

# **Investigating the adoption and utilisation of ICT facilities in a selected higher learning institution**

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## **Abstract**

The current times has brought demands for the effective adoption and utilization of Information Communication Technology (ICT). ICT integration is no longer an addition to the existing teaching and learning practices, but an integral part thereof. Therefore, the adoption and utilization of ICT for both teaching and learning is of utmost importance. Moreover, the adoption and utilization of ICT in teaching and learning institutes lies in the hands of the lecturer. This study was conducted to evaluate the adoption and the extent of the utilization of Information Communication Technology & Audio Visual (ICT & AV) facilities for teaching and learning in teaching centers at the North-West University Mafikeng campus.

The Unified Theory of Technology Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) guided the study as the underpinning theories, guided by the post-positivism philosophical paradigm. A mixed approach research design was utilized to collect data for this study. The target population of the study consisted of lecturers drawn from the Faculty of Economic Management and Sciences (FEMS) at the North-West University, Mafikeng campus. The study adopted the explanatory sequential mixed methods research design. Quantitative data were collected from lecturers through questionnaires and qualitative data through interviews. The statistical Package for Social Sciences (SPSS Version 26.0) was used to analyse the quantitative data, while the NVivo 14 package was used to process the qualitative data.

Among the key findings of the study was that lecturers had adopted and utilized a variety of ICT & AV facilities. Moreover, the findings did not automatically translate into a widespread utilization of such ICT & AV. Nonetheless, the findings further reveal that the majority of lecturers regularly pursue innovative ways to incorporate ICT & AV instructional facilities in their teaching to such an extent that it has become standard learning tools for the learners. The findings further revealed that lecturers utilize certain ICT and AV facilities more than others, mainly for presentation of lectures.

The findings further revealed that compatibility and trialability were the strongest factors influencing adoption and utilization of ICT & AV facilities for teaching purposes. The study determined insufficient number of ICT and AV resources, insufficient technical support, lack of adequate skills and a poor technology culture as major challenges. The study, therefore, concluded that North-West University (NWU) Mafikeng lecturers are not utilizing ICT & AV facilities to their fullest capacity for instructional delivery. Since lecturers are not fully utilizing

the facilities, a key recommendation was that the institute should consider putting in place a framework for the integration of ICT and AV facilities including the use of interactive digital cameras, white boards, and conference cam connect into the curriculum.

**Key terms:** Utilization, Adoption, Information Communication Technology (ICT), Audio-Visual (AV), Teaching and Learning.

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Above all, God the Almighty for the abundant Grace

## **Declaration**

I, Mmueleli Neville Menong, declare that this study entitled “Investigating the adoption and utilization of ICT facilities in a selected higher learning institution”, for the fulfilment of the requirements for the degree Master’s in Business Administration (MBA), has not been submitted by me or anyone else for the degree at this or any other university before, that this is my own work, and the materials consulted have been properly referenced and acknowledged.

Researcher: M. N. Menong

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## **Chapter 1**

### **1. Background and Orientation**

#### **1.1. Introduction**

The current study is titled Investigating the adoption and utilization of ICT facilities in a selected higher learning institution. This mixed methods study focused on two main ideas, namely Information Technology Communication & Audio-Visual and teaching centers. The study evaluated the adoption and the extent of utilization of ICT and AV facilities for teaching and learning in teaching centers at Mafikeng campus. Aspects that involve lecturers' opinions and attitudes towards the utilization of ICT & AV in teaching, social influence, availability and the impact and benefits. The study aimed to determine and to have a better understating of factors affecting ICT implementation in higher learning institutions.

#### **1.2. Background**

The technological and information era is upon us. This is because of the Information Communication Technology (ICT) that is growing at a rapid speed. Technology is changing the way we live, learn, and do our work (Dankbaar & De Jong, 2014). This modern trend has witnessed an ever-expanding demand from the institutes of higher education. The expansion has led to the emergence of Blended Learning sometimes referred to as Flipped Classrooms, this came as a demand to compensate the educational demands of the 21<sup>st</sup>-century learners (Ozdamli & Asiksoy, 2016). In recent years, Institutes of Higher Education/Learning (IHL or IHE) have invested enormously in technological infrastructure (Nyerere, 2013). It is thus in the current age that technology is a key component in our lives. It is a necessary skill in the current age to have a full understating of its implications, utilizing its potential and being comfortable with its effects.

Various studies by technology experts have shown that ICT & AV resources are not maximising their potential to affect the noteworthy change in education, are underutilized, and are not being implemented effectively (Abrahams, 2010; Uslu & Bümen, 2012; Thomas & Taiwo, 2014; Chimezie Comfort & Comfort Onaigho, 2015). In this research study, the fundamental focus was on the adoption and utilization of the infrastructure for instructional delivery purposes. Mbalamula (2016) describes ICT as an electronic means of accessing, processing, storing, and presenting communication and information using computers, internet,

telephone, cellular phones, television, radio and slide projectors. Audio & Visual entails possessing both sound and visuals. It is presentations, microphone, speaker, lighting and video according to Barman (2019).

The utilization of Information Communication Technology & Audio Visual (ICT & AV) facilities is an important factor for instructional delivery considering that the university is adopting technology into teaching and learning (North-West University, 2015). The adoption of these infrastructures brings forth a variety of ways to improve teaching and learning in teaching centers and administration. It also offers students with limited choice due to their lifestyle/commitments the opportunity to participate in class activities and/or interact with their fellow classmates.

### **1.3. Theoretical Framework**

The study was based and grounded on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and Diffusion of Innovations (DoI) (Rogers, 1995). However, for the purpose of a thorough understanding, the study also discussed the following proposed theories; the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA) (Ajzen, 1980), the Theory of Planned Behaviour (TPB) by (Ajzen, 1991), and the theory of Diffusion of Innovations (DoI) which was recommended by (Rogers, 1995). The above user acceptance theories and models demonstrate the desire of a user group to employ ICT for its designated tasks. Ajzens' (1991) theory has a significant effect on the utilization of teaching and learning equipment as it explains some behaviours and the link between usages of ICT & AV equipment. Likewise, Rogers' (Rogers, 1995) theory explains the process of change with the adoption of new technologies. The Unified Theory of Acceptance and Use of Technology (UTAUT) and the theory of Diffusion of Innovations (DoI) were appropriate to the study since part of the study sought to determine the factors that influence the adoption and utilizing of technology in teaching and learning centers. The study adopted the two theories so that they bring more meaning to the research. These theories help in explaining the phenomenon better, thus they are deemed relevant to the study. An examination of the selected theories is discussed further under the literature review.

#### **1.4. Problem statement**

The North-West University (NWU) has embraced the use of ICT technologies for teaching and learning. The institution has equipped most of its teaching/lecture centers with modern teaching and learning ICT & AV equipment such as smart podiums, document camera, computers, internet, interactive whiteboards, video camera, microphone and projectors with the aim of enhancing the quality of instructional delivery and experience of the students (North-West University, 2016).

Despite the demonstrated efforts by the leadership of NWU to achieve the teaching and learning strategy, adoption of this new technology has not really lifted off the ground. Onwuagboke and Ukegbu (2016) wrote that the availability of this technology does not assure the full utilization of the technologies involved to aid teaching and learning without hindrance. The scholars argue further that the expectation that this technology will bring about widespread changes in teaching methodologies is a mistake in reasoning. Govender and Govender (2014) highlight that most South African IHL (Institutes of Higher Learning) instructors have technological equipment, but not all instructors are using them. Granger, Morbey, Lotherington, Owston, and Wideman (2002) attribute the successful implementation of the utilization of technology in teaching and learning to pedagogical values, attitudes, curriculum needs and physical infrastructure.

Although lecturers acknowledge the value of the technology at glance, institutes of teaching and learning have not witnessed a comprehensive use of technology for teaching and learning (Ali et al., 2015; Obahiagbon & Joseph Osahon, 2015; Mavellas, Wellington & Samuel, 2016; Onwuagboke & Singh, 2016; Amesi & Yellowe, 2018). Obahiagbon and Joseph Osahon's (2015) study revealed that 98% of respondents agreed that ICT is utilized more in administrative purposes than in teaching and learning. This is partly because instructors might not know or not be aware of the potential that technology affords. Second, it can be because of a lack of a formal framework for integrating new technologies (Ali et al., 2015). Hence, there is insufficient support and guidance for both instructors and students.

If the technology is not used to its full capabilities, it will not yield the results anticipated. Secondly, an investment in a technology that is under-utilized is fruitless. The education system around the globe can be affected by the use of technology in teaching and learning (Ojo & Adu, 2019). Obakhume's (2012) study found that ICT in teaching and learning has the potential of accelerating, enriching, and increasing skills; it is able to keep learners engaged and motivated

in learning. It is able to aid in creating economic feasibility for future employees; able to create breakthroughs in schools, to magnify teaching and learning. Moreover, Sell et al. (2012) allude that using technology in teaching and learning enhances effective teaching, quality course organisation, productive lecture management, self-study collaboration amongst other benefits. Thus, it is necessary for instructors to embrace technology.

As expressed by studies, the utilization of ICT and AV has not been witnessed. It is therefore important to find the extent of adoption and utilization of these facilities. Moreover, significant investments have been made in ICT and AV resources to ensure the enhancement of quality instructional delivery (North-West University, 2016). The adoption and utilization of ICT and AV in teaching centers is key to successful instructional delivery. In view of the investment made, it is necessary to monitor the operation of ICT and AV facilities to ensure that strategic and operational objectives are met. It is important to find the extent of adoption and utilization of ICT and AV.

It is against this background that the study was embarked on. The whole aim is to teach with technology. In this case, future teaching concepts act as a motivation for the use of technology. Therefore, the study sought to determine the extent of the adoption and extent of utilization of ICT and AV facilities in teaching and learning centers by lecturers at North-West University Mafikeng Campus (NWU Mafikeng). Furthermore, it aims to determine the factors that influence the adoption and utilization of ICT & AV in teaching centers to support teaching and learning.

### **1.5. Research Objectives**

The main objective of the study was to evaluate the adoption and the extent of the utilization of ICT and AV facilities for teaching and learning in teaching centers at the Mafikeng campus

Sub research objectives:

- To determine the extent to which ICT and AV facilities are adopted in teaching and learning centers.
- To determine the extent to which lecturers utilize ICT and AV in teaching and learning centers.
- To determine factors that influence the adoption and utilization technology in teaching and learning centers.

- To determine the challenges that affect adoption and utilization of ICT and AV in teaching and learning centers.

### **1.6. Research Questions**

The main question this study sought to answer was: What are the factors that contribute to the adoption and utilization of ICT and AV in teaching and learning centers at North-West University at Mafikeng?

Sub research questions:

- To what extent is ICT and AV facilities adopted in teaching and learning centers?
- To what extent is ICT and AV facilities utilized by lecturers in teaching and learning centers?
- What are the factors that influence the adoption and utilization of technology in teaching and learning centers?
- What challenges affect the adoption and utilization ICT and AV in teaching and learning?

### **1.7. Research Paradigm**

A paradigm is the sharing of common beliefs and agreement amongst scientists on how a certain problem can be approached understood and addressed states (Kuhn & Hacking, 2012). Depicting from Kivunja and Kuyini's (2017) arguments, there are four dominant research paradigms that are applied in educational research. These are post positivism, interpretivist, critical and pragmatic paradigms. The current study was indoctrinated on the post positivism perspective. Post positivism research looks to predict and explain. The paradigms' ontological belief is critical realism. The axiology (ethical behaviour) is predicated on the respect of participants' privacy using informed consent. A post positivists paradigm is coherent with the mixed method approach, which combines both quantitative and qualitative design in data collection. The philosophy attempts to be objective, neutral and ensures that results are fitting with the present expert system (Saunders, Lewis & Thornhill, 2016).

## **1.8. Research Methodology**

In order to reach the objectives of the study, information was gathered from primary and secondary sources; namely, literature review and empirical study.

### **1.8.1. Literature Review**

The secondary data used in the study was gathered by consulting secondary sources that relate to the research questions. Amongst others, these include, published articles in journals, policies, online library catalogues, unpublished dissertations, and the internet.

### **1.8.2. Empirical Study**

#### **1.8.2.1. Research design**

The study utilized a mixed methods approach which includes both qualitative and quantitative data (Creswell, 2014). A mixed method approach involves collecting, analysing, and integrating quantitative (e.g., surveys, experiments) and qualitative (e.g., interviews, focus groups) research. Quantitative data consist of numbers representing counts or measurement, whereas qualitative data describes more than it defines (BusinessDictionary.com - Online Business Dictionary, 2018). Quantitative data can be broken into two parts which are discrete data and continuous data. Discrete data are explained as information that can be categorized and can take any value. Continuous data results from infinitely many possible values that can be associated with points on a continuous scale (Saunders, Lewis & Thornhill, 2016).

Aiming to address the objective of the study on the adoption of technology to support teaching and learning in teaching centers, the data were collected both quantitatively and qualitatively (mixed method). The acceptance/adoption essentially determines the extent to which technology is used. Quantitatively data were collected through a survey by means of a questionnaire. The study further used the qualitative research method to explore lecturers' perception of technology. The interview was conducted to evaluate the experience of the lecturer in using technology and questionnaires were used to determine the extent to which technology is used by lecturers in the teaching and learning centers. A mixed methods approach suits this study better because the study wishes to give the reader confidence in the results and the conclusions drawn from the study.

#### **1.8.2.2. Population**

The study evaluated the adoption and utilization of Information Communication Technology (ICT) & Audio-Visual (AV) facilities at North-West University (Mafikeng) teaching centers. The population of interest included lecturers at North-West University (Mafikeng).

The NWU Mafikeng lecturers making up the study population are:

- Full-time lecturers (Academic Staff),
- Regularly responsible for instructional delivery.

Participation was limited to full-time lecturers because of the role they play in preparing students for the leading roles they are expected to play in their professional lives. The lecturers also form part of the committee that contributes to curriculum decisions.

#### **1.8.2.3. Sampling Technique/Size**

For this study, probability sampling was deemed as the most appropriate type of sampling technique. Trochim (2006) explains probability sampling as a sampling method that utilizes a form of random selection. Probability sampling is made up of four types of sampling which are simple random, stratified random, systematic random and cluster random sampling. Simple random sampling was employed because it removes bias. Thus, the sample size of the study was forty (40) lecturers at North-West University Mafikeng campus.

#### **1.8.2.4. Data Collection Method**

Data were collected from the population that was previously described only. The nature of the data was both qualitative and quantitative. The data were collected from the participants through interviews, and questionnaires. The quantitative questions were a combination of ordinal/likert scale, open-ended, as well as yes or no questions. However, the qualitative questions were from semi-structured focus group interviews.

The group interviews provided lecturers with an opportunity to informally discuss their perception about the utilization of ICT & AV in teaching centers. Information was gathered first-hand directly from the participants, which meant that the study used primary data instead of secondary data. By definition, secondary data are data that is found collected already (Intellspot.com, 2016). The literature review is the source of collecting secondary data from relevant previous studies, reports, articles and textbooks to address the problem of the study.

#### **1.8.2.5. Data coding and analysis**

Data analysis involves the interpretation of findings against the research questions, determining if the results are constant with research objectives. A descriptive approach was employed in analysing data. Saunders, Lewis and Thornhill (2016) suggest that descriptive statistics are used to depict and summarise the data. Descriptive statistics forms the bases of all quantitative reasoning hence it is necessary to employ it. It uses measures such as dispersion or variability, frequency distributions, tabular data, bar charts, the measure of central tendency and measures of relationships.

The data type used/analysed in the study were nominal and ordinal. Data techniques such as frequency distribution, percentage and means were used to analyse the data. A statistical application by the name of International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS 26.0) was used to process and analyse the data collected. IBM Statistical Package for the Social Sciences (SPSS) is an integrated set of modules used to manipulate, analyse, and present data in a form of charts, graphs, and tables. The qualitative part of the study was analysed using NVivo Version 14. The application can manage qualitative data, ideas, query data, model visually and produce reports.

#### **1.8.2.6. Measures to ensure reliability and validity (Trustworthiness)**

The study took into consideration what Maree (2016) refers to as reliability and validity. Maree states that scholars should put measures in place, i.e., indicators for the trustworthiness of the study such as credibility, transferability, dependability, and conformability. Credibility ensures confidence in the truth of the research results. Transferability ensures that research results can be applied in another context. Dependability ensures that research findings can be repeated and are consistent, while confirmability ensures that the research findings are shaped by the research participants and not the researcher's bias, motivation or interest (Lincoln & Guba, 1985). Drawing from Grosser, Simmonds and Van der Vyver (2017), triangulation or crystallization is used to strengthen trustworthiness (Maree, 2016) in which the study's validity is strengthened by the use of multiple methods, data collection strategies, cross-check of information and analysis. Remler and Van Ryzin (2014) describe validity as the presentation of the findings of the research study without distorting the research participants' intentions. Moreover, reliability ensures that the research process produces stable and consistent results (Gratton & Jones, 2014).

To increase the reliability of the data, only lecturers were interviewed. Factors such as time, intervention, situations, and measures were as they can affect validity and generalizability. To ensure that the above factors were managed, the respondents were contacted through appropriate means prior to visiting them for interviews and questionnaire distribution. In terms of electronic data, the researcher had a conventional electronic information keeping network drive (NWU Google Drive) where all communications with the supervisor, submissions, and backup all the data were methodically saved. All notes during the research process were kept by maintaining a kind of audit trail to increase the credibility of the research.

#### **1.8.2.7. Ethical Consideration**

According to Saunders, Lewis and Thornhill (2016), ethical considerations ensure that the rights of participants are not violated. The fundamental purpose of ethical considerations is to curb the ill-treatment of research participants. It is important for the researcher to understand and uphold the research participants' basic human rights when they take part in the research study. This includes their rights to privacy and the protection from physical and psychological harm. Non-maleficence (harm that may occur intentionally or unintentionally in the study) was avoided. Second, there was a consideration of the beneficence principle. This principle states that the study should be helpful to most people. Third, the autonomy principle considers that research participants must be given informed consent to being part of the study. Therefore, research participants were provided with a consent form (Saunders, Lewis & Thornhill, 2016).

Further, it is important to consider the justice principle, which addresses issues of fairness and equal treatment of research participants. Confidentiality entails protection of sensitive and personal information of the participants. The anonymity principle, which refers to not assigning identities to research participants was adhered to. The process eliminated compromising participants' confidentiality. Minors did not partake in the research, only permanent academic members of NWU Mafikeng participated in the questionnaire. As required by NWU the research is subject to ethical considerations.

An ethical clearance form was requested from the relevant authorities. Pursuant to the above the researcher requested permission from the gatekeeper to conduct the research at NWU Mafikeng campus. The researcher requested permission from the dean of the Faculty of Economic Management and Sciences (FEMS) to be granted access to the research participants.

### **1.9. Importance of the study**

This study will make a considerable contribution to the institute at large as it focused on the utilization of teaching and learning technologies models and a framework that can be followed in order for instructors to utilize technologies. The progress of any institution is pivotal; therefore, embracing the values and policies of the current changing society is important. An ongoing exercise of critically scrutinizing practices, procedures, problems, and structure is necessary for any institute.

The results of the study can assist other institutions to make informed decisions on the adoption and utilization of ICT & AV in teaching centers. Furthermore, the study will provide a basis for a comprehensive discourse on the adoption of ICT in institutions. The study will provide information for lecturers and other stakeholders regarding the factors that affect the adoption and utilization of ICT & AV facilities and how to improve them. Another significant factor is the personal benefit afforded to instructors, as they will reflect on their attitudes, feelings, perceptions, and skills towards the technology in teaching centers.

Even though an institution can adopt a number of technological strategies and utilize different tools to support teaching and learning environment, disposition of technologies in teaching and learning centers is known to yield more effective and efficient practices in institutions. Studies showed that the effective utilization of technologies in teaching and learning centers promotes collaboration and improves students' performance (Lin, Wong & Shao, 2012; Sell et al., 2012; Hariadi, Dewiyan & Sudarmaningtyas, 2016). The above researchers indicated that teaching and learning with technology are equally or more effective than traditional instructional delivery when it is comprehensively utilized.

The contribution of the study will come in the form of a model for ICT adoption in NWU Mafikeng campus. The model will work as a guide to formulate strategies to improve the adoption and utilization of ICT and AV in teaching and learning centers. Upon completion, the study intends to contribute to the already available literature and practices concerning the adoption and utilization of ICT and AV in teaching and learning. Furthermore, the research will assist management to understand the challenges NWU Mafikeng faces with regards to adoption and utilization of ICT and AV.

### **1.10. Delimitation of study**

The following were the delimitations of the present study:

- The nature of the study was experimental and conducted at the NWU Mafikeng. The institution is selected since the teaching centers and facilities were in place.
- The research was delimited to the instructors of the Faculty of Economic and Management Sciences (FEMS). The faculty was selected because it has open distance learning programs, which means the utilization of technology is necessary.
- The current study was delimited to evaluating the extent to which ICT and AV was utilized in the teaching centers.

### **1.11. Definition of Concepts**

The below definitions mean the use of terminology, concepts and constructs associated with the research:

**Adoption:** “A decision to make full use of an innovation as the best course of action available. Rejection is a decision not to adopt an innovation” (Rogers, 1995).

**Utilization:** “The process of using objects to improve educational practice” (Amalu, 2015).

**Technology:** Any digital media used in instructional delivery e.g. computers, e-mail, Internet, list-serves, CDRoms, software, laserdisc players, interactive CDs, digital cameras, scanners, digital camcorders, etc (Kotrlik & Redmann, 2009).

**ICT:** Information Communication Technology (ICT) comprises all forms of technologies such as computers, mobile devices, internet, websites, wireless devices, hardware, software and any telecommunication equipment (Margaret, 2016).

**AV:** Abbreviation for Audio-Video (AV), it involves the use of sound and pictures or any equipment that makes them (Cambridge Business English Dictionary - Online Business Dictionary, 2020)

**ICT & AV:** For this study, includes any device or equipment's that communicates encompassing: radio, television, microphone, projector, speakers.

**ICT & AV Technologies:** “Productivity tools; multimedia presentation tools; internet; web applications; content-specific software; drill and practice software; games and simulations;

wireless handheld devices; course website imaging devices; computer projection device; email or other internet communication tools; authoring tools; learning management systems; web publishing tools and interactive whiteboard” (Amalu, 2015).

**ICT Integration:** The integration of ICT and AV to teaching and learning as the determination of ICT products or processes appropriate to use in instructional delivery and learning (Onwuagboke & Ukegbu, 2016).

Table 1.8.2.7-1 Abbreviations

| <b>Abbreviation</b> | <b>Meaning</b>                                          |
|---------------------|---------------------------------------------------------|
| NWU                 | North-West University                                   |
| NWU IT              | North-West University Information Technology Department |
| ICT & AV            | Information Communication Technology & Audio Visual     |
| IHL                 | Institutes of Higher Learning                           |
| IHE                 | Institutes of Higher Education                          |
| SPSS                | Statistical Package for the Social Sciences             |
| IBM                 | International Business Machines                         |
| TRA                 | Theory of Reasoned Action                               |
| ICT                 | Information Communication Technology                    |
| TPB                 | Theory of Planned Behaviour                             |
| TAM                 | Technology Acceptance Model                             |
| IS                  | Information System                                      |
| DHET                | Department of Higher Education and Training             |
| ET                  | Emerging Technologies                                   |
| FEMS                | Faculty of Economic Management and Sciences             |

## **1.12. Chapter outline**

### **Chapter 1: Introduction and Background**

The chapter covers the background information to the study. It includes the statement of the research problem, objectives of the study, research design and methodology, significance of the study, and outline of the study.

## Chapter 2: Literature Review

The chapter contains a discussion of the literature review and theoretical framework of the study. Literature includes the adoption of technology by learning institutes. The theoretical framework reviews generic theories on technology acceptance models such as the Technology Acceptance Model TAM.

## Chapter 3: Research Design and Methodology

The chapter describes the research design and methodology. In this study, both qualitative and quantitative methodologies were applied. The discussions include the study population, sample size, sampling procedure and ethical consideration.

## Chapter 4: Results Interpretation

The chapter explores both qualitative and quantitative study sections, Findings and results will be discussed for qualitative and quantitative findings. The answer to the research question will be provided in this chapter.

## Chapter 5: Results Discussion, Conclusions, Recommendations, and limitations

The final chapter includes a summary and conclusions of the study. Recommendations, limitations, and final remarks will be discussed.

### **1.13. Summary**

In this chapter the study was introduced by discussing the background, presenting the problem statement, theoretical framework, objectives, research questions, research design and methodology. The chapter further provided a brief discussion as to how the data were collected, the population, and study sample, ethical consideration, and chapter outline.

## **Chapter 2**

### **2. Literature Review**

#### **2.1. Introduction**

The success of the 21<sup>st</sup>-century education is underpinned by ICTs within the educational environment (Alemu, 2017). Onwuagboke and Ukegbu (2016) describe the integration of ICT and AV to teaching and learning as the determination of ICT products or processes appropriate to use in instructional delivery and learning. In the last 25 years, ICT has been endorsed to have the potential of transforming teaching and learning (Englund, Olofsson & Price, 2017). Englund, Olofsson and Price (2017) further state that central to the success of implementing ICT and AV in higher education is based on teachers' conception of and approaches to teaching with technology. In this regard, it is important for instructors to improve technology competency and integrating ICT in instructional delivery (Durak, 2019).

According to Mirzajani et al. (2016), the strategy to integrate ICT and AV in teaching and learning center can increase the efficiency of the teaching and learning process. The following section looks at the integration of ICT, the impact of ICT in education, and forms of applying ICT in teaching and learning. Moreover, it looks at the factors affecting the implementation of ICT. Lastly, the section reviews studies on the adoption and utilization of ICT in teaching and learning by instructors.

#### **2.2. Integrating ICT in instructional delivery**

Integration of ICT is *"the use of ICT to introduce, reinforce, supplement and extend skills"* as described by (Pisapia, 1994: 3). Onwuagboke and Ukegbu (2016) refers to the integration of ICT and AV to teaching and learning as the determination of ICT products or processes appropriate to use in instructional delivery and learning. Kadel (2005) argues that apart from the quantity and quality of the ICT available in the teaching centers, instructors are the key to how ICT is utilized. Tondeur et al. (2012) argue that in integrating ICT for teaching and learning lecturers are role models. The above suggests that for the integration of ICT to be successful in an institute culture, a thorough examination of the education vision, organisational norms, pedagogical perspectives, and an informed educational design are required (Dirckinck-Holmfeld, Hodgson & McConnell, 2011; Peled, Blau & Grinberg, 2017).

Sari (2019) further asserts that the involvement of school leadership and teacher readiness is vital for the success of ICT integration due to the complexity of ICT integration. It is the responsibility of institute leaders and lecturers for the utilization of teaching and learning tools for contemporary education. Hussein and Mourad (2014) assert that ICT adoption should follow a “top down” approach or “bottom up”. In accordance with the scholars, a top down approach is explained as an innovation that derives from administrators of institutes of learning, i.e, the vice chancellor or the deputy vice chancellor. Therefore, the motivation to adopt and utilize ICT for teaching and learning purposes might grow from one person and transfer through the institution (Hussein & Mourad, 2014).

Ottestad (2013) observes the essence of a stable relationship between institutes leaders and pedagogical use of ICT in institutes of learning. In order for institutes of learning to successfully improve institutes practices and introduce technologies in institutes, (Hughes et al., 2005) highlight that firm, and robust leadership is fundamental. Hughes et al (2005) further highlight that leaders who have the knowledge and are well experienced in both the potential and challenges of integrating ICT in this age are needed. Ottestad (2013) uses the term “School leadership for ICT” to describe the role of institutes’ leaders in advancing the adoption of ICT in institutes. Implementation by lecturers and changes in operational practices are requirements to the integration of ICT in teaching and learning. It is essential for the leadership to facilitate the necessary infrastructure and working surroundings (Ottestad, 2013).

In accordance to a publication by Cuban (2013), the ways of instructional delivery have evolved in recent years. Nonetheless, there has not been many changes witnessed within the pedagogy. These changes include what Cuban (2013) refers to the *how*. While it is conceivable to see a combination of lecture centred and students centred teaching room practices, the *how* is dependent on basic instructional practices such as class activities, lectures, assignments, homework, whiteboards and paper and pencils texts. In the implementation and integration of technology, reformers presumed that physical changes will change the present practices. Salavati (2016) confirms the above argument by stating that indeed technology implementers and teachers are far apart; they live in different worlds.

