College of Education and Behavioural Studies

Department of Educational Planning and Management

Graduate Program of Educational Leadership and Management

The Role of Digitalization in Higher Educational Institutions: The Case of Addis Ababa University

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Declarations of Statement

I, Emebet Hailemichael Admassu, do hereby declare that this thesis is my original work, and it has not been submitted partially or in full by any other person for the award of a degree or a master's degree in any university or institution.

Signature _____ Date _____

This is to certify that the thesis entitled The Role of Digitalization in Higher Educational Institutions: The Case of Addis Ababa University, was done under my close guidance and submitted for examination with my approval as a University Advisor.

Advisor: Demoze Degefa (PhD)

Signature _____ Date _____

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Acronyms

AAU – Addis Ababa University

AI – Artificial Intelligence

CC – Cloud Computing

CPD – Continuous Professional Development

EDC - Educator's Digital Competence

e-SHE - e-learning for Strengthening Higher Education

FDRE – Federal Democratic Republic of Ethiopia

HEAM - Higher Education E-readiness Assessment Model

HDP – Higher Diploma Program

HEI – Higher Educational Institutions

ICT – Information Communication Technology

IM – Instant Message

IoT – Internet of Things

LMS – Learning Management System

MoA – Ministry of Education

SD – Standard Deviation

ToT – Training of Trainers

TVET – Technical and Vocational Education and Training

Abstract

This study aimed to investigate the role of digitalization in HEIs in the case of Addis Ababa University questioning what effect digitalization has on enhancing student service; and to what extent AAU leadership possesses the readiness to embrace change. This research will be significant to AAU since it may provide critical information that could be utilized for policy reform and to make a paradigm shift in its investment in educational technologies and infrastructure. The research design is descriptive, and a pragmatic research approach is applied. Primary data sources were used, and multiple data-gathering instruments specifically close-ended questionnaires and semi-structured interviews were applied. Descriptive statistics were employed for data analysis. AAU has already fully digitalized the student service. This ensured the digital accessibility of the service through the online student portal. However, the accessibility and inclusiveness of the online portal to meet the needs of specially-abled students is under question mark. Leadership digital readiness can be explained as strategic level requirements i.e., predefining educational goals with digitalization; integrating ICT plan with institutional strategic plan; preparing institutional e-learning policy and guidelines; establishing e-learning partnership with different stakeholders like Arizona State University and China; designing digital literacy improvement program and engaging educators; financing digitalization through internal and external sources; building state of the art and installing LMS and fully digitalizing student service which is appreciated. Resistance to change will be a great challenge in digitalizing education. Therefore, assessing the digital behavior of educators, students, and support service experts and taking necessary development measures is mandatory.

Keywords: digitalization, higher education institutions, e-learning, digital literacy, educational technologies

CHAPTER ONE
1. INTRODUCTION

1.1. Background of the Study

Digitalization as the result of information and communication technology is a widely discussed and used phenomenon. It has become the focus of public discourses with the intent of transforming the political, economic, and socio-cultural systems (Gorensek & Kohont, 2018, p. 94). Digitalization is the usage of digital gadgets to bring systemic change and improve the performance of an organization (Kuusisto, 2017, p. 342). It has played a central role in the development of business ecosystems due to the enabling role of digital technologies in automating business transactions and offering cheap communication possibilities (Korpela, Kuusiholma, Taipale, & Hallikas, 2013). Digitalization has a significant impact on the performance of an organization (Wang, Lin, Lyulyov, & Pimonenko, 2023, p. 14) which include improved communication, enhanced productivity, better data management, digital innovation, organizational structure, organizational agility and organizational learning (Kuusisto, 2017, p. 365). Organizations are in a new era when their survivability and sustainability are mainly based on the integration of new technologies into their strategies (Masouskova, 2022, p. 51). They are being forced to restructure their organization to take a competitive advantage (Mubarak, Shaikh, Mubarik, Samo, & Mastoi, 2019, p. 5056). In different companies, digitalization has removed the barriers of distance; enabled to relocate their production facilities to different countries and to control access to information in real-time (Butollo, 2020); to automate several tasks (Bjorkdahl, 2020); to instantaneously access global financial markets with the possibility of conducting transactions in real time (Zhou, Kautonen, Dai, & Zhang, 2021), and allows customers to get services virtually (Cuadros-Solas, Rodriguez-Fernandez, & Carbo-Valverde, 2020).

Likewise, digitalization is playing a significant positive role in the education sector, especially in higher education. Jamah, et al., (2022) described that worldwide education has remarkably grown over the last 50 years, and digitalization is transforming the skills required to succeed and how teaching and learning strategies should be. Since digitalization remains a top priority on national, regional, and international agendas, higher education institutions around the globe are going through constant transformation to respond to societal and market demand. Digitalization has introduced interactive methods, adding new options for teaching, creating a wide variety of new courses, and increasing enrollment in many academic institutions. It makes education accessible from everywhere

with no regional boundaries which brings internationalization of education. New ways of teaching include the development of new information and communication technologies such as cable and satellite transmission, audio and video conferencing, PC software and CD Rooms, and internet sources (Kulkarni, n.d.). Above all, the outbreak of Coronavirus (COVID-19) accelerated the rapid expansion of digital services provided by HEIs across the globe which required a swift change from traditional methods of student support, teaching, and research to online methods requiring diversified skills and processes. Digitalization affects the teaching design of individual teachers and initiates organizational change requiring several measures at different levels (Qizi & Sharofat, 2021).

The global trend of digitalization of HE is mirrored in Ethiopian HE since Ethiopia is part of the global context. Different efforts have been made to introduce digitalization through the integration of ICT in HE. The 2018 United Nations E-Government Survey encompassing 193 nations put Ethiopia under the middle e-government development index with scores between 0.25 and 0.50. Considering the scope and quality of online services, the status of the development of telecommunication infrastructure, and the inherent human capital, Ethiopia came in a position of 151 out of 193 nations (United Nations, 2018, pp.84-86). This indicates the technological advancement of the country as embryonic which needs tremendous effort to get developed. Studies also show that digitalization of HE in Ethiopia is still meager since ICT is not well integrated into the education system in a sustainable manner (Dawit, Bandyopadhyay, & Negash, 2009, p. 54; Fisseha, 2011; Amanuel A. E., 2019; Moges, 2021). This is due to a lack of institutional ICT policy (Dawit, Bandyopadhyay, & Negash, 2009, p. 54; Amanuel A. E., 2019, p. 171), insignificant leadership support, lack of technical expertise, inadequate training for instructors and experts, organizational issues i.e., ICT being organized under an administrative unit and students' skill gap in utilizing ICT gadgets (Amanuel A. E., 2019, p. 171), and lack of infrastructure (Fisseha, 2011).

This indicates the demand for change in the Ethiopian education system which calls for a new educational strategy. With this respect (Qizi & Sharofat, 2021) described that HEIs need a digital strategy to achieve their objective and to apply digital thinking across their entire process. This can be achieved by using a framework that enables HEIs to manage all digital initiatives and approaches and considers stakeholders, emerging technologies, and core processes (Rodrigues, 2019). Accordingly, Ethiopia has developed "Digital Strategy Ethiopia 2025" as a roadmap for the country's digital transformation. In line with this strategy, the Federal Democratic Republic of Ethiopia Ministry of Education (MoE) has approved the Digital Skills Country Action Plan

(DSCAP) for 2020-2030" (Ministry of Education, n.d.; AAU, 2023). The focus of the MoE has been expanding universities and increasing their uptake capacity, and huge investments have been made over the years. Recently digitalizing education has been promoted by MoE as a cost-effective, sustainable, and resilient alternative delivery modality. Ethiopian HEIs have made significant investments to build connectivity and enhance the ICT infrastructure. Despite the significant effort, the state of digital education remains limited. This has not only compromised the quality, affordability, and accessibility of education but also made the sector vulnerable to external shocks which were profoundly marked during the COVID-19 pandemic when all the HEIs were closed and futile to reach their students (Ministry of Education, n.d.). The MoE has ratified the e-learning policy for HE. This policy pinpointed what should be done by the HEIs for the successful implementation of the e-learning system. The successful implementation of this policy will result in the digitalization of the HE system which is greatly demanded in the era of globalization (MoE, 2023). Taking the digitalization initiative of MoE into great account, this research investigated the role digitalization is playing in HEIs in the case of Addis Ababa University.

