanding of how perceptions of digital readiness—across the TAM components of BI, PU, PEOU—differed based on academic rank and years of experience. These findings offered valuable insights into variations among academic staff groups, helping to identify areas where additional support or intervention might be beneficial. This approach addresses the study’s core research questions regarding the influence of demographic factors on digital readiness and informed recommendations for targeted strategies to enhance digital integration.

3.7.5 CONTENT VALIDITY AND PILOT TESTING

The concepts of content validity and pilot testing are discussed in more detail below:

- **Content Validity:**

Before data collection, the questionnaire underwent a content validation process. A panel of experts, including faculty members knowledgeable in digital education technologies, reviewed the questionnaire to ensure its relevance and clarity. Their comments revealed that the questionnaire aligned with the TAM framework, as the

items effectively captured the dimensions of perceived usefulness, perceived ease of use, and behavioural intention to use digital technologies.

- **Pilot Testing:**

A pilot test was conducted with a small subset of academic staff from the faculty to identify any potential ambiguities or issues in the questionnaire design. Feedback from the pilot test was used to make minor adjustments, improving the clarity and usability of the questionnaire prior to its distribution to the entire sample.

3.8 SUMMARY OF STATISTICAL PROCEDURES

The statistical analysis performed in SPSS included both descriptive and inferential statistics, encompassing:

- **Descriptive Statistics:**

Descriptive statistics provided an initial overview of the dataset, summarising demographic characteristics and initial response patterns across the TAM components.

- **Levene's Test for Equality of Variances:**

Levene's test verified the assumption of equal variances between groups, ensuring accurate interpretation of t-tests.

- **Independent Samples t-test for Equality of Means:**

Compared responses across different demographic groups (academic rank and years of experience) for each TAM component, identifying any statistically significant differences in perceptions.

- **Subgroup Analysis:**

Explored variations in digital readiness perceptions across different academic ranks and levels of experience, addressing the study's research questions about the influence of demographic factors on TAM components.

The use of SPSS, combined with the expertise of a university statistician, facilitated a rigorous approach to data analysis. The use of Levene's Test, t-tests for Equality of Means, and subgroup analyses contributed significantly to the reliability and validity of the findings, ensuring adherence to high academic standards. These comprehensive analytical methods provided a robust foundation for drawing meaningful conclusions and formulating informed recommendations, which are further explored in subsequent chapters.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

This chapter presents the analysis and interpretation of the data collected from the academic staff of the Faculty of Health and Environmental Sciences at CUT. The data collection process focused on assessing digital readiness among academic staff, with a particular focus on using CUT Digital Tools. The analysis is structured into biographical data and data related to the TAM, which examines PU, PEOU, and BI associated with CUT Digital Tools.

4.2 RESPONSE RATE

The online survey was distributed to 81 faculty staff members in the Faculty of Health and Environmental Sciences at CUT. This included permanent and part-time academic staff. 41 responses were received, yielding a response rate of 50.6%. While this response rate falls short of the target of 100%, it is deemed adequate for analysis and reporting purposes.

Babbie and Mouton (2001) note that a response rate of 50% is generally regarded sufficient for analysis and reporting, a rate of 60% is considered a good response rate, and 70% is deemed very good. Therefore, the achieved response rate meets the minimum threshold for adequacy, allowing for meaningful analysis and interpretation of the data.

Factors such as time constraints and workload demand on participants may have influenced the response rate, limiting full participation. Despite these challenges, the responses obtained provide valuable insights into the digital readiness of academic staff at CUT and facilitate a comprehensive analysis of the data collected.

4.3 ANALYSIS AND INTERPRETATION OF BIOGRAPHICAL DATA

The biographical data collected from the respondents provides an overview of the demographics of the academic staff participating in this study. Understanding the participants' background characteristics, such as academic rank and years of experience, is essential for interpreting the results, as it provides context to their perspectives on digital readiness and the adoption of digital tools at CUT. This section analyses the respondents' academic rank and years of experience.

4.3.1 ACADEMIC RANKINGS

The survey gathered data on the academic rank of respondents within the faculty. The data in Figure 4.1 reflects a diverse range of positions held by participants, with the majority being lecturers constituting 29.27% of the total:

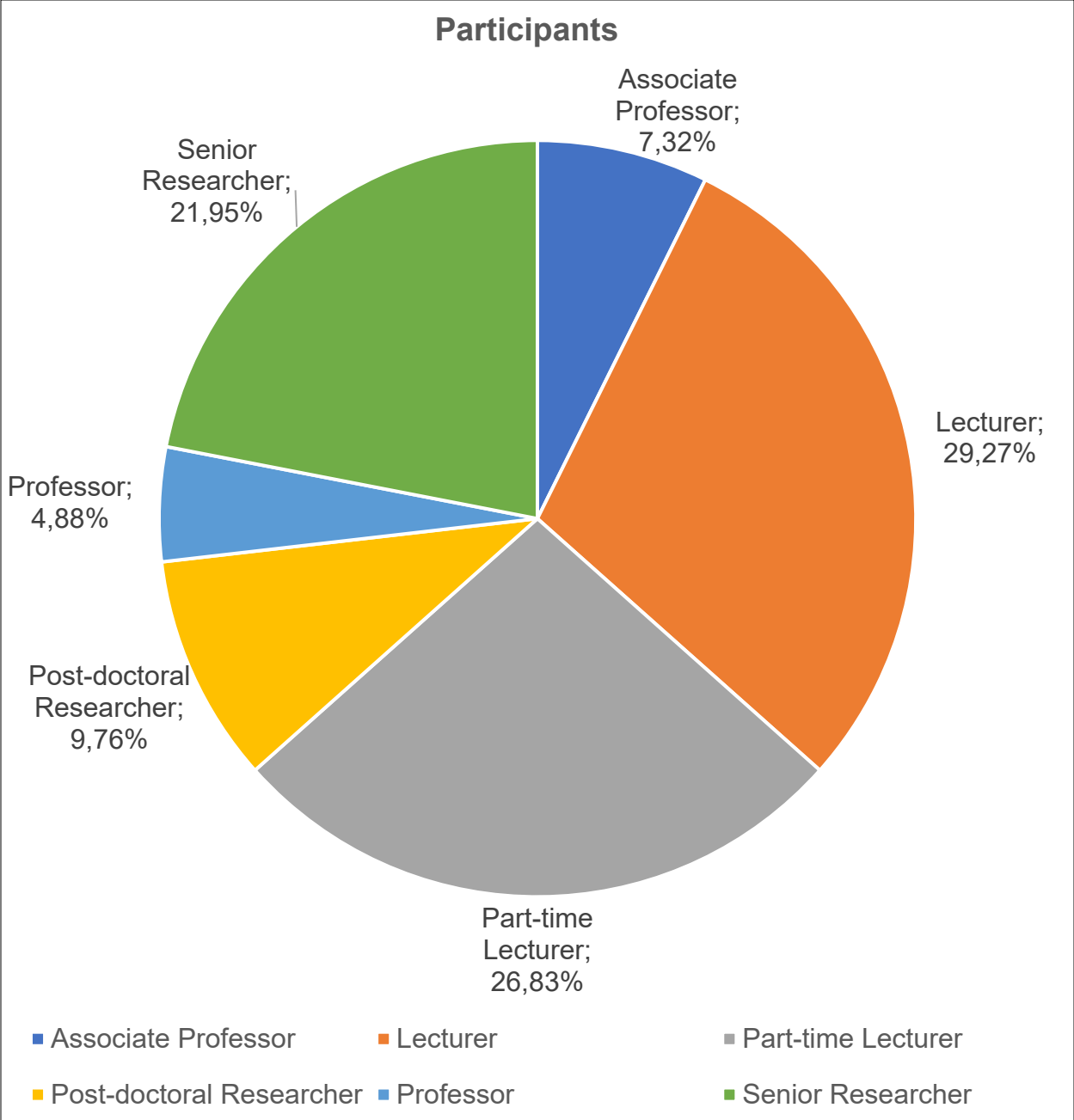


Figure 4.1: Demographics of Academic Staff that participated

This diverse representation of academic ranks suggests that the responses come from various levels of academic experience and responsibility, ensuring a comprehensive view of digital readiness across the faculty.

4.3.2 YEARS OF EXPERIENCE

The survey also collected data on the respondents' years of academic experience, ranging from less than 1 year to more than 15 years. The breakdown of the responses received is as demonstrated in Figure 4.2 below:

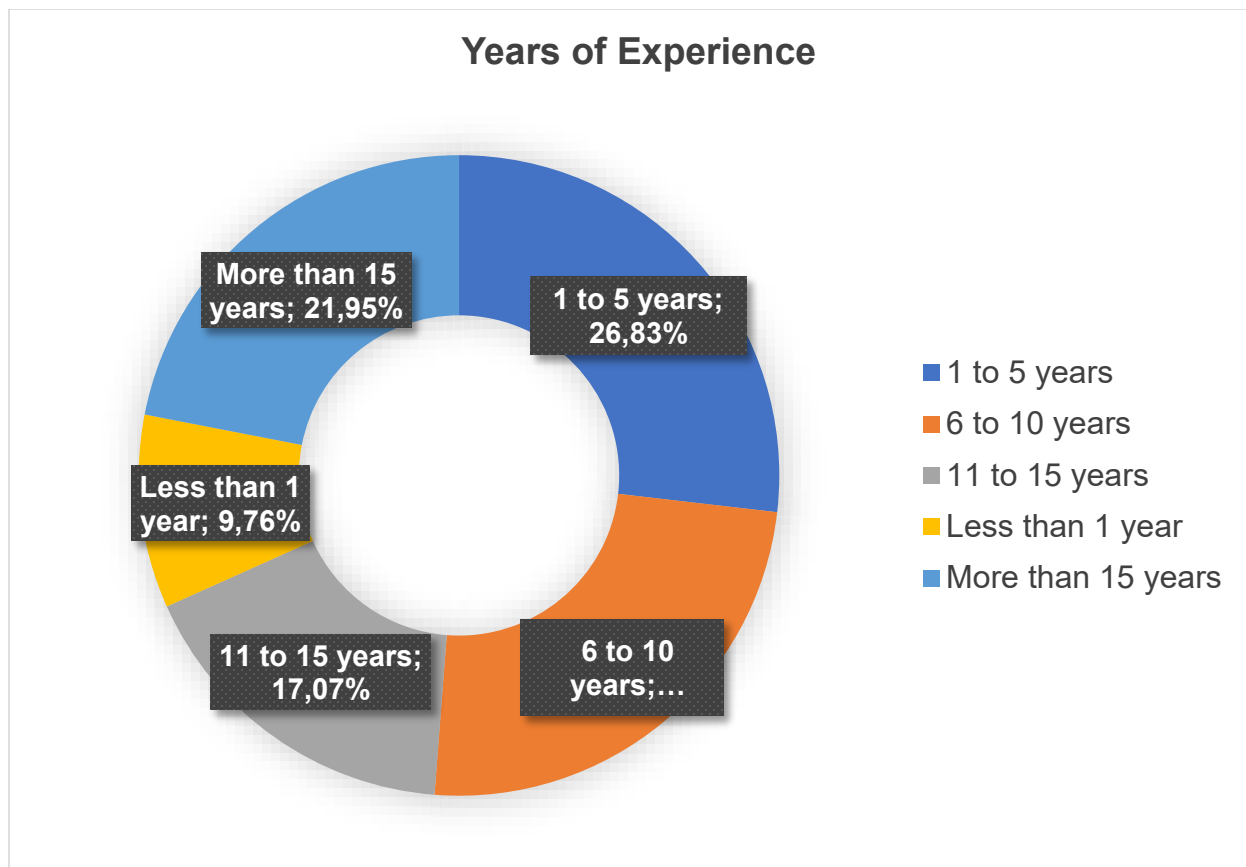


Figure 4.2: Academic experience of participants

Figure 4.2 indicates that a significant proportion of the respondents have more than 5 years of academic experience, providing a robust base for assessing digital readiness across different experience levels. The variation in experience levels contributes to a balanced perspective on how academic staff interact with digital tools in their teaching and research activities.