Moreover, lecturers and leaders of institutes of teaching and learning adopt how instructional delivery is applied from a selection of teaching and learning tools to how to use these learning tools (Blau & Shamir-Inbal, 2017). As indicated by Hylén (2010) and Skenderi and Fauzi Skenderi (2018), researchers found that teachers are committed to improve their use of

technology and technology-enhanced pedagogics. Nonetheless, as expressed by Christensen, Johnson and Horn (2008), A strategy must be put in place to increase the impact of digital technologies, and to understand the possibilities and restrictions. Bates (2016) argues that a long-term plan has to be in place to determine how teaching and learning technologies are integrated on daily pedagogy and work. In his studies, Cuban (1993, 2001, 2006, 2010, 2013) has widely addressed and discussed digital technology improvements within institutes of teaching and learning.

Cuban (1993) broke the approaches into three drivers. The first driver is to attain higher productivity and being an efficient institute in teaching and learning. This driver can be traced back for decades, and it has been a constant goal for education and schooling systems as suggested by Cuban (1993). The goal is the ability to reduce the cost and training period. Children's self-directed learning is the second driver which also encompasses arguments by educators, academics, and foundation officials. That motivates the fact that teaching should be modified and transfigured for learning to become more actively engaged with and directly correlated to real life. The last driver speaks to the preparation of students to compete in the job market and be able to adjust to the changing demands of the working environment. ICT is considered a major player in education in the future. Therefore, learners need to be prepared to utilize it (Cuban, 1993). This solidifies the belief that better education can make a significant impact in strengthening the national economy.

It is further contended that the leadership of institutes invest in digital technologies with the conviction that digital technologies will be utilized if they exist in teaching centers (Cuban, 2001). Cuban highlights that the procuring of technologies is the decision of the administration whilst the utilization of the technologies is the decision of the instructors (Cuban, 2006).

Technology reformers such as are corporate leaders, public officials and others non-lecturers far away from technology centres, believe that technology has the power to transform institutes of teaching and learning (Cuban, 2006). Technology reformers are seldom happy with the pace instructors utilize digital technology in teaching centers (Cuban, 2006). Subsequently, the criticism is placed on instructors for their lack of involvement in and the use of technologies (Cuban, 2006; Tondeur et al., 2018; Toprak, 2018). Studies conducted in China (Sang et al., 2011; Bai et al., 2016; Kim & Park, 2018) for developing countries revealed that there is a slow uptake and use of digital technology in teaching and learning institutes. Harrati, Bouchrika and Mahfouf (2017) proposes that part of the factors that influence the slow uptake was the

instructors' attitude (Harrati, Bouchrika & Mahfouf, 2017). Moreover, the scholars Harrati, Bouchrika and Mahfouf (2017) assert that positive user experience is an important pillar for technology adoption. They further argue that usability is critical in the actual utilization of technological products in teaching and learning (Harrati, Bouchrika & Mahfouf, 2017). Therefore, a negative attitude towards the integration of ICT and AV in teaching centers can emerge as a consequence of user experience.

Cuban (2006) further contends that in light of instructors being criticized by technology reformers for not utilizing ICTs as intended, the digitization of institutes of learning is oversimplified. Cuban (2006) asserts that as long as out of classroom technology reformers believe that the provision of sufficient hardware and software technology and technical assistance using these devices is enough, technology reform will remain a struggle.

The significant role played by instructors (teachers, lecturers) in effective utilization and adoption of ICT in teaching and learning institutes has been given prominence (Nikolopoulou & Gialamas, 2015; Comi et al., 2017; Englund, Olofsson & Price, 2017; Teeroovengadum, Heeraman & Jugurnath, 2017). Comi et al. (2017) assessed the effect of ICT related practices, and the results confirmed that with the inclusion of a set of controls, instructor's attitudes and beliefs towards the use of ICT influence students' performance. Englund, Olofsson and Price (2017) looked at the variation and changes in in the approach of instructors'' teaching with technology in Higher Education (HE). The study revealed that novice instructors developed their conceptions and approaches to teaching with technology, while the more experienced instructors failed.

Nikolopoulou and Gialamas (2015) investigated high school teachers perceptions of barriers to technology utilization. The conclusion of the study was that confidence and pedagogical training of the utilization of ICT results in higher probabilities of instructors using technology in the class (Nikolopoulou & Gialamas, 2015). However, Cuban (2006) denotes that the problems and solutions related to the adoption and integration of technologies in teaching centers are framed by reformers from bases of their access to the teaching and learning technologies.

## **2.3. Technology Accessible for Teaching and Learning**

### **2.3.1. Interactive whiteboard (IWB)**

The educational impact of the IWB as a presentational technology has been explored and assessed more than any other technologies. The findings suggest that most instructors underutilize the technology (Glover & Miller, 2001; Benoit, 2018; Gregorcic, Etkina & Planinsic, 2018). However, instructors provide positive intentions towards the use of IWBs in teaching centers. Essentially, instructors may think that they are effectively utilizing IWBs in teaching centers only to find out that there is more they can do with the tool (Thomas & Cutrim, 2010). Thomas and Cutrim (2010) propose that due to the underutilization of IWB, other forms through which ICT can be utilized as a teaching and learning tool can easily be overlooked. Gregorcic, Etkina and Planinsic' (2018) study suggest that confidence in using IWB played a critical role in instructors willingness to utilize the technology.

### **2.3.2. Digital video**

The literature analysis surveyed the use of digital video and the evidence suggest that the use of digital video in teaching and learning is increasing (Kayee & Pecay, 2017; Kaltura, 2018). The increase is seen because digital video promotes deeper understating of concepts in many subject areas. An advocate of digital video, Mhamdi (2017), suggests that digital video can be used as a practical tool whereby lecturers are able to achieve students' intended learning outcome (Mhamdi, 2017). Digital video can assist instructors with explaining difficult concepts, hence the increase thereof (Burden & Kuechel, 2004). Moreover, because digital videos can be repeated, learners have a chance to skip to parts that they find important.

### **2.3.3. Video and audio streaming**

Lecture capturing is a process of recording or capturing a lecture and distributing it electronically (London, 2018). It includes audio recording in order to produce a podcast. A podcast is a digital audio file that can be listened to by learners. A study by Gribbins (2007) on the usefulness of podcasting surveyed students' attitude and intention to use audio. The results suggested that podcasts have the potential of providing numerous benefits for instructors. Shim et al (2006) propose that podcasts can be used for sharing announcements, explaining assignments, and distribute lectures to students.

The survey further revealed that 70.21% of students agreed that podcasts can be useful. Podcasting also helped students to retain and process information by enabling them to revisit

lectures. Gribbins (2007) further stated that podcasting did not have any negative effect on instructors attendance and that participation increased during lectures. The scholar submits that in spite of utilizing podcasts, students attended lectures and the contribution of the students was evident.

Numerous studies have examined how and why learners utilize lecture recordings (Maynor et al., 2013; McGrath, 2015). Most learners rate podcasts as useful (Maynor et al., 2013). McGrath (2015), recommends that students must be supported on how to utilize lecture recordings in order that the podcasts are used to enhance the effectiveness of their studying. A doctoral study by (Montgomery, 2017) on factors that influence technology integration in the classroom investigated variation of teacher integration of technology into classroom instruction. The study found that the document camera was the least frequently used technology.

#### **2.3.4. Mobile devices**

Mobile device technologies include devices such as laptops, tablet computers (such as iPads), and smartphones (Techopedia, 2019). Duggan and Aaron (2013) assert that this technology is widely used and in demand in teaching and learning environments. Chiu and Churchill (2016) conducted a study to assess instructors' beliefs, attitude and anxiety on the use of mobile devices. The scholars found that using mobile devices in teaching centers offered diverse opportunities (Chiu & Churchill, 2016). For instance, learning can be shifted more to learners thus allowing instructors more time with individual students as guides and coaches (Jeng et al., 2010). Jeng et al. (2010) point out that in an environment as the one described above, individual and independent learning, learning by doing, sharing and peer-reviewing is encouraged. Therefore, teaching is made more effective (Wong, 2012).

#### **2.3.5. Visualizer (Document camera)**

Document cameras are exceptional tools for instructors (Zimmer, 2009). Also known as visualizers, digital overheads or doc cams, these are real time image capturing apparatus used for recording and displaying large objects for audiences (Camcor, 2017). According to Zimmer (2009), with document cameras, what used to be an individual assignment can be turned into a class assignment, creating discussion, interactions and also maintaining student attention. This technology has the same benefits as cameras as it can record what it focuses on and that can be distributed to learners (Gribbins, 2007).

Digital projectors are able to magnify three dimensional objects, slides and transparencies as compared to overhead projectors which cannot project opaque images or objects. Moreover, classroom text, three dimensional (3D) items, small object and classroom demonstration can be viewed in a larger and clearer way for visual and hands on students (Sundeen & Sundeen, 2013). Demonstration can be led by students who are hands on and be able to explain lessons that involve a hands on approach, for instance, science projects (Gray et al., 2010). Jones, Fox and Levin (2011) assert that in enhancing learning, instructors can bring real world learning in teaching centers and projecting it for all students to see. Studies by Lai, Tsai and Yu and Lanir (2010; 2011) as well as Lanir, Booth and Hawkey (2010) reveal that most frequently reported benefits in environments that have increased visual area include improved learner learning effectiveness and reduced cognitive loads (Chang, Hsu & Yu, 2011). Margolin et al.(2011) further highlight that very little skill is required to operate document cameras and instructors can effortlessly include them in their teaching room technology mix.

#### **2.4. Strength and shortcomings of the utilization of technology in teaching and learning centers.**

Promoters of instructional innovation propose that innovation aids individual learning rates and styles and offer access to learning at any random time of the day and in any area. They believe that the utilization of technology in teaching centers affords learners with the following prospects (Hopson, Simms & Knezek, 2001; Wheeler, Yeomans & Wheeler, 2008; Harris & Rea, 2009; Mercier, Vourloumi & Higgins, 2017):

- Obtain the necessary skills needed for employment in the future;
- Develop good problem-solving, communication and critical thinking skills;
- Collaborating with fellow peer groups;
- Engage in Hands-on learning activities; and
- Getting immediate feedback.

The above proponents, (Hopson, Simms & Knezek, 2001; Wheeler, Yeomans & Wheeler, 2008; Harris & Rea, 2009; Mercier, Vourloumi & Higgins, 2017) also claim that the introduction of technology in teaching centers benefits instructors. ICT offers instructors the ability to create instructional material and assessments that will address the needs of their learners, it offers access to more credible material that can assist in the growth, development and execution of their lessons (Wheeler, Yeomans & Wheeler, 2008; Mercier, Vourloumi &

Higgins, 2017). Additionally, it provides more sources of information for their students to access during teaching sessions (Dunleavy, Dexter & Heinecke, 2007; Cho & Lim, 2017).

An additional element of the literature highlights other justification for technology integration in the education system. The integration of technology in effect provides the following benefits to the society and educational community:

- A highly developed and advanced teaching and learning setting for learners: Technology offers a motivational educational setting where the learners engage with instruction in an advanced and educationally and constructive manner. Studies reveal that if the integration is implemented correctly, learners can gain the pedagogical benefits of technology in the learning centers (Shapley et al., 2010a). In the current world, an increasing number of experts advocates for the employment of the constructivist model of learning as a substitute to the old traditional instructivist model (Barbara Means, 2001; Sun, Franklin & Gao, 2017).
- An immensely powerful tool to amplify and supplement teachers' instruction in the classroom: Provided that the technology is properly used by the teachers, learning can be more interesting on the part of the learner and teachers can utilize it in the learning perspective of their subjects. With the ever-changing technological advancements, technology has the potential to make teaching and learning more interesting, motivating and newly challenging for instructors (Waddoup, 2004).
- An innovative administrative tool for administrators and teachers: Excluding classroom instruction, teachers get involved in administrative tasks such as lesson planning, tutorials, students record keeping, mathematical processing of student marks, preparing tests, etc. (Waddoup, 2004). Administrators, on the other hand, are involved in various activities that require the use of technology such as keeping records of employees, the recording of the learners' performance, the budget and other administrative duties. This goes to show that technology can be utilized both for teaching, learning and administrative tasks (Jackson Lorrie, 2004; Zrnec & Lavbič, 2017).
- Inclusive education and increased access to better education: Institutes of teaching and learning have made it their highest priority to decrease the digital divide reflected by statistics and better the education of any learner, regardless of their racial group, culture,

and socio economic background; the integration of technology hails as the highest priority in the education systems today (Lawrence, 2006). The digital divide in statistics and illiteracy rates in developing countries must be dropped and the potential of ICT (Information and communications technology) integration has been recognised as the main means to helping schools achieve this goal. Disabled learners will also reap the rewards of this move dearly (Zucker, 2005).

- An advanced platform of communication: In the past, distance restricted humans when it came to communicating with people, and today technology has changed all of that; it has transformed into multi-network and the internet where information and data can be transferred anywhere, and at any given time (Cartwright, 2005). Collaboration, information sharing, and meeting experts and peers are examples of activities that technology has made possible in schools today (Alberta, 2006; Zhao & Sullivan, 2017).
- Key to employment and gaining a competitive advantage in the worldwide economy: Developed and developing countries require computer literacy; therefore, job markets demand a computer literate personnel. In a time that is not long from now, computer literacy will be a necessity in the job sectors and competing for a share of the global market (Bonifaz & Zucker, 2004). Technology in teaching and learning equips learners on how to integrate the workplace and how to compete in the future.

Detractors list a number of rationales why ICT integration must not be emphasised in institutes of teaching and learning (Wright, 2001; Jackson Lorrie, 2004; Dunleavy, Dexter & Heinecke, 2007; Maynor et al., 2013). They contend that:

- Several institutes of teaching and learning emphasize technology over traditional learning; for instance, it does not mean learners will have a greater understanding of concepts in their core academic areas if attractive slide shows or document are utilized
- Spending on technology advancements suggest that the expenditure on other pivotal programs and activities such as art, sports, music, and field trips decrease.
- Because equipment requires extensive support, technology is not as cost effective as other interventions.
- Technological innovations have proven useless due to the schools' lack of capacity to integrate equipment use with instructional objectives.

- The utilization of technology requires educators with robust classroom management skills. Therefore, teachers must carefully monitor the students and the way they use the equipment, which means a repetitive procedural complicated explanation.
- Some instructors use computers as entertainment tools with irrelevant activities that deviate from the main purpose.
- Learners risk physical problems, such as eyestrain or repetitive stress injuries.
- Instructors reported that there is a decrease in attendance due to lecture recordings. Moreover, the concern is that learners would use the recordings as a substitute for interaction.

## **2.5. Effects of Technology on Student Success**

Research and thorough evaluation have made the conclusion that the utilization of technology in schools has an excellent impact on learners' morale, peer collaboration and self-directed learning. Research has also related the introduction of teaching and learning technology to an increase in attendance rates and less disciplinary issues (Dineva & Nedeva, 2013). The other positive impacts include increased levels of self-confidence, positive attitudes towards education, and a heightened ability of communications as well as problem-solving and organisational skills. The above-mentioned literature is shown below.

- Apple Classrooms of Tomorrow (ACOT) – The first large-scale initiative that provided one-to-one computer access to students and teachers. This programme operated in thirteen universities from the year 1985 to 1998 and the evaluations of the programme showed that students developed more problem solving and communication skills that enhanced their abilities to even become more independent. This also showed an increased level of self-confidence in the learners (Cooley, 2001; Marshall, 2002; Penuel, 2005).
- Waddoup (2004) examined 34 research studies that analysed the influence of technology integration on learners results. The conclusion of the scholar was that the utilization of technology in teaching centers was intertwined to an increase in student motivation, attitudes, and levels of self-esteem.
- Bebell (2005) evaluated how technology promotes student excellence in one-to-one computing initiative at the University of Pennsylvania. The findings highlighted that the educators thought that involvement in the initiative increased the motivation of the

student, engagement and improved their abilities to work in groups and independently. The greatest impact of the program was on students who performed lower, as their class engagement increased and their ability to retain content improved and worked well in groups (Bebell, 2005).

- Numerous assessments have been made on the Microsoft Corporation's *Anytime, anywhere learning project*; Learners and teachers at 800 schools were provided with laptops both usable for education and home purposes. The consistent assessments reported that following the execution of the initiative, the engagement of the learners with their work increased, collaboration with fellow colleagues improved, and learners engaged in autonomous learning. (Donovan, Hartley & Strudler, 2007).

## **2.6. Challenges affecting ICT Implementation in Teaching and Learning Institutions**

Rana and Rana (2020) argue that compared to developed countries, often developing countries represent contextual factors in institutional culture and societal structures that are different. Andersson & Grönlund (2009) highlight that factors such as cost, usability, appropriateness of technology as well as and management crisis are significant challenges in developing countries. A study conducted by (Abrahams, 2010) determined that the lack of knowledge, skills and support are the base factors that prevent the utilization of ICT & AV in teaching and learning. Abrahams (2010) found that perception, resistance to change, technological support, financial support infrastructure, knowledge & information and technophobia are basic barriers faced. Ely (1990) points out the following conditions to facilitate the implementation of ICT; 1) Displeasure with the status quo, 2) Sufficient time, 3) Resources, 4) Knowledge and skills, 5) Rewards and incentives, 6) Participation, 7) Commitment, 8) Leadership.

Ertmer (1999) mentions a two-part classification framework which inspires adoption of technology. In the study, Ertmer (1999) refers to the first order of barrier to logistical hindrances that are external (extrinsic) to the self. Normally these barriers are labelled according to the type of resources (e.g., equipment, time, training, support) which are either absent or inadequately provided in environments where they are supposed to be used. Studies show that increasing wireless capacities and allowing more handheld devices in institutes of teaching and learning has reduced some first-order barriers, but what remains are logistical barriers to successfully integrate ICT (Imazeki, 2014; Jones, Chin & Aiken, 2014).

The second order of barrier is internal (intrinsic) to the self and include beliefs. The intrinsic to the self denotes, attitude, beliefs resistance, etc. (Ertmer, 1999). Furthermore, these barriers are often believed to cause more problems compared to the first, because they are deeply rooted and are in the fundamental makeup of teachers beliefs (Kim et al., 2013). Scholars generalise the successful integration of ICT in teaching centers as being related to personal and professional beliefs about teaching and learning, demographic data, time and experience, skills, and confidence (Ertmer et al., 2012; Machado & Chung, 2015; Tondeur et al., 2015).

A number of scholars (Ajzen, 1991; Rogers, 1995; Ertmer, 1999) share the notion that attitude and belief influence the adoption of technology. The sentiment that attitude plays a big part in ICT & AV utilization is shared between (Ntemana & Olatokun, 2012; Govender & Govender, 2014). However, (Tsai & Chai, 2012) added a third barrier which they called, design thinking and design skills. They argue that the first and second barrier may be eliminated, but the third one might arise due to the dynamism of students and the class context. (Tsai & Chai, 2012) feel that an approach whereby a lecturer relies on some level of design thinking in order to create learning resources and activities assists with adjusting to the needs of different students. Therefore, it is vital to highlight that in order to encourage utilization resources, lecturers must be supported in all three barriers.

Notwithstanding the success of some of the institutes of higher learning when implementing ICT for teaching and learning purposes, the same institutes still face numerous challenges when executing such processes, and the challenges are:

- **Absence of systemic approach to ICT implementation**

The integration of ICT in the various spheres of any organisation is a complicated process that needs a completely mapped out and well-defined plan from the outset. An evaluation has shown that this is not the case in numerous institutes of higher. The majority of these institutions have embraced the role of technology and its integration without having a robust and well-defined plan and framework on how the integration will be executed. To implement ICT integration, a framework for the development of specific ICT projects should be guided by clearly defined ICT policy and strategic plans.(Buss et al., 2015). Buss et al. (2015) further argue that instructors struggle come from not being exposed to the technology tools that support curricular area. The competing interests and diversity of the various stakeholders in the institution should be recognised when developing an ICT policy and a strategic plan. In 1999 Stratham and Torell

(1999) looked at “The impact of technology on student learning”. The scholars suggested the following issues should be taken into account (Stratham & Torell, 1999); 1) ICT infrastructure must be in place already, 2) ICT skills level in institutions, 3) staff members and learners in all departments and expected growth, 4) academic management procedure: curriculum development, assessment methods and administration, 5) cost-effectiveness analysis – including hidden costs and the choice of appropriate technologies for the specific needs of the institution, and 6) personnel training. Somekh (2008) suggests that in an institute of teaching and learning, culture is critical in ICT integration. The scholar disproves the common assumption that failure to integrate ICT in teaching centers successfully is the result of the instructors’ resistance to change (Somekh, 2008). She further argues for the need of a broader analytical framework that takes into account cultural factors. Generally, teaching and learning institutes that successfully implemented ICT integration report: 1) availability of ICT resources, 2) concentrating on altering pedagogy with ICT, 3) improving instructors’ skills within authentic contexts, 4) offering support, and 5) offering opportunities for instructors to discuss problems with fellows facilitators and explore solutions (Somekh, 2008). The most common and consistent barrier to successfully integrate ICT is found to be institution culture (Preston et al., 2015).

- **Culture and Influence**

Salinas et al. (2017) mentions that the culture aspect has received limited attention in the research of ICT adoption in education. Scholars (Wozney, Venkatesh & Abrami, 2006; Vanderlinde, Aesaert & Van Braak, 2014) argue that there are various actors that influence the process of ICT adoption. The influence is, however, considered in very general terms. Most of the research accumulated on the issue of ICT adoption in Education analysed the social influence excluding the distinction between various actors that exert those social influences (Salinas et al., 2017). Actors include colleagues, institution leaders, parents, supervisors from the ministry of education or state institutions responsible for promoting ICT adoption in teaching and learning institutes.

Salinas et al. (2017) further state that the absence of these distinctions among diverse stakeholders might explain the reason why some research findings appear to contradict each other. While other results suggest that institute leaders and other prominent figures in an institute influence the utilization and adoption of ICT (Hadjithoma-Garstka, 2011; Vanderlinde, Aesaert & Van Braak, 2014), other scholars established that social influence plays

no role (Teo, 2011). A review by Leidner & Kayworth (2006) on the concept of a culture used in information systems research describes it as “an arrangement of beliefs about behaviour, relationship, reality and truth that operate as interpretive schemes that people use to perceive situations and give meaning to experience.”

Nistor et al. (2014) outline culture as the degree of adherence by subjects to a certain set of values. Hofstede (2016) considered five values, namely uncertainty avoidance, power distance, masculinity/femininity, individualism/collectivism, and time orientation. Uncertain avoidance is the degree at which an individual from a group feels contented with equivocality and doubt. Power distance is the degree to which an individual can agree to an unequal distribution of power. Masculinity or femininity is the extent at which an individual acknowledges gender contrasts in success and material accomplishment. Individualism or collectivism denotes the inclination of an individual to either attend to themselves or the group, which is the entity should take care of them. Last, time orientation refers to whether an individual is engrossed in instant outcomes or delayed rewards for the long term.

The values that appear to be amongst the most applicable to technology adoption are individualism or collectivism and uncertainty avoidance (Leidner & Kayworth, 2006). In their study, Salinas et al. (2017) analysed factors that affect the process in which teachers incorporate technologies into their classrooms. The study was conducted between three countries, namely Ecuador, Colombia, Chile. The results of the study suggest that the perception of support from colleagues is not related to the extent of ICT adoption. This means that there is no link between individualism and collectivism in accordance with Nistor et al. (2014). Therefore, acculturation is needed at the departmental, faculty and institutional levels to overcome cultural differences (Collis, 2000). Culture should play a major role in technology adoption.

- **Awareness and attitude towards ICT's**

Ajzen and Fishbein (1980) describe attitude as a person's favourable or unfavourable evaluation towards the object or its use. It is pivotal for all stakeholders in the institution to have knowledge of the current ICT facilities, services, and their relevance in relation to their specific tasks. However, it always appears as if there is a knowledge gap when it comes to ICT, where the majority see ICT as technologies that require advanced skills and money (Tusubira & Mulira, 2004). Hence, the perception is that ICT is not seen and treasured as a way of creating efficiency and cost-effectiveness. The lack of awareness of the benefits of ICT is aligned with attitude. A positive approach towards ICT is deemed as an important condition for the

effectiveness of the implementation (Woodrow, 1990). Due to rapid technological advances and changes, Teo (2011) found that instructors' perception on the usefulness and ease of technology use remain an unknown.

Cuban and Jandrić (2015) as well as Hutchison and Reinking (2011) share the same sentiment that instructors' personal and professional beliefs about ICT being utilized in teaching centers can be a major barrier to successful integrating of ICT. Daniels et al. (2013) highlight that constructivist teaching belief, innovativeness, and student-centered approaches are among beliefs and teaching traits that have a strong correlation with the increase of ICT integration in teaching centers. On the other hand, instructors with traditional instructional delivery beliefs and scepticism towards ICT resist and limit the utilization of ICT in the teaching centers (Daniels et al., 2013). A 4-year study by Kim et al. (2013) was conducted in which 22 instructors extensively participated in professional development related to ICT. The study revealed there is a direct relation between instructors' use of ICT in teaching centers and their beliefs about that knowledge, learning, and teaching.

All stakeholders should be fully involved in the implementation process in order to address the awareness and attitude problems experienced related to ICT. Formally, training contributes a lot to raise the awareness; the organised awareness programmes, visiting institutions with similar institutions where success has been seen, and a change in the attitude of all the stakeholders involved towards the facilities and services. Pritchett (2012) suggests that the availability of ICT influences instructors to be more constructivist, more student centred and more flexible. Constructivist in a teaching center means that the instructor creates a collaborative problem-solving environment where learners actively participate in their learning (Von Glasersfeld, 2013).

- **Administrative support**

The provision of direct and real-time technology support to instructors is a strategy to adopt to reduce the first-order barriers (Machado & Chung, 2015). An excellent administrative body and support is key to the success of the integration of ICT into teaching and learning processes. Administration teams can offer conditions that are necessary to execute effectively, such as an ICT policy, resources, and incentives. According to Machado & Chung (2015), having technology support has proven to increase the level of successful integration. Nevertheless, the

disparities on how the individuals are utilized make assessing the level of the support challenging to measure.

Although some scholars agree that providing technology support is essential to the successful integration of ICT, having an on-site technology coordinator might be most effective (Banoglu, 2011; Vanderlinde & van Braak, 2011; Machado & Chung, 2015). In that case, a technology coordinator could be a lecturer, or an administrator and utilizing this service to its full effect can reduce barriers to technology integration (Banoglu, 2011; Vanderlinde & van Braak, 2011; Machado & Chung, 2015). The role of an on-site technology coordinator is to provide coordinated technology support, perform professional development and arrange technology resources to support teaching and learning (Brown, 2011; Vanderlinde & van Braak, 2011)

A study in Turkey surveyed 134 school leaders and discovered that technology coordinators expressly do their job concerning pioneering institutes of teaching and learning into ICT integration. Technology coordinators aided the leaders' capacity in technology leadership and teaching skills (Banoglu, 2011). The interest and commitment at every level of management is the most crucial factor for the successful implementation of ICT. In addition, Joy et al. (2014) suggest that an environment that is safe and supportive is critical in order for academic staff to develop skills on using new technologies.

- **Technical support**

Guaranteeing that an institute has an adequate level of technology in its teaching centers is vital in integrating ICT successfully (Shapley et al., 2010b). This encompasses issues like operation, installation, maintenance, network administration and security. This is a key element in the integration and implementation of ICT in education systems. Lack of access to technical assistance is found to be part of some of the constant first-order barriers (Buabeng-Andoh, 2012; Ertmer et al., 2012). Carver (2016) asset that skills like technical support are limited or sometimes not available, therefore lecturers and learners should be afforded basic troubleshooting skills to subdue technical challenges when utilizing ICTs.