1.2. Statement of the Problem

Digitalization is highly visible in the education process. Its benefits extend from creating conducive teaching-learning for educators and learners to building a knowledge-based economy and improving the civilization level of society (Ciarko & Paluch-Dybek, 2021). This is particularly realized through HE which is a key education sector playing a highly significant role in the growth and development of a country through the production of human capital that can drive the socio-economic and political engine of a country. HEIs are operating in a highly competitive and globalized environment where the societal and market demand and the need for building a knowledge-based economy are constantly rising. The decline in traditional notions of national identity and the rise of a global marketplace has resulted in aggressive competition and customers demand talented knowledge workers capable of enhancing the market reputation and social prestige of an organization (Pinheiro, Wangenge-Ouma, & Balbachevsky, 2015). Globalization is supported by digitalization (Castells, 2010) which aspires to connectivity and knowledge as the main factors of production. The emergence of digitalization and globalization put great pressure on HEIs by requiring them to produce human capital capable of operating digital gadgets managing the global market on the one hand and creating a digital environment for educators and learners on the other. HEIs possess the vision, knowledge, and power to lead transformation and initiate change towards the new paradigm

of digitalization which provides HEIs with new designs such as digitalization of the classroom learning process, and new framework possibilities for didactic action and better achievement of educational goals (Bogdandy, Tamas, & Toth, 2020). Besides, digitalization is playing a remarkable role in easing administration and student services such as admission, testing, and withdrawal and making grading more transparent and transferrable (Brink, Packmohr, & Vogelsang, 2020)

In the Ethiopian context, digitalization is playing a remarkable role in business, banking and finance, marketing, and other service-providing sectors. However, the level of digital transformation is embryonic. The government of Ethiopia placed a great emphasis on the digitalization of the service sector including e-commerce (Taffere, 2022). It eases communication and service exchange by automating service, improving access, reducing distance, and minimizing mandatory physical attendance. However, this opportunity of digitalization cannot be pronounced in the education sector. Public universities do not offer accredited online degrees at the undergraduate or postgraduate level (Ministry of Education, n.d.). Still, individuals must attend either regular, extension, or distance programs to upgrade their education and competency. All these programs require physical attendance at different levels. This is a challenge for individuals having a problem with time and location. Digital gadgets like computers, different software and applications, and the internet are being utilized in HEIs. Nevertheless, digitalization has gone far beyond the use of computer applications and the internet for the teaching-learning process. It became a comprehensive process of digitalizing learning and teaching that requires arranging educational content using technological opportunities, creating educational materials combined with virtual reality, and applying gamification (Arisory, 2022) through the creative use of digital resources (Kools, et al., 2017). The use of digital technologies seems mainly concentrated in the administration and student service of many universities. This may be due to the diversified level of digital literacy and competency of educators and the lack of infrastructure since digitalizing HE requires ICT infrastructure which calls for huge financial investment (Masouskova, 2022). Different researchers (Dawit, Bandyopadhyay, & Negash, 2009, p. 54; Fisseha, 2011; United Nations, 2018; Amanuel A. E., 2019; Moges, 2021) have researched the digitalization of HE in Ethiopia. But as far as this research is concerned little is known about the role of digitalization in Ethiopian HE. Besides, the dynamic and erratic nature of technological advancement makes the area of digitalization of HE to be under constant investigation.

Furthermore, the FDRE Ministry of Science and Higher Education has endorsed an ICT policy for HE and TVET in Ethiopia with the vision of making every HE and TVET community digitally

enabled. This policy makes the integration of ICT in the instructional process and management of the education system; the provision of blended (hybrid) learning, and the development of a full-fledged online academic program mandatory (FDRE Ministry of Science and Higher Education, 2020). Moreover, a five-year multi-stakeholder initiative i.e. e-Learning for Strengthening Higher Education (e-SHE) is implemented by the FDRE MoE to strengthen the capacities of public universities to deliver online education. The e-SHE initiative is expected to develop and support the establishment of state-of-the-art facilities and systems for reliable online education (AAU, 2023). This makes investigating the readiness and commitment of HEIs to embrace change and digitalize the education system compulsory. To this end, examining and analyzing the role of digitalization in HEIs in the case of AAU with the specific concern of scrutinizing the leadership readiness to implement the new digitalization initiative and possible challenges have become obligatory.

1.3. Research Questions

1. What is the implication of digitalization in enhancing the student services of AAU?
2. To what extent does AAU possess the readiness to embrace change towards the new initiative of digitalization?
3. What are the challenges of implementing digital technologies in academic aspects of AAU?

1.4. Objective of the Study

1.4.1. General Objective

The study aims to investigate the role of digitalization in HEIs in the case of AAU.

1.4.2. Specific Objectives

Specifically, the study aims:

1. To examine the implication of digitalization on enhancing student services of AAU.
2. To scrutinize the extent to which AAU possesses the readiness to embrace change towards the new initiative of digitalization.
3. To investigate the challenges of implementing digital technologies in academic aspects of AAU.

1.5. Significance of the Study

This research will be significant to the government since it may provide critical information that could be utilized for policy reform; to make a paradigm shift in its investment in educational technologies and infrastructure and to make informed decisions that integrate national and international realities of digitization and the impact of globalization on HE. This informed decision

can bring change in the modalities of HE considering the level of digitalization the world has reached. It will also be remarkable for paving the way for educational leaders to take a great part and play a crucial role in HE policy making, educational program designing, digital education development projects and their implementation as well as to follow up and promote the real contribution of digitalization for improved access of HE. It will also inform them what gap may exist in educational leadership about updating and upgrading the education system in light of digital world requirements, the new digital initiative, societal and market demand, and how digitalization of the education system will help them to eradicate the problem of time and place and improve access to HE. Moreover, it will serve as an input for other researchers, especially researchers in the digitalization of HE. This study may spark other questions or result in the upbringing of new problems that are researchable and need extra examination. Therefore, this research can be a baseline for other investigations.

1.6. Delimitation of the Study

This study was spatially delimited to AAU. The choice of the study area is obliged by the fact that AAU is the first and the largest center of excellence in Ethiopia established in 1950 and enjoying an untouchable reputation in the nation's education system with over fifty public and private universities (Amanuel, 2021). Therefore, it is mandatory to investigate the extent to which AAU possess readiness to lead transformation and initiate change toward a new paradigm of digitalization; contributions of digitalization in enhancing administrative services specifically student services, and challenges that hamper AAU from digitalizing academic services. The study is started in January 2024 and completed in June 2024.

1.7. Literature Definition of Key Terms

Digitization – "is the technical process of converting analog signals into a digital form, and ultimately into binary digits" (Legner, et al., 2017)**.**

Digitalization – "is the manifold sociotechnical phenomena and processes of adopting and using these technologies in broader individual, organizational, and societal contexts" (Legner, et al., 2017).

Digital Transformation – is *"*a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies*"* (Vail, 2019).

1.8. Organization of the Thesis

This thesis is organized into five chapters. Chapter one deals with an introduction ranging from background to limitations of the study. Chapter two encompasses reviewing different theoretical and empirical literature related to the subject under investigation, and chapter three covers research design and methodology including research design, data source and data gathering method, sampling design, and techniques of data presentation and analysis. The fourth chapter presents an analysis and interpretation of the collected data, and chapter five stipulates a conclusion and recommendation. In addition to these, the thesis has preliminary and supplementary parts.