4.4 ANALYSIS & INTERPRETATION OF DATA ON THE THREE TAM COMPONENTS

This section examines the survey responses based on the three core components of TAM, including PU, PEOU, and BI. The analysis provides an overall perspective of the respondents' answers to the questions, followed by a breakdown of the responses according to academic rank and years of experience. This approach helps to determine whether respondents' perceptions of the usefulness, ease of use, and intention to use digital tools are influenced by their professional roles or tenure within the institution.

4.4.1 GENERAL FEEDBACK ON THE RESPONSE TO THE QUESTIONS

The following sections outline the responses to each question received from the participants.

4.4.1.1 Perceived Usefulness (PU)

- **Question 1:** "Using CUT Digital Tools enables me to accomplish tasks more quickly"

Figure 4.3 illustrates respondents' views on whether CUT Digital Tools enable them to complete tasks more efficiently, showing varied responses. A total of 70.2% of respondents expressed agreement, with 14.6% strongly agreeing, 43.9% agreeing, and 12.2% somewhat agreeing. Meanwhile, 9.8% remained neutral. In contrast, 19.5% of respondents expressed disagreement, comprising 12.2% who somewhat disagreed and 7.3% who strongly disagreed, while no respondents selected "Disagree" (0%). These results suggest that while a majority view the tools as beneficial for task efficiency, a notable proportion remains neutral or perceives them as ineffective.

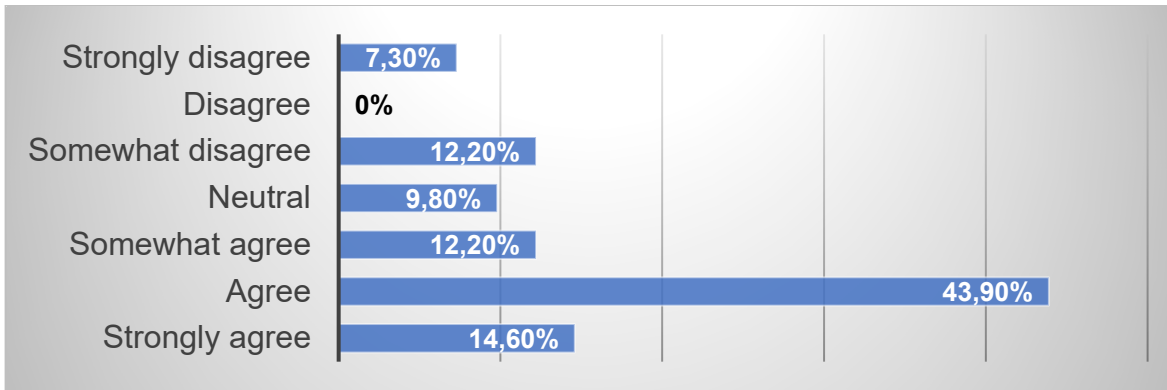


Figure 4.3: Responses to Question 1

- **Question 2:** “Using CUT Digital Tools improves my job performance”

Figure 4.4 illustrates respondents' views on whether CUT Digital Tools improve job performance, showing a range of perspectives. A total of 69.6% of respondents expressed a positive view, with 22.0% strongly agreeing, 36.6% agreeing, and 9.8% somewhat agreeing. Meanwhile, 14.6% remained neutral, and 4.9% somewhat disagreed. These results indicate that while a majority perceive the tools as beneficial for job performance, there is still variation in opinions regarding their overall effectiveness.

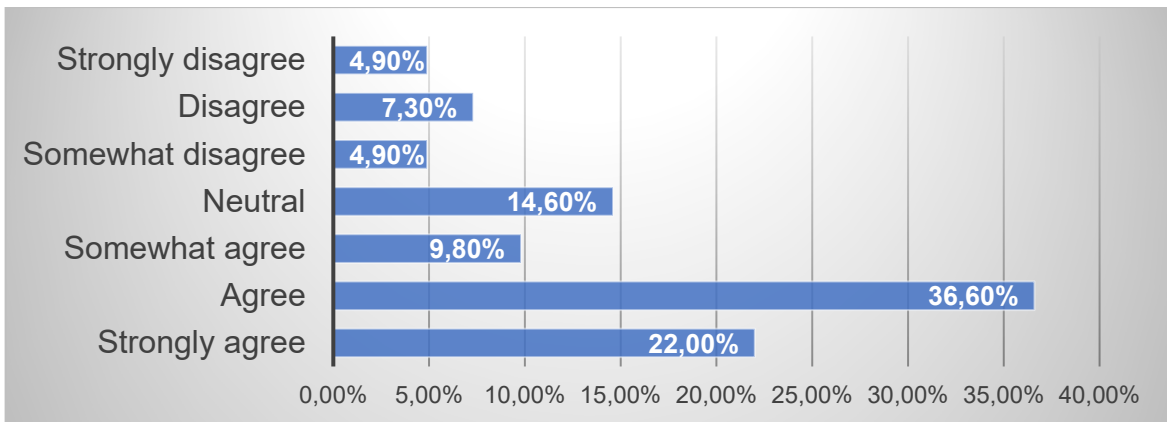


Figure 4.4: Responses to Question 2

- **Question 3:** “Using CUT Digital Tools in my job increases my productivity”

Figure 4.5 presents respondents' views on whether using CUT Digital Tools increases their productivity. A total of 68.2% of respondents expressed agreement, with 26.8% strongly agreeing, 26.8% agreeing, and 14.6% somewhat agreeing. Meanwhile, 9.8% remained neutral. In contrast, 22% of respondents expressed disagreement, comprising 9.8% who somewhat disagreed, 9.8% who disagreed, and 2.4% who strongly disagreed. These results indicate that while the majority perceive the tools as enhancing productivity, a notable proportion remains neutral or disagrees with their effectiveness.

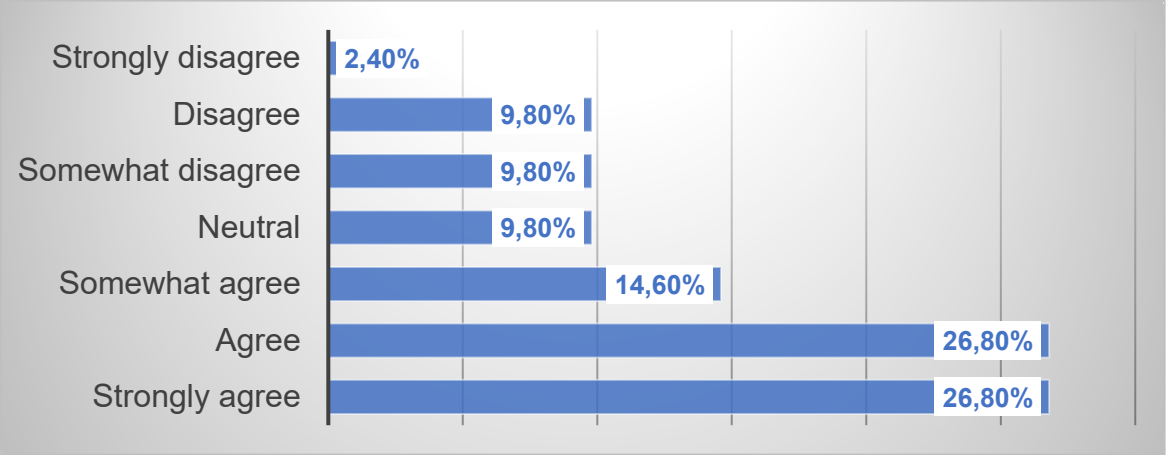


Figure 4.5: Responses to Question 3

- **Question 4:** “Using CUT Digital Tools enhances my effectiveness on the job”

Figure 4.6 presents respondents' perspectives on whether using CUT Digital Tools enhances their effectiveness on the job. A total of 70.8% of respondents indicated agreement, with 12.2% strongly agreeing, 36.6% agreeing, and 22.0% somewhat agreeing. Meanwhile, 7.3% of respondents remained neutral. In contrast, 21.9% expressed disagreement, including 19.5% who somewhat disagreed and 2.4% who strongly disagreed, while 0% selected "disagree". These results suggest that while most respondents perceive the tools as beneficial for job effectiveness, a considerable proportion remains neutral or expresses reservations about their impact.

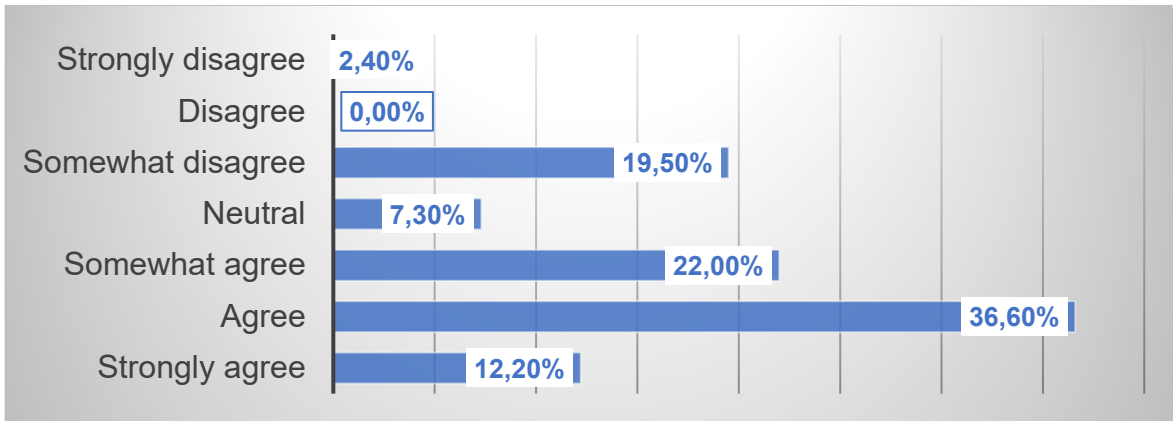


Figure 4.6: Responses to Question 4

- **Question 5:** “Using CUT Digital Tools makes it easier to do my job”

Figure 4.7 illustrates respondents' perceptions of whether using CUT Digital Tools makes it easier to perform their job. A total of 68.3% of respondents expressed agreement, with 22.0% strongly agreeing, 31.7% agreeing, and 14.6% somewhat agreeing. Meanwhile, 7.3% remained neutral. On the other hand, 24.4% of respondents disagreed to some extent, including 17.1% who somewhat disagreed, 4.9% who disagreed, and 2.4% who strongly disagreed. These results suggest that while a majority of respondents find the tools helpful in making their job easier, a notable proportion remains neutral or perceives challenges in their usability.

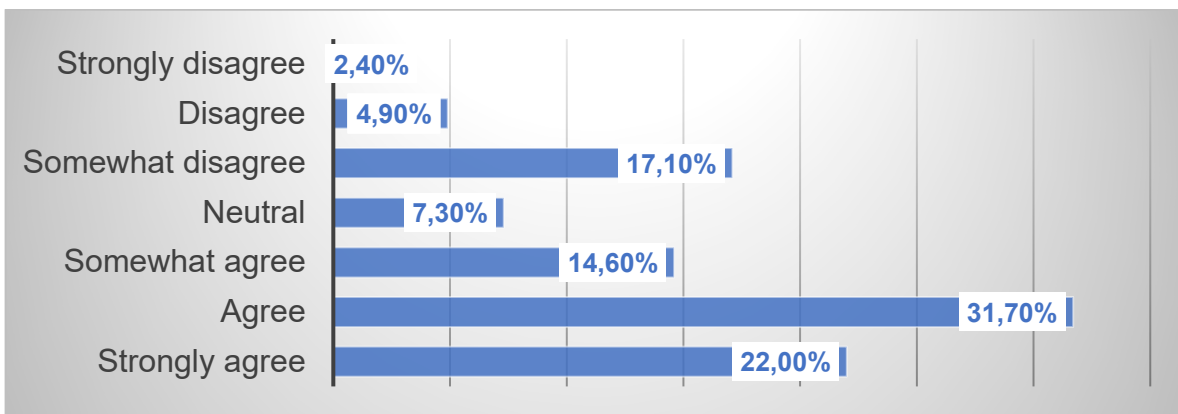


Figure 4.7: Responses to Question 5

- **Question 6:** “CUT Digital Tools are useful in my job”

Figure 4.8 presents respondents' views on the usefulness of CUT Digital Tools in their job. A total of 70.7% of respondents expressed agreement, with 29.3% strongly agreeing, 26.8% agreeing, and 14.6% somewhat agreeing. Meanwhile, 7.3% remained neutral. In contrast, 22.0% of respondents expressed some level of disagreement, including 12.3% who somewhat disagreed, 7.3% who disagreed, and 2.4% who strongly disagreed. These results indicate that while the majority of respondents perceive CUT Digital Tools as useful in their roles, a portion of the staff remains uncertain or does not find them beneficial.