Yilmaz (2011) assessed the technology integration process of the Turkish education system. The scholar stated that in the process of provisioning institutes with hardware and internet connections, it is critical to provision the institutes with technical support concerning repair and maintenance for the continuing utilization of ICT (Yilmaz, 2011). As a result, if there is a lack of technical support for instructors, they end up being frustrated and the result is their

unwillingness to utilize ICT (Tong & Trinidad, 2005). Institutes of teaching and learning in Britain and the Netherlands have acknowledged the significance of technical support to assist instructors in integrating technology in their instructional delivery (Korte & Hüsing, 2006). They argue that ICT support influences instructors to utilize ICT in teaching centers without losing time troubleshooting any hardware or software problems. However, in most cases, developing countries such as Tanzania have a very small number of ICT technical experts for implementation and maintenance (Bakari et al., 2005). The right strategies should be set up to solidify the integration of ICTs in the teaching and learning process and that it works hand in hand with the recruitment, training, and retention of staff required.

- **Transforming higher education**

Hakizimana (2015) argue that the failure of numerous institutions to integrate ICT into teaching and learning is caused by lecturers who utilize the ICT to replicate their old ways of teaching.. A white paper on Post School Education and Training (PSED) (2014) insists that to bring transformation in higher education for effective education delivery, better access, and use of fitting technologies are essential. Ng’Ambi (2013) identifies a relationship between instructors’ actions of teaching with developing technologies and the motives. The scholar was interested in understanding activities that have the potential to encourage the transformation of teaching and learning practices. The availability of technology and ICT predefines the skills and ability to use it.

Cobb (2010) suggests that educational institutions need to put in measures that aggressively eliminate ineffective technologies and track what works for their instructors. Effective integration requires the re-thinking and re-examining of the educators' old practices. Bates and Bates (2005) suggest that adjustments should be made in the current practice by universities and colleges to successfully adopt technologies for teaching and learning. The effective use of technology requires new and revolutionary thinking that will change the world of teaching and learning forever – this is a necessary step in changing the way higher education institutions plan, organise, lead and manage (Antonenko, Dawson & Sahay, 2017).

- **Staff development**

The integration of ICT in teaching and learning does not merely involve modern hardware and software, but both lecturers and learners should be given new roles, with new behaviours, with new teaching and learning methods that suit the ICT integration. Farrell (1999) highlights that

training and workshops are pivotal not only to improve instructors' skills, but also as a means of getting the participants involved in the whole process of implementing and integrating ICT in teaching and learning. For instance, Bates (2005) states that instructors require training not merely for the choice and use of appropriate ICT, but most importantly on how people learn and on how instructional design is facilitated. Pelgrum (2001) recommends staff training to be an ongoing process in order to keep up with the development of ICT.

The insufficiency of knowledge and skills, lack of lecturer confidence and insufficiency of training and development for utilizing ICT in the teaching and learning environment are generally highlighted together by researchers (Asabere et al., 2017). Asabere et al. (2017) highlights that most teachers in developing countries do not have the adequate skills and knowledge to utilize ICT. Professional development is an important element for teachers as it could make them feel as professional users of ICT. Beggs (2000) emphasises the point of competency by stating that if teachers do not have the competency for using ICT, it could lead to lack of confidence which in turn will cause fear of failure in utilizing ICT resources. Consequently, most studies put more emphasize on teachers being educated (Yüksel & Alemdar, 2012).

The lack of professional development for instructors on the effective utilization of ICT in teaching centers is interrelated to time, experience, and skills barriers (Hutchison & Reinking, 2011). Scholars determined that the cause of the lack of development in teaching centers is related to the lack of time available to instructors and funding for development (Shapley et al., 2010a; An & Reigeluth, 2011). Professional development barrier appears to be significant as it relates to other barriers, and it will always be mandatory as new technologies emerge (Hutchison & Reinking, 2011; Rutkowski, Rutkowski & Sparks, 2011). (Aesaert et al., 2015) contend that knowledge and skills that instructors need to utilize technology in instructional delivery are a relevant individual factor. A study by (Ohei & Brink, 2019) on the adoption of ICT web technologies in higher education found out that preparing educators is a critical element for successful integration and sustainability of Web 2.0 and Web 3.0 tools utilization in teaching and learning (Albion & Tondeur, 2018).

- **Time**

Time forms part of the intrinsic barriers. Scholars argue that besides formalized and planned professional development, instructors should be allowed time to experiment and collaborate in

supporting ICT integration (Ottenbreit-Leftwich et al., 2010; Kim et al., 2013; Preston et al., 2015). Merely providing funding for the technology tools and professional development for ICT integration, without giving time for instructors to practice using ICT in teaching centers can reduce the effectiveness of ICT integration (Gorder, 2008). Preston et al. (2015) suggest that time for instructors to practice teaching with ICT in centers or developing lesson plans that utilize technology for active learning should be established to help shape future professional development needs.

Researchers are in consensus that successful ICT integration can be witnessed when collaboration time and time dedicated to practice using technology are established (Gorder, 2008; Ottenbreit-Leftwich et al., 2010; Kim et al., 2013). An approach that will allow instructors time to discuss and support one another in integrating ICT into teaching centers is through establishing learning communities and time for collaboration (Hsu & Sharma, 2008). Moreover, Gorder and Kim et al. (2008; 2013) suggest a virtual learning community where instructors will be allowed to focus on specific topics related to technology, teaching and any relevant areas of teaching globally. Furthermore, the strategy is beneficial to both novice and veteran instructors. It affords administrators the opportunity to identify areas of concern and strength, pick up areas of need in terms of professional development (Kim et al., 2013). In hindsight, collaboration and time encourage instructors personally as a means of reducing barriers to ICT integration.

### **2.7. Adoption of ICT for instructional delivery**

The adoption of ICT by instructors intends to simplify and support the teaching and learning process in the teaching centres and to affect the quality of teaching and learning experience positively (Aldunate & Nussbaum, 2013). Aldunate & Nussbaum (2013) further state that even though technology is a dynamic transition between costs and benefits, generally school instructors do not make effective use of technology in teaching. Cloete (2017) highlights the importance of integrating ICT in education by stating that the application of ICT in education plays an integral role in an economy. The researcher further emphasises that there is a strong link between technology adoption and the education of the labour force (Cloete, 2017). Büschgens, Bausch & Balkin (2013) suggest that other technologies, practices, norms, and institutional leadership are prerequisites in the process and success of technology adoption.

Most scholars have studied the adoption of technology and use in numerous fields, namely, e-commerce, e-government, communication, agriculture, etc. However, the studies were mainly in developed countries (Al-Shafi & Weerakkody, 2010). Institutes of teaching and learning in developing countries are facing the challenge of managing and utilizing the multiplicity of ICT for teaching (Nchunge, Sakwa & Mwangi, 2012). Researchers suggest that there is substantial adoption and utilization of technology for instructional delivery in institutes of teaching and learning; nevertheless, instructors are not using the technology to the maximum (Volery & Lord, 2000; Lau & Sim, 2008; Kotrlik & Redmann, 2009; Ruto & Ndaloh, 2013; Boadu et al., 2014; Govender & Govender, 2014; Ifegbo, Blaise & Ukegbu, 2015; Karsh, 2019). In addition, (Simeo et al., 2019) found that the uptake of ICT technologies for teaching and learning is unclear across Africa.

Rogers (2000) theorizes that technology adoption in institutes of higher education is based on three levels of ICT adoption (Massy & Williger, 1998); 1) Personal Productivity Aids, 2) Enrichment add-ins, and 3) Paradigm shift. Massy and Williger (1998) describes the levels as follows: 1) Personal productivity aids are programs that allows instructors and students to perform similar task quicker and more effectively (e.g. Microsoft Word and Microsoft Excel), 2) Enrichment add-ins means bringing in new materials into teaching and learning without modifying the basic mode of instruction (e.g. use of video, emails, world wide web). Lastly, 3) Paradigm shift entails reconfiguring teaching and learning activities in order to take full advantage of new technologies.

Ifegbo et al. (2015) highlight that less has been done regarding the third level in most of the developing countries. Furthermore, Simeo et al. (2019) highlight that in Africa ICT is mostly used as an add-on function for both campus-based and open distance learning institutes based on available e-learning platforms and facilities. In that regard, the full utilization of ICT for teaching is yet to be witnessed in this continent. Al-Alak and Alnawas (Al-alak & Alnawas, 2011) propose that the lack of understanding that the extent of ICT uptake and knowledge of the concepts of ICT integration in relation to its application could explain this trend.

Instructors are the major role players in the adoption of ICT for teaching (Ifegbo, Blaise & Ukegbu, 2015). Rogers (1983) broke adopters into five categories namely, 1) the innovators, 2) early adopters, 3) early majority, 4) late majority and 5) diehards or laggards. The innovators make up to 3%; they are the ones who are willing to experiment. Early adopters are the risk takers; they enter the course once it is charted and make up 10%. The early majority

make 70% of the categories. They will adopt once the trail has been blazed and chartered. Late majority and diehards or laggards - this category comprises less than 2%. This category takes fewer risks and come into picture only when there are no alternatives, or they retire.

A study conducted by Aldunate and Nussbaum (2013) looked at teachers' adoption of technology. The research aimed to explore the adoption of technology. The research concluded that early technology adopters are seen by their commitment to spend a portion of their time on integrating technology into their teaching. Aldunate and Nussbaum (2013) further contend that regardless of the complexity of technology, early adopters are more likely to adopt any new technology. On the other hand, those who are not early technology adopters spend less time on integrating educational technology into their teaching. This means that the adoption of technology is less likely and they are likely to abandon adoption completely (Aldunate & Nussbaum, 2013).

Yidana(2007) conducted a study on teachers' levels of technology adoption for instructional delivery showed that 50% of research participants fell in the low technology users category. The moderate technology user category made up 34.8%, whereas users in the higher category amounted to 14.4%. The results indicate that instructors are low-level users, which suggest that instructors do not use technology extensively (Yidana, 2007). In addition, Den Hoogen (2010) observed that younger lecturers were more likely to adopt and utilize technology for teaching and learning because they possess more advantages of flexibility, risk taking, novelty and speed as compared to older ones. Essentially, the younger lecturers have the technology know-how and can display novelty and flexibility when it comes to the adoption of ICT and AV.

The Ifegbo et al. (2015) study focused on the adoption and utilization of education technologies. The findings showed that most instructors fall into the category of late majority and diehards (30.5%). Furthermore, on the level of a paradigm shift (Massy & Williger, 1998), the study revealed that there is a low level of adoption by instructors. This expressed that instructors are not yet at a point of fully taking advantage of ICT for teaching and learning. In the same context, the need for awareness and training for the early adopter is recommended (Odero-Musakali & Mutula, 2007; Muinde & Nzwilli, 2009).

Lau and Sim (2008) in their work, titled "Exploring the extent of ICT adoption among secondary school teachers in Malaysia" described the level of ICT use by instructors in Malaysian schools. It was found that instructors frequently used ICT. The results highlighted

that it was used for teaching and instructional support either daily or weekly (75%) and also used for classroom management activities (49%) (Lau & Sim, 2008). Respondents further reported less frequent use of ICT in communicating with peers (26%) as well as for personal development (12%). Lau and Sim (2008) suggested that in order to ensure that instructors utilize technology mechanisms should be put in place. Furthermore, the study results showed that instructors do not utilize graphical visualizing tools, hypermedia and simulation programmes. They considered the systems to be specialized requiring advanced skills. The reasons above suggest that instructors need training to make full use of the technologies in education (Lau & Sim, 2008).

In their study on the use of instructional materials for teaching of History and Government in Kenya, (Ruto & Ndaloh, 2013) established that 54% of instructors used maps when 62% instructors frequently used textbooks in teaching. Moreover, the researchers found that 80% of respondents never used radio in instructional delivery for History and Government sessions in schools. Only 3% reported frequent radio use (Ruto & Ndaloh, 2013).

Oye, Iahad & Rahim (2012) sought to understand acceptance and usage of ICT in Nigerian public institutes. The results showed that there is a low level of adoption. Nonetheless, it pointed out that there was a positive intent and willingness to use ICT for teaching and learning by instructors. Nonetheless, the study also revealed that the contributing factor to the use of ICT was the availability and the condition of resources – especially teaching centres. The reason was stated as poorly designed teaching centers. The findings also revealed that instructors need training on how to utilize ICT for teaching and learning (Oye, Iahad & Rahim, 2012).

Another study by Altun, Kalayci & Ümmühan (2011) from Turkey sought to examine the effective utilization and adoption of technology at the faculty of education. The data were collected from the dean, head of the department, and the department of computer education and instructional technology (CEIT) personnel. The method used to gather data were an observation, semi-structured and focused interviews. A total of 14 personnel completed interviews and the results revealed that the institute did not have a written ICT policy. However, the study further revealed that personnel had a positive attitude towards utilizing technology in teaching and learning. Furthermore, the scholars submitted that successful instructional technology adoption and utilization must comprise of stakeholders' involvement, creating awareness, analysis of needs, skilling, technical support, motivation, and infrastructure

availability. Moreover, researchers concluded that institutes should have a policy on instructional technology adoption and use as part of their strategic plans (Altun, Kalayci & Ümmühan, 2011).

Cherry (2014) completed a study on technology adoption in teaching and learning. The scholar's objective was to understand the factors affecting technology adoption with the aim of increasing and improving levels of technology adoption in the teaching and learning process. The results of the study disclosed that instructors had adopted technology for teaching and learning. Levels of adoption varied significantly by subject area. The business instructor's level of adoption was significantly higher compared to other subject areas. Notably business instructor's level of adoption was higher compared to math and science instructors.

The study further revealed that adoption of technology was significantly associated with technology anxiety, barriers of technology integration, availability of technology, training and skilling (Cherry, 2014). Another study revealed the same results as the above (Rader & McCoy, 2011). The study indicated that Business education instructors utilize technology for teaching more than other areas. According to (Rader & McCoy, 2011), business education instructors used multiple modalities such as instructional games, simulation, videos and tutorials to deliver and enhance classroom instructions.

Chaputula (2012) performed a research on the "state of adoption and use of technology by students and academics at Mzuzu University, Malawi". A survey was used, and the population comprised of learners, lecturers, and library personnel. The findings of the study revealed that the adoption and utilization of ICT and AV was high, however, the state of the technological facilities was poor. Furthermore, the research report that ICT and AV were particularly used for academic related task and accessing the internet. Majority of the research participants have access to the internet and access it through their personal laptop computers. The laptop computer is either connected to smart phones or to the off campus or commercial internet cybercafés.

## **2.8. Utilization of ICT for instructional delivery**

Chimezie Comfort and Comfort Onaigho (2015) refer to utilization as the art of putting tangible or intangible ICT resources to proper use. Amalu (2015) described the utilization of ICT as "the process of using objects to improve educational practice". Therefore, utilization in teaching and learning uses ICT devices to improve teaching and learning. Yusuf, Maina and

Dare (2005; 2013) complement by stating that the availability of teaching and learning technologies is of importance to the utilization of ICT in teaching centers. The scholars suggest that for ICT facilities to be utilized, they should be available (Yusuf, 2005; Yusuf, Maina & Dare, 2013).

ICT utilization can further be seen as the use of ICT facilities to enhance the practice of instructional delivery (Amalu, 2015). As described by Yusuf (2005), ICT utilization is presenting and distributing instructional content through web content (e-teaching) or the integration of a range of tools (computer instruction, video conference amongst others) that support teaching and learning (Akuegwu et al., 2011). Isiyaku, Ayub and Abdulkadir (2015) further described ICT utilization as the integration and use of technology for teaching and learning. Ajayi (2008) stated that the utilization ICT facilities encompasses a variety of technological ways and means including amongst others, network, video conferencing & audio conferencing, computer operation, and world wide web/internet.

A descriptive study on the availability and utilization of ICT resources in teaching and learning in secondary schools in Ardo-Kola and the Jalingo Taraba State was conducted by Amuchie (2015). The population of the study comprised of all teachers and the principals of secondary schools in Ardo-Kola and Jalingo. The size sample was 264 participants where 240 were teachers and 24 principals were selected randomly from a total of 1025 instructors at the secondary schools around Ardo-Kola and Jalingo. Data were collected through questionnaires. To determine the reliability the study employed the Cronbach Alpha. The reliability coefficient obtained was 0.85. The questionnaires were administered by the researcher in order to ensure a high rate of return. Frequency counts and percentages were used to analyse data.

The results of the study revealed that the availability of the resources was very low. The extent of utilization of ICT resources for teaching and learning was similarly very low. ICT facilities for teaching and learning activities were not available in the schools. The study further found out that teachers and principals perceived many factors as constraints to the effective utilization of ICT in teaching and learning. Constraints included, amongst others, poor power supply, lack of adequately skilled teachers in the use of ICTs in teaching, and expensive computers and accessories. The relationship between the current study and the reviewed study was that both of them were interested in the utilization of ICT facilities for teaching.

A study by Egomo, Enyi and Tah (2012) was conducted on the availability and utilization of ICT tools for effective instructional delivery in tertiary institutions in Cross River State,

Nigeria. The descriptive design was employed for the study using survey method. The population was made up of lecturers at a tertiary institution in the Cross River State. Three universities were carefully chosen, and random sampling was used to select 300 lecturers from the three institutions. The 300 lecturers were broken down as follows: Unical 150, CRSCOE 100 and NUG Polytechnic 50 lecturers. A questionnaire was used as an instrument of data collection. The split-half method was used to test reliability. In split-half method responses on the items are pooled and split-into odd and even numbers. Moreover, they are correlated and a reliability of 0.89 was obtained.

The research assistant assisted in questionnaire administration with a 100% return rate. Percentages were utilized to analyse data. The results of the study revealed that the availability and utilization of ICT tools for effective instructional delivery was significantly low. The use of laptops, cyber cafes and internet connectivity were common phenomenon among institutions and lecturers. Furthermore, the results of the study were discouraging with regards to lecturer competence in the use of ICT tools for teaching.

A South African study by Mushi (2010) explored “the use of electronic instructional media among academics and postgraduate students at the University of KwaZulu-Natal.” A mixed method approach was adopted by the study, where quantitative and qualitative data collection methods were used. The main data collection tool involved two questionnaires - one for students and the other for academics. A total of 53 academics and 173 postgraduate students participated in the quantitative study. The findings of the study showed that most of the respondents (both academics and learners) utilized electronic instructional technologies in teaching and learning.

Furthermore, the study identified that insufficient infrastructure and technical support as challenges to utilizing instructional technologies in teaching and learning. Benefits derived from utilizing instructional technologies included improved interactions between instructors and students, enhanced communication, online lecturing and the ability of learners to utilize personal computers to support learning, and accessibility of learning material (Mushi, 2010).

Ng’Ambi (2013) conducted a study on “Effective and ineffective uses of emerging technologies: Towards a transformative pedagogical model”. With the increasing use of emerging technologies (ET), the researcher suggested that there was little evidence that their use was transforming teaching and learning practices. The study drew its data from a survey by the South African Department of Higher Education and Training (DHET) aimed at

investigating ETs and their use. The survey comprised of 30 questions, both open-ended and closed questions, and an overall of 262 instructors responded (Ng'Ambi, 2013).

The results of the study suggested that most technologies used by instructors were for research. Research databases were mostly used (75%), followed by sharing resources via social media (68%), and open educational resources (60%). Part of the survey had respondents listing technologies that they had never used. To mention a few the results showed that instructors had never used remote instrumentation (e.g., remote labs) (85%), virtual worlds (e.g. second life) (82%) and social bookmarking (e.g. Delicious) (71%). The results suggested that the full utilization of ETs was still to be realised among instructors (Ng'Ambi, 2013).

A descriptive-survey study by (Hue & Jalil, 2013) investigated the use of electronic instructional technologies amongst lecturers. The study sought to establish the “attitude of academics towards the integration of electronic instructional media into the curriculum.”. The survey conducted at the public university (Tra Vinh University, Vietnam) consisted of 109 academics. The results unveiled that e-mail media was the most used media type with a frequency of 48 and a mean of 3.46, although the smallest mean was that of interactive whiteboards with a value of 1.22 (Hue & Jalil, 2013). The results suggested that the utilization of ICT was at low levels as other ICT facilities were not utilized (Hue & Jalil, 2013).

Onasanya et al. (2010) highlighted that Nigerian higher education institutes instructors lacked the pedagogical knowledge to effectively utilize ICT resources for teaching and learning. Their study surveyed instructors' attitude towards integrating ICT in teaching and research. The results suggested that gender had no effect on utilization. Furthermore, instructors who were in science had a better attitude towards integrating ICT in teaching and learning than other instructors. The findings also highlighted that instructors lacked adequate training and competence in the use of ICT teaching tools (Onasanya et al., 2010). The recommendations were that instructors should be upskilled and encouraged to develop an appropriate attitude towards utilizing ICT for teaching and learning.

Chimezie Comfort and Comfort Onaigho (2015) pointed out that lack of availability and utilization of ICT for teaching and learning were part of the results in their study. Scholars' findings pointed out that irregular power supply was one of the barriers to the utilization of ICT by business instructors. The study further revealed that the lack of technical support played a role with regards to the underutilization of ICT in teaching and learning. Similarly, a study

conducted by (Akuegwu et al., 2011) revealed that the utilization of ICT resources was significantly low. The study also suggested that availability was part of the reasons resulting in the inadequate utilization of ICT teaching resources. Furthermore, the findings suggested that instructors lacked ICT skills (Akuegwu et al., 2011).

This observation suggested that there was a lack of ICT integration in institutes of teaching and learning which is a key factor in the current gap between developing countries and the developed ones (Isiyaku, Ayub & Abdulkadir, 2015). Drawing from Chimezie Comfort & Comfort Onaigho (2015), studies conducted by Bolaji (2001) and Kelly (2004) showed that the application of ICT and AV in tertiary institutions were below expectations.

## **2.9. Theories and Framework**

The current world is constantly growing, and emerging new technologies are continuously challenging education, although, on the other hand, it is presenting new learning opportunities. In previous years, ICT has induced the attention of countless governments globally and consequently, enormous investments had to be made to equip institutes of higher learning (IHL) with the pertinent technology for teaching centers. Even though there is a huge growth in the accessibility and availability of technology in institutions of higher education, there is evidence that ICT & AV integration in teaching centers has little success (Ntemana & Olatokun, 2012; Wario, 2014). This comes as a challenge for Institutes of Higher Learning (IHL), technology activists and government institutes (Abrahams, 2010). Studies have discovered that the integration and implementation of educational technologies rely on the attitudes of lecturers, thus also determining how ICT & AV is used in teaching halls (Abrahams, 2010; Uslu & Bümen, 2012; Wario, 2014). Considering the aforementioned challenge, it is pivotal to look at the theories describing changes driven by diffusion of innovation, adoption, acceptance and usage. The study has elected to use the following theories: Technology Acceptance Model (TAM) and Diffusion of Innovations (DoI). These theories will help explain the phenomenon better thus they are deemed relevant to the study. An examination of the selected theories will be discussed further under the literature review.

### **2.9.1. Rogers Theory of Diffusion of Innovation (DOI)**

The theory provides a framework that explains how over time new ideas and technologies diffuse and are accepted in a community (Rogers, 2003). Since its inception, the framework has been empirically tested and has undergone criticism from numerous standpoints (Yates, 2001). The framework has been utilized throughout mostly by professionals, scholars, and

students. It remains to be instrumental in other areas, particularly in the teaching and learning field (Rogers, 1995). Moreover, the theory is widely used as Google scholar as of 07 October 2018 records 97524 citations to Rogers (Google, 2018).

Sooknanan, Melkote and Skinner (2015) point out three grounds why Rogers' theory is of benefit in the educational technology field. Sooknanan, Melkote and Skinner (2015) highlights that educational technologists are clueless on reasons why innovation is adopted or never adopted and in that case Rogers' theory can come as help in explaining the reasons. The second point is that the educational technology field is related to innovations. That is to say that if technologists understand the theory, the better they work with potential technology adopters. Lastly, the field of educational technology can be of benefit in a case where the theory results in a systematic model of adoption. Rogers employs the phrase 'technology' and 'innovation' interchangeable, thus the diffusion of innovation framework is suitable for the study of diffusion of ICT.

In accordance to Rogers (2003), the adoption of innovation is reliant on the quality of the innovation in question. He stated five key characteristics of innovations that affect adoption rate: 1) *relative advantage*, 2) *compatibility*, 3) *complexity*, 4) *trialability*, and 5) *observability* (Rogers, 2003). *Relative advantage* alludes to the extent to which a technology is seen as better than the idea it replaces, *compatibility* describes the extent to which a technology is recognized as being in accord with current values, previous experiences and requirements of possible adopters. *Complexity* pertains to the extent to which a technology is discerned as easy or difficult to use and understand and *trialability* refers to the extent to which a technology might be tested within a limited time limit. Lastly, Rogers defined *observability* as the extent to which technology results are noticeable to others. There seems to be a connection between the successful diffusion of innovation and the norms, assumptions, community values and behaviours. This speaks to how much innovations depend on its community and organisation to be successfully implemented.

A number of researchers have utilized Rogers' theory on the diffusion of innovation to explain the portents of ICT diffusion in IHL (Bennett & Bennett, 2003; Li, 2004; Albirini, 2006; Gonçalves & Pedro, 2012). Bennett and Bennett (2003) employed Rogers (Rogers, 1995) theory on the diffusion of innovation assess the "*impact of perceived characteristics of instructional technology on faculty member willingness to integrate ICT into teaching practices.*" The two reported that the utmost essential barriers to adoption of technology use

are the faculty members dislike and doubt in the utilization of technology, contrary to the commonly documented lack of financial funds and technological infrastructure.

Gonçalves and Pedro (2012) employed Rogers theory to examine “*the different stages of technology Learning Management System (LMS) adoption among the faculty member at the University of Lisbon over a period of three academic years.*” Their results showed noticeable growth in the adoption of LMS. The following was recorded, in 2008/2009, nearly 4% of faculties were registered on the Moodle platform. In 2009/2010, the number elevated to 15% and in 2010/2011 the number increased to 39%. The researchers characterised the stages as innovators, early adopter, and early majority accordingly.

Li (2004) utilized Rogers theory of diffusion of innovation to “*examine factors affecting the diffusion of Web-based distance education at the China Agricultural University.*” The results indicated that the university lecturers agreed with the five key characteristics of innovation mentioned above. The same has been reported by (Albirini, 2006). Albirini (2006) found that the five perceived attributes of innovation by Rogers were important in influencing Syrian instructors to integrate technology into their instructional delivery.

A study conducted in Malaysia by (Mohamad Hsbollah, 2009) on e-learning adoption among lecturers aimed to evaluate the perception of lecturers on e-learning adoption. The data collection was from 244 lecturers at the university of Utara Malaysia (UUM). The study utilized logistic regression to determine factors that influence the adoption of e-learning among lecturers in UUM. The outcomes of the study showed that relative advantage, trialability and academic specialisation had a positive effect towards technology adoption.

A study conducted by (Alone, Maiga & Peter, 2016) sought to identify the factors that affect adoption of e-learning technologies in Ugandan High Education Institutions (HEI). To collect data a questionnaire was used. The data were collected from 380380 respondents (learners, lecturers, and ICT support) from four Ugandan HEI. The results of the study showed that Patronage, Compatibility, Trialability, Complexity, Relative Advantage, Perceived Usefulness, and Perceived Ease of Use were the factors that affected the adoption of teaching and learning technologies. Alone, Maiga and Peter (2016) posit that the technology needs to be compatible with the needs of the students, lecturers, and ICT support staff for teaching and learning technologies to be adopted in Ugandan HEIs.

The scholars further suggested that demonstration of the utilization of teaching and learning technologies would help learners, lecturers, and ICT support staff to adopt ICT and AV (Alone, Maiga & Peter, 2016). To reduce technology anxiety amongst lecturers Yang, Mohamed and Beyerbach (1999) proposed trialability as an antidote. Chen and Chao (2011) argued that in a teaching and learning environment, compatibility plays an important function in influencing behaviour towards technology adoption and utilization. Technology will be adopted easily if the effort required to use it is less than that required in traditional instructional delivery methods (Njenga, 2011).

Ntemana and Olatokun (2012) conducted a study to investigate the influence of the five attributes of diffusion of innovation theory on lecturers' utilization of ICT and AV. The scholars utilized the DOI theory as the theoretical framework. The study utilized structured questionnaires for data collection. The research population was made up of 213 lecturers at the National University of Lesotho (NUL). To analyse the results stepwise multiple regression was employed. The scholars' results showed that relative advantage, complexity, and observability had a positive effect on the attitude of lecturers towards the utilization of ICT and AV. Furthermore, the findings revealed that observability had the highest influence. Their recommendation was that the university should organise pertinent training and install user friendly ICT and AV resources in the university.