CHAPTER TWO

2. LITERATURE REVIEW

Theoretical and empirical literature related to the subject under investigation i.e., the impact of digitalization on HEIs are reviewed. Taking the objective of the study into great consideration literature related to basic concepts of digitalization, the history of digitalization, digitalization in education and digital education, challenges and opportunities of digitalization, and the impacts of digitalization has been reviewed and discussed.

2.1. Theoretical Literature Review

2.1.1. Basic Concept of Digitization and Digitalization

Digitization and digitalization are two conceptual terms that are closely related and often used interchangeably. However, there is a clear distinction between them (Brennen & Kreiss, 2014; Clerck, 2017). Digitization refers to the process of digitizing which refers to converting analog data like images videos and texts into digital forms. On the contrary, digitalization refers to the excessive use of digital technologies by different entities like organizations, industries, and countries (OED as cited in Brennen & Kreiss, 2014). Digitization is the process of converting individual analog information into digital bits of 0s and 1s with discrete and discontinuous values (Brennen & Kreiss, 2014; Clerck, 2017; Johannes & Singh, 2021; Lachvajderová & Kádárová, 2021). It is the computerization of information using a computer system (Lachvajderová & Kádárová, 2021) having symbolic and material dimensions (Brennen & Kreiss, 2014). Its symbolical dimension is expressed in terms of its process of converting analog signals into bits of 0s and 1s, and it produces different types of information that can be expressed in many different ways, on many different types of materials, and in many different systems (ibid).

Digitalization is the process of restructuring various domains of social life into digital communication and media infrastructures. In digitalization information is the organizing mode of many domains of social life (Brennen & Kreiss, 2014). Digitalization is one of the decisive ongoing transformations of modern society incorporating different business aspects and people's everyday life. It refers to a transformation from "analog" to "digital" and the facilitation of new forms of value creation such as accessibility, availability, and transparency (Amit & Zott, 2001). It is defined as the use of digital technologies and data to transform and enhance business functions, processes, operations, and activities and create an environment for digital business and generation of income

keeping digital information at the heart (Clerck, 2017). Digitalization embraces the ability of digital technology to collect data, establish trends, and make better business decisions. It is about using new digital technologies such as social media, mobile, analytics, or embedded devices to achieve big progress in business (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014). Digitalization is the road towards digital transformation (Clerck, 2017). Digital transformation is the focus of organizations on their core competency and transforming their needs into digital technologies (Vrana & Singh, 2021). Digital Transformation is the change in a company's entire business model and process because of digital technologies which bring observable changes in organizational structure, system, and products with increasing demands for online media (Hess & Wiesbock, 2016).

2.1.2. History of Digitalization

Digital technologies are fetching extraordinary transformation and altering people's work and lives in a very different way. The Internet of Things (IoT), mobility, cloud, big data, augmented reality, blockchain, and social media are steering companies and transforming their systems to digital business processes, products, and services as well as virtual customer engagement. This indicates that the world is under a swift and continuous change (Auriga, 2016). This change got its start in 1967 when Gottfried Wilhelm Leibniz pioneered the binary system with the help of his book i.e. The Explanation of Binary Systems published in 1970. Since then, various scientists have engaged in various studies, authored different books, and developed different systems keeping the binary system at the heart different achievements were recorded including the UNIVAC 1 computer, mass digitized record-keeping systems, RAMAC (Random Access Method of Accounting and Control), MARC (Machine Readable Cataloguing Records), and the CCD (charge-coupled device) (Base22, 2024). The first contemporary use of the term "digitalization' in conjunction with computerization appeared in a 1971 essay first published in the North American Review (Brennen & Kreiss, 2014). According to Auriga (2016), the computerization of processes started 30 years ago, and the digitalization of organizational activities is already under implementation. Companies started to connect all processes.

The history of digitalization is divided into four eras. The Pre-internet Era which was between 1950 – 1989 is where the foundational blocks of the digital revolution were established. Manual processes were converted into digital technologies following the invention of microchips and semiconductors in 1958, and this was the starting point of a major digital transformation. Companies shifted outdated processes to digital data, and this created the need for change and transformation in businesses across

the world. The Post-internet Era (1990 – 2006) brought immense change. The creation of the internet and increased access to customer data hammered the change. In 1990 the Internet became publicly available, and Google was founded in 1998. The internet changed the isolated and divided world into a global and unified environment through networking and access to extensive data. People own personal computers with access to the World Wide Web, and this is the era when the first social network emerged. Facebook was founded in 2004 and the number of internet users reached 1 billion in 2005. The creation of the internet and increased access to customer data hammered the change in the prevailing system and business operations. It compels organizations to volte-face their customer interactions. The year 2007-2019 is known as the Mobile Era denoted by the introduction of the iPhone in 2007 and the shift to mobile with a new possibility through the creation of new business models, and the introduction of new social and mobile channels which is another level of digitalization. The Post-Pandemic Era which is between 2020 to now is the last major era which is denoted by epidemic accelerated digital innovations. Companies were compelled to reconsider the way they served their clientele remotely with zero contact. This forced companies to shift their business models and take their services to the front with new urgency to achieve better customer experiences (Paige, 2023)"Advances in AI and machine learning are playing a huge role in digital transformation initiatives. While the history of AI warrants its timeline, advances in machine learning and tools like ChatGPT are going to drive even more change in the way we work, interact, and live" (ibid).

2.1.3. Digitalization in Education and Digital Education

The digitalization of societies has come to the forefront following rapid technological advancement, and digitalization affects every aspect of society including education (Arisory, 2022). The cruciality of information systems for all companies imposes the responsibility on the education sector to produce a digitally able and competent workforce for companies. This in turn compelled education institutions to change their curricula and introduce more interactive learning methods with the use of artificial intelligence (Yosi, Anggraini, Jurusan, & Batam, 2022). Digitalization in education has become the order of the day, and it is become for every learner to be more attentive in their learning (Islam & Jahan, 2018). Digitalization in education is the utilization of digital technologies in the instructional process (Gupta, Kishor, Mathur, & Gupta, 2021; Lynn, Rosati, Conway, & Curran, 2022).

Digital education also known as technology-enhanced learning or e-learning allows teachers to design an interactive classroom either in the form of a hybrid or fully online (Muhammmad, 2020). Digitalization is indispensable in the education sector. Industry 4.0 and digitalization are interconnected which leads to Education 4.0 having the feature of the fourth industrial revolution characterized by transformed teaching-learning processes such as peer-to-peer learning, critical thinking skills, automated assessment, advanced data analytics, and personalized learning. Digitalization in education requires adjusting educational content to allow distance and face-to-face learning (Gupta, Kishor, Mathur, & Gupta, 2021). It brings internationalization of education, hybridized teaching and learning, flipped classes, digital cooperative learning, gamification, virtual reality, personalized learning, and content (Abad-Segura, Gonzalez-Zamar, Infante-Moro, & Garcia, 2020). Digital technologies are prominent tools to support learning in the school, classroom, libraries, home, and other locations, and these technologies include but are not limited to general ICT, multimedia materials, multi-tasking and interactive environments, gaming, and stimulation, collaborative and Web 2.0 environment. Digital technologies can be integrated into instructional processes to augment student learning in and outside the classroom. Digital technologies are being used beyond the instructional practices. Teachers also utilize these technologies to interact with parents and concerned stakeholders, to cooperate with other educators as well and for personal growth and development (NUSCHE & MINEA-PIC, 2020, pp. 11-14). Digital technologies in education can be mainstream or frontier and could be used for general or education-specific purposes. They are largely mainstream technologies. Except for higher education other education and training markets are reluctant to utilize frontier technologies due to various factors such as risk averseness, resource inadequateness, and low competencies (Lynn, Rosati, Conway, & Curran, 2022, pp. 135-136).