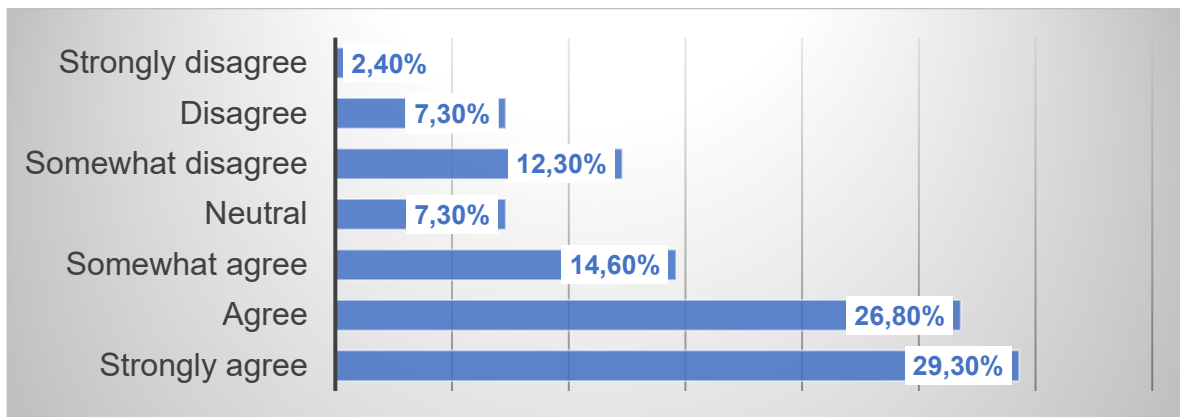


Figure 4.8: Responses to Question 6

4.4.1.2 Perceived Ease of Use (PEOU)

- **Question 7:** “Learning to operate CUT Digital Tools is easy for me”

Figure 4.9 illustrates respondents' perceptions of the ease of learning to operate CUT Digital Tools. A total of 58.5% of respondents indicated agreement, with 7.3% strongly agreeing, 39.0% agreeing, and 12.2% somewhat agreeing. Meanwhile, 9.8% of respondents remained neutral. On the other hand, 31.7% of respondents expressed some level of disagreement, including 17.1% who somewhat disagreed, 12.2% who disagreed, and 2.4% who strongly disagreed. These findings suggest

that while the majority find learning to operate the tools manageable, a notable proportion of respondents experience difficulties.

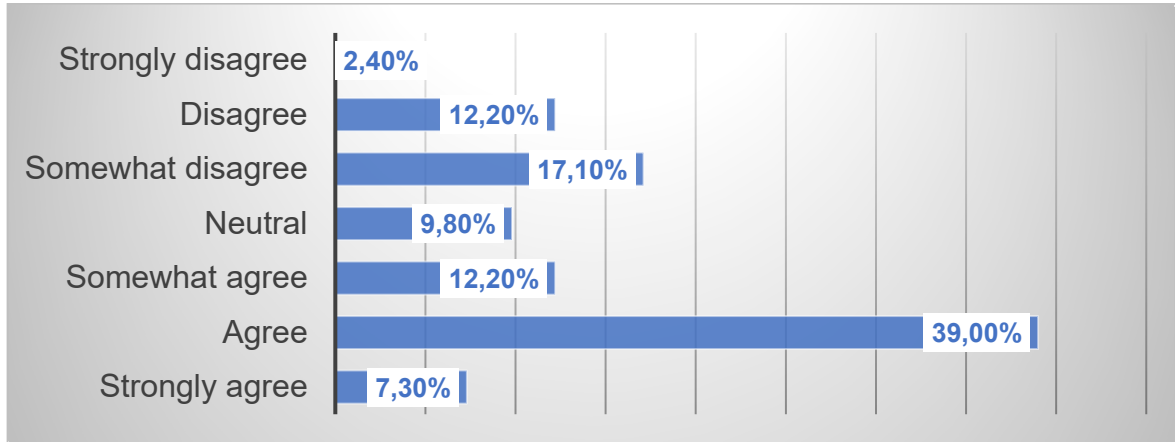


Figure 4.9: Responses to Question 7

- **Question 8:** “I find it easy to use CUT Digital Tools to do what I want them to do”

Figure 4.10 illustrates respondents' perceptions of how easy it is to use CUT Digital Tools for their intended purposes. A total of 58.5% of respondents indicated agreement, with 7.3% strongly agreeing, 39.0% agreeing, and 12.2% somewhat agreeing. Meanwhile, 9.8% of respondents remained neutral. On the other hand, 31.7% of respondents expressed some level of disagreement, including 17.1% who somewhat disagreed, 12.2% who disagreed, and 2.4% who strongly disagreed. These results indicate that while a majority find the tools easy to use for their tasks, a significant proportion of respondents still face challenges in fully utilising them as intended.

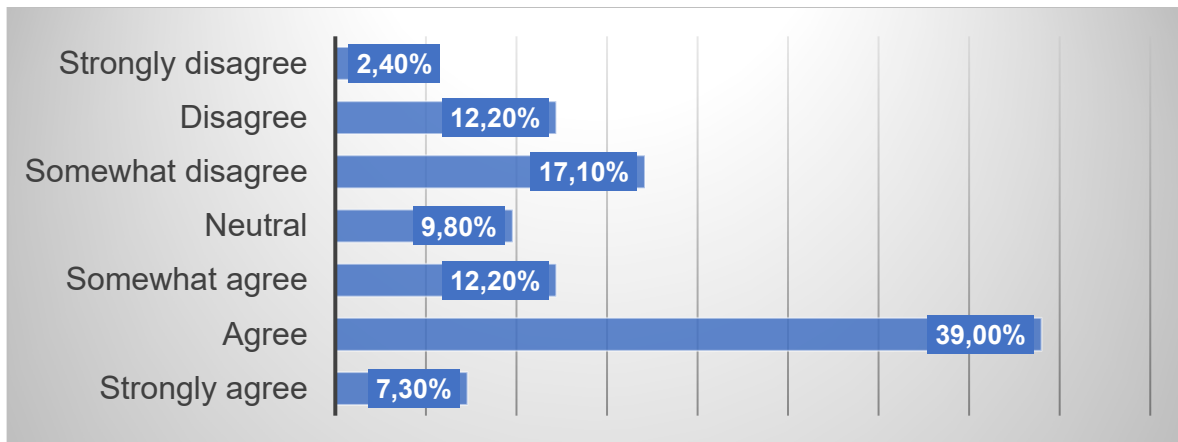


Figure 4.10: Responses to Question 7

- **Question 9:** “My interactions with CUT Digital Tools are clear and understandable”

Figure 4.11 illustrates respondents' perceptions regarding the clarity and understandability of their interactions with CUT Digital Tools. A total of 63.5% of respondents indicated agreement, with 12.2% strongly agreeing, 22.0% agreeing, and 29.3% somewhat agreeing. Meanwhile, 7.3% of respondents remained neutral. On the other hand, 29.2% of respondents expressed some level of disagreement, including 14.6% who somewhat disagreed, 7.3% who disagreed, and 7.3% who strongly disagreed. These findings suggest that while a majority of respondents perceive their interactions with the tools as clear and understandable, a notable portion of participants experience some level of difficulty in engaging with them effectively.

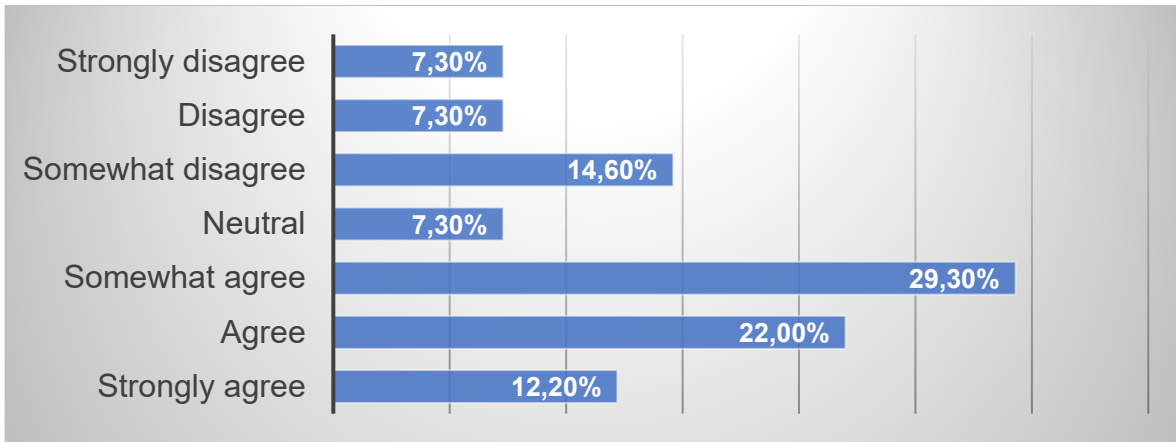


Figure 4.11: Responses to Question 9

- **Question 10:** “CUT Digital Tools are clear and understandable”

Figure 4.12 presents respondents' views on whether CUT Digital Tools are clear and understandable. A majority of 65.9% of respondents expressed agreement, with 4.9% strongly agreeing, 43.9% agreeing, and 17.1% somewhat agreeing. Meanwhile, 4.9% of respondents remained neutral. However, 29.3% of respondents indicated some level of disagreement, comprising 9.8% who somewhat disagreed, 14.6% who disagreed, and 4.9% who strongly disagreed. These findings suggest that while most respondents find the tools clear and understandable, a notable proportion still experiences challenges in fully comprehending their functionalities.

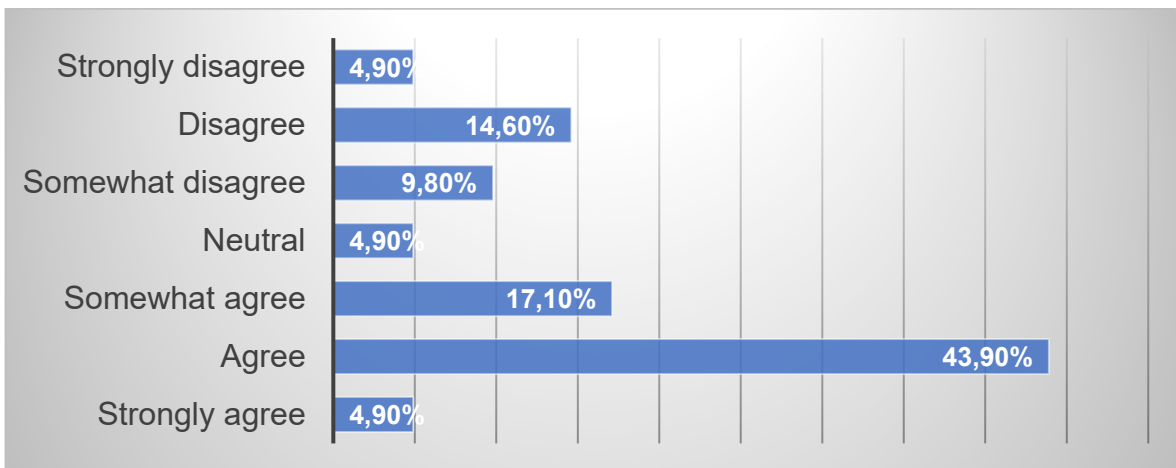


Figure 4.12: Responses to Question 10

4.4.1.3 Behavioural Intention to Use (BI)

- **Question 11:** “I intend to use CUT Digital Tools regularly in my job”

Figure 4.13 illustrates respondents' intentions regarding the regular use of CUT Digital Tools in their jobs. A majority of 63.4% expressed a willingness to use these tools consistently, with 12.2% strongly agreeing, 24.4% agreeing, and 26.8% somewhat agreeing. Meanwhile, 17.1% of respondents remained neutral, indicating some uncertainty about their long-term adoption. Additionally, 19.6% of respondents expressed some level of reluctance, with 9.8% somewhat disagreeing, 4.9% disagreeing, and 4.9% strongly disagreeing. These findings suggest that while most respondents intend to use CUT Digital Tools regularly, there is still a notable proportion with reservations, highlighting potential areas for further support or training.