A study conducted by Almobarraz (2007) looked at internet adoption among lecturers at the Imam Muhammad Bin Saud Islamic University (IMSU) in Saudi Arabia. The study was guided by Rogers' diffusion of innovation (DOI) theory to examine the influence of eight constructs of the DOI. Trialability was determined to influence internet adoption. The results revealed that trialability had a statistical significance in predicting the adoption of internet ( $p = .006 < .05$ ). The results further showed that the construct (trialability) explained 4% of the variance in predicting the adoption of internet with  $R^2$  value = 0.040 (Almobarraz, 2007).

### **2.9.2. Theory of Reasoned Action and Theory of Planned Behaviour**

Ajzen's (1980) theory of reasoned action must be one of the most prominent theories to expound the relationship among human behaviour and intention to accept new technology (Venkatesh et al., 2018). Essentially, the theory acknowledges that there are factors which limit the influence of attitude on behaviour, as long as actions are reasoned, behavioural intentions are predicted. Ajzen's (1980) theory is of particular significance as it has influenced a number

of other theories and models (Davis, 1989). For instance, the Technology Acceptance Model (TAM) in fact originates from the Theory of Reasoned Action (TRA).

Cios (1986) explains the theory of reasoned action by stating that it uses two elements; attitude and subjective norms, in order to predict behavioural intent. Attitude or attitude towards behaviour can be termed as an individual's personal prediction on how either positively or negatively he/she will feel performing a certain behaviour. On the other hand, subjective norms can be described as an individual's perception of social pressure toward him/her to behave in a certain way. According to Ajzen (1980), the studies they conducted led them to consider that attitude towards certain conduct is a function of personal belief. On the other hand, according to TRA theory, a belief that motivates attitude to the conduct is called behavioural belief and a belief that motivates the subjective norms is called normative belief.

Overall, subjective norms, personal and normative beliefs inspire attitudes. These factors put together influence intentions which subsequently influence behaviour. The above authors' argument is that it is important to understand behaviours in order to influence change. TRA states that behavioural change is the consequence of changes in beliefs. These entail that individuals must be exposed to new information that will produce a change in their beliefs, either-or personal or normative beliefs. If change is fashioned in beliefs, it can be fashioned in attitudes, which in turn change intentions, which eventually bring preferred behavioural change. A positive attitude is critical in adoption (Wario, 2014).

Similar to TRA, the Theory of Planned Behaviour (TPB) is also a social psychology theory which simply says, particular prominent beliefs impact behavioural intentions and subsequent behaviour (Ajzen, 1991). The difference between TRA and TPB is the third determinant factor introduced by TPB which is a perceived behavioural control. Perceived behavioural control refers to “... *perceived ease or difficulty of performing the behaviour*” (Ajzen, 1991: 286).

Figure 2.9.2-1 Theory of Reasoned Action (Fishbein & Ajzen 1975)

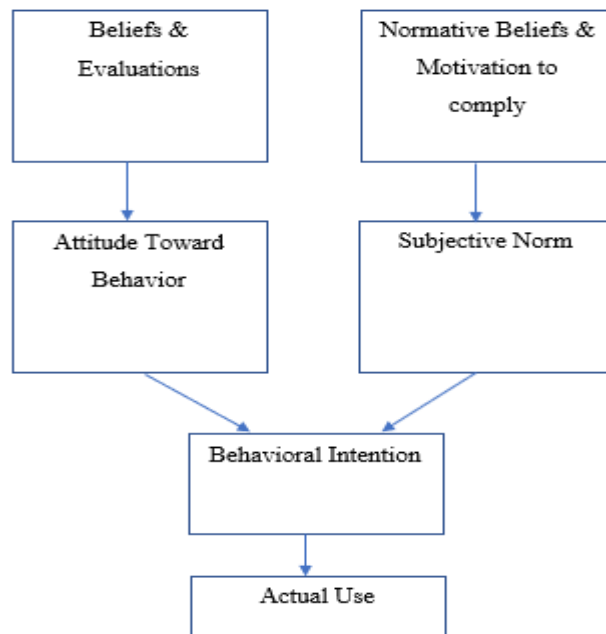
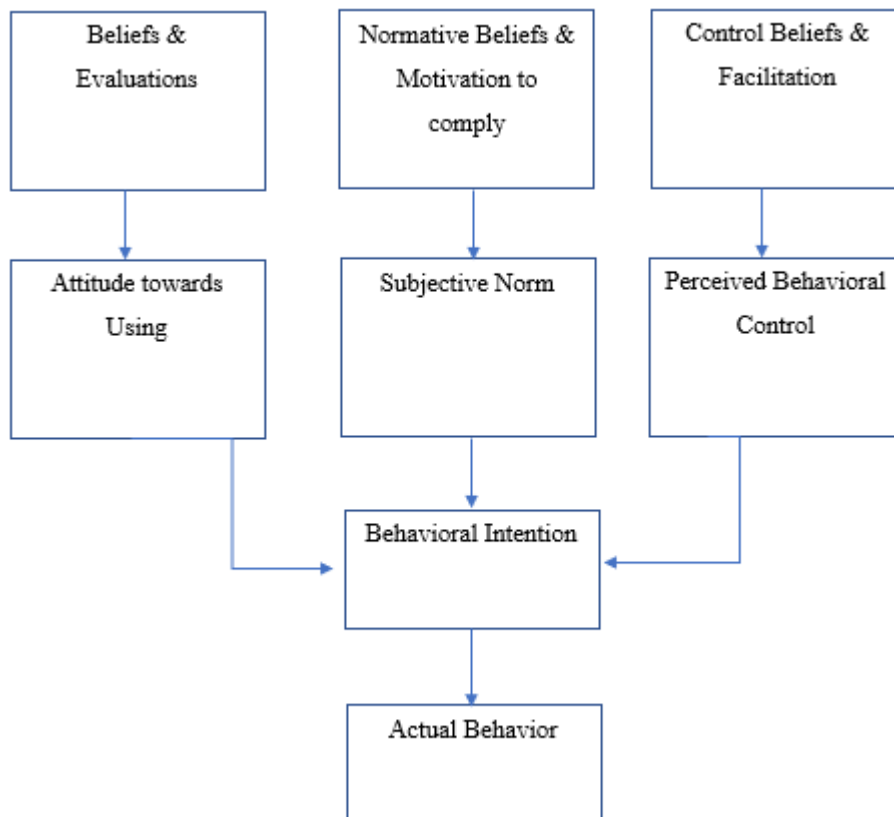


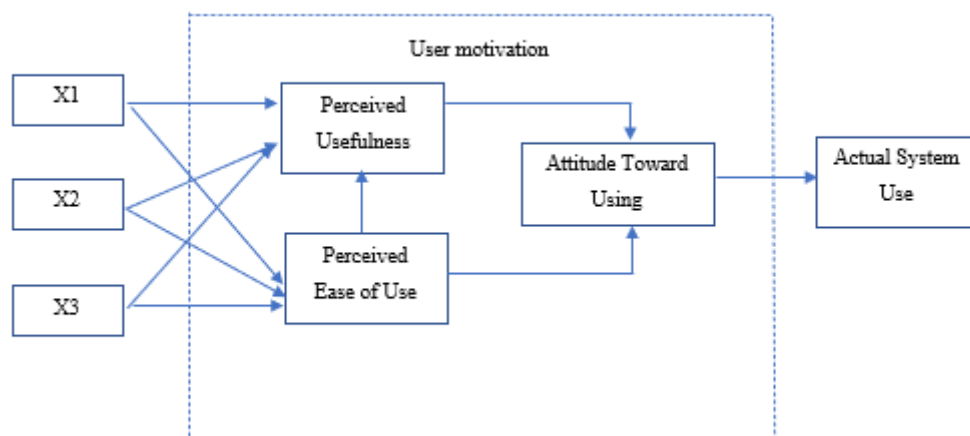
Figure 2.9.2-2 Theory of Planned Behaviour (Ajzen 1985)



### 2.9.3. Technology Acceptance Model

Technologies have been developed and organisations have invested in technologies; however, there is underutilization of these technologies. To solve the problem, Davis (1989) developed the Technology Acceptance Model (TAM) that focuses on the perceptions of users. It is worth highlighting again that TAM is in fact derived from TRA to explain behavioural intentions and the actual behaviour of individuals ICT usage. TRA generally explains the general human behaviour, whereas TAM is specific to the information system (IS) usage. TAM implies that a number of factors influence a user's decisions about how and when they will utilize it. These factors are; *Perceived Usefulness (PU)* and *Perceived ease of use (PEOU)*.

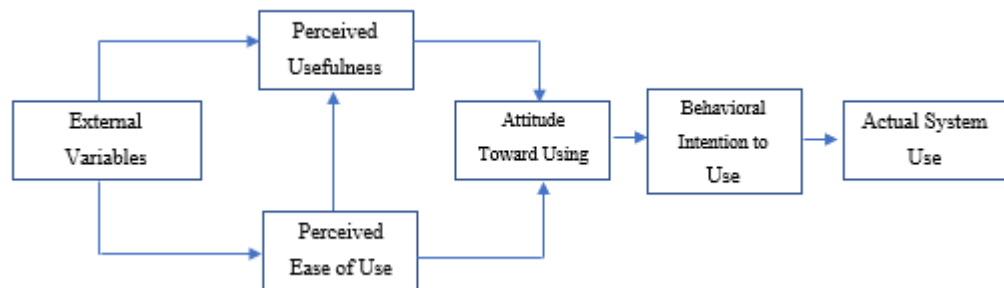
Figure 2.9.3-1 Original TAM proposed by Fred Davis (Davis 1986)



The two factors are central to understanding the essential workings of TAM. Davis (1989) refers to *perceived usefulness* as the degree to which a user thinks that a specific system might improve his or her job performance while *perceived ease of use* refers to the degree to which a user thinks that a specific system might be free of effort. The researcher also took note that in using technology there is an association between users' beliefs about technology's usefulness, attitude and the intent to utilize it (Davis, 1989). TAM replaces most TRA attitudes measure with "ease of use" and "usefulness." Scholars (Jaradat & Smadi, 2013; Kurkinen et al., 2013; Lee & Setiawan, 2013) have found perceived usefulness and ease of use of the TAM significant in individual adoption decision making. The above two constructs of TAM have been revealed as applicable to capture IT usage contexts (Abu-Nahleh, 2013; Abu-Shanab, 2013; Fung, 2013). A study by (Gimhae, 2013) supports the TAM in being able to predict individuals user acceptance of new technology.

The above figure displays TAM as proposed by Fred Davis. Figure 2.9.3-1 displays the originally proposed TAM and figure 2.9.3-2 displays TAM proposed by Davis in 1989. The difference is that the second figure has a behavioural intention (BI) which is not in figure 2.9.3-1.

**Figure 2.9.3-2 Technology Acceptance Model (Davis 1989)**



Davis' (1989) model claims that perceived ease of use influences perceived usefulness such that when users see a technology's "*ease of use*" they perceive the technology a "*useful one*". TAM offers other concepts within the model, attitude towards using (ATT), behavioural intention to use (BI) and actual use (AU). Ajzen (1980) refers to attitude towards using (ATT) as a positive or negative feeling of an individual about performing a target behaviour. In the current study, it can be the use of teaching and learning technologies. The model further states that, a user's attitude towards using technology is influenced by perceived ease of use and perceived usefulness. Furthermore, TAM claims that if a technology is useful and easy to use, the results are that users develop a positive attitude towards using it.

The fourth concept of the model is "*behavioural intention*". Davis (1989) refers to the behavioural intention (BI) as the degree to which a user consciously expresses plans to perform or not perform a specified future behaviour. The model further claims that perceived usefulness (PU) and attitude towards using (ATT) influence behavioural intention to use (BI). As stated above, the study adopted the Technology Acceptance Model and user acceptance of ICT & AV for teaching and learning in teaching centers will be tested. The theory was tested to establish whether lecturers find the use of ICT & AV easy to use or whether it is least effort.

An empirical study conducted by Evans (2013) in South Africa at the University of Zululand sought to predict the acceptance of electronic learning resources by lecturers. The scholar found that on the utilization of e-learning facilities by lecturers, direct influence of behavioural intention to utilize e-learning facilities was the most important. The scholar further concluded that to engage in e-learning it is important to provision an enabling environment for both lecturers and learners. The submission is that an enabled environment will improve behavioural intention towards the utilization of e-learning between lecturers (Evans, 2013).

Al-alak and Alnawas (2011) used TAM as the theoretical framework to “examine attitudes of academics and the adoption of e-learning” in Jordan universities. The validity of the study was tested using structural equation modelling. The results revealed that perceived ease of use and perceived usefulness were significant predictors of behavioural intentions of lecturers to adopt e-learning. The results of their empirical research suggested that adoption and utilization become easy when ICT and AV technologies are compatible with the lecturer’s work arrangement and current practices. Furthermore, the implication of the study is that management support significantly and positively influences the attitudes of academics towards e-learning adoption (Al-alak & Alnawas, 2011).

The literature depicts that although TAM has been successful and popular from an individualistic point of view, the model has its challenges at an organisational level. Where participants have different perspectives with regards to usefulness and ease of use constructs on specific system or technology. TAM’s approach is deterministic and based on cause-and-effect relationship which is less relevant to a socio-complex environment where participants perception is subjective. It is therefore necessary to consider the shortcomings of the model and integrate it with other variables to alleviate its weaknesses.

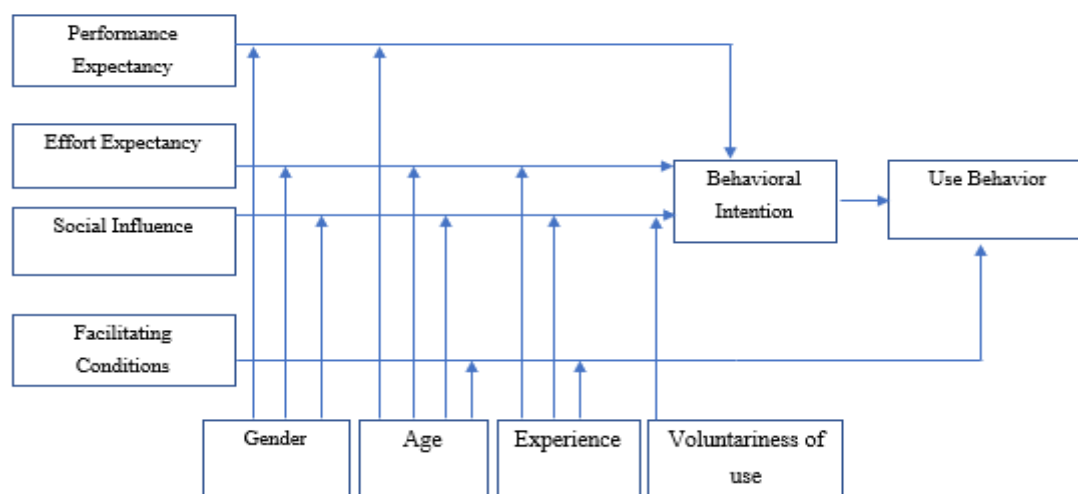
#### **2.9.4. Unified Theory of Acceptance and Use of Technology (UTAUT)**

The UTAUT theory which stands for Unified Theory of Acceptance and Use of Technology was confirmed and recommended to provide a unified theoretical foundation to assist in the investigation of information system (IS) adoption and diffusion. The developers of the theory Venkatesh, Michael Morris, Gordon Davis, and Fred Davis recommended and confirmed the theory to overcome the experiential weaknesses observed on technology adoption, acceptance and use theories/models (Venkatesh et al., 2003). The development and formulation of the theory is grounded on a theoretical and empirical basis of the eight well known technology acceptance models. UTAUT theory comprises: 1) Theory of Reasoned Action (TRA), 2)

Theory of Planned Behaviour (TPB), 3) Technology Acceptance Model (TAM), 4) Motivational Model (MM), 5) Combined TAM and TPB (C-TAM-TPB), 6) model of PC Utilization (MPCU); 7) Innovation Diffusion Theory (IDT), and 8) Social Cognitive Theory (SCT) (Venkatesh et al., 2003; Wu, Tao & Yang, 2007).

The model consists of four direct determinants of BI which eventually leads to positive behaviour toward the adoption and utilization of technology (Venkatesh et al., 2003). The four direct determinants are named as follows: performance expectancy, effort expectancy, social influence, and facilitating conditions. Venkatesh et al., (2003) suggested gender, age, experience, and voluntariness of use as moderators to the effect of the key determinants. The idea behind UTAUT was to provision researchers with a model that will not compromise the roles of other models. UTAUT has been utilized in numerous cultures and organisational contexts thus making it one of the commonly utilized models in technology adoption studies (Akbar, 2013).

**Figure 2.9.4-1 The Unified Theory of Acceptance and Use of Technology (UTAUT) Model Source: Venkatesh et al., 2003**



The UTAUT model has been utilized from a general perspective to analyse predictors of technology acceptance and use perspective in contrast to other theories that are explicitly meant for other domains (Kolawole, 2012). Moreover, consolidation of the reliability and validity of UTAUT, a bibliometric analysis and systematic review of articles that cited the theory from UTAUT's original article was conducted by Dwivedi et al. (2011). The scholars revealed that UTAUT earned popularity and acceptance among IS scholars. Furthermore, the model was effective in identifying factors that are probably influential in the adoption and utilization of technology (Dwivedi et al., 2011).

- **Performance Expectancy (PE)**

Performance expectancy is the degree to which a person believes that utilizing a system helps in doing the job at hand, helps to achieve tasks more quickly, increases productivity, and enhances career progression. In respect with the current research, performance expectancy is where a lecturer believes that ICT and AV facilities will help in instructional delivery. Scholars have found performance expectancy has significant positive effect on behavioural intention towards technology adoption and utilization (Jairak, Praneetpolgrang & Mekhabunchakij, 2009; Wang, Wu & Wang, 2009; Ghalandari, 2012; Abu-Al-Aish & Love, 2013). Moreover, performance expectancy and effort expectancy are significant determinants of behavioural intention to utilize ICT and AV in teaching and learning (Alvarado, Boughzala & Assar, 2014).

- **Effort Expectancy (EE)**

Effort Expectancy (EE) was quantified as perceived ease of use (PEOU) in TAM and in DOI as complexity. Effort Expectancy (EE) is described as the ease related to utilizing a technology (Venkatesh et al., 2003). Scholars have found EE to have a positive effect on perceived usefulness and behavioural intention to utilize ICT (Venkatesh et al., 2003; Wang, Wu & Wang, 2009; Wong, 2013). The above scholars suggest that behavioural intention to utilize ICT is indirectly influenced by perceived ease of use through attitude and perceived usefulness.

Accordingly, intention to utilize and actual system utilization can be experienced if lecturers consider that ICT and AV technologies would increase teaching and learning effectiveness and provide access to quality knowledge. Consequently, perceived usefulness and perceived ease of use have a significant influence on attitude. Therefore, the adoption and utilization become more important when ICT is perceived to influence an individual's productiveness and is believed to be comparatively effort free. (Venkatesh et al., 2003).

A study in the United States at Metropolitan University sought to examine the antecedents of students' adoption of electronic textbooks and learning outcomes (Terpend, Gattiker & Lowe, 2014). One of the study objectives was to understand factors that contributed to students' acceptance of e-texts. The questionnaire was administered at the Business School of the university. Around 20 000 learners were surveyed. The results revealed that perceived ease of use and the price of e-texts were key determinants of the adoption of e-text. However, perceived usefulness, Internet self-efficacy and environmental concerns were factors were not significant. Even though the research was carried out between learners the antecedents of adoption and

utilization of ICT in teaching and learning environment were determined (Terpend, Gattiker & Lowe, 2014).

- **Social Influence (SI)**

Social Influence (SI) is a core construct determinant of behavioural intention to technology utilization. The construct is referred to as “subjective norm” in TRA, TPB, TAM and images in DOI. Norman and Conner (2005) describes SI as the normative belief in perception of others to either engage or not engage in a certain behaviour. According to (Shao & Siponen, 2011), in the adoption and utilization of technology social influence is dependent on demographics influences namely gender, age, and experience. (Chu, 2013) conducted a study in China and revealed there is a positive relationship between social influence and intention to adopt and utilize the internet.

Kate et al. (2010) endeavoured to broaden TAM with additional variable social network characteristics. The researchers assumed that social network features are precursors of subjective norm (Social influence) and are proficient to predict technology adoption and utilization from a perspective of social interactions. The research suggested that when lecturers within a department or faculty are friends, they can easily exchange information, and knowledge about the technologies.

- **Facilitating conditions (FC)**

Venkatesh, Davis and Morris (2007) postulated that the facilitating condition (FC) construct refers to having technological resources and institutional resources. Venkatesh (2003) referred to FC as the extent at which a lecturer assumes that an institutional and technical infrastructure is available to support the adoption and utilization of ICT and AV. Al-Mobaideen (2009) at Jordanian universities developed a model on critical success factors that influence ICT and AV adoption in universities. The scholar utilized the qualitative approach which involved face to face semi-structured interviews, observation, and documentation reviews to understand ICT and AV adoption in four universities in Jordan. Applying deductive analysis, the scholar discovered that infrastructure, networks, policy, and culture had a significant contribution to the adoption and utilization of ICT. In addition, (Arias & Clark, 2004) highlighted that the adoption and utilization of ICT and AV was influenced by elements such as economy, culture, and the availability of technology.

### **2.9.5. Adopted Conceptual Framework**

Gavai, Musungwini and Mugoniwa (2018) described a conceptual framework as a graphical portrayal that shows important concepts of a study and their linkage. It can be viewed as a guide that provides researchers with design research instruments, processes, and procedures to follow in executing the research. In accordance with Imenda (2014), “*a conceptual framework is a product of synthesised related concepts.*” Concepts may be found from the literature. However, a conceptual framework can be developed from understandings, beliefs and sometimes assumption of the study (Gavai, Musungwini & Mugoniwa, 2018). It can be in a narrative or graphical form. In a case where a research problem cannot be meaningfully researched in reference to a single theory, a conceptual framework can be utilized in place of the theoretical framework.

Therefore, the conceptual framework of the current study was a synthesis of concepts borrowed from the Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of innovation theory (DOI). The current study integrated all the four UTAUT constructs, to be exact performance expectancy, effort expectancy, social influence, and facilitating conditions. The constructs were used to examine the third research question: What are the factors that influence the adoption and use of ICT and AV? The data collection tool (see appendix 1), part 2b perused the following items: performance expectancy; effort expectancy/perceived ease of use, social factors/image, compatibility; trialability, observability and, facilitating conditions using a five point likert scale 1= Strongly Disagree 2= Disagree 3= Undecided 4 = Agree 5 = Strongly Agree.

### **2.10. Summary**

What is derived from the above literature is that lecturers are not utilizing technology to its fullest capacity. The literature points that lecturers use technology for research more than they use it for teaching and learning. They need to adapt and align their integration of ICT and AV to their teaching and learning. Furthermore, the literature highlights that stakeholders should collaborate in order to make technology integration a success, even though most teaching and learning institutes have substantially adopted technology for instructional delivery. The uptake of ICT technologies for teaching and learning is unclear across Africa. Review on instructors’ use of ICT in teaching showed that, even though possible benefits were visible from utilizing ICT in teaching, instructors were less likely to enhance their understanding of how ICT could

improve the teaching and learning process (Hammond, Reynolds & Ingram, 2011; Aflalo, Zana & Huri, 2018; Grimalt-Álvaro, Ametller & Pintó, 2019). Teaching and learning institutes face significant encounters to transform the mindset of lecturers from traditional instructional delivery. It is evident that there are possible benefits for students and as well as institutes of teaching and learning. The review further suggests that training courses, ongoing professional development, availability of technology (infrastructure), and most important colleagues, may have an impact on technology adoption for teaching and learning.

What confronts teaching and learning institutions is finding a way to remove barriers that prevent lecturers from adopting and utilizing technology in teaching and learning. Institutes of teaching and learning can optimize the benefits of technology if they manage to get the majority of lecturers fully utilizing it. The above literature indicated the possibility to obtain the necessary skills needed for employment in the future, develop good problem-solving, communication and critical thinking skills, collaborating with fellow peer groups, engage in hands-on learning activities and getting immediate feedback. Moreover, the literature discusses theories and framework explaining possible factors impacting technology use and utilization. The research framework and questionnaires of this study were developed using information obtained from studies using these models and additional ad hoc factors. In conclusion, understanding the digital readiness of lecturers, institutions of teaching and learning can make a success and employ integrated teaching and learning strategies.

## **Chapter 3**

### **3. Research design and methodology**

#### **3.1. Introduction**

The previous chapter presented an overview of ICT integration in teaching and learning centers, the adoption and utilization of ICT for instructional delivery, and factors affecting the implementation of ICT. This chapter gives a description of the research design with techniques used for gathering information and other aspects related to the study. The chapter describes the different research methodologies frequently utilized in social research. Furthermore, the research sub-questions, aims of the study, the research design which includes the qualitative and quantitative research methods, research methodology used, description of data required, the research setting, and its elements will be discussed. Moreover, the chapter discusses the processes followed, the research paradigm, population, and sampling. Methods of data collection, ethical considerations and measures that ensure reliability and validity are described in this chapter.

#### **3.2. Research question and sub-questions**

The problem statement in chapter one is defined in terms of the four objectives which intends to meet the objectives of conducting the research. The research methodology is a procedure adopted to associate the research questions and the method for data collection, analysis and explanation in a manner that is logical. The following is the main research question that needs to be answered: What are the factors that contribute to the adoption and utilization of ICT and AV in teaching and learning centers at North-West University Mafikeng?

Empire State College (2020) refers to research sub-questions as questions that assist the research scholar to answer the research question. Moreover, the research question keywords are used and utilized to develop good questions (Empire State College, 2020). Through analysing the literature thoroughly, the researcher was be able to derive research questions for the questionnaire and interviews. The following are the research sub-questions:

- To what extent are ICT and AV facilities adopted in teaching and learning centers?
- To what extent are ICT and AV facilities utilized by lecturers in teaching and learning centers?

- What are the factors that influence the adoption and utilization ICT and AV in teaching and learning centers?
- What challenges affect the adoption and utilizing ICT and AV in teaching and learning?

### **3.3. Objectives of the research study**

The most essential objective of utilizing technology in teaching and learning is to allow lecturers to be on par with future teaching concepts and to prepare learners for future professions. It has been determined that utilization of teaching and learning technology is important because of the impact it has on students' performance and development.

The following are objectives of the study:

- To determine the extent to which of ICT and AV facilities adopted in teaching and learning centers
- To determine the extent to which lecturers utilize ICT and AV in teaching and learning centers.
- To determine the factors that influence the adoption and utilization of technology in teaching and learning centers.
- To determine the challenges that affect adoption and utilizing of ICT and AV in teaching and learning centers.

### **3.4. Research Paradigm**

Creswell (2014) suggested that the actions of the study are guided by the research paradigm. The scholar further postulates that the research paradigm can be named a philosophical world view whereby four dimensions are employed through the research process; epistemology, ontology, axiology and methodology (Creswell, 2014). As a term, paradigm originates from the Greek word "*paradeigma*" which connotes pattern. The term was first used by Thomas Kuhn (1962) to represent a conceptual framework shared by a community of scientists which provided them with an appropriate model to investigate problems and find solutions (Thomas, 2010).

Grosser, Simmonds and Van der Vyver (2017) argue that the global knowledge base of research is made of four philosophical worldviews, i.e. post-positivism, social construction, transformative and the pragmatic knowledge base. Dwivedi, Williams and Lal (2008) highlighted the fact that 74.8% of studies utilize the positivism paradigm. The above indicates

that positivism is the dominant or most popular epistemology in research. Guba and Lincoln (1994) further add by submitting that the shortcoming of positivism can be averted by using qualitative data. The study adopted a post-positivism worldview. The epistemology of post-positivist research can be characterised as a modified dualist/objectivist philosophy (Guba & Lincoln, 1994). Drawing from Saunders, Lewis and Thornhill (2016), post-positivism holds the theory that humans create knowledge for understating views or beliefs about the globe. Post-positivism emphasizes multiple measurements and observations to get a better knowledge about the world, as a result, all measurement is imperfect (Trochim, 2006).