Frontier technologies and illustrative applications in education include artificial intelligence (AI) with intelligent tutoring systems the Internet of Things (IoT) with internet-based physical devices enabled to collect and share data (Southgate, 2020). Datasets with big sizes and different types, blockchain which is an immutable time-stamped series of data records, 5G next generation of mobile internet connectivity; programmable machines capable of performing actions and interacting with the environment via sensors and actuators autonomously or semi-autonomously, and unmanned aerial vehicle (UAU) that can be remotely controlled or fly autonomously using software and GPS are some of the digital technologies being utilized for educational purposes (Lynn, Rosati, Conway,

& Curran, 2022). The learning formats in digital education include asynchronous learning – a teaching-learning happening in different place at different time; audio-visual (AV) –learning material in audio, video or both formats; blended learning – instructional method integrating face to face and virtual delivery methods; curated content –materials found, reviewed and selected as per the audiences demand; digital learning resources which includes digital materials supporting learners' achievement of instructional objectives; discussion board which is an online forum for discussion; e-portfolio -a digital assembly of work collected and managed by the user; flipped classroom whereby the learning material is provided earlier to the session make the session more interactive; lecture capture or recording of face-to-face teaching and make it digitally available; mobile learning (M-Learning)facilitating teaching-learning using mobile devices such as mobile and tablet; Massive Open Online Course (MOOC) with open access aimed at mass participation; screencast a video capturing the computer screen; synchronous learning whereby learning occurs at the same time but not necessarily at the same place; virtual learning environment (VLE)– an online platform for supporting teaching-learning; webinar which is a web based seminar held via the internet, and wiki website developed by users community whereby users can enrich or edit the content (Mcilwhan, n.d.).

2.1.4. Digital Readiness of Higher Educational Institutions

Digital readiness is the level of an organization's personnel's keenness to transition into digitized workflows that are enabled by software and technology. An organization's technology transformation consists of three basic components i.e., culture, process, and technology. By the time organizations work to readjust their objectives and support their infrastructure with technology, the beginning point of transmission must begin with people. The digital transformation process will be smoother if the employees can adopt these evolving technologies quickly (Ogbevoen, 2024). Assessing the e-readiness of an organization is the improvement to the use of digital applications (Dutta, Mia, & Geiger, 2011), which infers appropriate infrastructure including high bandwidth, reliable equipment, consistent maintenance, dependable content, and sustainable developmental level to integrate ICT throughout the lifespan of an organization. Digital readiness highly interacts with people's preparedness in terms of their digital skills and trust in technology which has a greater influence on their use of digital tools. Digital readiness is the extent to which people or organizations are prepared to participate in the digital world (CID, 2000). From a higher education perspective e-readiness is "the ability of HEIs and the capacity of institutional stakeholders (managers, key ICT

persons, teachers and students) to generate (e-) learning opportunities by facilitating computer-based technologies – in short, how e-ready a HEI is to benefit from educational technology (or e-learning)" (Machado, 2007). Digital skills to initiate online sessions, surf the internet, and share content online; trust i.e., people's beliefs about their capacity to determine the trustworthiness of information online and safeguard personal information, and the extent to which people are capable of using digital tools to accomplish online tasks can be indicators of organizations' digital readiness (Horrigan, 2016). The digital readiness of HEIs should be assessed to take advantage of opportunities afforded ICT. Moreover, assessing the e-readiness of HEIs is important to diagnose e-readiness as part of a country's ICT strategic planning and to rank institutions.

2.1.5. Opportunities of Digitalization in Education

Digital technologies have brought massive opportunities to the field of education. These opportunities can be explained at a mega level as teaching without contact, immersive practice, and contact on-site (Kools, et al., 2017). Digital technologies offer new framework possibilities for didactic action and better achievement of educational goals (Davis, 2017). Education is a potential influencer of the prospects of a nation's human growth and competitiveness, and the knowledge revolution provides extraordinary opportunities through digital education. The opportunities of digital education include enhancing teaching and learning and enriching the learning experiences; increasing the rate of investment; increasing innovation in a global and competitive workplace; increasing parental and student engagement; increasing student enrichment through the creation of more relevant, engaging and interactive learning environment; mitigating inequality through the provision of enhanced learning opportunities, and increasing access from anywhere at any time in any place through accessible virtual classroom and improved access to remote learning resources (Suleiman & Danmuchikwali, 2020, pp. 80-81; Tino, 2003, p. 6). It helps to prepare individuals for future workplaces where using digital gadgets is compulsory. Skills required in the workplace include functional literacy which is the ability to express ideas using different media including images, graphics, video, charts, and graphs (visual literacy); scientific literacy which is the ability to understand theoretical and applied aspects of science and mathematics; technological literacy which is the competence to use ICT; information literacy referring the competence to find, analyze and utilize information through the use of ICTs; cultural literacy encompassing the appreciation of cultural diversity, and global awareness which is understanding how of the interconnection of nations, corporations and communities all over the world. Besides, inventive thinking which includes adaptability, curiosity, creativity, and risk-taking; high-order thinking which is creative

problem-solving and logical thinking for sound judgment; and effective communication which entails teaming, collaboration, and interpersonal skills, personal and social responsibility; interactive communication and high productivity are the top skills required by the workplace in the digital world. Digital education capacitates learners with those required skills. Moreover, the use of ICT in education helps to improve the quality of education by motivating learners to learn; facilitating the acquisition of basic skills; enhancing teachers' training, and transforming the learning environment into learner-centered through initiating active, collaborative, creative, integrative, and evaluative learning (Tino, 2003, pp. 6-10).

Digital education offers various opportunities for learners and educators by allowing them to actively interact through email, instant messages (IM), video chat, online forums, social media, and with learning material; engage in the learning process and personalize learning experiences and widen access. It increases access to education at a time and place of the learners and allows the learners to control their learning pace. It facilitates lifelong learning and improves access to specially able students. Online and blended learning increase education access to students away from HEI and who are occupied by other responsibilities including work. Besides, it empowered the personalization of learning by making learning materials available and accessible for learners to support their education. Moreover, digital technologies allow flexibility by increasing the ability to provide learning content in different formats, models, and languages to interact synchronously and asynchronously with people across the globe (Mcilwhan, n.d.). Digitalization has created an environment with a dynamic and flexible culture that allows social transformation. Its implementation in education enables to reconfiguring of digital skills and capacitates graduates with the basic tools required to succeed in their personal and professional lives. Digital education enables everyone to be the creator of knowledge as well as to develop the capacity to use various forms of understanding and stimulate the fruitful exchange of knowledge (Catalano, 2018, pp. 28-29).

To enjoy those opportunities, it is compulsory to engage in digital education using digital technologies. The application of digital technologies in education requires following mandatory steps as stipulated by (Mcilwhan, n.d.). These steps include taking a pedagogically informed approach which requires ensuring that the technology is the right one and for educational purposes; learning from others' experiences; starting small in a safe environment; reusing the existing digital resources; preparing a backup plan for things that do not go as per the plan; being creative with the use of digital technologies and sharing one’s practices and experiences for others to them learn (ibid).

"…learning would be delivered in the manner and environment that best suit the needs and learning styles of individual learners. In the future, technologies like personalization, integration, and electronic portfolios will progress toward this ideal by broadening the learning universe. These technologies will enable learners to have more control over how, where, and when they experience educational and professional development in pursuit of their individual goals" (LaCour, 2005).