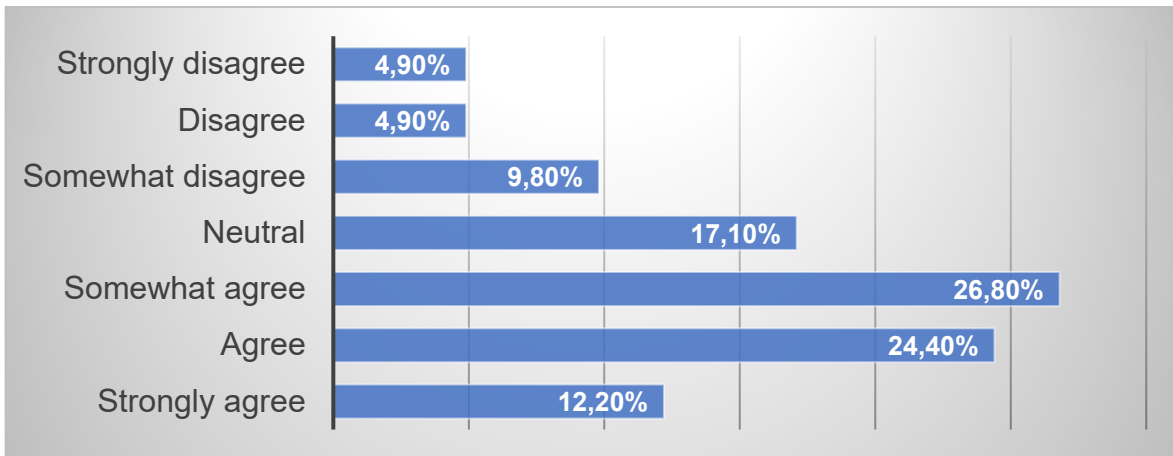


Figure 4.13: Responses to Question 11

- **Question 12:** “I plan to use CUT Digital Tools to assist me with my teaching/research activities”

Figure 4.14 presents respondents' plans to use CUT Digital Tools to support their teaching and research activities. A total of 65.8% of respondents indicated a positive intention to use these tools, with 14.6% strongly agreeing, 24.4% agreeing, and 26.8%

somewhat agreeing. However, 9.8% of respondents remained neutral, suggesting uncertainty about their future usage. Additionally, 24.4% expressed some level of disagreement, with 12.2% somewhat disagreeing, 7.3% disagreeing, and 4.9% strongly disagreeing. These results indicate that while a majority of respondents see value in using CUT Digital Tools for teaching and research, a significant portion remains hesitant, potentially due to usability concerns or perceived relevance.

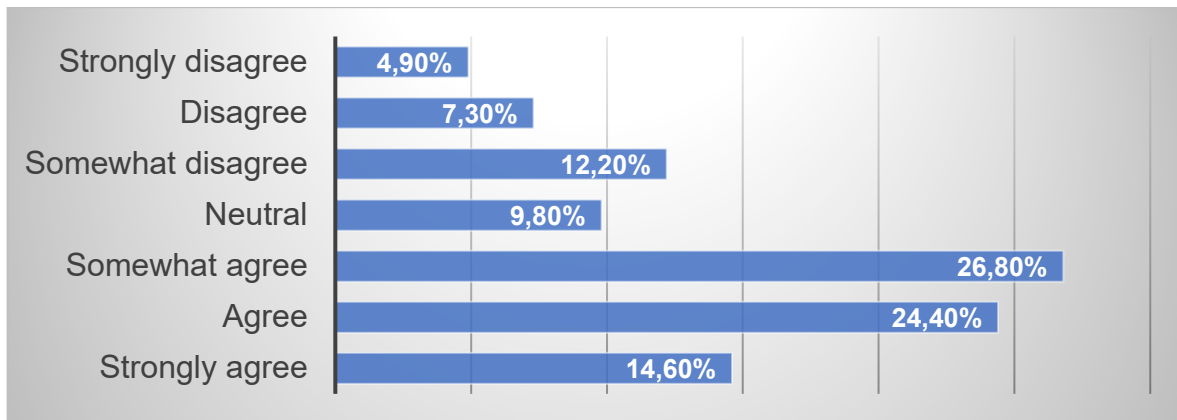


Figure 4.14: Responses to Question 12

4.4.2 RESPONSES BY ACADEMIC RANK

The following sections outline insights gained from the survey concerning participants' academic rank:

4.4.2.1 Perceived Usefulness by Academic Rank

Table 4.1 below presents an aggregate view of responses to the questions pertaining to the perceived usefulness of CUT Digital tools, categorised by the various academic staff ranks.

Table 4.1: Responses on PU of CUT Digital Tools by Academic Rank

Academic Position	Agree	Neutral	Disagree
Associate professor	67%	0%	33%
Lecturer	57%	8%	35%
Part-time lecturer	56%	17%	27%
Post-doc	100%	0%	0%
Professor	100%	0%	0%
Senior researcher	83%	11%	6%
Senior Lecturer	95%	5%	0%

The overview found in Table 4.1 above which presents the various academic ranks' responses regarding the usefulness of CUT Digital Tools, reflects differing levels of agreement with the perceived usefulness of these tools. These differences are discussed below:

- **Professors and Post-Doctoral Researchers:**

Both groups report the highest levels of agreement, with 100% of respondents in each group expressing that they find the tools useful.

- **Senior Lecturers:**

A substantial majority (95%) agree on the usefulness of the tools, with only 5% remaining neutral.

- **Senior Researchers:**

83% agree on the tools' usefulness, with 11% remaining neutral and 6% expressing disagreement.

- **Associate Professors:**

67% of Associate Professors agree with the usefulness of the tools, while 33% disagree, indicating a mixed perception within this group.

- **Lecturers and Part-time Lecturers:**

Among Lecturers, 57% agree on the digital tools' usefulness, with 8% neutral and 35% disagreeing. Whereas part-time Lecturers showed similar mixed perceptions, with 56% agreeing, 17% remaining neutral, and 27% disagreeing.

These results highlight varying perceptions of the tools' usefulness across academic ranks, with higher agreement levels observed among professors, post-docs, and senior lecturers and more mixed responses from lecturers and part-time lecturers.

4.4.2.2 Perceived Ease of Use by Academic Rank

Table 4.2 below presents an aggregate view of the responses to the questions in the survey that related to the PEOU of CUT Digital Tools, categorised by the various academic staff ranks.

Table 4.2: Responses on PEOU of CUT Digital Tools by Academic Rank

Academic Position	Agree	Neutral	Disagree
Associate professor	67%	8%	25%
Lecturer	52%	4%	44%
Part-time lecturer	50%	16%	34%
Post-doc	100%	0%	0%
Professor	100%	0%	0%
Senior researcher	64%	14%	22%
Senior lecturer	86%	3%	11%

Interpretation of the results found in Table 4.2 above pertaining to the manner in which different academic ranks respond to the PEOU of CUT Digital Tools:

- **High Ease of Use Perception Among Professors and Senior Lecturers:**

Professors (100%) and Senior Lecturers (86%) strongly agree that the tools are user-friendly, with minimal to no disagreement with this statement. This suggests that these groups of academics may find it easier to adapt to digital tools, potentially due to experience or familiarity with similar systems.

- **Mixed Ease of Use Perception Among Lecturers and Part-time Lecturers:**

Lecturers (52%) and Part-time Lecturers (50%) show moderate agreement regarding the ease of use of these tools. However, a significant portion of these groups (44% of Lecturers and 34% of Part-time Lecturers) express disagreement, indicating that usability challenges might exist for these groups of academics. This could highlight a need for additional training or support to enhance their experience with the tools.

- **Unanimous Positive Perception Among Post-docs:**

Post-docs unanimously agree (100%) on the ease of use of CUT Digital Tools, suggesting high adaptability or familiarity with these digital tools among early-career academics in this group.

These observations suggest that while senior academic ranks generally perceive CUT Digital Tools as user-friendly, there is a noticeable divide between Lecturers and Part-time Lecturers compared to their more senior counterparts. This distinction indicates potential areas for targeted usability improvements, particularly for Lecturers and Part-time Lecturers, who may require additional support or training to enhance their digital tool adoption and usage.

4.4.2.3 Behavioural Intention to Use by Academic Rank

Table 4.3 provides an aggregate view of the response to the questions relating to the BI of CUT Digital Tools, categorised by the various academic staff ranks.

Table 4.3: Responses on BI to Use CUT Digital Tools by Academic Rank

Academic Position	Agree	Neutral	Disagree
Associate professor	83%	0%	17%
Lecturer	50%	17%	33%
Part-time lecturer	36%	27%	36%
Post-doc	100%	0%	0%
Professor	100%	0%	0%
Senior researcher	88%	6%	6%
Senior lecturer	71%	14%	14%

Interpretation of Results observed in Table 4.3 above:

- **High Intention Among Professors, Senior Researchers, and Post-docs:**

Professors, Senior Researchers, and Post-docs exhibit a strong behavioural intention to continue using CUT Digital Tools, with 100% of Professors and Post-docs and 88% of Senior Researchers indicating agreement. This may reflect a recognition of the tool's relevance and value in their academic and research activities.

- **Moderate Intention Among Associate Professors and Senior Lecturers:**

Associate Professors (83%) and Senior Lecturers (71%) also show a high level of intention to use these tools. However, there are minor portions within these groups who either disagree or remain neutral, indicating a generally positive but slightly varied outlook towards regular digital tool usage.

- **Lower Intention Among Lecturers and Part-time Lecturers:**

Lecturers and Part-time Lecturers display the lowest levels of behavioural intention to use CUT Digital Tools regularly, with only 50% and 36%, respectively. Notably, a considerable portion of Part-time Lecturers (36%) disagree with this notion, suggesting potential barriers to adoption or perceived limitations in the utility of the tools in their daily work.

These results indicate a generally positive outlook on the regular use of CUT Digital Tools among higher-ranking academic staff and post-docs, who already seem to recognise the tool's value in their academic and research activities. Some uncertainty, particularly among Lecturers and Part-time Lecturers, suggests an opportunity to implement targeted initiatives aimed at fostering greater engagement and enhancing the perceived utility of these tools among these groups.

4.4.3 RESPONSES BY YEARS OF EXPERIENCE

The following sections outline insights gained from the survey concerning participants' years of experience:

4.4.3.1 Perceived Usefulness by Years of Experience

Table 4.4 below indicates the aggregate of participants' responses regarding the PU of CUT Digital Tools, categorised by the academic staff's years of experience.

Table 4.4: Responses on PU of CUT Digital Tools by years of experience

Years of Experience	Agree	Neutral	Disagree
Less than 1 year	50%	21%	29%
1 to 5 years	68%	9%	21%
6 - 10 years	87%	5%	8%
11 - 15 years	77%	14%	7%

More than 15 years	79%	14%	7%
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The following findings is observed in Table 4.4 above:

- High Agreement Among Staff with Extensive Experience:**
 Respondents with more than 15 years of experience largely agree (79%) on the perceived usefulness of the tools. This trend reflects a strong perception among the most experienced staff members that the CUT Digital Tools enhance productivity, job performance, and task efficiency.
- Strong Agreement in the 6 to 10 Years Group:**
 Those with 6 to 10 years of experience reported a high level of agreement (87%) regarding the tools' usefulness, with minimal disagreement. This group's responses suggest a solid appreciation of the tools' impact on work efficiency, possibly due to their familiarity with the digital environment.
- Mixed Responses Among Less Experienced Staff:**
 For respondents with less than 1 year of experience, only 50% agree that the tools are useful, while 21% were neutral and 29% disagree. This distribution may indicate initial challenges among newer staff members in recognising or adapting to the digital tool's functionality.