Post-positivism displays openness to different methodological techniques, and frequently includes qualitative and qualitative methods (Glicken, 2003). Glicken (2003) continues to highlight that alternative strategies to find information in unlikely and creative ways is permitted. In addition, post-positivists believe in multiple perspectives from research participants instead of a single reality (Creswell, 2009). Maree (2016) suggests that within a post-positivism paradigm, researchers follow a crucial realist ontology, knowledge is fallible however not equally fallible (Yeung, 1997). Moreover, reality exists but cannot be perfectly understood (Maree, 2016). Creswell (2009) further postulates that post-positivists developed understanding through scientific tests and observation, determining objective reality in the world.

The explanation for adopting a post-positivism paradigm for the study is that it allows a combination of both qualitative and qualitative methods. Post-positivists also acknowledge the complex connection that exists between individual behaviour, attitudes, external structures, and socio-cultural issues (Crossan, 2003). Moreover, the study intends to examine the influence of independent variables: performance expectancy, effort expectancy, social influence, behavioural intention, observability, trialability, compatibility, facilitating condition on the adoption and utilization of ICT and AV facilities in teaching centers. Thus, the post-positivist paradigm was used to collect data relevant to the research problem.

### **3.5. Research Design**

Creswell (2014) affirmed that what contributes to the research approach are philosophical assumptions, design and methods. The scholar makes mention of three research approaches which are the quantitative research method, the qualitative research method and a mixed research method (Creswell, 2014). The types of research approaches are elaborated further in the section below.

### **3.5.1. Quantitative research approach**

Edmonds and Kennedy (2016) posited that a quantitative method involves the use of systematic steps of scientific research which adopt empirical methods to investigate a specific social phenomenon. The approach utilizes arithmetical information and data to generalise the results of the selected population (Maree, 2016). Creswell (2014) maintained that researchers who utilize the quantitative research approach start with the theory. The theory is used to analyse, examine, and provide predictions from the collected data to answer the research question. Furthermore, the theories are tested by scrutinizing the relationships between variables, measured through the use of detailed instruments and analysing the data using statistical procedures (Creswell, 2014). Advantages of the quantitative research approach include:

- Allows scholars to present information in graphs charts and tables.
- Allows scholars to establish and discover the prevailing relationship between variables.
- Works with collecting data using questionnaires.
- Allows for wider coverage and response within a short time frame.

### **3.5.2. Qualitative research approach**

Bryman and Bell (2015) refer to the qualitative research approach as the collection of non-quantitative data using designs, namely, participant observations, phenomenology, and/or case studies to interpret the outcomes. Qualitative research focuses on producing meaning and in-depth understating through thorough description. The scholar collects open-ended, emerging data with the principal intent of developing themes from the data. Advantages of a qualitative research approach are as follows:

- It allows subject materials to be assessed in more detail
- It allows the researcher to interact with participants through interviews, gaining extensive information
- It enables the researcher to provide the results in a narrative account thus establishing the central concepts and then discussing these concepts

### **3.5.3. Mixed research approach**

Creswell and Maree (2016) referred to a mixed research approach as the collection, analysis and utilization of quantitative and qualitative data in a research study to obtain comprehensive knowledge. Data collection is both numeric information (e.g., on collected during surveys) as well as text information (e.g., collected during interviews) to ensure that the final database is the representation of both quantitative and qualitative information. Other positive aspects of utilizing a mixed method research approach are:

- Supports the results of the study by comparing and discussing both qualitative and quantitative findings.
- Discusses the quantitative findings before the qualitative findings thereby establish lucidity of findings.
- Quantitative findings are used to inform other qualitative results thus increasing the scope and range of the study.

This study adopted a mixed research approach. The goal is to utilize a mixed methods research approach by taking benefit of the distinctions between quantitative and qualitative research methods. It combines both of these methods for use within a research project depending on the kind of study and its own methodological groundwork (Bryman & Burgess, 1999). Quantitative questions are intended to establish the extent to which the lecturers utilize ICT and AV facilities for teaching and learning in teaching centers. In a qualitative study the phenomenon's qualities, properties or characteristics are examined aimed at providing better understanding and explanation. Questions that were asked intended to establish the perceptions of participants about their usage of ICT & AV usage in teaching and learning centers.

The mixed research approach is made up of four main types, i.e. triangulation design, embedded design, explanatory design, and exploratory design, as detailed by (Creswell, 2014). This study adopted the explanatory sequential mixed methods research design as suggested by Creswell and Clark (2017). The rationale behind using the sequential explanatory approach is centred on the fact that quantitative data and its statistical analysis will provision a general insight of the research question (Creswell & Clark, 2017). The qualitative aspect of the study will enhance and explain the quantitative aspect by investigating the views of the lecturers in depth (Creswell, 2009). In the present study the quantitative approach was prioritised based on the objective to determine extent of the adoption and utilization of ICT and AV facilities for

teaching and learning in teaching centers, to understand the factors that affect the adoption and utilization thereof; and to identify challenges that affect the adoption and utilization of ICT and AV in teaching and learning centers. The qualitative phase of the present study explored and explains the results obtained from the quantitative analysis.

### **3.6. Population**

A population is a complete set of persons or objects, which may be finite or infinite (Saunders, Lewis & Thornhill, 2016). The population can be divided into three categories namely finite, existence and hypothetical population. The finite population involves numbers that are countable or fixed. An existence population refers to identifiable individuals. A hypothetical population explains the materialisation of a population. A sample is part of a population. Sampling defines the selection of units of research or individuals of research. This is followed with a selection procedure, and motivating participation of selected participants (Gary, 2009). Sampling can also be broken down into probability (representative) sampling and non-probability (non-representative) sampling.

As highlighted, the aim of this study is to evaluate the adoption and the extent of the utilization of technology by lecturers in teaching and learning centers. Furthermore, the purpose is to determine the challenges encountered in utilizing ICT and ICT dynamics at the instructional delivery level. This involves a thorough study of the broader and internal factors that influence the phenomenon. The sample was drawn from lecturers at North-West University (NWU) Mafikeng employed in the Faculty of Economic Management and Sciences (FEMS).

By definition, a unit of analysis is a phenomenon one looks to study (Lewis-Beck, Bryman & Futing Liao, 2004). In a general sense, it is what a researcher ends up sampling in a quantitative study. According to Lewis-Beck, Bryman and Futing Liao (2004), a primary unit is an element that is to be subjected to statistical analysis.

### **3.7. Sampling**

In accordance with Gray (2013), sampling is selecting subsets which are involved in the population in a manner that it can be used to generalize the population results. The study used probability sampling ensuring that each and every element has an equal chance of being selected. Furthermore, with probability sampling, simple random sampling was employed in the quantitative phase because of its advantage of removing bias (Creswell, 2014). In the

qualitative phase stratified purposive sampling strategy was utilized to select research participants. In this study, a sample was drawn from NWU academic staff members in the Faculty of Economic Management and Sciences (FEMS). Academic lecturers/instructors formed the unit of analysis. The unit of analysis comprised of academic lecturers/instructors who provide instructional delivery at the North-West University Mafikeng Campus. Furthermore, respondents consisted only of academic lecturers in the Faculty of Economic and Management Sciences (FEMS).

Often the size of a sample determines the accuracy of the general population. The sample size was forty (40) lecturers from North-West University Mafikeng in the Faculty of Economic Management and Sciences (FEMS). Data were collected from the faculty because of the role it plays in preparing students for the leading roles they will be expected to play in their professional lives. Lecturers further contribute vastly to the development of the curriculum thus they were deemed as the relevant stakeholder group. This well-characterized collection of individuals or objects is known to have similar characteristics (Trochim & Donnelly, 2006).

### **3.8. Data collection**

Gray (2013) described data collection as a procedure used to attain data from research participants. To answer the research questions the study collected data through structured questionnaires, semi-structured, and face to face interviews. Questionnaires were distributed to forty (40) lecturers, and five (5) lecturers were selected for the semi-structured and face to face interviews. An ethical clearance form was requested from the relevant authorities. A sample questionnaire and consent form that assured participants of confidentiality, anonymity, voluntariness, and non-maleficence were distributed to NWU Mafikeng FEMS lecturers to justify the results. The questionnaire was formulated to determine the extent at which teaching, and learning technologies are adopted, utilized, the perception of lecturers and factors that affect the adoption.

The objective of the study was explained in the consent letter as it is critical to emphasise the importance of the survey and the contributions expected from the questions. Participants had the freedom to voluntarily participate in the research knowing in detail what the research entailed. They were requested to acknowledge the consent form as an indicator that participation in the study was voluntary. Research participants were anonymous, and the contents of the survey were confidential. Participants were selected randomly from the

population. They were contacted discretely via email, SMS, or phone call to set up appointments. During the appointments, the researcher explained the ethical considerations of the interview and/or questionnaire. The researcher did the administration of the questionnaires and interviews.

### **3.8.1. Questionnaire**

#### **3.8.1.1. Development of questionnaire**

The questionnaire is structured to be brief and ask only for information that is important and necessary for the study. To assist in making the best use of the responses to the questionnaire, the questionnaire consisted of three parts. The first part of the questionnaire asked demographical questions. Part two asked questions relating to adoption of teaching and learning technologies. The third part of the questionnaire asked questions relating to the extent of the utilization of teaching and learning technologies. The questions in the questionnaire are related to the literature review (Chapter 2) and additional research instruments utilized in comparable research. The five perceived attributes of innovation by Rogers (2003), Ajzens' theory of reasoned action (Azjen, 1980) and Davis' (Davis, 1989) Technology Acceptance Model were also utilized to derived responses.

#### **3.8.1.2. Structure of questionnaire**

The questionnaire was comprised of closed questions that attempted to determine the extent at which lecturers of NWU Mafikeng adopt and utilizes technology for teaching and learning, usage of the technology, attitudes of lecturers, factors affecting the utilization and extent of tools utilized. The following categories are contained in the questionnaire:

Part 1: Demographic information (general personal particulars of the participant).

Part 2a: Extent of adoption of ICT and AV in teaching and learning centers

Part 2b: Extent of usage of ICT and AV in teaching and learning centers

Part 2c: Factors that influence the adoption and utilization of ICT and AV in teaching centers

Part 3: Challenges affecting the utilization of ICT and AV

### **3.8.2. Interviews**

#### **3.8.2.1. Development of interview**

Interviews were used to gather additional data to corroborate the information obtained from the questionnaire. As stated above, semi-structured interview questions were used to address lecturers about their perception and attitudes with regards to the utilization of ICT for teaching and learning in teaching centers. The interviews were recorded, and English was the common language to avoid misunderstandings between the interviewer and the interviewee. The interview questions were structured in such a way that the researcher would get supplementary information from the interviewee. All the data collected through the interviews was analysed using qualitative analysis (See appendix 2).

### **3.9. Data coding and analysis**

Bastick and Matalon (2007) described data analysis as the interpretation of the data that is collected from research participants to present a comprehensive report. Data analysis involves the interpretation of findings against the research questions and, determining if the results are constant with research objectives. A descriptive approach was employed in analysing the data. Saunders, Lewis and Thornhill (2016) suggested that descriptive statistics are used to depict and summarise the data. Descriptive statistics formed the basis of all quantitative reasoning.

It uses measures such as dispersion or variability, frequency distributions, tabular data, bar charts, measures of central tendency and measures of relationships. The data types used/analysed in the study were nominal and ordinal. This data was analysed using data techniques such as frequency distribution and cross-tabulation. A statistical application by the name of the International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS 26.0) and NVivo Version 14, Plus Edition was used to process and analyse the data collected. IBM's Statistical Package for the Social Sciences (SPSS) is an integrated set of modules used to manipulate, analyse, and present data in a form of charts, graphs, and tables.

A cross-tabulation with a chi-square test was employed to test the kind of association that exists between two variables. The test is a statistical technique used to examine categorical relationships between two (nominal or ordinal) variables (IBM, 2018). With regards to qualitative data, content analysis was used for reports and transcripts of conversations (Focus group interviews). The reason for content analysis is because it uses standardised measurement

for code, characterisation and comparison of text makes it more relevant to be used in this type of study.

### **3.10. Measures to ensure validity, and reliability (trustworthiness)**

The study took from Maree (2016) that to ensure reliability and validity scholars should put measures in place, i.e., the trustworthiness of the study such as credibility, transferability, dependability and conformability. Credibility ensures confidence in the truth of the research results. Transferability ensures that research results can be applied in another context. Dependability ensures that research findings can be repeated and are consistent, while confirmability ensures that the research findings are shaped by the research participants and not the researcher's bias, motivation or interest (Lincoln & Guba, 1985).

Drawing from Grosser, Simmonds and Van der Vyver (2017), triangulation or crystallization are used to strengthen trustworthiness, and validity is strengthened by the use of multiple methods, data collection strategies, cross-check of information and analysis. Remler and Van Ryzin (2014) described validity as the presentation of findings of the research without distorting the research participants' intentions. Reliability ensures that the research process produces stable and consistent results (Gratton & Jones, 2014).

The validity of the study was strengthened by using multiple data sources to cross reference the research findings. The interview questions were formulated to ensure reliable results. Questionnaires provided an insight into the extent of usage of ICT and AV facilities for teaching and learning in teaching centers. Interviews provided an understanding of lecturers' perception with regards to their usage of ICT & AV in teaching and learning centers. Documents reviewed provided an insight into factors underlying the utilization of ICT & AV facilities. In this regard, triangulation reduced the possibility of portraying misleading or false interpretation of data. To increase the reliability of data the researcher interviewed only academic lecturers. Factors such as time, intervention, situations, and measures were considered by the researcher as they can affect validity and generalizability. To ensure that the above factors were managed, the researcher contacted the respondents through appropriate means prior to visiting them for interviews and questionnaire distribution. In terms of electronic data, the researcher had a conventional electronic information keeping network drive (NWU Google Drive) and methodically saved all communications with the supervisor, submissions, and backup all the data.

### **3.11. Ethical considerations**

The Belmont Report and the Nuremberg Code (Beauchamp, 2008) suggested that for any study conducted the university subscribes to the research ethics and guidelines as prescribed. According to Saunders, Lewis and Thornhill (2016), ethical considerations ensure that the rights of participants are not violated. The fundamental purpose of ethical considerations is to curb the ill-treatment of research participants. It was important for the researcher to understand and uphold the research participants' basic human rights when they took part in the research study.

The rights to privacy and protection from physical and psychological harm had to be considered. Non-maleficence (harm that may occur intentionally or unintentionally in the study) was avoided. Secondly, there was a consideration of the beneficence principle. The principle states that the study should be helpful to most people. Thirdly, the autonomy principle made it imperative that research participants had to give informed consent to being part of the study. Therefore, research participants will be provided with the consent form (Saunders, Lewis & Thornhill, 2016).

It was important to consider the justice principle, which addresses issues of fairness and equal treatment of research participants. Confidentiality entails protection of sensitive and personal information of participants. The anonymity principle, which refers to not assigning identities to research participants was adhered to. The process eliminated compromising participants' confidentiality. Minors did not partake in the research, only permanent academic members of NWU Mafikeng participated in the questionnaire. As required by NWU, the research was subject to ethical considerations.

The university's higher degree committee (HDC) that relates to the non-violation of research ethical issues guided and aligned the study. An ethical clearance form was requested from the relevant authorities. Pursuant to the above, the researcher requested permission from the gatekeeper to conduct the research at the NWU Mafikeng campus. The researcher also requested permission from the dean of FEMS to be granted access to the research participants.

### **3.12. Summary**

The above chapter provided a description of the research methods adopted for the study in order to find solutions to the current problem as stated in the problem statement. The study adopted the post-positivism paradigm which emphasizes multiple measurements and observations to get a better knowledge about the world.

The paradigm improved the study as it displays openness to different methodological techniques and frequently includes qualitative and qualitative methods. A mixed method study was applied utilizing explanatory sequential mixed methods design which assisted in obtaining the opinions of respondents through face to face interviews and to establish the extent that the lecturers utilize ICT and AV facilities for teaching and learning in teaching centers.

## **Chapter 4**

### **4. Results and Discussion**

#### **4.1. Introduction**

The study sought to evaluate the extent of adoption and the utilization of ICT and AV for instructional delivery at NWU Mafikeng. The following chapter deals with the presentation and discussion of the results gathered from the research participants through questionnaires and interviews. An incorporation of both quantitative and qualitative analysis was employed to form a mixed method approach. The quantitative data gathered from the lecturers through questionnaires, whereas qualitative data were gathered through interviews. The questions included in the questionnaire are informed by the literature in chapter two and are intended to address the objectives of the research. This chapter presents, analyse interpret and discusses the results of the data.

#### **4.2. Rate of return**

The response rate is utilized as “a common measure to evaluate survey quality under the premise that a higher response rate will produce findings that are more representative of the population of interest” (Johnson & Wislar, 2012). A Sample size of 40 was the intended sample for collecting data. Therefore, the questionnaires were distributed to the FEMS lecturers at the Mafikeng campus. The questionnaires for quantitative purposes were distributed to the FEMS lecturers (the sample) at the Mafikeng campus. From the 40 questionnaires which were administered to lecturers, 35 (87.5%) were completed and returned. The above response rate is acceptable and conforms to recommendations by Bless, Higson-Smith and Kagee (2006).

The response rate for this study was above the 60% threshold as suggested by Johnson and Wislar (2012). For the qualitative study, five (5) respondents took part in the semi structured interviews. The response rates of 87.5% was considered as a sufficient representation of the population of interest in accordance with Johnson & Wislar (2012).

### 4.3. Data Analysis and Research objectives

The following section of the study presents the results of the surveys based on the response of the research questions. It reflected on the research questions: the extent to which ICT and AV facilities were adopted in teaching and learning centers, the extent to which lecturers utilize ICT and AV in teaching and learning centers, the factors that influence the adoption and utilization of technology in teaching and learning centers, and the challenges that affect the adoption and utilization of ICT and AV in the teaching and learning centers at the NWU Mafikeng campus. The Statistical Package for the Social Sciences (SPSS) Version 26 was used to analyse the quantitative data and the NVivo Version 14 Plus Edition was used to analyse the qualitative data.

#### 4.3.1. Demographic variables

##### Age distribution (lecturers)

Table 4.3.1-1 Age Distribution

| Age Distribution   | Percentages of Age | Count of Age |
|--------------------|--------------------|--------------|
| 20 – 29            | 20%                | 7            |
| 30 – 39            | 49%                | 17           |
| 40 – 49            | 23%                | 8            |
| 50 and above       | 9%                 | 3            |
| <b>Grand Total</b> | <b>100%</b>        | <b>35</b>    |

Table 4.3.1-1 above depicts that from 35 responses 7 (20%) were between 20-29 years, 17 (49%) were between 30-39 years, 8 (23%) were between 40-49 years and 3 (9%) were 50 years and above. The results imply that the majority of the respondents were between 30-39 years followed by those between 40-49 years.

##### Gender Distribution

Table 4.3.1-2 Gender distribution

| Gender             | Percentage of Gender | Count of Gender |
|--------------------|----------------------|-----------------|
| Female             | 46%                  | 16              |
| Male               | 54%                  | 19              |
| <b>Grand Total</b> | <b>100%</b>          | <b>35</b>       |

Table 4.3.1-2 above depicts that from 35 responses 16 (46%) were female and 19 (54%) were male. The researcher did not apply any preferences to a specific gender. The figures further show that most of the respondents were marginally male. All the respondents identified their gender.

### Access to full range of ICT & AV facilities distribution

Table 4.3.1-3 Access to full range of ICT & AV facilities

| Access to full range of ICT & AV facilities in teaching centers? | Percentages | Count |
|------------------------------------------------------------------|-------------|-------|
| No                                                               | 29%         | 10    |
| Yes                                                              | 71%         | 25    |
|                                                                  | 100%        | 35    |

Table 4.3.1-3 above shows that out of a total of 35 respondents 10 (29%) said that they do not have access to a full range of ICT & AV facilities in teaching centers and 25 (71%) said they have the full range of ICT & AV facilities. The results show that most respondents agreed (71%) that they have full range of ICT & AV facilities.

### How do you access reading materials?

Table 4.3.1-4 How do you access reading materials

| How do you access reading materials | Percentages | Count     |
|-------------------------------------|-------------|-----------|
| Print it to read it                 | 9%          | 3         |
| Read it on my computer              | 3%          | 1         |
| Read it on my computer/laptop       | 86%         | 30        |
| Read it on my phone/tablet          | 3%          | 1         |
| <b>Grand Total</b>                  | <b>100%</b> | <b>35</b> |

Table 4.3.1-4 shows how lecturers prefer to access reading materials. The results depicted that out of 35 respondents 3 (9%) prefer printing the material to read, 1 (3%) prefers accessing it on their computer, 30 (86%) prefer accessing the material using their laptops and 1 (3%) prefers accessing them using their phone/tablet. The figures further suggest that the majority made up 30 (86%) of respondents prefer accessing reading materials through their laptops.

### How would you prefer to receive your teaching materials?

Table 4.3.1-5 How would you prefer to receive your teaching materials

| How would you prefer to receive your teaching material? | Percentages | Count (N) |
|---------------------------------------------------------|-------------|-----------|
| Does not matter                                         | 23%         | 8         |
| Electronic book                                         | 57%         | 20        |
| Hardcopy (Printed book)                                 | 20%         | 7         |
|                                                         | <b>100%</b> | <b>35</b> |

Table 4.3.1-5 above depicts that from 35 responses, 8 (23%) say that it does not matter how they prefer receiving teaching materials, 20 (57%) prefer receiving teaching materials through in electronic book format and 7 (20%) prefer receiving teaching material as a hardcopy (printed book). The results indicated that most respondents prefer receiving teaching materials in electronic format.

## 4.4. Reliability

### 4.4.1. Overall Reliability

**Table 4.4.1-1 Overall Cronbach's Alpha coefficient**

| <b>Reliability Statistics</b> |            |
|-------------------------------|------------|
| Cronbach's Alpha              | N of Items |
| .912                          | 68         |

The overall reliability of the questionnaire was determined and verified with descriptive statistics utilizing Cronbach's Alpha coefficient. It was determined that the overall reliability coefficient was 0.912 as depicted in Table 4.4.1-1. It is worth noting that a coefficient of 0.912 is considered acceptable in most social research. Therefore, all items show a relatively high internal consistency.

### 4.4.2. Parts of the questionnaire Reliability

**Table 4.4.2-1 Statistical Reliability**

| <b>Statistical Reliability</b> | <b>Questions or Statements</b> | <b>Cronbach's Alpha</b> |
|--------------------------------|--------------------------------|-------------------------|
| Part 2                         | 8                              | .674                    |
| Part 3                         | 12                             | .723                    |
| Part 4a Item1                  | 6                              | .920                    |
| Part 4b Item2                  | 6                              | .860                    |
| Part 4c Item3                  | 4                              | .912                    |
| Part 4d Item4                  | 4                              | .793                    |
| Part 4e Item5                  | 3                              | .717                    |
| Part 4f Item6                  | 3                              | .710                    |
| Part 4g Item7                  | 6                              | .728                    |
| Part 4h Item8                  | 4                              | .609                    |
| Part 5                         | 11                             | .838                    |

The above table (Table 4.4.2-1) summarizes Cronbach's Alpha analysis on each part of the questionnaire. The figures show that all parts are within the acceptable range, which is 0.6 to 0.9.

## 4.5. Data Analysis and research objectives

### 4.5.1. Extent of adoption of ICT & AV facilities in teaching and learning centers.

**Table 4.5.1-1 Extent of adoption of ICT & AV facilities in teaching and learning centers N=35**

|                                                                                                                                  | <b>Strongly Agree (%)</b> | <b>Agree (%)</b> | <b>Neutral (%)</b> | <b>Disagree (%)</b> | <b>Strongly Disagree (%)</b> | <b>Majority Response (%)</b> | <b>Mean</b> | <b>Std. Dev</b> |
|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------|--------------------|---------------------|------------------------------|------------------------------|-------------|-----------------|
| I currently use ICT & AV in teaching and learning                                                                                | 48,57%                    | 40,00%           | 5,71%              | 2,86%               | 2,86%                        | 48,57% Strongly Agree        | 4.29        | .926            |
| I have made changes to accommodate ICT & AV utilization in my lectures                                                           | 45,71%                    | 42,86%           | 5,71%              | 2,86%               | 2,86%                        | 45,71% Strongly Agree        | 4.20        | .961            |
| I regularly pursue innovative ways to incorporate ICT & AV instructional facilities into my lectures                             | 34,29%                    | 54,29%           | 5,71%              | 2,86%               | 2,86%                        | 54,29% Agree                 | 4.03        | .890            |
| I provide my learners course materials in electronic format                                                                      | 74,29%                    | 22,86%           | 0,00%              | 0,00%               | 2,86%                        | 74,29% Strongly Agree        | 4.66        | .765            |
| I incorporate ICT & AV in my teaching to such an extent that it has become standard learning tools for my learners               | 54,29%                    | 40,00%           | 2,86%              | 0,00%               | 2,86%                        | 54,29% Strongly Agree        | 4.43        | .815            |
| I incorporate ICT & AV in my teaching to such an extent that my students can collaborate with other students even after lectures | 45,71%                    | 37,14%           | 17,14%             | 0,00%               | 0,00%                        | 45,71% Strongly Agree        | 4.29        | .750            |

Table 4.5.1-1 depicts the items utilized in measuring the extent of adoption of ICT and AV in teaching centers among lecturers at North-West University, Mafikeng. The table shows that from the 35 respondents, 74.29% strongly agreed that they provide learners, course materials in electronic format, 54.29% strongly agree that they regularly pursued innovative ways to incorporate ICT & AV instructional facilities into their lectures, and that they incorporated ICT & AV in their teaching to such an extent that it has become a standard learning tool for their learners.

The data presented shows that the parameter “*I provide my learners course materials in electronic format*” records the highest mean score of 4.66 and thus takes the first position. The second highest scoring parameter was “*I incorporate ICT & AV in my teaching to such an extent that it has become standard learning tools for my learners*”, with a mean score of 4.43. The above table (Table 4.5.1-1) expresses significant measurement of attributes. The table shows that all attributes scored a mean of over 4.0. The results demonstrate the extent of

adoption of ICT and AV in the teaching and learning centers. The results indicate that the level of adoption of ICT and AV among NWU lecturers is relatively high.

The first research question which asked about the extent of adoption of ICT and AV in teaching centers was addressed via interviews (qualitative) with FEMS lecturers. There was one specific question from the interview guide (See Appendix 2) that provided the answer for the to the first research question. The research participants were asked to describe the extent of adoption of ICT and AV in teaching centers at their campus. The results of the qualitative analysis dictate that the level of adoption of ICT and AV among lecturers at NWU Mafikeng is considerable. The results of the qualitative analysis (see Figure 4.5.1-1) substantiate that the level of adoption of ICT and AV among NWU lecturers is relatively high.

One of the research participants responded as follow: *“I would say over 70% of my colleagues use technology for instructional delivery and the hope is that it will improve as time goes by. From my observation as well, most young academics have adopted the culture of utilizing this teaching and learning technologies, particularly the technologies in teaching centers.”*

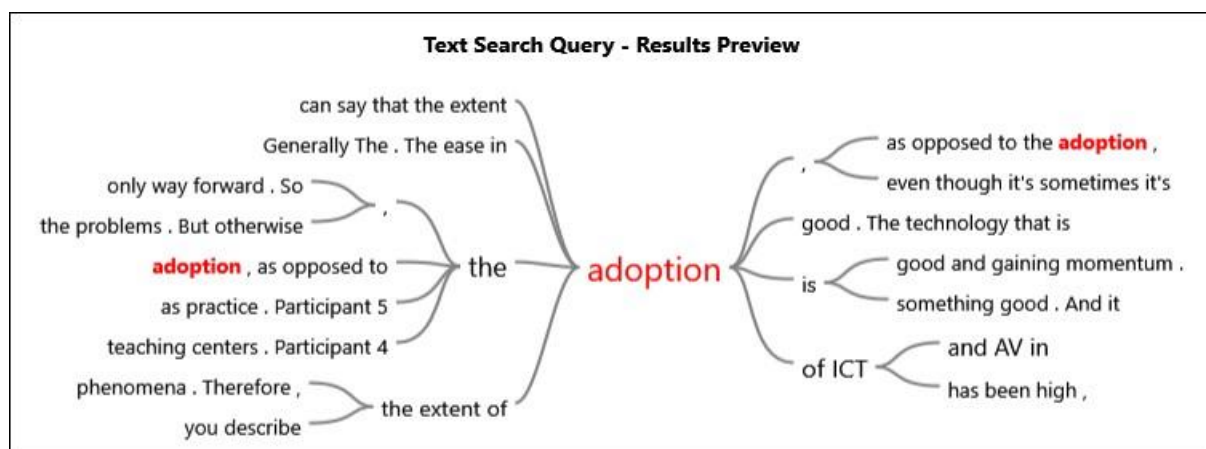


**Figure 4.5.1-1 Extent of adoption of ICT & AV facilities in teaching and learning centers**

Table 4.5.1-2 depicts a summary of the research participants' responses on the question asking about the extent of adoption of ICT and AV in teaching centers by NWU Mafikeng FEMS.