2.1.6. Challenges of Digitalization in Higher Education

Despite the exceptional opportunities of digital education, using digital platforms for instructional purposes has restraints that can challenge the fruitful utilization of digital opportunities in education. Its challenge is related to development, use, and integration into teaching, learning, and educational management (Kundi & Nawaz, 2014, pp. 145-149). E-learning changes the relationship between teachers and learners since it is not simply a medium for instruction. Educational planners, managers, teachers, and other practitioners need to have skills, competencies, and attitudes for the development and implementation of digital education. However, lack of local research recording the local context to plan according to the local demand, borrowing and transferring models of e-learning from others which fails to meet the local environment, and lack of users' engagement in the development of digital education projects are development related challenges of digital education (ibid). People's practice of preserving information and controlling themselves due to cultural mindset in organizations (LaCour, 2005), mismatch between training content and educators' educational needs (Juniu, 2005), system compatibility in terms of too complex digital environment learners skill level; the dependence of educators and learners on technical department and ICT professionals; change management including resistance to change; gaps between theory and practice; inability to let go old method of instruction, learning and educational management (Kundi & Nawaz, 2014, pp. 149-152); individual challenge in terms of divergent attitude and reaction towards technology and resistance to integrating technology in the learning process (Juniu, 2005).

Challenges of digital education can be related to infrastructure, capacity building, language and content, and finance. Infrastructure-related challenges can be expressed in terms of the availability of buildings or rooms to house the technology, electricity, telephony, and ICT gadgets. Policymakers and planners must consider these issues before launching ICT-based educational programs. Capacity building encompasses challenges related to knowledge, skills, and competencies required to integrate ICT throughout the education system. Teachers, education administrators, content developers, and technical support specialists need to have extensive capability in ICT utilization.

Teacher training should address skills with particular applications; integration into the existing curricula; and curricular changes about the use of ICT including changes in instructional design; changes in teacher roles and underpinning educational theories. Since leadership plays a prominent role in integrating ICT into education, educational administrators need to have an extensive understanding of the technical, curricular, administrative, and social dimensions of ICT utilization in education. Huge resources and time may be lost because of technical breakdowns unless on-site technical support is in place (Tino, 2003, pp. 21-23). Moreover, it is mandatory to develop original educational content in the form of radio programs, interactive multimedia learning materials on CD-ROM or DVD, Web-based courses, etc., converting printed materials into digital media and adapting the existing content. Since content development specialists are responsible for these in HEI, they need to be skilled and highly capable of utilizing ICT tools. A large proportion of online educational materials is produced in the English language, and this puts language barriers for students from where English language proficiency is lower. Furthermore, financing the cost of ICT use in education is one of the utmost challenges. Balancing economic realities with educational goals is a great challenge since digital education is capital intensive and the installation of ICT systems for education requires huge investments, especially in developing nations. Therefore, it is mandatory to be wise in deciding on the choice of models of ICT keeping the maintenance of economies of scale at the center. Considering if digital education is the most suitable strategy to achieve educational goals and what modality and scale of implementation is required in a given resource is compulsory (Tino, 2003, pp. 24-25). In addition to these, computer illiteracy of educators and learners, lack of teacher-student physical interaction, need for self-discipline, poor time management, technical difficulties, and unsuitability of digital education for practical courses are challenges of digital education (Suleiman & Danmuchikwali, 2020, pp. 81-82).

2.2. Empirical Literature Review

2.2.1. ThePractice of Digitalization in Higher Education Institutions

The 4th Industrial Revolution enabled the spread of digital technologies in all aspects of modern society. This brings a qualitative change in all aspects including higher education and makes digitalization unavoidable. The integration of digital technologies into the instructional process was the initiative of a few HEIs at the beginning. Currently, however, digitalizing the education system has become the top priority of countries with developed education systems. The governments of developed nations adopted strategies for digitalizing science and higher education. They strongly

amalgamated digitalization of higher education with the development of digital services, modernization of infrastructure, systematic data management, and human resource development (Khramova, Grinevich, & Vinogradova, 2022).

Digitalization of HEI has resulted in competitive transformational advantages which include virtual learning, and virtual program management to provide a world-class educational experience. The practice of digitalization in higher education shows that technologies such as cloud computing (CC), artificial intelligence (AI), internet of things (IoT), and big data (BD) are playing a prominent role. AI is getting highly intense, universal, and consequential, and is constantly influencing decision-making in HEIs. Similarly, CC is highly impacting universities through the promotion of the utility of IT efficiency and organizational agility. It offers a wide range of virtual resources for research and teaching-learning; enables to dissemination of research flexibly and efficiently; extends resources, promotes collaborative learning, and enhances learning. IoT enabled universities to build a new system for the delivery of courses remotely with fast speed and wide coverage (Hashim, Tlemsani, & Robin, 2022, pp. 3191-3192).

The practice of digital learning during COVID-19 portrayed that learning and teaching environments around the world had shifted from conventional to digital strategies and became more responsive to all students to ensure that no one is left behind. The Online Collaborative Learning (OCL) approach identified gaps in the instructional process, and it is best suited the online teaching. However, the transition to digital learning is not a one-time process. Instead, it is a gradual process requiring critical discussion and debates between learners and teachers. Besides, it is mandatory to adopt the teaching-learning practice that best suits the dynamic environment, not the static one (Jakoet-Salie & Ramalobe, 2023, p. 41).

In developed nations, remarkable efforts have been made to close the digital divide. Successful approaches have engrossed on promoting digital skills, developing targeted programs for deprived learners to ensure inclusion; engaging teachers in professional development programs, and developing online resources and co-curricular activities for students. Modern nations are very innovative in integrating AI into classroom teaching-learning and maximizing the use of data to modernize their education system. Educational technologies are more common in classrooms so that educational institutions can support the personal learning needs of their students. For practical and

efficient use of digital technology in education, consulting and engaging stakeholders in developing new educational policies is essential (Gabriel, Marrone, & Sebille, 2022, p. 28)

2.2.2. Opportunities and Challenges of Digitalization in Higher Education

Digital education has strengths and weaknesses as well as opportunities and threats as described by (Toader, Safta, Titirisca, & Firtescu, 2021, p. 17). Program flexibility, quick information access, and validation, quick access to teaching aids, access to diversified online teaching diversified means of assessment, and financial savings for both students and universities are the positive side of digital education. On the contrary, increased length of time spent in front of electronic equipment; time-consuming preparation of teaching as compared to conventional teaching, and interrupted communication between teachers and learners due to different factors such as malfunctioned camera and power and connection interruption, low quality of electronic equipment are the downside of digital education. Likewise, permanent adaptation to the new realities determined by accessing different online platforms; reassessment of specific competencies; emphasizing pedagogical skills, and seminar teaching activities with several groups of learners are opportunities provided by digital education. Threats of digitalization in education include endangering health due to long time spent in front of electronic equipment and a sedentary lifestyle; social distance between teachers and learners due to lack of face-to-face communication; unauthorized registration of courses or seminars and privacy issues, and dissemination of materials with copyright infringement (ibid).

Even though a wide range of technologies are available, they are mostly used in hybrid form integrating in-person and online instruction in conjunction with flipped classroom strategies. This is to create and provide access to a more flexible learning environment. Learning strategies in higher education are classified as low-impact (adding extra exercise to an existing course) medium-impact (trying to replace activities in a multiple listing) and high-impact (creating a blended course from concept to completion) approaches based on modifications on the conventional teaching methodology and learner's experiences. Accordingly, teachers' effort, skills to use technologies, and experience must move from a low to a high-impact approach. The increased use of digital technologies in education highlights the need for greater consideration of user presumption and well-organized implementation of digital learning. The preparation of students for a swift technological advancement required change in how schools taught their students. Currently, the curricula of many countries are far behind digital education, and this calls for a comprehensive examination of these educational institutions for significant and urgent adjustment (Alenezi, Wardat, & Akour, 2023, pp.

9-10). Moreover, attitudes and motivation of learners and staff, organization, financial and technological aspects are great challenges of digitalizing higher education which call for attentiveness and cautious planning of the need for change and greater work of preparation including installing appropriate infrastructure, getting and providing technical support and provision of training for the target groups. Besides, necessary cautions should be taken not to dehumanize digital education since teacher-learner connection and interaction are essential for an effective learning process (Butryn, Katarzyna, Sobinska, & Martini, 2022, p. 111).