These results suggest that the perceived usefulness of CUT Digital Tools generally increases with experience, indicating greater acceptance among staff with longer tenure in the academic environment. Less experienced staff members may benefit from additional support to enhance their understanding and ability to fully leverage the advantages of these digital tools.

4.4.3.2 Perceived Ease of Use by Years of Experience

Table 4.5 below indicates the aggregate of participants' responses regarding the PEOU of CUT Digital Tools, categorised by the academic staff's years of experience.

Table 4.5: Responses on Perceived Ease of Use of CUT Digital Tools by years of experience

Years of Experience	Agree	Neutral	Disagree
Less than 1 year	25%	19%	56%
1 to 5 years	59%	9%	32%
6 - 10 years	83%	5%	13%
11 - 15 years	64%	18%	18%
More than 15 years	56%	3%	41%

In Table 4.5 above, the following is observed:

- **Moderate Comfort Among Highly Experienced Staff:**

Among staff with more than 15 years of experience, 56% found the tools easy to use, with a relatively high 41% expressing disagreement. This mixed response could indicate that while many seasoned staff members are comfortable with the tools, a notable proportion may face usability challenges, possibly due to ingrained work habits or preferences for traditional methods.

- **High Ease of Use in the 6 to 10 Years Group:**

Respondents with 6 to 10 years of experience demonstrate strong ease of use perceptions, with 83% agreeing that the tools are user-friendly and only 13% disagreeing. This group appears well-acquainted with the tools, perhaps reflecting their balance between digital adaptability and experience.

- **Challenges for Less Experienced Staff:**

Staff members with less than 1 year of experience report the highest level of difficulty, with only 25% agreeing that the tools are easy to use and 56% disagreeing. This trend suggests that newer staff may face initial barriers in adapting to or navigating the digital tools, emphasising the need for enhanced onboarding or training support.

These findings reveal that perceived ease of use varies across experience levels, with moderately experienced staff (6-10 years) reporting the highest ease of use. In contrast, the least and most experienced groups indicate potential challenges, suggesting that tailored support may help all staff fully use the tools.

4.4.3.3 Behavioural Intention to Use by Years of Experience

Table 4.6 below indicates the aggregate of participant’s responses regarding BI to use CUT Digital Tools, categorised by the academic staff’s years of experience.

Table 4.6: Responses on BI to use CUT Digital Tools by years of experience

Years of Experience	Agree	Neutral	Disagree
Less than 1 year	25%	25%	50%
1 to 5 years	50%	27%	23%
6 - 10 years	75%	10%	15%
11 - 15 years	86%	7%	7%
More than 15 years	72%	0%	27%

In Table 4.6, the following are observed:

- **Strong Behavioural Intention Among Mid-Experienced Staff:**

Respondents with 11 to 15 years of experience demonstrated the highest BI to use CUT Digital Tools, with 86% indicating they plan to continue using the tools regularly. This group shows a particularly strong commitment to digital tool usage.

- **Moderate Intention Among Staff with 6 to 10 Years:**

Staff with 6 to 10 years of experience also expressed a positive BI, with 75% planning to use the tools, although this group still included a small portion (15%) who disagree, suggesting some variability in their intention to use digital tools.

- **Lower Intention Among the Least and Most Experienced Groups:**

The least experienced group (less than 1 year) had the lowest level of BI, with only 25% who agree to use the tools regularly, and 50% disagreeing. This suggests that newer staff may not yet see the tools as integral to their work. Meanwhile, even though 72% among the most experienced group (more than 15 years) express an intention to use the tools, a notable 27% disagree. This indicates that while many experienced staff members recognise the value of digital tools, a substantial proportion may still exhibit hesitation.

Overall, these findings indicate that mid-career staff (6-15 years) display the highest levels of BI to use CUT Digital Tools. In contrast, the least and most experienced groups demonstrate some reluctance or hesitation, potentially reflecting differing levels of familiarity with or perceived relevance of the tools in their academic roles.

4.4.4 BRIEF SUMMARY OF THE ANALYSIS AND INTERPRETATION OF DATA ON THE THREE TAM COMPONENTS

The above findings illustrate how the study participant's academic rank and years of experience correlate with their perceptions of CUT Digital Tools. More senior and seasoned academics generally believe the tools are helpful and straightforward, and they plan to use them in the future. However, less experienced and junior staff, particularly Post-docs and Part-time Lecturers, express less certainty regarding these tool's usefulness and ease of use. This suggests that additional training or support may be necessary to overcome the gap and ensure all academic staff feel comfortable and confident adopting CUT Digital Tools.

The previous section offers a comprehensive overview of how academic staff perceive and intend to use digital tools in their professional activities at the university faculty. These findings are critical for forming future recommendations aimed at improving faculty digital readiness.

4.5 DATA VALIDATION AND STATISTICAL ANALYSIS

The following section outlines the statistical procedures used to validate responses to the three components of the TAM: PU, PEOU, and BI.

Various statistical tests are applied and discussed in the following section to examine potential response differences across grouping variables, such as years of experience and academic rank. Levene's Test for Homogeneity of Variances and ANOVA assess variance equality and differences across groups, while effect size measures evaluate the strength of associations. SPSS software was employed for all analyses, ensuring rigorous statistical data validation. The detailed results for each TAM component (PU, PEOU, and BI) are presented in the subsequent sections.

4.5.1 PERCEIVED USEFULNESS (PU)

This section presents the results for PU across different academic ranks and years of experience within the Faculty of Health and Environmental Sciences. Grouping (as outlined in section 3.7.4) is based on academic ranks (Associate Professor, Lecturer, Part-Time Lecturer, Post-Doctoral Lecturer, Professor, Senior Lecturer, and Senior Researcher) and years of experience (less than 1 year, 1 – 5 years, 6 – 10 years, 11 – 15 years, and more than 15 years) to examine potential differences in perceived usefulness among these subgroups. For each dataset, three statistical analyses were conducted and interpreted: namely, i. Levene's test, ii. ANNOVA results, and iii. effect sizes. Levene's Test assesses the homogeneity of variances across groups to determine the appropriateness of subsequent statistical tests. ANOVA results examine differences in

means across groups to identify potential statistical significance. effect sizes measure the strength of the relationships or differences to provide context beyond p-values, indicating the practical significance of findings.

4.5.1.1 Summary of Results for PU by Academic Rank

This section, represented by Figure 4.15, presents findings on perceived usefulness across academic rank groups within the academic faculty, highlighting differences in PU by academic rank.

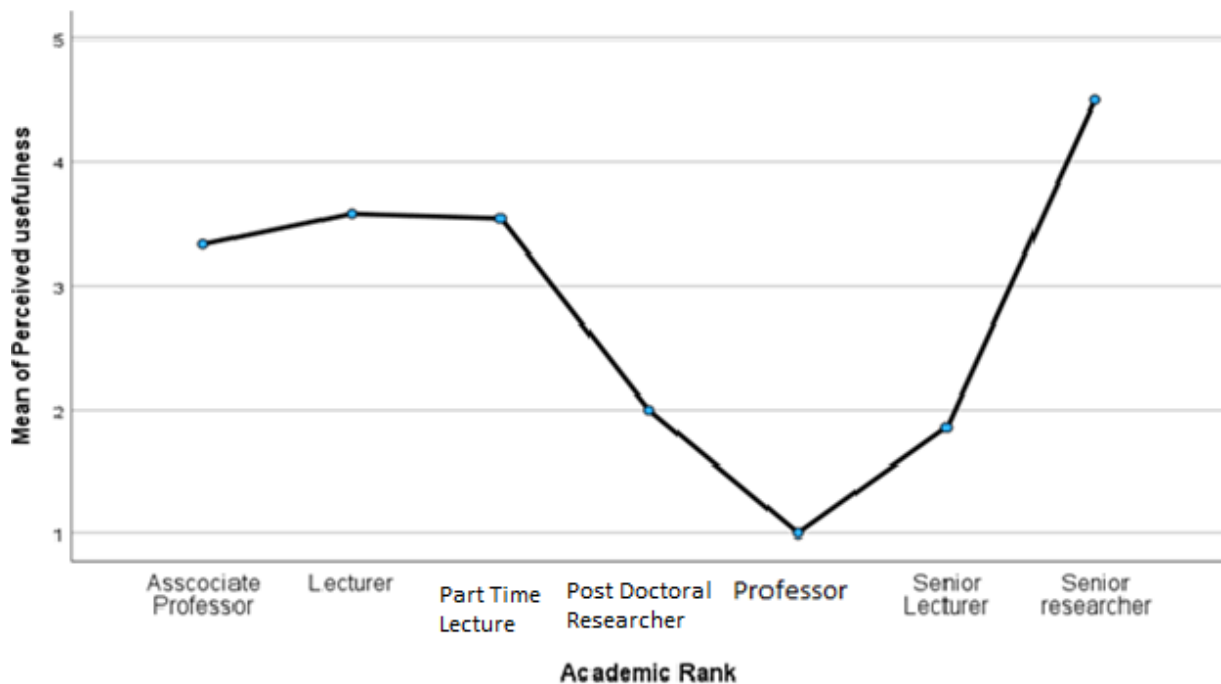


Figure 4.15: PU by Academic Rank

The data from Figure 4.15 above, indicating the relationship between PU and academic rank, is statistically analysed and interpreted in the three sections below according to i. Levene's test, ii. ANNOVA Results, and iii. Effect Sizes. In these sections below, "groups" refers to categories representing different academic ranks, namely Associate Professor, Lecturer, Part-Time Lecturer, Post-Doctoral Lecturer, Professor, Senior Lecturer, and Senior Researcher.

i. Levene's Test:

- **Based on Mean:** Levene's statistic = 6.538, $p < .001$, indicating significant differences in variances among the groups.
- **Based on Median:** Levene's statistic = 2.008, $p = .092$, suggesting no significant difference in variances when using the median.
- **Based on Median with Adjusted Degrees of Freedom:** Levene's statistic = 2.008, $p = .145$, supporting the lack of significant variance differences.
- **Based on Trimmed Mean:** Levene's statistic = 6.340, $p < .001$, indicating significant differences in variances.
- **Interpretation:** Overall, the results suggest that while there are significant differences in variances when using means and trimmed means, the median approach does not show significant variance differences among the various academic ranks.

ii. ANOVA Results:

- **Between Groups:** Sum of Squares = 33.308, Mean Square = 5.551, $F = 2.256$, $p = .061$.
- **Within Groups:** Sum of Squares = 83.668, Mean Square = 2.461.
- **Interpretation:** The p-value (.061) is slightly above the common significance threshold of .05, indicating that differences in perceived usefulness among academic ranks is not statistically significant at the conventional level.

iii. Effect Sizes:

- **Eta-squared:** $\eta^2 = .285$, indicating a moderate effect size, suggesting that approximately 28.5% of the variance in perceived usefulness can be attributed to group differences.

- **Epsilon-squared and Omega-squared (Fixed):** Values suggest moderate effects but with wider confidence intervals that include negative values.
- **Omega-squared (Random):** $\omega^2 = .030$, suggesting minimal variance explained by random effects.
- **Interpretation:** While indications of moderate effect sizes suggest academic rank differences in perceived usefulness, these findings are tempered by the p-values, which do not reach conventional significance levels. Further post-hoc testing may be warranted to explore specific group comparisons if this analysis continues.

4.5.1.2 Summary of Results for PU by Years of Experience

Figure 4.16 below presents findings on PU across years of experience within the faculty, examining how usefulness perceptions vary by experience level. Here, 'groups' refers to these categories of years of experience.