**Table 4.5.1-2 Summary of research participants responses on Extent of adoption of ICT and AV in teaching centers (N=5)**

| <b>Participant</b> | <b>Response</b>                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 1      | <i>“So, the adoption of ICT has been high, although it has been difficult to use it extensively because sometimes when you go to class, you go with the intention of using something bigger or testing anything new that will be taught by the CTL or Teaching and Learning Center. But when you reach the classroom, some things don't work out as planned.”</i> |
| Participant 2      | <i>“I think there is progress people are slowly adjusting to that is on we usually do use technology now nowadays in terms of teaching and learning.”</i>                                                                                                                                                                                                         |
| Participant 3      | <i>“I think if we have adopted ICT and AV in our teaching. I will say over 70% of my colleagues use technology for instructional delivery and the hope is that it will improve as time goes by.”</i>                                                                                                                                                              |
| Participant 4      | <i>“The adoption of ICT and AV in Mafikeng campus specifically in the FEMS is I can say that colleagues have adopted technology moderately high.”</i>                                                                                                                                                                                                             |
| Participant 5      | <i>“Graphics and visual videography have created a new sphere in creating multiple means of explaining various phenomena. Therefore, the extent of adoption is good and gaining momentum.”</i>                                                                                                                                                                    |

#### 4.5.2. Extent of Utilization of ICT and AV technologies in teaching centers

Table 4.5.2-1 Extent of Utilization of ICT and AV technologies in teaching centers (N=35)

|                                                                | Always utilize % | Often utilize % | Sometimes utilize % | Seldom utilize % | Never utilized % | Majority Response      | Mean | Std. Dev |
|----------------------------------------------------------------|------------------|-----------------|---------------------|------------------|------------------|------------------------|------|----------|
| Digital projectors                                             | 68,6%            | 17,1%           | 8,6%                | 0,0%             | 5,7%             | 68,57% Always utilize  | 4.43 | 1.065    |
| Digital cameras                                                | 20,0%            | 11,4%           | 8,6%                | 8,6%             | 51,4%            | 51,43% Never utilized  | 2.40 | 1.666    |
| Interactive whiteboards                                        | 20,0%            | 17,1%           | 14,3%               | 0,0%             | 48,6%            | 48,57% Never utilized  | 2.60 | 1.684    |
| Other presentation tools (Google Slides, Keynote, Prezi Basic) | 31,4%            | 14,3%           | 17,1%               | 11,4%            | 25,7%            | 31,43% Always utilize  | 3.14 | 1.611    |
| Podium desktop                                                 | 68,6%            | 25,7%           | 2,9%                | 2,9%             | 0,0%             | 68,57% Always utilize  | 4.60 | .695     |
| Laptops                                                        | 62,9%            | 28,6%           | 0,0%                | 2,9%             | 5,7%             | 62,86% Always utilize  | 4.40 | 1.063    |
| Tablets                                                        | 17,1%            | 5,7%            | 11,4%               | 14,3%            | 51,4%            | 51,43% Never utilized  | 2.23 | 1.555    |
| Document Cameras                                               | 25,7%            | 22,9%           | 8,6%                | 8,6%             | 34,3%            | 34,29% Never utilized  | 2.97 | 1.671    |
| Wireless Presenters (Mobile Projector)                         | 8,6%             | 2,9%            | 11,4%               | 11,4%            | 65,7%            | 65,71% Never utilized  | 1.77 | 1.285    |
| Conference Cam Connect (Mobile Video conference camera)        | 17,1%            | 5,7%            | 8,6%                | 17,1%            | 51,4%            | 51,43% Never utilized  | 2.20 | 1.549    |
| Microphone & Receiver                                          | 37,1%            | 14,3%           | 5,7%                | 8,6%             | 34,3%            | 37,14% Always utilized | 2.00 | 1.782    |
| Mecer Digimemo (Notes taker)                                   | 0,0%             | 5,7%            | 8,6%                | 2,9%             | 82,9%            | 82,86% Never utilized  | 1.37 | .877     |

The objective of the table is to present the results in determining the extent of utilization of ICT and AV in teaching centers among lecturers at North-West University, Mafikeng. The results show that 68.57% of respondents always utilize digital projectors and podium desktop. The results proceed to depict that 62.86% always utilize laptops, 37.14% always utilize microphone

and receiver, and 31.43% always utilize other presentation tools (Google Slides, Keynote, Prezi Basic) in the teaching centers. From the presented data, 82.86% never utilized Mecer Digimemo (Notes Taker), 65.71% never utilized wireless presenters (mobile projector), 51.43% never utilized digital projectors and conference cam connect, 48.57% never utilized interactive whiteboards, and 34.29% never utilized document cameras.

The results on the table (See table 4.5.2-1) further presents the means and standard deviations of responses. The presented results show that the podium desktop scored the highest mean score of 4.60 and occupies the first position among ICT and AV technologies utilized by lecturers in instructional deliver. It is followed by digital projectors with a mean score of 4.43, followed by laptops with a mean score of 4.40. Furthermore, the results show that respondents rated Mecer Digimemo (Notes Taker) the lowest with a mean score of 1.37 followed by wireless presenters (mobile projector) with a mean score of 1.77. Overall, the data indicate that out of the technologies analysed above, only a certain set of ICT and AV technologies (Digital projectors, other presentation tools, podium desktop, laptops, and microphone & receiver) are utilized more than others. The results mean that most technologies are not utilized in teaching centers by lecturers for instructional deliver purposes.

Moreover, to provide more clarity on the second research question, the study operationalised the behavioural intent (BI) construct. The construct was operationalised because it provides a clear picture in terms of the degree at which a user consciously expresses plans to perform or not perform a specified future behaviour. The results on table 4.5.2-2 depict the behavioural intention of lecturers towards the utilization of ICT and AV technologies in teaching efforts. Davis (1989) describes BI as the willingness of lecturers towards the utilization or non-utilization of ICT and AV technologies.

The study operationalised the construct as: the lecturers' intent to utilize; likely to utilize; plan to utilize; and willingness to utilize ICT and AV in instructional delivery practices. Table 4.5.2-2 below depicts research participants' ratings on their intentions to utilize ICT and AV in their instructional deliver. The presented results (See table 4.5.2-2) depict that respondents scored the "whenever possible, I intend to use computers for learning and teaching" item the highest with a mean rating of 4.51. Moreover, participants rated all items a mean score of 4.00. The results mean that lecturers have a positive intention towards the utilization of ICT and AV in teaching centers.

**Table 4.5.2-2 Behavioural Intention of lecturers towards the utilization of ICT and AV (N=35)**

|                                                                                                        | Total | Strongly Agree (%) | Agree (%) | Neutral (%) | Disagree (%) | Strongly Disagree (%) | Majority Response | Mean | Std. Dev |
|--------------------------------------------------------------------------------------------------------|-------|--------------------|-----------|-------------|--------------|-----------------------|-------------------|------|----------|
| Whenever possible, I intend to use computers for learning and teaching                                 | 35    | 65,7%              | 25,7%     | 5,7%        | 0,0%         | 2,9%                  | 65,7%             | 4.51 | .853     |
| I am likely to use ICT & AV in my lecturing sessions                                                   | 35    | 40,0%              | 40,0%     | 17,1%       | 2,9%         | 0,0%                  | 40,0%             | 4.17 | .822     |
| I plan to use ICT & AV during my teaching practicum                                                    | 35    | 40,0%              | 51,4%     | 5,7%        | 2,9%         | 0,0%                  | 51,4%             | 4.29 | .710     |
| I am willing to participate in ICT & AV trainings                                                      | 35    | 54,3%              | 40,0%     | 5,7%        | 0,0%         | 0,0%                  | 54,3%             | 4.49 | .612     |
| I will visit IT department often for future training                                                   | 35    | 48,6%              | 40,0%     | 11,4%       | 0,0%         | 0,0%                  | 48,6%             | 4.37 | .690     |
| I regularly pursue innovative ways to incorporate electronic instructional facilities into my lectures | 35    | 51,4%              | 34,3%     | 8,6%        | 2,9%         | 2,9%                  | 51,4%             | 4.29 | .957     |

The second research question was addressed utilizing the qualitative approach. To provide an answer to the question, items (2, 3, 4 and 5) from the interview guide (See Appendix 2) were posed to the research participants. The second item question sought to determine the utilization of ICT and AV facilities in teaching and learning centers. The analysis of interviews (see Figure 4.5.2-1) depicts that the utilization of technologies by lecturers in teaching centers is limited. The analysis further highlights that a select few technologies are utilized regularly by most lecturers.

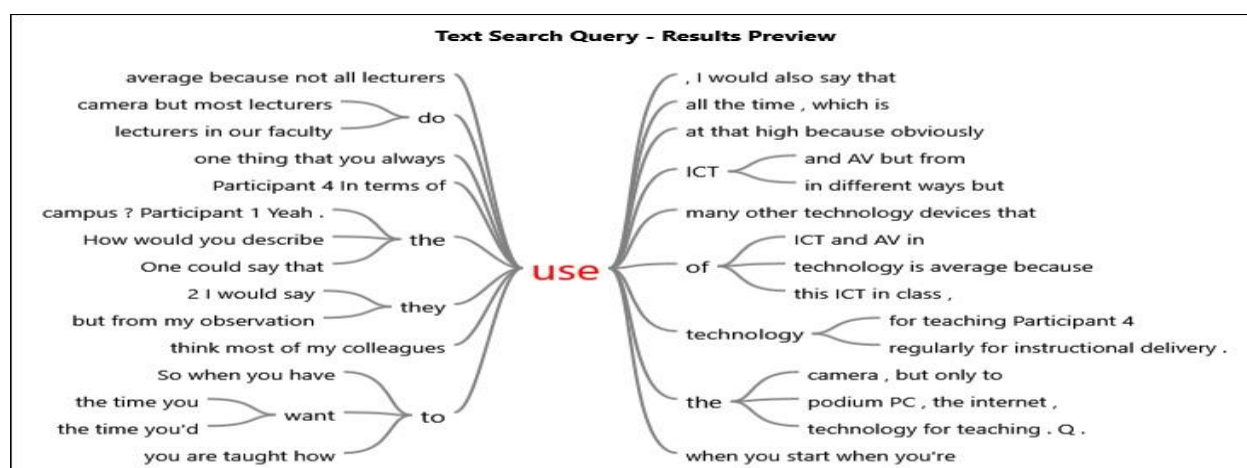


**Figure 4.5.2-1 Utilization of ICT and AV technologies in teaching centers**

Table 4.5.2-3 depicts a summary of the research participants' responses on the questions of the extent of utilization of ICT and AV in teaching centers at NWU Mafikeng FEMS.

**Table 4.5.2-3 Summary of extent of utilization of ICT and AV in teaching centers (N=5)**

| <b>Participant</b> | <b>Response</b>                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 1      | <i>"The use of this ICT in class, like I said it is minimal due to reasons or circumstances that will prevail at that time. It is something that really everybody is not into because of those problems (lack of availability of technology). But what I would say is that there is one that is always been used and is used more often. It is the PowerPoint projection"</i> |
| Participant 2      | <i>"I would say they use at that high because obviously technology comes with a lot of advantages, it makes it easier."</i>                                                                                                                                                                                                                                                   |
| Participant 3      | <i>"I think most of my colleagues use ICT and AV but from my observation they use the podium PC, the internet, media projector and mostly PowerPoint for presentation of lectures."</i>                                                                                                                                                                                       |
| Participant 4      | <i>"In terms of use, I would also say that most of lecturers in our faculty do use technology regularly for instructional delivery."</i>                                                                                                                                                                                                                                      |
| Participant 5      | <i>"One could say that the use of technology is average because not all lecturers use the technology for teaching."</i>                                                                                                                                                                                                                                                       |

The third item on the interview guide asked participant to describe their rating and experience on the usage of ICT & AV in teaching centers. The analysis (see table 4.5.2-3) reveal that lecturers found the availability of the technology a challenge. One of the participants said, *"Often the technology in teaching centers do not work until technicians come in to support or fix the challenge"*. This implies that the technology is not reliable and can affect the experience in a negative way. Moreover, most of the respondents rated their experience as satisfactory. Another respondent said: *"The type of support we receive from CTL and the IT department is good but not perfect"*. The overall response suggests that most of the participants have had a good experience in utilizing the technology.

**Table 4.5.2-4 Summary of rating and experience on the of usage of ICT & AV in teaching centers (N=5)**

| <b>Participant</b> | <b>Response</b>                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 1      | <i>“we can use it if things are working well. But the problem is the kind of corruption of our systems as sometimes they appear.”</i>                                                                                                                                                                    |
| Participant 3      | <i>“I think what I've picked up is like people, they tend to get comfortable with their traditional way because sometimes the technology does not do what one wishes to do or they are not working at that moment. Now, I think that is what more makes them a little bit reluctant with technology”</i> |
| Participant 5      | <i>It has made it easier and more effective to teach, making the experience much better and way more effective.</i>                                                                                                                                                                                      |

The interview probed further to ascertain how lecturers use technology in learning and teaching processes at NWU Mafikeng and compared the utilization with no utilization. The analysis reveals that (See table 4.5.2-5) lecturers utilize the technology in a form of projecting pictures/presentations, recording lecture sessions, and projecting sound. The results further reveal that the experience of utilizing technology is better than that of not utilizing. One respondent said: *“And then the non-utilization is not good at all, because if you are going to stand there and preach to the students, especially our large classes in Mafikeng is just as good as not coming to class “*. This indicates that lecturers in Mafikeng do utilize the technology in their teaching practices and they find it important to continue utilizing it.

**Table 4.5.2-5 Summary of how lecturers use technology in learning and teaching processes in NWU Mafikeng and compare the utilization with no utilization (N=5)**

| <b>Participant</b> | <b>Response</b>                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 1      | <i>“So our, our lecturers, to use ICT, they use AV, and at times like I said it's only because of the problem with the systems with the podium sometimes to the projector, that they don't always use, but it is something that we always want to see ourselves using.”</i>                         |
| Participant 2      | <i>“previously I was using the old method of taking the class attendance register, then I attended a workshop with CTL, whereby they introduced a QR code scanner thing, whereby I use a QR code instead of using the old method, the QR code is much, much faster does not consume much time.”</i> |
| Participant 3      | <i>“Most of my colleagues use the technology for presenting sound and pictures or presentations.”</i>                                                                                                                                                                                               |
| Participant 4      | <i>“The usage is good for learners and learner experience however it is not always the case that learners will get good experience from being instructed through the technology. Reason being that some room are too big for the technology to be used.”</i>                                        |
| Participant 5      | <i>“I often use the document camera to record lessons that have notes and the video camera when I explain complex topics so that students can revert. The technology is easy to use and always works”</i>                                                                                           |

The fourth item sought to understand the attitude and perceptions of NWU Mafikeng lecturers' in terms of the usage of ICT & AV technological tools. The results that emerged from the respondents include that lecturers have a positive attitude towards the adoption and utilization of ICT and AV in teaching centers (see table 4.5.2-6). They in fact see technology as a good tool for them and students. To support this, one research participant said: *“Less writing on the board is needed, which saves time and creates more room for discussions, presentations and different forms of information absorption. “.*

**Table 4.5.2-6 Summary of the attitude and perceptions of NWU Mafikeng lecturers' in terms usage of ICT & AV technological tools. (N=5)**

| <b>Participant</b> | <b>Response</b>                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 1      | <i>"Yeah, I think if everybody can work together as explained, you would find that we will always be able to update the ICT people on how to assist us in getting ourselves forward, because it's not always what they teach you."</i> |
| Participant 2      | <i>"Like I said, that most of the lectures are People will prefer the traditional way of doing things, but with a good marketing strategy that the university has, slowly more lecturers are getting persuaded to use ICT,"</i>        |
| Participant 3      | <i>"Okay I think most lecturers are a little bit reluctance based on the fact that you need to learn, you need to understand, with technology you cannot just run with it without learning."</i>                                       |
| Participant 4      | <i>"NWU Mafikeng lecturers actually have a positive attitude towards the usage of technology in teaching centers. My experience is that they are willing to use the technology."</i>                                                   |
| Participant 5      | <i>"The lecturers look at this integration as a big step ahead, in terms of creating bigger and better teaching environments, that are multi-faceted and have more to offer to students."</i>                                          |

#### **4.5.3. Factors that affect the adoption and utilizing technology in teaching and learning**

The third research question sought to determine the factors that influence the adoption and utilization of ICT and AV in teaching and learning centers. The parameters used to define and measure the factors were: performance expectancy, effort expectancy, social influence, compatibility, observability, trialability, behavioural intention and facilitating conditions. Performance expectancy is defined as the degree at which an individual believes that utilizing the system will aid him/her to attain gains in job performance. Effort expectancy is the easiness associated while using a system.

Social influence is "the degree to which an individual perceives that important others believe that he/she should use the new system" (Venkatesh et al., 2003). Compatibility describes the extent to which an innovation is recognized as being in accord with current values, previous experiences, and requirements of possible adopters. Observability denotes the degree to which the results of an innovation is visible to other. Trialability is the ease with which academics examine, analyse, and try an innovation, with a view to know how to operate and use it. Behavioural intention (BI) is the degree at which a user consciously expresses plans to perform

or not perform a specified future behaviour. Facilitating conditions denotes the available technological and organisational resources.

Research question three was addressed by both the survey and interviews. Tables 4.5.3-1 to 4.5.3-4 present a summarised version of the analysis by depicting the relative contribution of independent variables compared to dependent variables. Stepwise multiple regression was used and it can be described as the step by step iterative construction regression model that involves automatic selection of independent variables (Draper & Smith, 1998) using a sequence of techniques such as F-tests, t-tests and adjusted R-square. The aim of utilizing stepwise regression was to ascertain the most influential independent variable predictor(s) of one dependent variable (Adoption of ICT & AV).

Stepwise multiple regression executes multiple regressions several times and, on every occasion, it removes the weakest correlated variable and retains the variables that explain the resulting variable best. As described by Ntemana and Olatokun (2012), this statistical procedure indicates which independent variable is the best predictor, the second-best predictor, and so on.

**Table 4.5.3-1 Stepwise Multiple regression Analysis showing contributions of predictors of adoption and utilization of ICT and AV in teaching centers (N=35)**

| Model                                        |               | Unstandardized Coefficients |            | Standardized Coefficients | T     | Sig. |
|----------------------------------------------|---------------|-----------------------------|------------|---------------------------|-------|------|
|                                              |               | B                           | Std. Error | Beta                      |       |      |
| 1                                            | (Constant)    | 1.073                       | .636       |                           | 1.689 | .101 |
|                                              | Compatibility | .756                        | .143       | .678                      | 5.298 | .000 |
| 2                                            | (Constant)    | .358                        | .687       |                           | .521  | .606 |
|                                              | Compatibility | .725                        | .136       | .650                      | 5.325 | .000 |
|                                              | Trialability  | .215                        | .099       | .265                      | 2.172 | .037 |
| Note: a. Dependent Variable: AdoptionofICTAV |               |                             |            |                           |       |      |

**Table 4.5.3-2 Stepwise Multiple regression Analysis showing excluded variables from predictors of adoption and utilization of ICT and AV in teaching centers (N=35)**

| Model |                         | Beta In            | t     | Sig. |
|-------|-------------------------|--------------------|-------|------|
| 1     | Performance Expectancy  | .293 <sup>b</sup>  | 1.696 | .100 |
|       | Effort Expectancy Per   | .182 <sup>b</sup>  | 1.364 | .182 |
|       | Social Influence        | .198 <sup>b</sup>  | 1.089 | .284 |
|       | Trialability            | .265 <sup>b</sup>  | 2.172 | .037 |
|       | Observability           | -.243 <sup>b</sup> | -.923 | .363 |
|       | Behavioural intention   | -.050 <sup>b</sup> | -.185 | .855 |
|       | Facilitating conditions | -.032 <sup>b</sup> | -.172 | .865 |
| 2     | Performance Expectancy  | .251 <sup>c</sup>  | 1.506 | .142 |
|       | Effort Expectancy Per   | .231 <sup>c</sup>  | 1.851 | .074 |
|       | Social Influence        | .151 <sup>c</sup>  | .862  | .395 |
|       | Observability           | -.222 <sup>c</sup> | -.886 | .383 |
|       | Behavioural intention   | -.035 <sup>c</sup> | -.136 | .893 |
|       | Facilitating conditions | -.028 <sup>c</sup> | -.159 | .875 |

The results in table 4.5.3-1 and 4.5.3-3 show a stepwise multiple regression analysis of the relationship of independent variables (performance expectancy, effort expectancy, social influence, compatibility, trialability, observability, behavioural intention and facilitating condition) and the adoption and use of ICT and AV. The findings revealed the standardised beta coefficients which gave the strength of the effect of each variable to the model. While the *t* and *p* values depicted the effect of the independent variables on the dependent variable. The Beta ( $\beta$ ) values for compatibility ( $\beta = 0.756$ ,  $p = 0.000 < 0.05$ ) and Trialability ( $\beta = 0.215$ ,  $p = 0.037 < 0.05$ ) show that these attributes positively affected the adoption and use of ICT and AV in the teaching centers.

**Table 4.5.3-3 Model summary showing prediction level of the constructs (N=35)**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .678 <sup>a</sup> | .460     | .443              | .578                       |
| 2     | .727 <sup>b</sup> | .529     | .500              | .548                       |

b. Predictors: (Constant), Compatibility, Trialability

c. Dependent Variable: AdoptionofICTAV

Table 4.5.3-3 illustrates the prediction level of each construct. The statistical expression R Square illustrates the proportion of variability in the data set that is accounted for by the statistical model. This means that 46% and 52% of adoption and utilization can be explained

by compatibility and trialability, respectively. Furthermore, the data on the table depicts that compatibility and trialability were the best predictors of adoption and utilization of ICT and AV for instructional delivery in teaching centers.

**Table 4.5.3-4 Regression Analysis on overall performance of predictors of adoption and utilization of ICT and AV in teaching centers (N=35)**

| Model |            | Sum of Squares | Df | Mean Square | F      | Sig.              |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1     | Regression | 9.376          | 1  | 9.376       | 28.065 | .000 <sup>b</sup> |
|       | Residual   | 11.024         | 33 | .334        |        |                   |
|       | Total      | 20.400         | 34 |             |        |                   |
| 2     | Regression | 10.792         | 2  | 5.396       | 17.971 | .000 <sup>c</sup> |
|       | Residual   | 9.608          | 32 | .300        |        |                   |
|       | Total      | 20.400         | 34 |             |        |                   |

a. Dependent Variable: AdoptionofICTAV

b. Predictors: (Constant), Compatibility

c. Predictors: (Constant), Compatibility, Trialability

The data presented in table 4.5.3-4 depicts a regression analysis of the total performance of the predictors of adoption and utilization of ICT and AV. The results in the table suggest that there is a joint significant relationship amongst the strongest predictors ( $F = 17.971$ ,  $p < 0.05$ ). Therefore, the model is significant since the value of  $p$  is less than 0.05 for both variables. The results further suggested that the combination of compatibility and trialability significantly predicted the adoption and utilization of ICT and AV in teaching centers.

An analysis of the factors that affected the adoption and utilization of ICT and AV was conducted qualitatively. The results depicted that most research participants affirmed that performance expectancy, ease of use, technical support and trialability were factors that affect the adoption and utilization of ICT and AV in teaching centers. One of the research participants responded to the question by stating that trialability and observability influenced the utilization of ICT and AV in teaching centers. The responded said: *“My personal experience is that seeing (observability) and trying (Trialability) the technology plays a critical role in it being used. I think what will influence us and others to utilize the teaching technology is seeing it being used and that technology working as expected”*. Nonetheless, what is clear from the results (see figure 4.5.3-1) is that performance expectancy and ease of use are the most important factors that affect the adoption and utilization of teaching and learning technologies.

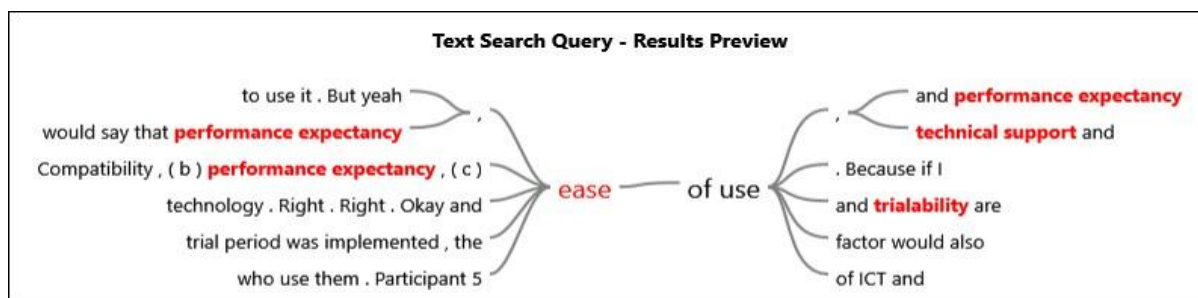


Figure 4.5.3-1 Factors that affect the adoption and utilization of ICT and AV

#### 4.5.4. Challenges affecting the utilization of ICT and AV in teaching centers

Table 4.5.4-1 Challenges affecting the utilization of ICT and AV

|                                                                        | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree<br>(%) | Strongly<br>Disagree<br>(%) | Majority<br>Response          | Mean | Std.<br>Dev |
|------------------------------------------------------------------------|--------------|--------------------------|--------------|----------------|-----------------|-----------------------------|-------------------------------|------|-------------|
| Lack of adequate skills                                                | 35           | 22,9%                    | 34,3%        | 28,6%          | 5,7%            | 8,6%                        | 34,3%<br>Agree                | 3.57 | 1.170       |
| Insufficient number of ICT & AV resources                              | 35           | 45,7%                    | 31,4%        | 14,3%          | 5,7%            | 2,9%                        | 45,7%<br>Strongly<br>Agree    | 4.11 | 1.051       |
| Insufficient technical support                                         | 35           | 42,9%                    | 37,1%        | 8,6%           | 8,6%            | 2,9%                        | 42,9%<br>Strongly<br>Agree    | 4.09 | 1.067       |
| Lack of access to utilizing ICT & AV for teaching and learning         | 35           | 20,0%                    | 45,7%        | 22,9%          | 8,6%            | 2,9%                        | 45,7%<br>Agree                | 3.71 | .987        |
| Lack of interest                                                       | 35           | 17,1%                    | 11,4%        | 40,0%          | 20,0%           | 11,4%                       | 40,0%<br>Neutral              | 3.03 | 1.224       |
| No or unclear benefit to use ICT for teaching                          | 35           | 8,6%                     | 25,7%        | 28,6%          | 17,1%           | 20,0%                       | 28,6%<br>Neutral              | 2.86 | 1.264       |
| Using ICT in teaching and learning not being a goal in our institute   | 35           | 11,4%                    | 22,9%        | 14,3%          | 22,9%           | 28,6%                       | 28,6%<br>Strongly<br>Disagree | 2.66 | 1.413       |
| Poor culture of using ICT and AV for teaching                          | 35           | 22,9%                    | 51,4%        | 25,7%          | 0,0%            | 0,0%                        | 51,4%<br>Agree                | 3.97 | .707        |
| Lack of pedagogical models on how to use ICT for teaching and learning | 35           | 28,6%                    | 22,9%        | 22,9%          | 25,7%           | 0,0%                        | 28,6%<br>Strongly<br>Agree    | 3.54 | 1.172       |
| Too difficult to integrate ICT use into the curriculum                 | 35           | 8,6%                     | 25,7%        | 25,7%          | 22,9%           | 17,1%                       | 25,7%<br>Agree                | 2.86 | 1.240       |
| Insufficient pedagogical support for teachers                          | 35           | 17,1%                    | 37,1%        | 25,7%          | 11,4%           | 8,6%                        | 37,1%<br>Agree                | 3.43 | 1.170       |

The fourth research question was answered through responses to the eleven items. The following: training, access, technical support from IT department, support from internal IT, social influence, culture, time, and institutional policy were used as parameters to determine the challenges affecting the utilization of ICT and AV in teaching centers. The results in Table 4.5.4-1 indicate the challenges affecting the adoption and utilization of ICT and AV in teaching and learning centers at NWU Mafikeng. The results reflect that 45.7% of respondents strongly agreed that there were insufficient numbers of ICT & AV resources, 28,6% strongly agreed that there was a lack of pedagogical models on how to use ICT, and 42.9% of the respondents strongly agreed that there was insufficient technical support for teaching and learning.