Hindrances to the successful implementation of digital technology include a lack of efficient computers and peripheral devices, virus threats, scarcity of educational software, and insufficient broadband internet accessibility. The language barrier is another challenge in digitalizing education. Besides, data security, the use of unlicensed software, and the use of others' work as one's own are unethical issues in digital education. Greater demand for capable IT professionals and the need to secure online data and ensure maximum connectivity with minimum cyber security; social alienation due to excessive engagement with computers losing human relations; and huge cheating opportunities are challenges of digital education. Despite those challenges, the digitalization of higher education will be the top priority of governments in the digital world due to its untapped opportunities (Shrivastava & Shrivastava, 2022, p. 11).

2.2.3. Impacts of Digitalization on Higher Education

Digitalization has a direct positive long-run impact on higher education (Toader, Safta, Titirisca, & Firtescu, 2021, p. 20). Artificial Intelligence (AI) provides great opportunities for personalized and equitable access to education, and administrative functions of higher education including, admissions, registrations, library, and student services are digitalized and augmented. Enrollment is easily managed using web portals. The digital revolution has altered the way universities teach and operate. The conventional instructional model is greatly impacted by the digitalization of education. Digitalization has brought the rise in data-driven technologies and teaching practices in higher education that enabled personalized learning, better feedback, and predictive analytics for better student achievement. Moreover, it enabled educators to get access to enormous student data, check students' work to detect plagiarism for academic integrity, provide online quizzes and immediate formative assessment data, and automatically grade students' achievement. Besides, it also enables tracking library usage through campus card swipes, campus even attendance, students' social relationships, and extracurricular activities and each digital touchpoint provides additional data for

the creation of students' profiles and monitoring progress (Qolamani & Mohammed, 2023, pp. 837-842). Digitalization has a direct positive long-run impact on higher education (Toader, Safta, Titirisca, & Firtescu, 2021, p. 20).

Digitalizing education has impacts on students' knowledge, skills, attitudes, and emotions; equality, inclusion, and social integration; teachers' professional and teaching practice, and school-related aspects and stakeholders. Access to computer-assisted instruction (CAI) programs in simulation or tutorial modes used to supplement rather than substitute instruction enhanced student learning. The use of digital technologies resulted in further positive gains for students i.e. increased attention, engagement, motivation, communication and process skills, teamwork, and gains related to their behavior toward learning (Timotheou, et al., 2023, p. 6699). The integration of digital technologies into the education system enhances students' efficient and effective access to digital information; assists learner-centered and self-directed learning; creates a creative learning environment, promotes a collaborative learning environment in a distance-learning environment; and provides extensive opportunities to develop critical thinking skills. Similarly, it also assists teachers in improving teaching and learning quality and supports teaching by facilitating course content access (Fu, 2013, pp. 112-116). The administrative opportunities of digitalization include enabling attendance monitoring, assessment records, reporting to parents, financial management, creation of repositories for learning resources, and sharing of information amongst staff. Such data can be used strategically for self-evaluation and monitoring purposes which in turn can result in school improvements (Condie & Munro, 2007). However, the effective and efficient use and implementation of digitalization in education is greatly determined by students' perceptions; teachers' attitudes, perceptions, and confidence in the use of ICT; administrative support and ICT infrastructure availability, and school culture in the use of ICT (Fu, 2013, p. 118).

2.2.4. Special Considerations in Implementing Digitalization in Education

Technology is simply a tool. Therefore, attentive, and careful implementation, integration with the pedagogical system, and linking to humans should be a great concern. To harness the extensive potential of technology to best serve the learners conducting further research and developing a socially responsible framework is compulsory (Qolamani & Mohammed, 2023, p. 841)**.** Besides its benefit, the rise of data-driven teaching in higher education has another side that must be considered. The increased data collection raised privacy issues (Willis, Campbell, & Pistilli, 2013). Even if the digital transformation in higher education creates new opportunities, increased international

collaboration, and educational accessibility without any geographical limit, it has created major disruptions and challenges for stakeholders in higher education. The challenges include data security, access gaps, and adaptation of teaching staff. Therefore, higher education must be continually innovative and work with the technology industry in close collaboration (Qolamani & Mohammed, 2023, p. 843).

Digitalization of higher education has been upscaled and blown out throughout the world. In the future technologies such as AI, immersive media and analytics will be best utilized to improve students learning. Nevertheless, it is obligatory to take the needs of students and equity into great account to avoid sidelined groups. Considering technology, human and ethical dimensions, embracing change and innovation is essential for organizations more than ever. It is mandatory to close the digital divide and build strong data governance, and integrate technology into the education system prudently, and this will bring new opportunities for students to amplify their potential and acquire better learning (Qolamani & Mohammed, 2023, p. 844).

The use of digital technology is generally associated with enhanced learning processes and students' learning outcomes. However, this needs extensive further investigation by educators and researchers (Alenezi, Wardat, & Akour, 2023, p. 10).Taking the positive impact of digitization in education, public policies should consider intensive investment in the digitalization of education and the application of new technologies in e-learning. Digitalizing education should be the focus of public expenditure as a way for sustainable development. However excessive use of online education is not advisable since it makes students feel alienated as a result of lower interaction. This makes hybrid teaching the appropriate one that integrates online teaching with face-to-face interaction and allows to adapt of teaching strategies to the needs of the learners (Toader, Safta, Titirisca, & Firtescu, 2021, p. 25).

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

AAU was established in 1950 as the University College of Addis Ababa (UCAA) in Addis Ababa city. It is Ethiopia's hoariest and largest HEI which has been the leading center of instruction, research, and community service since its establishment. It started with an enrollment capacity of 33 pupils in 1950 and currently enrolled 48,673 students (33,940 undergraduate, 13,000 masters', and 1733 PhD students) attending 70 undergraduates, 221 master's and 72 PhD programs, and various specializations in health sciences. It has 2,408 academics and 3635 administrative staff. Over 222,000 students graduated from AAU since its establishment. The top leadership structure of the university is composed of a President, and four vice presidents i.e., the Academic Vice President, the Vice President for Research and Technology Transfer, the Vice President for Administration and Student Services, the Vice President for Institutional Development, and the Executive Director of the College of Health Sciences (with the rank of Vice President). The University has recently conducted various reform schemes to cope with and respond to the fast-changing national and international educational dynamics. Currently, it has 10 colleges, 4 institutes running both teaching and research and 6 research institutes predominantly conducting research. Within these academic units, there are 55 departments, 12 centers, 12 schools, and 2 teaching hospitals (AAU, 2024).

3.2. Research Model

The Higher Education E-readiness Assessment Model (HEAM) is suitable for assessing the e-readiness of HEIs in Sub-Saharan Africa. It is an e-readiness assessment diagnostic model with 5 basic indicators. It was derived from the Center for International Development (CID) tool and the Association of African Universities (AAU) assessment guidelines. The five basic indicators are network access, networked campus, networked learning, networked society, and institutional ICT strategy (Kashorda & Waema, 2011, pp. 64-74). This model was applied (the four indicators were used) to assess the digital readiness of AAU. It is selected since it is specifically developed to assess the e-readiness of universities in countries classified into the low average in the International Telecommunication Union (ITU) ICT Index (Kashorda & Waema, 2011, p. 74). And Ethiopia is one of those countries as depicted in the 2018 United Nations E-Government Survey which put Ethiopia in a position of 151 out of 193 nations (United Nations, 2018, pp.84-86).