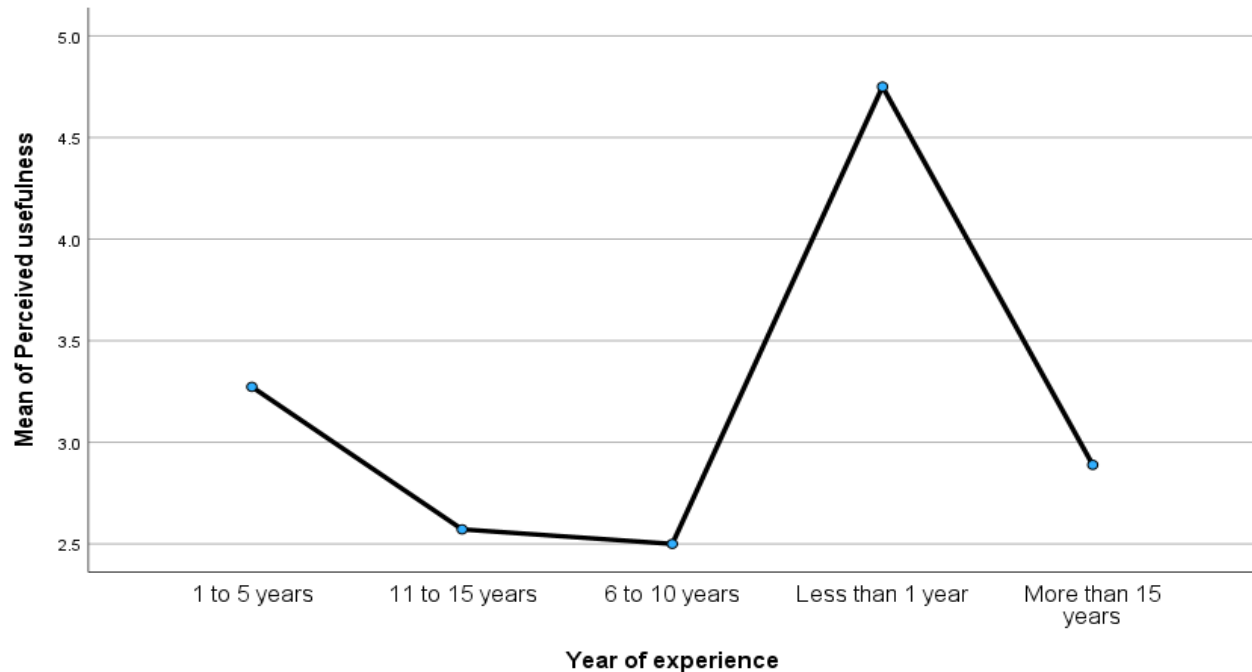


Figure 4.16: PU by Years of Experience

The data from Figure 4.16 above, illustrating the relationship between PU and years of experience, is statistically analysed and interpreted in the three sections below according to i. Levene’s test, ii. ANNOVA Results, and iii. Effect Sizes. In these sections below, “groups” refers to the categories representing different years of experience, namely (less than 1 year, 1 – 5 years, 6 – 10 years, 11 – 15 years, and more than 15 years).

i. Levene’s Test:

- **Based on Mean:** Levene’s statistic = 3.235, $p = .023$, indicating significant variance differences among groups.
- **Based on Median:** Levene’s statistic = 1.059, $p = .391$, suggesting no significant variance differences.
- **Based on Trimmed Mean:** Levene’s statistic = 2.787, $p = .041$, indicating significant variance differences.

- **Interpretation:** The results suggest significant differences in variances among groups (based on years of experience) when assessed by mean and trimmed mean but not by median.

ii. ANOVA Results:

- **Between Groups:** Sum of Squares = 16.941, Mean Square = 4.235, $F = 1.524$, $p = .216$.
- **Interpretation:** The p -value (.216) indicates no statistically significant differences in perceived usefulness across experience groups at the conventional level of .05.

iii. Effect Sizes:

- **Eta-squared:** $\eta^2 = .145$, suggesting that 14.5% of the variance in perceived usefulness can be attributed to group differences.
- **Epsilon-squared and Omega-squared (Fixed)** are lower, with confidence intervals that include negative values, indicating uncertainty in these estimates.
- **Omega-squared (Random):** $\omega^2 = .013$, indicating minimal variance explained by random effects.

Overview of the statistical analysis results for PU by years of experience:

- i. **Homogeneity of Variances:** Significant differences in variances were found based on means and trimmed means, suggesting that the assumption of homogeneity may not hold for these analyses.
- ii. **ANOVA Results:** The ANOVA did not reveal statistically significant differences in perceived usefulness among the groups ($p = .216$). This suggests that while there may be variations in means, they are not statistically meaningful.

- iii. **Effect Sizes:** The effect sizes indicate a moderate association between group membership and perceived usefulness (as shown by eta-squared). However, the lack of statistical significance suggests that these differences may not be practically relevant.

While there are indications of variance among academics of different levels of experience and moderate effect sizes, the lack of statistical significance in both Levene's test (for some measures) and ANOVA suggests that years of experience do not have a substantial impact on PU in this study's context. Further investigation may be warranted to explore specific group comparisons (such as different experience levels) or to consider additional variables that could influence PU.

4.5.2 PERCEIVED EASE OF USE (PEOU)

This segment investigates the results related to the perceived ease of use of CUT Digital Tools, which were conducted across varying academic ranks and faculty experience levels. To find any possible variations in how these groups evaluate ease of use, the analysis groups responses according to years of service (1–5 years, 6–10 years, and others) and academic positions (Associate Professor, Lecturer, and others).

4.5.2.1 Summary PEOU by Academic Rank

Figure 4.17 presents findings on PEOU across academic rank groups within the faculty, exploring variations in ease-of-use perceptions by rank.

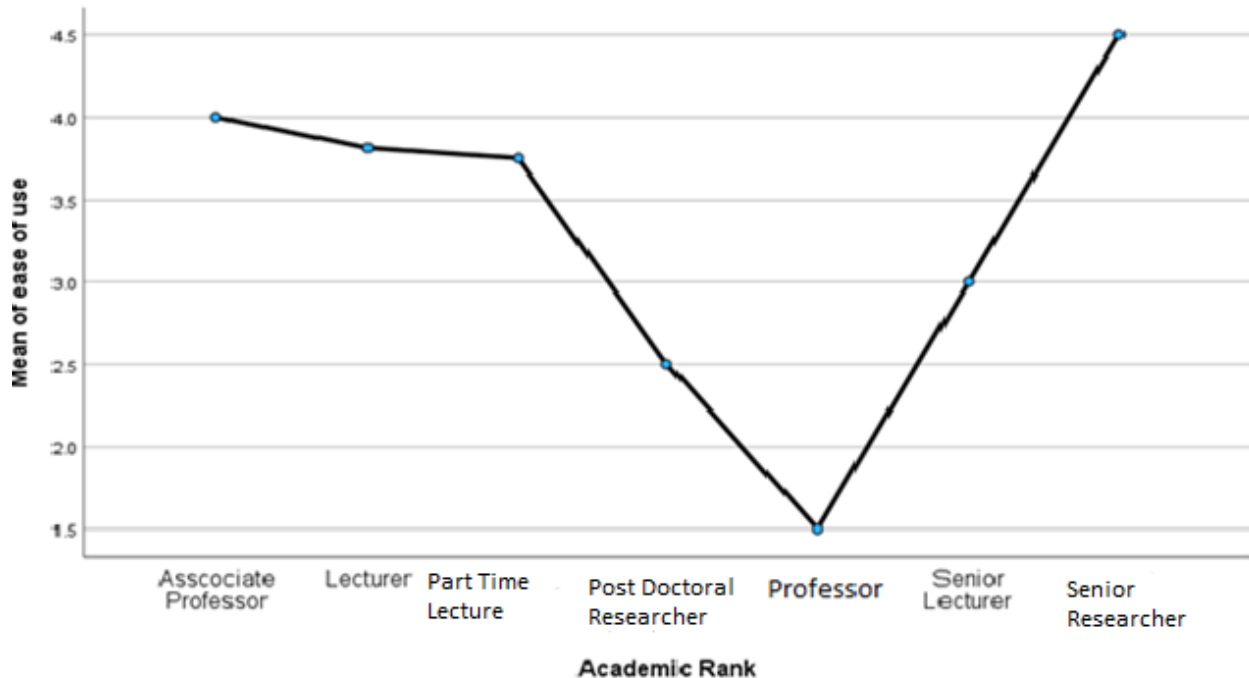


Figure 4.17: PEOU by Academic Rank

The data from Figure 4.17 above, indicating the relationship between PEOU and academic rank, is statistically analysed and interpreted in the three sections below according to i. Levene's test, ii. ANNOVA Results, and iii. Effect Sizes. In these sections below, "groups" refers to categories representing different academic ranks, namely Associate Professor, Lecturer, Part-Time Lecturer, Post-Doctoral Lecturer, Professor, Senior Lecturer, and Senior Researcher.

i. Levene's Test:

- **Based on Mean:** Levene's statistic = 3.413, $p = .010$, indicating significant differences in variances among groups.
- **Based on Median:** Levene's statistic = 1.856, $p = .117$, suggesting no significant variance differences.
- **Based on Trimmed Mean:** Levene's statistic = 3.337, $p = .011$, showing significant differences in variances.

- **Interpretation:** Significant variance differences were observed among groups when assessed by mean and trimmed mean but not by median, suggesting that the assumption of homogeneity may not hold for these analyses.

ii. **ANOVA Results:**

- **Between Groups:** Sum of Squares = 18.304, Mean Square = 3.051, $F = 1.164$, $p = .348$.
- **Interpretation:** The p-value of .348 indicates no statistically significant differences in ease of use across academic ranks.

iii. **Effect Sizes:**

- **Eta-squared:** $\eta^2 = .170$, suggesting that approximately 17% of the variance in ease of use may be attributed to academic rank differences.
- **Epsilon-Squared and Omega-Squared (Fixed):** $\epsilon^2 = .024$ and $\omega^2 = .023$, with confidence intervals including negative values, indicating lower and uncertain effect sizes.
- **Omega-squared (Random):** $\omega^2 = .004$, indicating minimal variance explained by random effects.
- **Interpretation:** While the effect sizes suggest a moderate association between academic rank and ease of use, the lack of statistical significance indicates that these variations may not be practically impactful.

Overview of the statistical analysis results for PU by academic rank:

- i. **Homogeneity of Variances:** Significant variance differences were observed based on means and trimmed means but not by median, indicating the assumption of homogeneity may not hold.
- ii. **ANOVA Results:** The lack of statistical significance in the ANOVA ($p = .348$) suggests that academic rank does not have a meaningful impact on ease of use.

- iii. **Effect Sizes:** While moderate effect sizes were noted, the absence of statistical significance implies that these differences are unlikely to be practically relevant.

In summary, despite moderate effect sizes and observable differences in PEOU across academic ranks, the lack of statistical significance in both Levene's test (for some measures) and ANOVA suggests that academic rank does not have a substantial impact on PEOU in this study. Further analysis could investigate specific group comparisons or other influencing factors.

4.5.2.2 Summary PEOU by Years Experience

This section, represented by Figure 18, presents findings on perceived ease of use across years of experience groups (1-5 years, 6-10 years and others) within the faculty, examining how ease of use perceptions vary by experience level. Here, 'groups' refers to these categories of years of experience.