The results in Table 4.5.4-1 continue to show that 45.7% agreed that there is a lack of access to the utilization of ICT and AV. The table shows that 34.3% agreed that there was lack of adequate skills, 51.4% of the respondents agreed that there was a poor culture of using ICT and AV for teaching, 37.1% agree that there was insufficient pedagogical support for teachers and 25.7% agreed that it was too difficult to integrate ICT use into the curriculum. The results demonstrate that 40.0% of the respondents responded neutrally in terms of lack of interest and 28.6% were also neutral that there was no or unclear benefit to use ICT for teaching. Furthermore, the data presented shows that 28.6% strongly disagreed that using ICT in teaching and learning was not a goal in their institute.

The table above, moreover, presents the mean and standard deviations of the respondents' scores. The results show that insufficient number of ICT & AV resources recorded the highest mean score of 4.11 and occupied the first position among issues predefined as challenges affecting the adoption and utilization of ICT and AV in teaching and learning centers. It was closely followed by insufficient technical support with a mean score of 4.09. The overall results indicate that respondents perceived insufficient number of ICT and AV resources, as well as insufficient technical support as top impediments to the adoption and utilization of ICT and AV in teaching centers.

Like other research questions, the qualitative approach was used to address the fourth question which sought to determine: "*Challenges affecting the utilization of ICT and AV in teaching centers*". In order to determine the challenges, research participants were asked to describe challenges that affected the utilization of ICT and AV in teaching centers. The results of the analysis (see figure 4.5.4-1) indicate that the availability of resources/technology, culture, training, and technical support were found to be the main challenges. The results of the

qualitative analysis supported that of the quantitative analysis in terms of technical support and availability of resources as challenges that affect the utilization of ICT and AV in teaching centers.

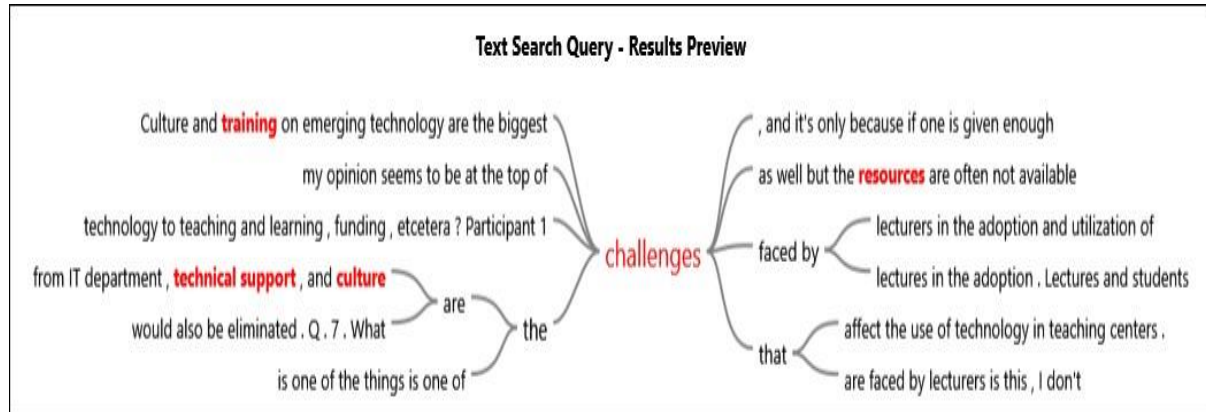


**Figure 4.5.4-1 Challenges affecting the utilization of ICT and AV in teaching centers**

Table 4.5.2-2 illustrates a summary of the interview responses on the challenges that affect the utilization of ICT and AV in teaching centers. Research participants highlighted that culture was also a challenge as it can affect lecturers towards utilizing technology for teaching.

**Table 4.5.4-2 Interview responses on challenges affecting the utilization of ICT and AV in teaching centers**

| Participant   | Response                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 1 | <i>“So lack of skills is one of the things is one of the challenges, and it's only because if one is given enough time to go through all the training, the necessary trainings, without having to start immediately with your work, that may help, but otherwise if you have to do both at the same time, you will find that time is a factor, and is a problem there but a person will focus more on doing the job than going to the trainings.”</i> |
| Participant 2 | <i>“Yes, the availability of resources will always hinder the progress. From the ones you mentioned, I would say resources, because the IT support is always there, there is training, the top management they always encourage us to attend this kind of thing (training and workshop) so I would say the availability of resources to see the only, only problem or challenge.”</i>                                                                 |
| Participant 3 | <i>“My experience would say limited software and hardware. Support from IT department, technical support, and culture are the challenges as well, but the resources are often not available for use.”</i>                                                                                                                                                                                                                                             |

|               |                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Participant 4 | <i>“The poor technology culture in my opinion seems to be at the top of challenges that affect the use of technology in teaching centers. Technical support follows and thirdly time.”</i>                                                                                                                                                                                                   |
| Participant 5 | <i>“Culture and training on emerging technology are the biggest challenges faced by lectures in the adoption. Lectures and students are used to the traditional way of learning and writing notes slowly, and having to use the projector to facilitate a lesson, makes it quicker for the lecturer to move from one chapter to the other and this is a very big challenge to students.”</i> |

#### 4.6. Summary

This chapter provided detailed results on the data analysed and presented the findings on the research questions investigated. The findings of the survey indicated that lecturers have made changes to accommodate ICT and AV utilization for instructional delivery. The first research objective was to determine the extent of adoption of ICT and AV in teaching centers. The results, in relation to this question, reveal that the adoption of ICT and AV in teaching centers is relatively high. The study findings from the quantitative analyses corroborate with the qualitative analysis. The second objective of the study was to determine the extent of the utilization of ICT and AV in teaching centers. The findings reveal that lecturers utilize some technologies more than others. The study operationalised the Behavioural Intention (BI) construct to provide more clarity on the objective and the results showed that lecturers have positive intentions towards the utilization of ICT and AV in teaching centers. The qualitative section of the second research objective indicated that the utilization of technologies in teaching centers was limited and a select few technologies were being utilized regularly by most lecturers. The findings on the second objective revealed that most lecturers have had a good experience in utilizing ICT and AV. They found it important to continue utilizing it and their attitudes were positive towards the utilization of ICT and AV in teaching centers. With respect to the third objective, the results showed that trialability and compatibility were the best predictors of the adoption and utilization of ICT and AV. The study, lastly, identified insufficient numbers of ICT & AV resources, and insufficient technical support as top impediments to the adoption and utilization of ICT and AV in teaching centers. The qualitative findings revealed, in addition, culture and training as impediments. The quantitative findings corroborated the qualitative findings.

## **Chapter 5**

### **5. Discussion, Conclusion and Recommendations**

#### **5.1. Introduction**

The utilization and adoption of ICT and AV in teaching and learning institutes has come to be part of the norm in the current age. The utilization of ICT and AV has provided lecturers with an opportunity to excel in their instructional delivery practices. Therefore, ICT and AV in teaching and learning cannot be overlooked because of its benefits for both lecturers and students. The current chapter presents the meaning, purpose, and relevance of the findings of the research. Furthermore, the aim of the chapter is to discuss the similarities and differences between the current study and previous results. The presentation of the current chapter is based on both quantitative and qualitative analysis findings.

#### **5.2. Discussion of findings**

##### **5.2.1. Extent to which ICT and AV facilities adopted in teaching and learning centers**

The study sought to ascertain the extent of adoption of ICT & AV facilities in teaching and learning centers at NWU Mafikeng. The extent of adoption of ICT & AV facilities in teaching and learning centers major findings are as follows:

- The parameter “I provide my learners course materials in electronic format” recorded the highest mean score of 4.66 and takes the first position.
- Most (74.29%) of the respondents strongly agreed that they provided their learners, course materials in electronic format, 54.29% strongly agreed that they regularly pursued innovative ways to incorporate ICT & AV instructional media into their lectures and incorporate ICT & AV in their teaching to such an extent that it has become standard learning tool for their learners.
- All attributes scored a mean of over 4.0, the results demonstrate the extent of the adoption of ICT and AV teaching in learning centers.
- The results of the qualitative analysis substantiated that the level of adoption of ICT and AV among NWU lecturers is relatively high.

The extent of adoption of ICT & AV facilities in teaching and learning centers was reflected in the unanimous accord from the research participants with all the attributes scoring a mean

of 4.0. The qualitative attributes of the research validated the findings. Research participants highlighted that the adoption of ICT & AV facilities at NWU Mafikeng teaching centers was substantial. The results are in line with findings in a number of studies (Lau & Sim, 2008; Kotrlik & Redmann, 2009; Chaputula, 2012; Ruto & Ndaloh, 2013; Boadu et al., 2014; Govender & Govender, 2014; Ifegbo, Blaise & Ukegbu, 2015; Karsh, 2019). The findings further suggested that lecturers had a positive attitude towards adopting ICT and AV in instructional delivery. Oye, Iahad and Rahim (2012) argued that the availability and the condition of resources and training would encourage lecturers to fully adopt ICT and AV in their teaching practices. Büschgens, Bausch and Balkin (2013) posited that to successfully adopt ICT and AV, institutional leadership, practices, norms and other technologies were prerequisites. Furthermore, the results of the current study suggest that lecturers were buying into reconfiguring their teaching and learning activities in order to take full advantage of new technologies as suggested by Roger (2000) on the three levels of ICT adoption.

#### **5.2.2. Extent of Utilization of ICT and AV technologies in teaching centers**

The second research question sought to determine the extent of utilization of ICT and AV technologies in teaching centers. In accordance to Evans (2013), the extent of utilization relied on understanding the construct that demonstrated a positive relationship with behavioural intention and utilization. Therefore, the following parameters were utilized to determine the extent of utilization of ICT and AV technologies in teaching centers: utilization and behavioural intention (BI). The qualitative aspect of the second research question was guided by items (2, 3, 4 and 5) from the interview guide. The major findings on the extent of utilization of ICT and AV facilities in teaching and learning centers are as follows.

- The findings of the current study reveal that digital projectors, podium desktop, laptops, microphone & receiver, and other presentation tools (Google Slides, Keynote, Prezi Basic) were the technologies found to be “always utilized” by lecturers in teaching centers.
- Mecer Digimemo (Notes Taker), wireless presenters (mobile projector), digital camera & conference cam connect, interactive whiteboards, and document cameras were some of the technologies “Never utilized” in teaching centers for teaching. The findings showed that most technologies are not utilized in teaching centers for instructional delivery.

- The findings from the BI construct revealed that all respondents had a positive intention towards utilizing ICT and AV in teaching centers.
- The findings of the qualitative analysis reveal that the utilization of ICT and AV was not widespread. Participants' responses revealed that ICT and AV technologies were not always available. However, the findings show that participants had a good experience when utilizing the technology.
- Overall, the qualitative aspect of the findings showed that lecturers do utilize technology in their teaching practices and had a positive attitude towards utilizing ICT and AV.

The findings of the current study confirm earlier studies in terms of the utilization of ICT and AV not being fully realised (Egomo, Enyi & Tah, 2012; Hue & Jalil, 2013; Ng'Ambi, 2013; Amuchie, 2015). Ng'Ambi and Mushi (2010; 2013) found that lecturers used ICT and AV technologies for research purposes more than for instructional delivery purposes. In line with the current findings, Egomo, Enyi & Tah and Mushi (2010; 2012) found that the use of laptops was a common phenomenon among lecturers. The scholars further lamented that lecturers were not competent enough in the use of ICT and AV tools for instructional delivery (Egomo, Enyi & Tah, 2012). Mushi (2010) further found that most lecturers used presentation software. The findings are parallel to those of the current study. The findings of BI are well supported by previous research (Oye, Iahad & Rahim, 2012; Evans, 2013), whereby lecturers were found to have intentions to utilize ICT and AV. Oye, Iahad and Rahim (2012) argued that BI determines the extent of the use of ICT and AV. This suggests that BI is a critical measure of technology acceptance. The qualitative part of the current study found that lecturers found it important to utilize ICT and AV as it improves the quality of their teaching practices. The findings further revealed that lecturers' attitude towards the utilization of ICT and AV was positive which is similar to the findings by Onasanya et al. (2010). Teo (2011) highlighted that in teaching and learning settings, lecturers were the ones who determined the success or failure of the adoption and utilization of ICT and AV by behavioural intention. Onasanya et al. (2010) submitted that lecturers should be upskilled and encouraged to develop a positive attitude towards utilizing ICT for teaching and learning.

### **5.2.3. Factors that affect the adoption and utilization of technology in teaching and learning**

The third research question sought to determine factors that affect the adoption and utilization of technology in teaching and learning. To address the question the following parameters were used: Performance expectancy, effort expectancy, social influence, compatibility, observability, trialability, behavioural intention and facilitating conditions derived from DOI and UTAUT. The findings of the current study showed that compatibility and trialability were the best predictors of the adoption and utilization of ICT and AV in teaching centers. Furthermore, the findings revealed that compatibility and trialability of  $F = 17.971$ ,  $p < 0.05$  jointly accounted for 52% of variability in the adoption and utilization of ICT and AV by lecturers in teaching and learning centers.

Chen and Chao's (2011) research identified facilitating condition (FC) as compatible. The researchers contend that the compatibility construct is a key predictor of ICT adoption. Rogers (2003) found trialability to be important to the adoption and utilization of ICT and AV for the reason that it affords lecturers the opportunity to learn and practice by doing. The findings of the current research are concurrent with the findings of Njenga (2011) as well as Alone, Maiga and Peter (2016). Njenga's (2011) findings revealed that highly compatible technologies are highly readily adopted.

The scholar posits that if the effort required to use ICT and AV for teaching and learning is less than that that is required in traditional instructional delivery methods, then ICT and AV will be adopted (Njenga, 2011). This insinuates that teaching and learning technologies must work better than the existing alternatives to convince adopters (Alone, Maiga & Peter, 2016). Yang, Mohamed and Beyerbach (1999) recommend trialability as an antidote to reduce technology anxiety amongst lecturers. The scholars liken trialability to training and argue that training reduces anxiety by relieving stress.

The interviews revealed that performance expectancy and ease of use are the most important factors that influence the adoption and utilization of ICT and AV. The results are in line with those of Davis (1989) who found that performance expectancy as a direct factor of users' intention to adopt ICT and AV. Alone, Maiga and Peter (2016) found that trialability significantly influenced perceived ease of use and behavioural intention to adopting and utilizing ICT and AV. One of the research participants submitted that if lecturers are trained

and enough trials are done on using the technology maximum, positive results might be achieved.

#### **5.2.4. Challenges affecting the utilization of ICT and AV in teaching centers**

The fourth research question sought to examine the challenges affecting the adoption and utilization of ICT and AV in teaching centers. To answer this research question, the research participants responded to eleven items in table 4.5.1-1 to determine the challenges. The current study found insufficient number of ICT and AV resources, insufficient technical support, lack of adequate skills as major challenges. The results of the semi structured interview are in support of the quantitative data. Additionally, a challenge that emerged from qualitative findings is poor technology use culture.

The first major challenge identified by lecturers who participated in the current study was insufficient number of ICT and AV resources. The finding is similar to that of Buss et al. (2015) who found that lecturers are not being exposed enough to the tools that support teaching and learning. These similar findings could be because of insufficient number of ICT and AV resources. Somekh (2008) posited that the availability of ICT resources was critical in the successfully implementation of ICT and AV.

The study found technical support as a challenge faced by lecturers. The findings are in line with those of Buabeng-Andoh (2012) and Ertmer et al., (2012) who found lack of access to technical support assistance as the first order barrier. Yilmaz (2011) reported that for the continued use of ICT, provision of technical support concerning repair and maintenance was critical. Tong and Trinidad (2005) found that lack of technical support for instructors ended up in them being frustrated and unwilling to utilize ICT.

The current research identified inadequate skills as a major challenge facing lecturers on ICT and AV adoption and utilization. The findings of this study are consistent with those of Asabere et al. (2017) as well as Yüksel and Alemdar (2012). Skills developments remains a critical challenge in that most lecturers in developing countries lack the adequate skills and knowledge to utilize ICT (Asabere et al., 2017). Beggs (2000) posited that the consequences of lack of competency in using ICT could lead to lack of confidence which subsequently would cause fear of failure in utilizing ICT. Bates (2005) proposed investment in the training of lecturers, not just in the choice and use of appropriate technologies, but more importantly in how people learn and in how instructional design is facilitated.

The findings of the present study revealed poor technology culture in adopting and utilizing ICT and AV as one of the impediments among lecturers. Hofstede (2016) posited that “culture was beneficial in predicting observable and measurable verbal and non-verbal behaviour.” Other scholars suggested that institute leaders and other senior figures in institutions influence the use and adoption of ICT (Hadjithoma-Garstka, 2011; Vanderlinde, Aesaert & Van Braak, 2014). Collis (2000) suggested the need for acculturation in order to overcome the cultural differences viz-a-viz intra organisational divide.

### **5.3. Summary of the findings**

The current chapter examined the findings of the results that were presented in chapter 4. The discussions were guided by the research objectives and supported by the literature and the conceptual framework that underpinned the study. The discussion revealed that the extent of adoption of ICT and AV among lecturers was high and that they have adjusted to utilize ICT and AV in teaching centers. The discussion of the second objective revealed that most lecturers had a good in experience utilizing ICT and AV. Lecturers further found it important to continue utilizing it and their attitudes towards the utilization of ICT and AV in teaching centers were positive.

Two constructs of the DOI and UTAUT were found to be strong enough to determine the factors that affect the adoption and utilizing technology in teaching and learning. The discussion revealed compatibility and trialability as the best predictors of adoption and utilization of ICT and AV in teaching centers. The discussion on the challenges affecting the utilization of ICT and AV in teaching centers revealed that insufficient number of ICT and AV resources, insufficient technical support, lack of adequate skills and poor technology culture as major challenges.

### **5.4. Conclusion**

The aim of this study was to evaluate the adoption and the extent of the utilization of technology by lecturers in teaching and learning centers. The following research questions were addressed: 1) To what extent is ICT & AV facilities adopted in teaching and learning centers? 2) To what extent is ICT & AV facilities utilized by lecturers in teaching and learning centers? 3) What are the factors that influence the adoption and utilization of technology in teaching and learning centers? 4) What challenges affect the adoption and utilization ICT and AV in teaching and learning?

The overall findings of the research revealed that the extent of adoption of ICT & AV facilities in teaching and learning centers was high. However, the high adoption of ICT and AV did not mean high utilization. Lecturers were found to utilize certain ICT and AV facilities more than others, mainly for presentation of lectures. Utilization of technologies such as digital cameras, interactive whiteboards, document cameras, wireless presenters (mobile projectors), conference cam connect and Digimemo were yet to be fully utilized by NWU Mafikeng lecturers. Therefore, the utilization of ICT and AV was limited.

The study determined that the best predictors of ICT and AV adoption and utilization in teaching centers were compatibility and trialability. The findings seem to point to training, capacity building and technical support as the factors affecting the adoption and utilization of ICT and AV. The study also found that lecturers are confronted with challenges in their attempts to adopt and utilize ICT and AV. The challenges identified were insufficient number of ICT and AV resources, insufficient technical support, lack of adequate skills and poor technology culture. The findings suggest that lecturers are yet to fully utilize ICT and AV technologies in teaching and learning centers. The study concluded that lecturers were yet to fully embrace ICT and AV in teaching centers for teaching and learning as much as they should.

### **5.5. Recommendations**

The following section of the chapter serves to provide recommendation from the findings of the empirical study, theory and the literature reviewed. Recommendation are made on the following aspects: adoption and utilization of ICT and AV, factors that affect the adoption and utilization of technology in teaching and learning and challenges of adoption and utilization.

The university should consider putting in place a framework for the integration of ICT and AV such as interactive white boards, digital cameras and conference cam connect into the curriculum. The university should have awareness campaigns among lecturers on the importance of integrating interactive white boards, digital cameras and conference cam connect into their teaching practices.

The university should initiate capacity building programmes to provision lecturers with skills that will improve their utilization of ICT and AV in teaching centers. The programmes must be innovative and focused on enhancing the competency of lecturers on the utilization of teaching and learning technologies. The programmes should also cover technical support skills

to guarantee constant utilization of ICT facilities. The university should consider introducing needs assessments to identify gaps in terms of training needed by lecturers.

### **5.6. Limitations and suggestions for future research**

The study evaluated the adoption and the extent of the utilization of ICT and AV facilities for teaching and learning in teaching centers at the Mafikeng campus. The study was limited to the North-West University Mafikeng campus. The sample consisted only of individuals/lecturers belonging to the FEMS. Therefore, it is recommended that future studies should be conducted in other campuses of the North-West University and that the sample should consist of lecturers of other faculties. This would offer a complete view and understanding of how ICT and AV is utilized at North-West University. The study focused only on lecturers and did not include students who are also important users of ICT and AV in learning. Future studies should consider understanding the factors influencing the adoption and use of technology in teaching and learning institutes from a perspective of a student.

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## Appendix 1: Survey Questionnaire for lecturers

### PART 1: BIOGRAPHICAL DATA

**Direction 1:** Please, appropriately mark one response with a tick in the space provided below. *Note that all responses are handled anonymously!*

#### 1. Gender

|        |  |
|--------|--|
| Male   |  |
| Female |  |

#### 2. Age

|              |  |
|--------------|--|
| Less than 20 |  |
| 20- 29       |  |
| 30- 39       |  |
| 40- 49       |  |
| 50 and above |  |

#### 3. ICT & AV usage experience

|                    |  |
|--------------------|--|
| Less than 1 year   |  |
| 1 - 3 years        |  |
| 4 - 6 years        |  |
| 7 - 9 years        |  |
| More than 10 years |  |

#### 4. Do you have access to ICT & AV facilities in teaching centers?

|     |  |
|-----|--|
| Yes |  |
| No  |  |

#### 5. How often do you use the internet to search for information?

|                           |  |
|---------------------------|--|
| Every day                 |  |
| Two or three times a week |  |
| A few times a month       |  |

#### 6. How do you access reading materials?

|                            |  |
|----------------------------|--|
| Read it on my computer     |  |
| Read it on my phone/Tablet |  |
| Print it to read it        |  |

#### 7. How would you prefer to receive your teaching material?

|                         |  |
|-------------------------|--|
| Hardcopy (printed book) |  |
| Electronic book         |  |
| Does not matter         |  |

#### 8. Please state the number of years you have served as an academic

1. Less than a year [ ] 2. 1-5 years [ ] 3. 6-10 years [ ] 4. 11-15 years [ ]  
5. [ ] 16-20 years [ ] 6. 20 years and above [ ]

## PART 2a: Extent of Adoption and Performance Expectancy (PE) of Technology in Teaching and Learning Rooms

For the following questions, indicate the extent of your agreement or disagreement you give to each factor by marking it with an X according to the scale.

| Rating | Response Mode     | Description                                         |
|--------|-------------------|-----------------------------------------------------|
| 5      | Strongly Agree    | You agree with no doubt at all                      |
| 4      | Agree             | You agree with some doubt                           |
| 3      | Undecided         | You have no idea                                    |
| 2      | Disagree          | You disagree with some doubt                        |
| 1      | Strongly Disagree | Strongly Disagree You disagree with no doubt at all |

| No. | Extent of Adoption of ICT & AV in teaching centers                                                                               | Rating |   |   |   |   |
|-----|----------------------------------------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                                                                  | 1      | 2 | 3 | 4 | 5 |
| 1.  | I currently use ICT & AV in teaching and learning                                                                                |        |   |   |   |   |
| 2.  | I have integrated ICT in my lessons/lectures                                                                                     |        |   |   |   |   |
| 3.  | I regularly pursue innovative ways to incorporate electronic instructional facilities into my lectures                           |        |   |   |   |   |
| 4.  | I encourage and recommend that learners use ICT & AV in teaching centers                                                         |        |   |   |   |   |
| 5.  | I intend to use ICT & AV technologies in future                                                                                  |        |   |   |   |   |
| 6.  | I incorporate ICT & AV in my teaching to such an extent that my students can collaborate with other students even after lectures |        |   |   |   |   |
| 7.  | I incorporate ICT & AV in my teaching to such an extent that it has become standard learning tools for my learners               |        |   |   |   |   |
| 8.  | I provide my learners course materials in electronic format                                                                      |        |   |   |   |   |

## Part 2b: Extent of utilization of ICT & AV

For the following questions, indicate the extent of your agreement or disagreement you give to each factor by marking it with an X according to the scale. Seldom

| Rating | Response Mode     | Description                          |
|--------|-------------------|--------------------------------------|
| 5      | Always utilize    | You always utilize the technology    |
| 4      | Often utilize     | You often utilize the technology     |
| 3      | Sometimes utilize | You sometimes utilize the technology |
| 2      | Seldom utilize    | You seldom utilize the technology    |
| 1      | Never utilized    | You never utilize the technology     |

| No. | Extent of utilization of ICT & AV (Multimedia Technologies) | Rating |   |   |   |   |
|-----|-------------------------------------------------------------|--------|---|---|---|---|
|     |                                                             | 1      | 2 | 3 | 4 | 5 |
| 1.  | Digital projectors                                          |        |   |   |   |   |
| 2.  | Digital cameras                                             |        |   |   |   |   |
| 3.  | Interactive whiteboards                                     |        |   |   |   |   |
| 4.  | Presentation tools (PowerPoint)                             |        |   |   |   |   |
| 5.  | Desktops                                                    |        |   |   |   |   |
| 6.  | Laptops                                                     |        |   |   |   |   |
| 7.  | Tablets                                                     |        |   |   |   |   |
| 8.  | Document Cameras                                            |        |   |   |   |   |
| 9.  | Wireless Presenters (Mobile Projector)                      |        |   |   |   |   |
| 10. | Conference Cam Connect (Mobile Video conference camera)     |        |   |   |   |   |
| 11. | Microphone & Receiver                                       |        |   |   |   |   |
| 12. | Mecer Digimemo (Notes taker)                                |        |   |   |   |   |

## PART 2c: Factors that affect the adoption and utilizing technology in teaching and learning

For the following questions, indicate the extent of your agreement or disagreement you give to each factor by marking it with an X according to the scale.