Table 1: Constructs and variables

Research Objective	Constructs	Operational definitions
To examine the implication of digitalization on enhancing student service of AAU.	Digital accessibility	It refers to the availability and accessibility of digital tools i.e., online portals and applications to provide online student services.
	Service quality	It refers to the speed, reliability, and responsiveness of digital services.
	Accessibility and inclusivity	It refers to accessibility features of digital services for students with disability.
	Data privacy and security	It refers to compliance with data protection, secure data storage, and privacy-enhancing technologies.
	Learning support and resources	It refers to online libraries, academic databases, tutoring services, and virtual learning environments.
To scrutinize the extent to which AAU possesses the readiness and commitment to embrace change towards the new initiative of digitalization.	Institutional ICT strategy	It refers to the alignment of ICT strategy to organizational strategy, ICT financing, and ICT human capacity (adopted from Kashorda & Waema, 2011, pp. 64-74).
	Network access	It means the availability of information infrastructure and internet service, affordability of the internet, and speed and quality of the network (adopted from Kashorda & Waema, 2011, pp. 64-74).
	Networked campus	It refers to the network environment including data protection, institutional firewall, the use of licensed antivirus, and e-compass including website updating and online interaction of the campus community (adopted from Kashorda & Waema, 2011, pp. 64-74).
	Networked learning	It refers to enhancing education with ICT through the usage of educational software and course management systems, integration of ICT into curricula, use of ICT in the classroom, use of ICT in student projects, and development of ICT workforce (adopted from Kashorda & Waema, 2011, pp. 64-74).
To investigate the challenges of implementing digital technologies in academic aspects of AAU.	Commitment	It refers to leadership's willingness to support and evaluate the integration of ICT in education (adopted from Tino, 2003)
	Organizational culture	It refers to resistance to change and willingness to let go of the old method of instruction (adopted from Tino, 2003).
	Digital competence	It encompasses the knowledge, skills, and competencies required to integrate ICT throughout the education system (adopted from Tino, 2003).
	Language and content	Online content development, language barrier (adopted from Tino, 2003)
	Finance	It refers to financing the cost of ICT use in education (adopted from Tino, 2003)

3.3. Research Design

The research design is descriptive. This research design is selected since the objective of the study is to investigate and describe the impact of digitalization in HEIs in the case of AAU. Descriptive research design is to describe the existing phenomenon without influencing the variables of the study with a focus on the "what" rather than the 'why' (Manjunathan, 2019, p. 863). Besides, the research approach is pragmatic in that it involves collecting both quantitative and qualitative data. This is to investigate the subject using a multi-paradigmatic approach instead of through a mono-paradigmatic

approach. Using a pluralistic approach allowing the combination of methods is necessary to study the phenomenon most effectively (Kivunja & Kuyini, 2017, p. 35). Mainly, the QUAN-QUAL or triangulation design is used to collect complementary but distinct data that can be integrated during analysis and interpretation (Almalki, 2016, p. 292). Furthermore, this study is cross-sectional since it involved collecting data on a unique period.

3.4. Data Sources

Primary data sources were used to be able to collect raw and firsthand data about the phenomenon under study (Streefkerk, 2023). The data source was top management of the university specifically leaders managing the teaching-learning, e-learning unit, and institutional development. Besides, middle-level managers i.e., college deans, institutes, and schools' heads and directors were the primary source of data. Managers in the lower tiers of the academic division were also the data sources. In short, the unit of analysis for this investigation was educational leaders at the upper, middle, and lower tiers of management.

3.5. Sampling Design

3.5.1. Population of the Study

The target population of the study was the academic and administrative community specifically people in the position of leading, managing, and facilitating the academic and supportive aspects of AAU. Therefore, the total target population of the study was 5 presidents, 10 college deans, 12 institutes running teaching and research, 12 school heads, 55 department heads, 2 directors of the Student Service Directorate and ICT Development Directorate Director and an E-Learning Coordinator.

3.5.2. Sample Size and Sampling Techniques

The total target population of this study was 98 people who are at the top, middle, and lower levels of management. This target group was selected to be the unit of analysis of this study due to the nature of the research questions which mainly needs respondents who are involved in the management and administrative processes of the university. Since the total target population in the upper and middle-level management was small, there was no need to establish a sampling frame and take samples. Therefore, all were taken through the census method. However, samples were taken from the lower level of management due to time constraints. About 30 percent of 55 department

heads were taken using sample percentage calculation. Accordingly, 16 department heads were taken using the lottery method.

3.6. Data Gathering Instruments and Procedures

Data gathering instruments were developed based on the research model which depicts constructs and variables. Multiple data-gathering instruments were used to illuminate the strength and reduce the drawbacks of using a single approach (Kabir, 2016). Since the research approach is mixed, both quantitative and qualitative primary data gathering tools specifically questionnaires, interviews, and observation were used to collect primary data from data sources. The close-ended questionnaire contained continuous scale questions (Kabir, 2016, p. 209) was developed in Google and printed form.

Before the actual data collection, the questionnaire was distributed to 10 colleagues and members of the university community to test the data collection instruments. Initially, the questionnaire contained 120 questions. The pilot study revealed that the questionnaire was excessively long. As a result, the researcher refined the research model, which allowed for clearer construct definitions and a more focused questionnaire. Consequently, the number of questions was reduced to 36.

The refined questionnaire was distributed to college deans and institute and school heads, directors as well as department heads electronically as well as in printed form. Semi-structured interviews were conducted with the Academic Vice President and E-Learning Unit Coordinator of AAU. Moreover, libraries, computer laboratories, and AAU multimedia studios were observed.

3.7. Data Presentation

Textual, and tabular data presentation were employed. Textual presentation of data was used to present data textually using statements with and without numbers. Complex tables were used for tabulation.

3.8. Data Analysis and Interpretation

The type of research questions this study addressed, the research design that is employed, and the type of data that was gathered were taken into prior consideration to select the right data analysis technique and statistical method. Quantitative and qualitative data analysis techniques in general and descriptive analysis techniques, in particular, are employed since the research design and type of research questions are descriptive. Primary data obtained through interviews and observation were

analyzed thematically. On the contrary, primary data gathered through a close-ended questionnaire was analyzed quantitatively through descriptive analysis. Descriptive statistics was used to summarize and describe the data. Specifically, frequency distribution, percentage mean, and standard deviation were applied to count the redundancy or number of times a particular score is found and to articulate a set of scores, a percentage of the whole and to know the central tendency and variability of the data set, respectively. SPSS was utilized to run the statistical analysis for easy handling and automation of data.

CHAPTER FOUR

4. DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Response Rate

A close-ended questionnaire was dispersed among 52 participants, and 42 participants returned the questionnaire filled. The rate of return is 80.7% which is acceptable as described by (Finchman, 2008).

4.2. Respondents Biography

About 2 respondents are excluded from the percentage calculation because they do not show their sex. As indicated in the table below 75% and 25% of the respondents were male and female, respectively. This indicates that there were more male respondents than female.

Table 2: Demography of the respondents

Sex of the respondents					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	30	71.4	75.0	75.0
	Female	10	23.8	25.0	100.0
	Total	40	95.2	100.0	
Missing	-1	2	4.8		
Total		**42**	**100.0**		
Age of the respondents					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	26-33	2	4.8	5.4	5.4
	34-41	7	16.7	18.9	24.3
	42-49	19	45.2	51.4	75.7
	50-57	9	21.4	24.3	100.0
	Total	37	88.1	100.0	
Missing	-1	5	11.9		
Total		**42**	**100.0**		
Marital status of the respondents					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Single	9	21.4	22.0	22.0
	Married	28	66.7	68.3	90.3
	Widowed	1	2.4	2.4	92.7
	Divorced	3	7.1	7.3	100.0
	Total	41	97.6	100.0	
Missing	-1	1	2.4		
Total		**42**	**100.0**		

About 5 participants do not depict their age; therefore, the percentage is calculated out of 37 total participants excluding the missing. Accordingly, most of the respondents i.e., 51.4% have reported

that their age is between the ranges of 42-49. The age of the remaining 24.3%, 18.9%, and 5.4% of respondents was between the range of 50-57, 34-41, and 26-33, respectively. Of 41 participants (1 is missing), 68.3% and 22%of the respondents reported that they are married; and singly, respectively. The remaining 7.3% and 2.4% are divorced and widowed, respectively as portrayed in table 2.