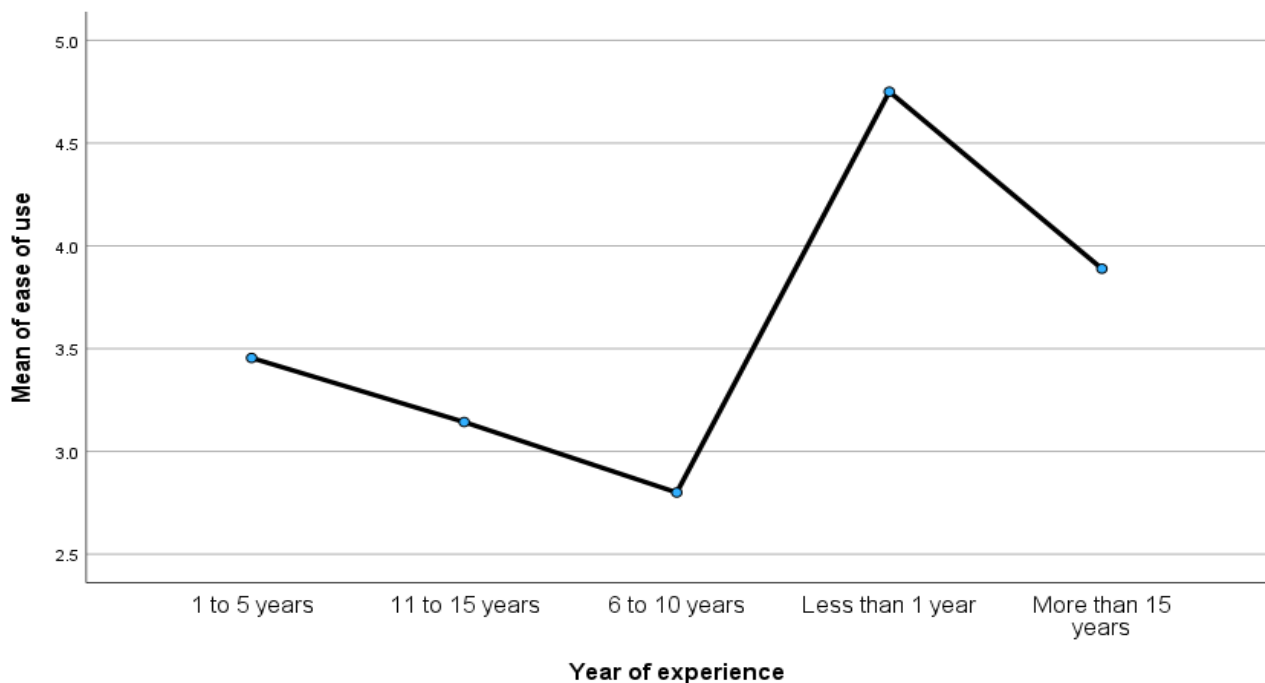


Figure 4.18: PEOU by Years Experience

The data from Figure 4.18 above, illustrating the relationship between PEOU and years of experience, is statistically analysed and interpreted in the three sections below according to i. Levene's test, ii. ANNOVA Results, and iii. Effect Sizes. In these sections below, "groups" refers to the categories representing different years of experience (less than 1 year, 1 – 5 years, 6 – 10 years, 11 – 15 years, and more than 15 years).

i. Levene's Test:

- **Based on Mean:** Levene's statistic = 4.776, $p = .003$, indicating significant differences in variances among groups.
- **Based on Median:** Levene's statistic = 1.908, $p = .130$, suggesting no significant variance differences.
- **Based on Median with Adjusted Degrees of Freedom:** Levene's statistic =
- **Based on Trimmed Mean:** Levene's statistic = 4.533, $p = .005$, indicating significant variance differences.
- **Interpretation:** The results suggest significant differences in variances among groups when assessed by mean and trimmed mean but not by median, indicating that the assumption of homogeneity may not hold for these analyses.

ii. ANOVA Results:

- **Between Groups:** Sum of Squares = 13.372, Mean Square = 3.343, $F = 1.279$, $p = .296$.
- **Interpretation:** The p -value (.296) indicates no statistically significant differences in ease of use among groups based on years of experience at the conventional significance level of .05.

iii. Effect Sizes:

- **Eta-squared:** $\eta^2 = .124$, suggesting that approximately 12.4% of the variance in ease of use can be attributed to differences based on years of experience.
- **Epsilon-Squared and Omega-Squared (Fixed):** $\epsilon^2 = .027$ and $\omega^2 = .027$, with confidence intervals that include negative values, indicating smaller effects and uncertainty in these estimates.
- **Omega-squared (Random):** $\omega^2 = .007$, indicating minimal variance explained by random effects.
- **Interpretation:** While eta-squared indicates a moderate effect size, suggesting some association between years of experience and ease of use, the lack of statistical significance implies that these differences may not be practically meaningful.

Overview of the statistical analyses results for PEOU by years of experience:

- i. **Homogeneity of Variances:** Significant differences in variances were found based on mean and trimmed mean, indicating that the assumption of homogeneity may not hold for these analyses.
- ii. **ANOVA Results:** The lack of statistically significant differences in ANOVA ($p = .296$) suggests that years of experience do not have a meaningful impact on ease of use.
- iii. **Effect Sizes:** Although moderate effect sizes were observed, the lack of statistical significance implies that these variations in ease of use by years of experience are unlikely to be practically relevant.

In summary, while moderate effect sizes and variance differences in PEOU were observed across different experience levels, ANOVA's lack of statistical significance suggests that the years of experience of academic staff do not substantially influence PEOU in this study's context. Further analysis could explore specific comparisons or additional variables influencing PEOU.

4.5.3 BEHAVIOURAL INTENTION (BI)

This section delves into the findings on BI to use CUT Digital Tools, as analysed according to participants' different academic ranks and experience levels within the Faculty of Health and Environmental Sciences at CUT. The grouping criteria include academic rank and experience duration (as outlined in section 3.7.4) to determine if there are notable distinctions in behavioural intention across these categories.

4.5.3.1 Summary of Results for BI by Academic Rank

Figure 4.19 presents the findings on BI across different academic rank groups, examining how adoption intention varies by professional level.

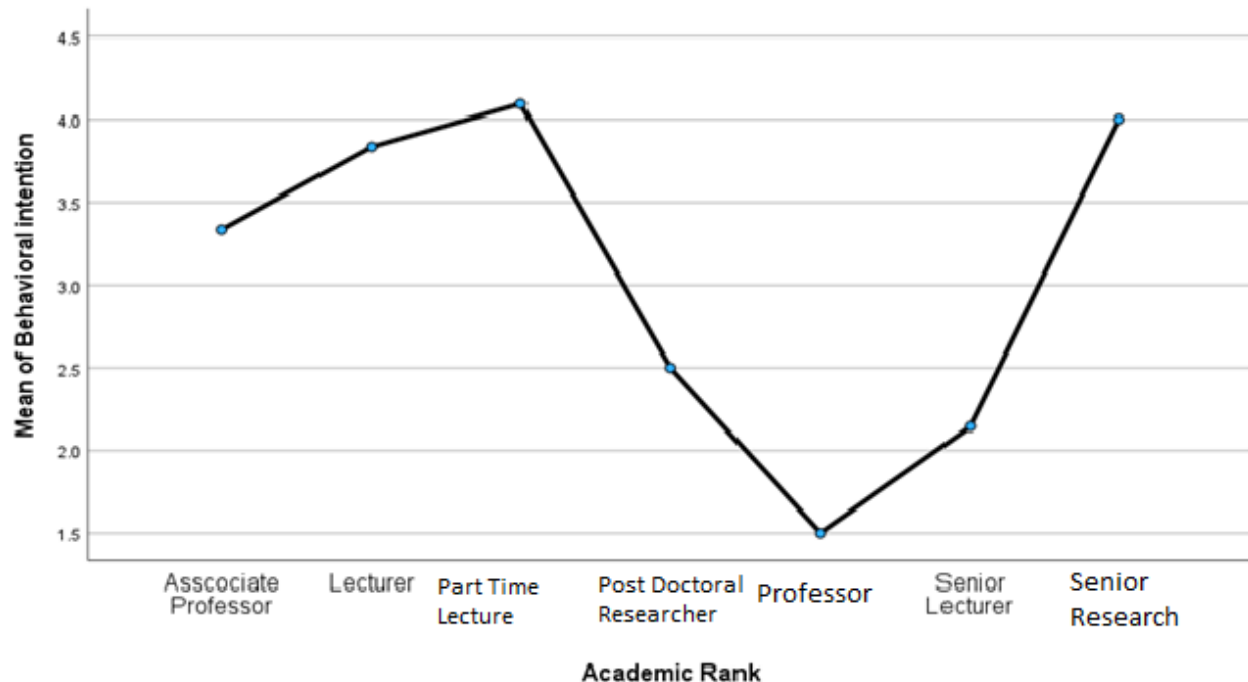


Figure 4.19: BI by Academic Rank

The data from Figure 4.19 above, indicating the relationship between BI and academic rank, is statistically analysed and interpreted in the three sections below according to i. Levene's test, ii. ANNOVA Results, and iii. Effect Sizes. In these sections below, "groups" refers to categories representing different academic ranks (as outlined in section 3.7.4).

i. Levene's Test:

- **Based on Mean:** Levene's statistic = 2.201, $p = .067$, indicating marginal significance in variance differences among groups.
- **Based on Median:** Levene's statistic = .930, $p = .104$, suggesting no significant differences in variances.
- **Based on Trimmed Mean:** Levene's statistic = 2.196, $p = .067$, also indicating marginal significance in variance differences.
- **Interpretation:** While some indications of variance differences across academic ranks exist, these do not reach conventional significance levels ($p < .05$). However, the results are close enough to warrant attention.

ii. ANOVA Results:

- **Between Groups:** Sum of Squares = 29.620, Mean Square = 4.937, $F = 2.344$, $p = .053$.
- **Interpretation:** The p-value (.053) is very close to the significance threshold of .05, suggesting possible differences in behavioural intention across academic ranks. However, it does not meet the conventional threshold for statistical significance.

iii. Effect Sizes:

- **Eta-squared:** $\eta^2 = .293$, indicating a large effect size, suggesting that approximately 29.3% of the variance in behavioural intention may be attributed to differences in academic rank.
- **Epsilon-squared and Omega-Squared (Fixed):** $\epsilon^2 = .168$ and $\omega^2 = .164$, showing moderate effects but with wider confidence intervals that include negative values, indicating potential uncertainty.
- **Omega-squared (Random):** $\omega^2 = .032$, suggesting minimal variance explained by random effects.
- **Interpretation:** The eta-squared value indicates a large effect size, suggesting that academic rank may have a substantial impact on behavioural intention. However, the uncertainty in the effect size estimates and the p-value's proximity to significance require cautious interpretation.

Overview of the statistical analysis results for BI by academic rank:

- i. **Homogeneity of Variances:** Levene's test indicates marginally significant differences in variances based on means and trimmed means, suggesting that the homogeneity assumption may be somewhat violated but not severely.

- ii. **ANOVA Results:** The ANOVA p-value (.053) is close to statistical significance, indicating that there may be meaningful differences in BI across academic ranks. However, it does not meet the conventional threshold for significance.
- iii. **Effect Sizes:** The large eta-squared value suggests that academic rank considerably impacts BI, even if statistical significance is not achieved.

In summary, while there are notable indications of differences in BI across academic ranks and large effect sizes, the lack of strict statistical significance suggests a cautious interpretation. Further research with larger sample sizes could clarify these findings and provide more definitive insights into how academic rank influences BI.

4.5.3.2 Summary of Results for BI by Years of Experience

Figure 4.20 presents findings on BI across years of experience groups, examining how adoption intention varies by experience level.