| Rating | Response Mode     | Description                                         |
|--------|-------------------|-----------------------------------------------------|
| 5      | Strongly Agree    | You agree with no doubt at all                      |
| 4      | Agree             | You agree with some doubt                           |
| 3      | Undecided         | You are uncertain                                   |
| 2      | Disagree          | You disagree with some doubt                        |
| 1      | Strongly Disagree | Strongly Disagree You disagree with no doubt at all |

| No. | Item 1: Performance Expectancy                                                | Rating |   |   |   |   |
|-----|-------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                               | 1      | 2 | 3 | 4 | 5 |
| 1.  | I find ICT & AV useful in my lectures                                         |        |   |   |   |   |
| 2.  | Using ICT & AV would enhance my effectiveness in lecturing                    |        |   |   |   |   |
| 3.  | Using ICT & AV would improve my lecturing performance                         |        |   |   |   |   |
| 4.  | Using ICT & AV would increase my productivity in my course work               |        |   |   |   |   |
| 5.  | ICT & AV could improve students' performance in teaching and learning centers |        |   |   |   |   |
| 7.  | I benefit from using ICT & AV                                                 |        |   |   |   |   |

| No. | Item 2: Effort Expectancy/Perceived Ease of Use        | Rating |   |   |   |   |
|-----|--------------------------------------------------------|--------|---|---|---|---|
|     |                                                        | 1      | 2 | 3 | 4 | 5 |
| 1.  | I have high level of self-confidence in using ICT & AV |        |   |   |   |   |
| 2.  | I'm able to skilfully use ICT & AV                     |        |   |   |   |   |
| 3.  | Using ICT & AV is entirely within my control           |        |   |   |   |   |
| 4.  | ICT & AV allows easy access to information             |        |   |   |   |   |
| 7.  | I find ICT & AV easy to learn                          |        |   |   |   |   |
| 8.  | I find ICT & AV easy to use                            |        |   |   |   |   |
| 9.  |                                                        |        |   |   |   |   |

| No. | Item 3: Social Influence                                                                                 | Rating |   |   |   |   |
|-----|----------------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                                          | 1      | 2 | 3 | 4 | 5 |
| 1.  | People such as the Dean, HOD and colleagues think I should use ICT & AV in teaching centers for teaching |        |   |   |   |   |
| 2.  | Most lecturers are in favour of the use of ICT and AV in teaching centers                                |        |   |   |   |   |
| 3.  | In general, the authority would support the use of ICT and AV in teaching centers                        |        |   |   |   |   |
| 4.  | I'm able to ask questions and receive answers                                                            |        |   |   |   |   |

| No. | Item 4: Compatibility                                                                                         | Rating |   |   |   |   |
|-----|---------------------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                                               | 1      | 2 | 3 | 4 | 5 |
| 1.  | Using ICT & AV suits my lecturing                                                                             |        |   |   |   |   |
| 2.  | Using ICT and AV in teaching centers fits well with my work                                                   |        |   |   |   |   |
| 3.  | ICT & AV usage in teaching makes me redundant                                                                 |        |   |   |   |   |
| 4.  | I worry that ICT & AV are not secure enough to protect my personal information, intellectual content or right |        |   |   |   |   |

| No. | Item 5: Trialability                                                                         | Rating |   |   |   |   |
|-----|----------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                              | 1      | 2 | 3 | 4 | 5 |
| 1.  | It is easy to use ICT & AV more frequently after trying them out                             |        |   |   |   |   |
| 2.  | A trial convinced me that using ICT & AV is better than using traditional method of teaching |        |   |   |   |   |
| 3.  | It is better to experiment with ICT & AV before adopting them                                |        |   |   |   |   |

| No. | Item 6: Observability                                                                              | Rating |   |   |   |   |
|-----|----------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                                    | 1      | 2 | 3 | 4 | 5 |
| 1.  | I was influenced by what I observed as the benefits of using ICT & AV as instructional facilities. |        |   |   |   |   |
| 2.  | I observed others using ICT & AV and saw the advantages of doing so.                               |        |   |   |   |   |
| 3.  | I have seen how my colleagues use ICT & AV before I could use them.                                |        |   |   |   |   |

| No. | Item 7: Behavioural intention                                                                          | Rating |   |   |   |   |
|-----|--------------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                                        | 1      | 2 | 3 | 4 | 5 |
| 1.  | Whenever possible, I intend to use computers for learning and teaching                                 |        |   |   |   |   |
| 2.  | I am likely to use ICT & AV in my lecturing sessions                                                   |        |   |   |   |   |
| 3.  | I plan to use computers during my teaching practicum                                                   |        |   |   |   |   |
| 4.  | I am willing to participate in ICT & AV trainings                                                      |        |   |   |   |   |
| 5.  | I will visit IT department often for future training                                                   |        |   |   |   |   |
|     | I regularly pursue innovative ways to incorporate electronic instructional facilities into my lectures |        |   |   |   |   |

| No. | Item 8: Facilitating conditions/Organisational factors                                                                                    | Rating |   |   |   |   |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                                                                                           | 1      | 2 | 3 | 4 | 5 |
| 1.  | ICT and AV personnel are available to provide assistance with difficulty on use of ICT and AV technologies in teaching centers            |        |   |   |   |   |
| 2.  | There is access to the internet in teaching centers and connectivity is very fast and reliable                                            |        |   |   |   |   |
| 3.  | There is available the resources (adequate computers and internet connectivity for lecturers in the teaching centers, camera, microphone) |        |   |   |   |   |
| 4.  | There is available space (teaching centers or dedicated computer with internet access for instructional delivery)                         |        |   |   |   |   |

### PART 3: Challenges affecting the utilization of ICT & AV

For the following questions, indicate the extent of your agreement or disagreement you give to each factor by marking it with an X according to the scale.

| Rating | Response Mode     | Description                                         |
|--------|-------------------|-----------------------------------------------------|
| 5      | Strongly Agree    | You agree with no doubt at all                      |
| 4      | Agree             | You agree with some doubt                           |
| 3      | Undecided         | You are not certain                                 |
| 2      | Disagree          | You disagree with some doubt                        |
| 1      | Strongly Disagree | Strongly Disagree You disagree with no doubt at all |

| No. | Factors affecting                                                      | Rating |   |   |   |   |
|-----|------------------------------------------------------------------------|--------|---|---|---|---|
|     |                                                                        | 1      | 2 | 3 | 4 | 5 |
| 1.  | Lack of adequate skills                                                |        |   |   |   |   |
| 2.  | Insufficient number of ICT & AV resources                              |        |   |   |   |   |
| 3.  | Insufficient technical support                                         |        |   |   |   |   |
| 4.  | Lack of access to utilizing ICT & AV for teaching and learning         |        |   |   |   |   |
| 5.  | Lack of interest                                                       |        |   |   |   |   |
| 6.  | No or unclear benefit to use ICT for teaching                          |        |   |   |   |   |
| 7.  | Using ICT in teaching and learning not being a goal in our institute   |        |   |   |   |   |
| 8.  | Most lecturers in favour of the use of ICT and AV in teaching centers  |        |   |   |   |   |
| 9.  | Lack of pedagogical models on how to use ICT for teaching and learning |        |   |   |   |   |
| 10. | Too difficult to integrate ICT use into the curriculum                 |        |   |   |   |   |
| 11. | Insufficient pedagogical support for teachers                          |        |   |   |   |   |

## **Appendix 2: Focus Group Interview**

This Interview will help research on technology adoption at North-West University Mafikeng. Please orally respond to these questions as accurately as you can. Your oral response will be recorded using a cell phone recorder. Your response will not be used for any other purpose other than research and will be kept confidential. Thank you very much!

Interview Schedule for lecturers

Gender: Female [ ] Male [ ]

Age category: 41-50 [ ] 51-60 [ ] 61-70 [ ]

1. How would you describe the extent of adoption of ICT and AV in teaching centers in your campus?
2. How would you describe the use of ICT and AV in teaching centers in your campus?
3. Briefly describe your rating and experience on the of usage of ICT & AV in teaching centers.
4. Kindly explain how lecturers use technology in learning and teaching processes in NWU Mafikeng and compare the utilization with no utilization.
5. From your ICT & AV utilization experience briefly describe the attitude and perceptions of NWU Mafikeng lecturer's in terms usage of ICT & AV technological tools available in NWU.
6. From your experience which factors do you think affect the adoption and utilization of ICT and AV technologies in teaching centers: 1) Compatibility, 2) performance expectancy, 3) ease of use of ICT and AV, 4) social influence 5) trialability, 6) observability 7) behavioural intention 8) government policy, 9) institutional policy, 10) organizational support, 11) technical support and 12) culture, 12) other factors.
7. What are the challenges faced by lecturers in the adoption and utilization of ICT and AV in teaching centers? matters such as 1) senior management 2) amount of the student population 3) organisational preparedness 4) time 5) skills development on emerging technology 6) insufficient software and hardware 7) support from IT department 8) institutional policy 9) technical support and 10) 11) other factors?
8. How do you think these challenges that associated with adoption and use of ICT and AV can be surmounted?

**THANK YOU!**

### Appendix 3: Letter of Consent



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Fax: 018 392-5775  
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Web: <http://www.nwu.ac.za>

#### **Subject: Informed consent for participation in the study**

I, Mmueleli Menong, am an employee of North-West University (NWU) and a registered student: MBA NWU School of Business & Governance. I am currently engaged in a research for my master's degree. The title of the study is *Investigating the adoption and utilization of ICT facilities in a selected higher learning institution*. The main objective of the study is to evaluate adoption and the extent of the utilization of ICT & AV facilities for teaching and learning in teaching centres in Mafikeng campus.

The research requires NWU lecturers to complete questionnaires and an interview. The electronic final version of the research will be used as the official communication tool and will be available in the NWU library system. I hereby request your consent and support in conducting this research. Before agreeing to participate in the research study, it is important to read and understand the following information:

- Any information obtained in this study will be regarded as confidential and will not be shared with any third party that is not directly involved in the research process.
- No monetary reward shall be made available for participation in the study.
- Participation in this study does not create any physical risk to you, as the study does not involve any physical activities or experiments.
- The findings concluded in the study will be for academic purposes and will only be utilized to add to current body of available knowledge.
- You have the right to discontinue participation in this study and can exit the research process at any time without any negative consequences to me.

Thanking you

Mmueleli Menong

## Appendix 4: Survey data output

### Item 1: performance expectancy

Table 5.2.4-1 Item 1: Performance Expectancy

|                                                                               | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree (%) | Strongly<br>Disagree<br>(%) | Majority<br>Response | Mean | Std.<br>Dev |
|-------------------------------------------------------------------------------|--------------|--------------------------|--------------|----------------|--------------|-----------------------------|----------------------|------|-------------|
| I find the ICT & AV useful in my lectures                                     | 35           | 51,4%                    | 31,4%        | 11,4%          | 2,9%         | 2,9%                        | 51,4%                | 4.51 | .658        |
| Using ICT & AV would enhance my effectiveness in teaching                     | 35           | 62,9%                    | 28,6%        | 8,6%           | 0,0%         | 0,0%                        | 62,9%                | 4.54 | .657        |
| Using ICT & AV would improve my lecturing performance                         | 35           | 65,7%                    | 20,0%        | 14,3%          | 0,0%         | 0,0%                        | 65,7%                | 4.51 | .742        |
| Using ICT & AV would increase my productivity in my course work               | 35           | 45,7%                    | 45,7%        | 8,6%           | 0,0%         | 0,0%                        | 45,7%                | 4.37 | .646        |
| ICT & AV could improve students' performance in teaching and learning centers | 35           | 62,9%                    | 28,6%        | 8,6%           | 0,0%         | 0,0%                        | 62,9%                | 4.54 | .657        |
| Using the ICT available increases my productivity                             | 35           | 54,3%                    | 34,3%        | 8,6%           | 2,9%         | 0,0%                        | 54,3%                | 4.40 | .775        |
| I benefit from using ICT & AV                                                 | 35           | 28,6%                    | 51,4%        | 17,1%          | 2,9%         | 0,0%                        | 51,4%                | 4.06 | .765        |

## Item 2: Effort Expectancy/Perceived Ease of Use

Table 5.2.4-2 Item 2: Effort Expectancy/Perceived Ease of Use

|                                                        | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree<br>(%) | Strongly<br>Disagree<br>(%) | Majority<br>Response | Mean | Std.<br>Dev |
|--------------------------------------------------------|--------------|--------------------------|--------------|----------------|-----------------|-----------------------------|----------------------|------|-------------|
| I have high level of self-confidence in using ICT & AV | 35           | 20,0%                    | 51,4%        | 14,3%          | 11,4%           | 2,9%                        | 51,4%                | 3.74 | 1.010       |
| I am able to skilfully use ICT & AV                    | 35           | 25,7%                    | 40,0%        | 22,9%          | 2,9%            | 8,6%                        | 40,0%                | 3.71 | 1.152       |
| Using ICT & AV is entirely within my control           | 35           | 20,0%                    | 25,7%        | 37,1%          | 11,4%           | 5,7%                        | 37,1%                | 3.43 | 1.119       |
| ICT & AV allows easy access to information             | 35           | 60,0%                    | 34,3%        | 2,9%           | 2,9%            | 0,0%                        | 60,0%                | 4.51 | .702        |
| I find ICT & AV easy to learn                          | 35           | 20,0%                    | 54,3%        | 25,7%          | 0,0%            | 0,0%                        | 54,3%                | 3.94 | .684        |
| I find ICT & AV easy to use                            | 35           | 28,6%                    | 45,7%        | 17,1%          | 8,6%            | 0,0%                        | 45,7%                | 3.94 | .906        |

### Item 3: Social Influence

Table 5.2.4-3 Item 3: Social Influence

|                                                                                                          | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree<br>(%) | Strongly<br>Disagree<br>(%) | Majority<br>Response | Mean | Std.<br>Dev |
|----------------------------------------------------------------------------------------------------------|--------------|--------------------------|--------------|----------------|-----------------|-----------------------------|----------------------|------|-------------|
| People such as the Dean, HOD and colleagues think I should use ICT & AV in teaching centers for teaching | 35           | 60,0%                    | 31,4%        | 8,6%           | 0,0%            | 0,0%                        | 60,0%                | 4.51 | .658        |
| Most lecturers are in favour of the use of ICT and AV in teaching centers                                | 35           | 65,7%                    | 25,7%        | 8,6%           | 0,0%            | 0,0%                        | 65,7%                | 4.57 | .655        |
| In general, the authority would support the use of ICT and AV in teaching centers                        | 35           | 62,9%                    | 22,9%        | 14,3%          | 0,0%            | 0,0%                        | 62,9%                | 4.49 | .742        |
| I am able to ask questions and receive answers                                                           | 35           | 51,4%                    | 40,0%        | 8,6%           | 0,0%            | 0,0%                        | 51,4%                | 4.43 | .655        |

## Item 4: Compatibility

Table 5.2.4-4 Item 4: Compatibility

|                                                                                                               | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree<br>(%) | Strongly<br>Disagree<br>(%) | Majority<br>Response | Mean | Std.<br>Dev |
|---------------------------------------------------------------------------------------------------------------|--------------|--------------------------|--------------|----------------|-----------------|-----------------------------|----------------------|------|-------------|
| Using available ICT & AV suits my lecturing                                                                   | 35           | 65,7%                    | 25,7%        | 5,7%           | 0,0%            | 2,9%                        | 65,7%                | 4.51 | .853        |
| Using ICT and AV in teaching centers fits well with my work                                                   | 35           | 40,0%                    | 40,0%        | 17,1%          | 2,9%            | 0,0%                        | 40,0%                | 4.17 | .822        |
| ICT & AV usage in teaching makes me redundant                                                                 | 35           | 40,0%                    | 51,4%        | 5,7%           | 2,9%            | 0,0%                        | 51,4%                | 4.29 | .710        |
| I worry that ICT & AV are not secure enough to protect my personal information, intellectual content or right | 35           | 48,6%                    | 40,0%        | 11,4%          | 0,0%            | 0,0%                        | 48,6%                | 4.37 | .690        |

## Item 5: Trialability

Table 5.2.4-5 Item 5: Trialability

|                                                                                                                   | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree<br>(%) | Strongly<br>Disagree<br>(%) | Majority<br>Response | Mean | Std.<br>Dev |
|-------------------------------------------------------------------------------------------------------------------|--------------|--------------------------|--------------|----------------|-----------------|-----------------------------|----------------------|------|-------------|
| It is easy to use<br>ICT & AV more<br>frequently after<br>trying them out                                         | 35           | 25,7%                    | 37,1%        | 25,7%          | 5,7%            | 5,7%                        | 37,1%                | 3.71 | 1.100       |
| A trial<br>convinced me<br>that using ICT<br>& AV is better<br>than using<br>traditional<br>method of<br>teaching | 35           | 48,6%                    | 31,4%        | 14,3%          | 2,9%            | 2,9%                        | 48,6%                | 4.20 | .994        |
| It is better to<br>experiment with<br>ICT & AV<br>before adopting<br>them                                         | 35           | 45,7%                    | 34,3%        | 8,6%           | 8,6%            | 2,9%                        | 45,7%                | 4.11 | 1.078       |

**Item 6: Observability****Table 5.2.4-6 Item 6: Observability**

|                                                                                                    | <b>Count<br/>(N)</b> | <b>Strongly<br/>Agree<br/>(%)</b> | <b>Agree<br/>(%)</b> | <b>Neutral<br/>(%)</b> | <b>Disagree<br/>(%)</b> | <b>Strongly<br/>Disagree<br/>(%)</b> | <b>Majority<br/>Response</b> | <b>Mean</b> | <b>Std.<br/>Dev</b> |
|----------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|----------------------|------------------------|-------------------------|--------------------------------------|------------------------------|-------------|---------------------|
| I was influenced by what I observed as the benefits of using ICT & AV as instructional facilities. | 35                   | 45,7%                             | 45,7%                | 5,7%                   | 2,9%                    | 0,0%                                 | 45,7%                        | 4.34        | .725                |
| I observed others using ICT & AV and saw the advantages of doing so.                               | 35                   | 60,0%                             | 34,3%                | 5,7%                   | 0,0%                    | 0,0%                                 | 60,0%                        | 4.54        | .611                |
| I have seen how my colleagues use ICT & AV before I could use them.                                | 35                   | 51,4%                             | 37,1%                | 11,4%                  | 0,0%                    | 0,0%                                 | 51,4%                        | 4.40        | .695                |

## Item 7: Behavioural intention

Table 5.2.4-7 Item 7: Behavioural intention

|                                                                                                        | Total | Strongly Agree (%) | Agree (%) | Neutral (%) | Disagree (%) | Strongly Disagree (%) | Majority Response | Mean | Std. Dev |
|--------------------------------------------------------------------------------------------------------|-------|--------------------|-----------|-------------|--------------|-----------------------|-------------------|------|----------|
| Whenever possible, I intend to use computers for learning and teaching                                 | 35    | 65,7%              | 25,7%     | 5,7%        | 0,0%         | 2,9%                  | 65,7%             | 4.51 | .853     |
| I am likely to use ICT & AV in my lecturing sessions                                                   | 35    | 40,0%              | 40,0%     | 17,1%       | 2,9%         | 0,0%                  | 40,0%             | 4.17 | .822     |
| I plan to use ICT & AV during my teaching practicum                                                    | 35    | 40,0%              | 51,4%     | 5,7%        | 2,9%         | 0,0%                  | 51,4%             | 4.29 | .710     |
| I am willing to participate in ICT & AV trainings                                                      | 35    | 54,3%              | 40,0%     | 5,7%        | 0,0%         | 0,0%                  | 54,3%             | 4.49 | .612     |
| I will visit IT department often for future training                                                   | 35    | 48,6%              | 40,0%     | 11,4%       | 0,0%         | 0,0%                  | 48,6%             | 4.37 | .690     |
| I regularly pursue innovative ways to incorporate electronic instructional facilities into my lectures | 35    | 51,4%              | 34,3%     | 8,6%        | 2,9%         | 2,9%                  | 51,4%             | 4.29 | .957     |

### Item 8: Facilitating conditions/Organisational factors

|                                                                                                                                           | Count<br>(N) | Strongly<br>Agree<br>(%) | Agree<br>(%) | Neutral<br>(%) | Disagree<br>(%) | Strongly<br>Disagree<br>(%) | Majority<br>Response       | Mean | Std.<br>Dev |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------|--------------|----------------|-----------------|-----------------------------|----------------------------|------|-------------|
| ICT and AV personnel are available to provide assistance with difficulty on use of ICT and AV technologies in teaching centers            | 35           | 54,3%                    | 31,4%        | 8,6%           | 2,9%            | 2,9%                        | 54,3%<br>Strongly<br>Agree | 4.31 | .963        |
| There is access to the internet in teaching centers and connectivity is very fast and reliable                                            | 35           | 51,4%                    | 37,1%        | 11,4%          | 0,0%            | 0,0%                        | 51,4%<br>Strongly<br>Agree | 4.40 | .695        |
| There is available the resources (adequate computers and internet connectivity for lecturers in the teaching centers, camera, microphone) | 35           | 62,9%                    | 28,6%        | 5,7%           | 0,0%            | 2,9%                        | 62,9%<br>Strongly<br>Agree | 4.49 | .853        |
| There is available space (teaching centers or dedicated computer with internet access for instructional delivery)                         | 35           | 42,9%                    | 40,0%        | 14,3%          | 2,9%            | 0,0%                        | 42,9%<br>Strongly<br>Agree | 4.23 | .808        |

## Appendix 5: Ethical Clearance



Private Bag X6001, Potchefstroom  
South Africa 2520

Tel: 018 299-1111/2222  
Web: <http://www.nwu.ac.za>

Economic and Management Sciences Research Ethics  
Committee (EMS-REC)  
Tel: 016-2103358  
Email: [ayeshabevandye@gmail.com](mailto:ayeshabevandye@gmail.com)

31 January 2020

Dr P Pretorius  
*Per e-mail*

Dear Dr Pretorius,

**EMS-REC FEEDBACK: 31012020**  
**Student: Menong, M (25001175)(NWU-00754-19-A4)**  
**Applicant: Dr P Pretorius – MBA**

Your ethics application on, Investigating the adoption and utilization of ICT facilities in a selected higher learning institution, which served on the EMS-REC meeting of 31 January 2020, refers.

### **Outcome:**

Approved as a minimal risk study. A number NWU-00754-19-A4 is given for three years of ethics clearance.

Kind regards,

*AL Bevan-Dye*

Prof Ayesha Bevan-Dye  
Deputy-Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)  
Vanderbijlpark Campus

## Appendix 6: Research Data Gatekeeper Certificate



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South Africa 2520

Tel: +2718 299-1111/2222  
Web: <http://www.nwu.ac.za>

Research Data Gatekeeper Committee

### NWU RDGC PERMISSION GRANTED / DENIED LETTER

Based on the documentation provided by the researcher specified below, on 02/12/2020 the NWU Research Data Gatekeeper Committee (NWU-RDGC) hereby grants permission for the specific project (as indicated below) to be conducted at the North-West University (NWU):

**Project title:** Investigating the adoption and utilization of ICT Facilities in a selected higher learning institution.

**Project leader:** Dr P Pretorius

**Researcher/Project Team:** M Menong

**Ethics reference no:** NWU-00754-19-A4

**NWU RDGC reference no:** NWU-GK-2017-069

**Specific Conditions:**

- Due the COVID-19 pandemics the Committee would like to advise the researcher to practice the necessary caution and adhere to the National Covid-19 Guidelines when conducting research with participants.

**Approval date:** 02/12/2020

**Expiry date:** 01/11/2021

**General Conditions of Approval:**

- The NWU-RDGC will not take the responsibility to recruit research participants or to gather data on behalf of the researcher. This committee can therefore not guarantee the participation of our relevant stakeholders.
- Any changes to the research protocol within the permission period (for a maximum of 1 year) must be communicated to the NWU-RDGC. Failure to do so will lead to withdrawal of the permission.
- The NWU-RDGC should be provided with a report or document in which the results of said project are disseminated.

Please note that under no circumstances will any personal information of possible research subjects be provided to the researcher by the NWU RDGC. The NWU complies with the Promotion of Access to Information Act 2 of 2000 (PAIA) as well as the Protection of Personal Information Act 4 of 2013 (POPI). For an application to access such information please contact Ms Annamari De Kock (018 285 2771) for the relevant enquiry form or more information on how the NWU complies with PAIA and POPI.

The NWU RDGC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the NWU RDGC for any further enquiries or requests for assistance

Yours sincerely

Prof Marlene Verhoef  
Chairperson NWU Research Data Gatekeeper Committee

## Appendix 7: Request Permission for Access to FEMS Lecturers



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Web: <http://www.nwu.ac.za>  
**NWU BUSINESS SCHOOL**  
Tel: 018 299 1406  
<http://commerce.nwu.ac.za/business-school>  
E-mail: [Jan.Meyer@nwu.ac.za](mailto:Jan.Meyer@nwu.ac.za)  
Date: 28 September 2020

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### MEMORANDUM

**TO: Executive Dean F-EMS** (For attention: Prof Sonia Swanepoel)  
**Cc: Deputy Dean R&I** (For attention Prof Surujlal)

**From:** Dr Piet Pretorius

Dear Professor Swanepoel

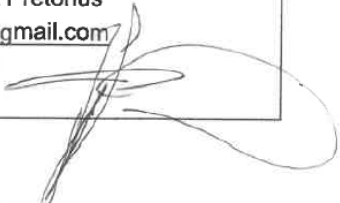
### REQUEST PERMISSION FOR ACCESS TO FEMS LECTURERS

The request is on behalf of Mr Mmueleli Menong (25001175). Permission is hereby kindly requested to access EMS faculty lecturer(s) to collect data. The student is doing his MBA mini-dissertation on **"Investigating the adoption and utilization of ICT facilities in a selected higher learning institution"**. Data collection will be by way of interviews and surveys. Emails will assist with distributing the survey link to lecturers and to setup interviews. Interviews with lecturers will be arranged outside the university contact time so as not to interfere with teaching and assessment processes of office duties. The POPI act policy and guidelines restrict personal information to be shared with the lecturers. Hence, with your permission and the Research Data Gatekeepers Committee (RDGC), the researcher can setup interviews and distribute the survey link through email for the FEMS lecturers to participate voluntarily. The study will adhere to COVID-19 Protocols by not having any human contact.

The study will benefit the Faculty through understanding the extent of adoption of ICT and AV facilities in teaching centers and the attitudes and perceptions of lecturers towards the utilization of ICT. The university will also benefit as the study may provide a basis for a comprehensive discourse on the adoption of ICT in institutions. The study may provide information for lecturers and other stakeholders regarding the factors that affect the adoption and utilization of ICT & AV facilities and how to improve them. Of significance is the personal benefit afforded to the instructors, as they will reflect on their attitudes, feelings, perceptions and skills towards the technology in teaching centers. The study will provide possible recommendations that can be considered in order to improve the lecturers' perceptions. The contribution of the study will come in the form of a model for ICT

adoption at the NWU Mafikeng campus. The model will work as a guide to formulate strategies to improve the adoption and utilization of ICT and AV in teaching and learning centers. Should you be in support, please approve by signing the document. This will enable us to motivate for approval at the RDGC committee

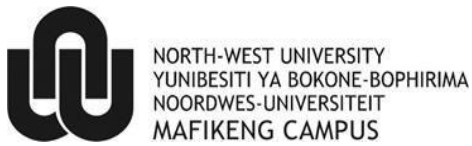
Your assistance in this matter will be much appreciated.

Supervisor: Dr Piet Pretorius  
E-mail: [oldocpiet@gmail.com](mailto:oldocpiet@gmail.com)  
Cell: 082 467 3953  
Signature: 

Approval granted YES [ ☐ ] / NO [ ☐ ] for the student to access FEMS lecturers email address

Approval granted by \_\_\_\_\_ Signature: \_\_\_\_\_

## Appendix 8: Letter from Language Editor



Department of Academic Literacy

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27<sup>th</sup> November 2020

Private Bag X2046

Mmabatho

2735

### CERTIFICATE OF EDITING A DISSERTATION

TO WHOM IT MAY CONCERN

This serves to confirm that I have read and edited Mr M. N. Menong's dissertation titled: **Investigating the adoption and utilization of ICT facilities in a selected higher learning institution**. The candidate corrected the language errors identified. The document is of an acceptable linguistic standard.

Thank you

Yours Faithfully

A rectangular box containing a handwritten signature in grey ink that reads 'J.R. Moletsane'.

.....  
J.R. Moletsane (Academic  
Literacy) Accr. No. 1002708

[joel.moletsane@nwu.ac.za](mailto:joel.moletsane@nwu.ac.za)

## Appendix 9: Turnitin Report

|                                                         |                                                               |              |                |
|---------------------------------------------------------|---------------------------------------------------------------|--------------|----------------|
| 25001175:MBA_Dissertation_06_December_2020_language_ed. |                                                               |              |                |
| ORIGINALITY REPORT                                      |                                                               |              |                |
| 19%                                                     | 15%                                                           | 8%           | 7%             |
| SIMILARITY INDEX                                        | INTERNET SOURCES                                              | PUBLICATIONS | STUDENT PAPERS |
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