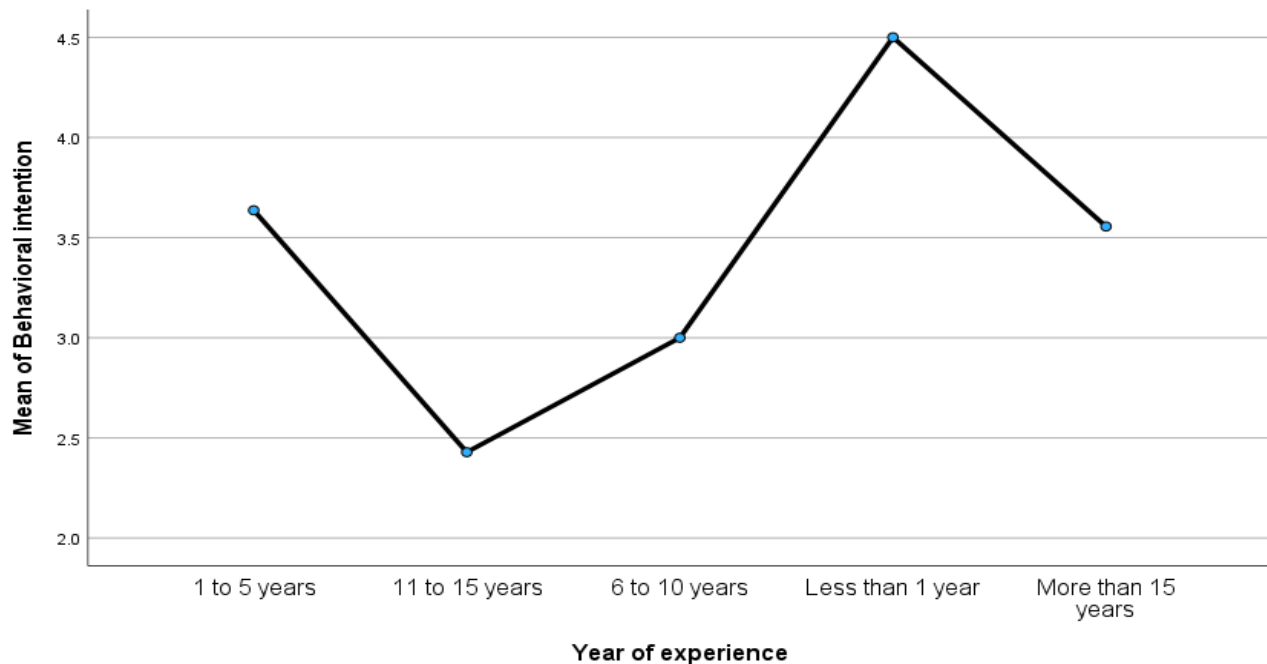


Figure 4.20: BI by Years of Experience

The data from Figure 4.20 above, indicating the relationship between BI and years of experience, is statistically analysed and interpreted in the three sections below according to i. Levene's test, ii. ANNOVA Results, and iii. Effect Sizes. In these sections below, "groups" refers to categories representing different years of experience (as outlined in section 3.7.4).

i. Levene's Test:

- **Based on Mean:** Levene's statistic = 2.125, $p = .098$, suggesting no significant differences in variances among groups when using the mean, though it is close to the threshold.
- **Based on Median:** Levene's statistic = .931, $p = .457$, indicating no significant variance differences.
- **Based on Trimmed Mean:** Levene's statistic = Levene's statistic = 2.003, $p = .115$, suggesting no significant variance differences.
- **Interpretation:** The results indicate that the assumption of homogeneity of variances holds for this analysis, as all tests show p-values greater than .05, implying no significant differences in variances among groups.

ii. ANOVA Results:

- **Between Groups:** Sum of Squares = 13.738, Mean Square = 3.434, $F = 1.413$, $p = .249$.
- **Interpretation:** The p-value (.249) suggests that there are no statistically significant differences in behavioural intention across years of experience at the conventional alpha level of .05.

iii. Effect Sizes:

- **Eta-squared:** $\eta^2 = .136$, indicating a moderate effect size, suggesting that approximately 13.6% of the variance in behavioural intention can be attributed to group differences in years of experience.
- **Epsilon-Squared and Omega-Squared (Fixed):** $\epsilon^2 = .040$ and $\omega^2 = .039$, showing smaller effects with confidence intervals that include negative values, indicating uncertainty in these estimates.
- **Omega-squared (Random):** $\omega^2 = .010$, suggesting minimal variance explained by random effects.
- **Interpretation:** While the eta-squared value suggests a moderate effect size, indicating some impact of years of experience on behavioural intention, the lack of statistical significance implies that these differences may not be practically meaningful.

Overview of the statistical analysis results for BI by years of experience:

- i. **Homogeneity of Variances:** Levene's test results show that the assumption of homogeneity holds, as none of the tests indicate significant differences in variances among groups.
- ii. **ANOVA Results:** The ANOVA results, with a p-value of .249, indicate no statistically significant differences in behavioural intention across years of experience.
- iii. **Effect Sizes:** Although it falls short of statistical significance, the moderate effect size (eta-squared) raises the possibility that years of experience may have an impact on behavioural intention.

In summary, although there are moderate indications of differences in BI by years of experience, the lack of statistical significance implies that years of experience may not substantially impact BNI in this study. Further research with larger sample sizes or additional variables could provide more clarity on these findings.

4.6 SUMMARY

In this chapter, data from academic staff in the Faculty of Health and Environmental Sciences at CUT was analysed based on biographical data and the three key components of the TAM: PU, PEOU, BI. The biographical analysis highlights a diverse sample encompassing various academic ranks and years of experience, from Professors to Part-time Lecturers and from less than one year to over 15 years of experience, respectively.

The findings reveal that senior staff generally perceive CUT Digital Tools as useful and easy to use, strongly intending to integrate these tools into their professional work. In contrast, Part-time Lecturers, Post-docs, and less experienced staff demonstrate more neutral or negative views, particularly regarding PEOU and intention to adopt these tools regularly. This suggests a need for targeted support to enhance digital readiness among junior and part-time staff. The insights from this chapter inform the recommendations in the next chapter, which aim to improve digital adoption and support across all segments of the faculty.

CHAPTER 5: RECOMMENDATIONS AND CONCLUSIONS

5.1 INTRODUCTION

This chapter concludes the study by summarising the findings and providing targeted recommendations to address the specific challenges in digital readiness identified among academic staff within the Faculty of Health and Environmental Sciences at CUT. Recommendations are prioritised based on the study's data analysis, considering resource constraints and focusing on practical, faculty-specific interventions. Broader institutional considerations are also briefly discussed.

5.2 FINDINGS

The study examines digital readiness among academic staff in CUT's Faculty of Health and Environmental Sciences, applying the TAM framework's three key components: PU, PEOU, and BI.

The findings of this study highlight the following considering PU, PEOU, and BI:

- **Perceived Usefulness (PU):**

While most respondents acknowledge the usefulness of digital tools in enhancing productivity and task efficiency, part-time lecturers and less experienced staff are less likely to view these tools as beneficial. Senior academic staff, especially Professors and Senior Lecturers, however, demonstrate higher levels of PU.

- **Perceived Ease of Use (PEOU):**

The analysis indicated that less experienced staff and part-time lecturers encounter usability challenges with CUT Digital Tools. On the other hand, experienced faculty members find the tools more intuitive, suggesting that a learning curve may affect those less familiar with the technology.

- **Behavioural Intention to Use (BI):**

Senior and permanent academic staff strongly intend to integrate digital tools into their academic activities. In contrast, less experienced and part-time staff show mixed levels of commitment to regular use.

These findings suggest that while there is general acceptance of digital tools among faculty members, significant differences based on academic rank and experience highlight the need for targeted interventions.

5.3 RECOMMENDATIONS

The following recommendations address the specific challenges identified within the Faculty of Health and Environmental Sciences at CUT. These recommendations are structured in a prioritised order to ensure efficient resource use, beginning with the most immediate needs within the faculty, followed by broader institutional considerations.

- **Develop Targeted Training Programs for Part-Time and Less Experienced Staff:**

The study identified that part-time and less experienced staff members exhibited lower confidence levels in using digital tools. To address this, it is recommended to implement targeted training programmes focused on foundational digital skills, especially for those who may require additional support. These training sessions should be practical, hands-on, and specifically designed to cover the basic functionalities of the most essential CUT Digital Tools. Leveraging resources from the CILT and existing IT support infrastructure can enable cost-effective implementation without significant additional expenses.

- **Integrate Digital Tool Training into Onboarding for New Academic Staff**

Structured onboarding sessions for new academic staff should include comprehensive digital tool training. By embedding this training into the initial

orientation process, the faculty can ensure that all new hires start with a baseline understanding of the available digital tools, enhancing their ability to perform tasks efficiently from the start. Using existing resources from the faculty and institutional IT departments can facilitate this integration without requiring additional funding.

- **Implement Continuous Digital Skills Development Opportunities**

Given the varied levels of digital proficiency across academic ranks, ongoing professional development sessions should be established, allowing faculty members to update their digital skills regularly. These periodic sessions could focus on foundational and advanced features of digital tools, enabling faculty staff to adapt to evolving digital requirements. Coordinating these efforts with CILT and IT support can maximise existing resources, ensuring sustainability with minimal added costs.

- **Establish a Feedback Mechanism to Monitor Tool Usability and Effectiveness**

To address usability concerns highlighted in the study, a formal feedback mechanism is recommended. Periodic surveys or feedback sessions will allow staff to share their experiences and challenges with CUT Digital Tools. This feedback loop will enable the faculty and the IT department to identify common issues and adjust IT support accordingly. Using existing communication channels can make this initiative efficient and low-cost while fostering a culture of continuous improvement.

- **Prioritise Ease of Use in Training Initiatives**

The study indicates that ease of use as a significant challenge for some academic ranks and experience levels. Training programmes should prioritise ease-of-use content, focusing on familiarising faculty with intuitive and frequently used digital functions. This approach would build confidence among hesitant staff and ensure resources are directed toward areas with the most immediate impact.

- **Promote Collaboration and Mentorship for Digital Skill Enhancement**

Encouraging mentorship and peer support networks within the faculty can serve as an additional resource for digital skill-building. More digitally proficient staff, particularly those with extensive experience, could assist less experienced colleagues through informal mentoring or structured peer-learning sessions. This initiative would require minimal resources and could be coordinated during existing faculty meeting or via virtual platforms, leveraging internal expertise to strengthen digital readiness.

These recommendations aim to enhance digital readiness across all segments of the faculty, ensuring that challenges identified in the study are effectively addressed.

5.4 LIMITATIONS OF THE STUDY

While this study provides valuable insights into the digital readiness of academic staff within the Health and Environmental Sciences Faculty at CUT, several limitations should be acknowledged:

- **Limited Scope of Digital Tools:**

The study focused specifically on of the specific digital tools introduced by the CILT at CUT between January 2023 and April 2024. While these tools were selected to represent essential digital solutions for academic work, they do not cover the full spectrum of digital technologies that some academic staff may use or be familiar with in other contexts. Consequently, the findings may not fully capture the overall digital proficiency of staff skilled in tools beyond those included in this study.

- **Timing of the Study:**

This study occurred during the 2023-2024 academic period, coinciding with the period when CUT was actively rolling out digital transformation initiatives. This

timing may have influenced staff perceptions, as attitudes towards digital readiness will likely evolve with further implementation of digital strategies.

- **Researcher's Role and Potential Bias:**

The researcher's position within CUT's ICT department poses a potential risk of bias. Despite all efforts taken to maintain objectivity, such as anonymised responses and independent data analysis, it is still possible that some staff might have modified their responses due to awareness of the researcher's affiliation.

- **Self-Reported Data:**

The study relied on self-reported data obtained through a questionnaire. Biases in self-reported replies include social desirability bias and overestimating one's abilities. It's possible that participants' assessments of their attitudes and level of digital preparedness were based more on their opinions than actual use or competence.

- **Sample Size and Response Rate:**

The study achieved a response rate of 41 out of 81 potential participants, below the initial target. While this response rate is sufficient for initial analysis, a higher rate would likely yield more robust and generalizable findings. Furthermore, the sample is limited to a single faculty, potentially limiting the ability to generalise results to academic staff in other faculties at CUT.

- **Lack of Departmental Differentiation:**

The study does not account for the specific departments of the respondents. This limitation restricts the analysis of whether digital readiness or attitudes toward digital tools vary across different academic disciplines or departments within the faculty.

- **Variability in Digital Literacy Levels:**

Given the participants' diverse academic ranks and years of experience, the study likely reflects differing prior exposure to digital tools. Participants with extensive experience may already be proficient in using certain digital technologies, potentially skewing the overall results toward higher digital readiness.

Acknowledging these limitations is essential to contextualise the findings and identify areas for future research to address gaps in the study.

5.5 CONCLUSION

This study assessed the digital readiness of academic staff in the Faculty of Health and Environmental Sciences at the Central University of Technology. It focused on their perceptions of CUT Digital Tools' usefulness, ease of use, and evaluates their behavioural intention to use these digital resources.

The findings reveal that while digital tools are generally perceived as beneficial, disparities in digital readiness exist across academic ranks and experience levels. Senior staff and those with more years of experience demonstrate higher acceptance and stronger intentions to use these tools.

The study emphasises the importance of targeted training, structured orientation for new staff, continuous professional development, and enhanced user support to improve digital readiness among academic staff members. Addressing these areas will support digital transformation within the faculty and contribute to CUT's Vision 2030 goals.

By implementing these recommendations, CUT can foster a digitally empowered academic environment where all staff effectively leverage digital tools in their teaching, research, and administrative roles.

This research provides a foundational understanding of digital readiness in higher education and offers actionable insights for institutions seeking to enhance their digital transformation efforts. Further research is recommended to explore digital readiness across other faculties and institutions, examining the broader applicability of these findings within the South African higher education sector.

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