Table 3: Education and Academic Rank of the Respondents

The education level of the respondents					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	MA/MSC	9	21.4	22.0	22.2
	PHD	32	76.2	78.0	100.0
	Total	41	97.6	100.0	
Missing	-1	1	2.4		
Total		42	100.0		
Academic rank of the respondents					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Lecturer	6	14.3	16.2	6.2
	Assistant Professor	9	21.4	24.3	40.5
	Associate Professor	20	47.6	54.1	94.6
	Professor	2	4.8	5.4	100.0
	Total	37	88.1	100.0	
Missing	-1	5	11.9		
Total		**42**	**100.0**		

Regarding the education level of the respondents, 78.0% are PhD holders, and the remaining 22% are master's degree holders. This indicated that most respondents had already reached the maximum level of education in the system. Regarding the academic rank of the respondents the majority i.e., 54.1% of the respondents are associate professors, 24.3% are assistant professors, 16.2% are lecturers and 5.4% are professors. About 5 respondents do not report their level of academic rank; therefore, they are excluded as a missing entry.

4.3. Data Presentation, Analysis and Findings

4.3.1. The Implication of Digitalization on Enhancing Student Service

To measure the implication of digital student service 11 variables were identified and changed into questions. The first one is the availability of online portals for digital services. Regarding this theme about 97.6 % of the respondents strongly agreed and the remaining 2.4% agreed with the availability of the portal. The responses from the respondents have a 1.02 mean and standard deviation of 0.154. This indicated a high level of agreement on the portal availability with low variability and a very

low spread of responses from managers at different levels which is close to the mean. With this respect interviewee A said

"Digitalization is already effectively implemented in the provision of digital student services which include admission, registration, campus, section and dormitory placement, grade reports, and online examination. Teachers submit students' results to the registrar using the online system. This put its own restriction on teachers not to be able to manipulate students' results easily. When making changes on the submitted grade report becomes compulsory, they must apply online which is good for credibility…".

Table 4: Digital accessibility

An online portal is available for digital student service.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	41	97.6	97.6	97.6
	Agree	1	2.4	2.4	100.0
	Total	42	100.0	100.0	
Mobile application is available for online student service.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Agree	7	16.7	16.7	16.7
	Neutral	21	50.0	50.0	66.7
	Disagree	13	31.0	31.0	97.6
	Strongly disagree	1	2.4	2.4	100.0
	Total	42	100.0	100.0	

Regarding the availability of mobile applications for online student service, 50% of the respondents reported that they are neutral which means they are not informed about the availability or unavailability of the mobile application for easy access to digital student services. 31% of the respondents disagreed with the availability of mobile applications whereas 16.7% of the respondents agreed with the presence of mobile applications. The remaining 2.4% of the respondents strongly disagreed with this theme as indicated in table 4. The mean for the availability of mobile applications for student services was 3.19 with a SD of 0.74. This indicated that the respondents tended to be neutral with the availability of mobile applications, and moderate variability is evident in the respondents' responses. However, mobile applications for digital student service will upscale easy access to the service by allowing students to get the service through their mobile phones if it has been applied.

This means AAU has made a great move in utilizing an online portal that helps to digitalize student service. The availability of this online portal enables students to access services as well as to save

time and money. This is happening by allowing students to access services like registration, admission, grade reports, and so on from wherever they are. This is one indication of the university's digital readiness through the improvement of digital accessibility. However, the unavailability of mobile applications for even better digital access is a gap that should be rectified.

Table 5: Digital service quality and accessibility

The digital student service is speedy.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	22	52.4	52.4	52.4
	Agree	17	40.5	40.5	92.9
	Neutral	1	2.4	2.4	95.2
	Disagree	2	4.8	4.8	100.0
	Total	42	100.0	100.0	
The online student service is reliable.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	23	54.8	54.8	54.8
	Agree	12	28.6	28.6	83.3
	Neutral	7	16.7	16.7	100.0
	Total	42	100.0	100.0	
The digital feature has accessible features for specially able students.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	1	2.38	2.38	2.38
	Agree	10	23.81	23.81	26.19
	Neutral	19	45.24	45.24	71.43
	Disagree	12	28.57	28.57	100
	Total	42	100	100	

Concerning the speed of digital student service, 52.4% and 40.5% of the respondents strongly agreed and agreed with the speediness of digital student service. The remaining 4.8% and 2.4% of the respondents express their disagreement and neutrality, respectively. The central tendency of the responses was 1.60 with a SD of 0.767 indicating that on average respondents agreed with the speediness of digital student services and a moderate degree of variability of responses from the mean.

Regarding the reliability of online digital services, 52.4% and 40.5% of the respondents strongly agreed and agreed with its reliability. The remaining 16.7% of the respondents described their neutrality. The mean of the responses was 1.62 with a SD of 0.764 suggesting on average respondents tended to agree but not strongly. While the mean suggested agreement, the SD indicated a moderate deviation of responses from the mean indicating a skewed distribution of opinions.

Regarding the accessible features of digital student services for specially-abled students, the majority of the respondents i.e., 45.24% described their neutrality which indicated their lack of knowledge

about the features of digital student services that are accessible for specially-abled students. The remaining 28.57%, 23.81%, and 2.38% of the respondents disagreed, agreed, and strongly agreed with this theme, respectively as indicated in Figure 1. The mean of the responses is 3.00 with SD of 0.796. It indicates the neutrality of the respondents about the availability of accessible features of digital services for students with disability, and a considerable degree of variability of responses which shows different levels of experience. With this regard, interviewee A said

"AAU digital systems including student services are inclusive. Digital services consider students with different kinds of physical impairments. Even the inclusive digital services of AAU for specially-abled students are special and exemplary in Ethiopian HE. Different facilities and infrastructures are available to support the learning of specially-abled students".

The speediness of Internet connection and the moderate reliability of digital service indicate that AAU is climbing on the ladder of digitalization progressively with some improvement areas, including making the digital service inclusive and equally accessible for specially-abled students.

Table 6: Data privacy and security

Online data is secured at AAU					
Valid		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
	Strongly agree	23	54.76	54.76	54.76
	Agree	6	14.29	14.29	69.05
	Neutral	10	23.81	23.81	92.86
	Disagree	3	7.14	7.14	100
	Total	42	100	100	
	Students' privacy is protected.				
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	25	59.5	59.5	59.5
	Strongly disagree	16	38.1	38.1	97.6
	Neutral	1	2.4	2.4	100.0
	Total	42	100.0	100.0	
Online data are manipulated in line with Ethiopia's data protection proclamation.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	8	19.0	19.0	19.0
	Agree	8	19.0	19.0	38.1
	Neutral	17	40.5	40.5	78.6
	Disagree	9	21.4	21.4	100.0
	Total	42	100.0	100.0	

Regarding the online data being secured about 54.76% and 23.81% of the respondents strongly agree and agree that online data is secured in AAU. The remaining 14.29% and 7.14% of the respondents are neutral and disagree with the security of online data, respectively. The central tendency of the

response is 1.74 with a standard deviation of 0.964. It portrays that the respondents agreed but not strongly on the online data being secured, but the skewness of responses since there is a range of opinions.

Concerning the protection of students' privacy, 59.5% and 38.1% of the respondents agreed and strongly agreed that student's privacy is protected in AAU. The remaining 2.4% of the respondents remained neutral as depicted in table 6. The mean of these responses is 1.43 with a SD of 0.547 which suggests that on average the respondents strongly agreed on the notion that student privacy is protected in AAU with little variation in their responses.

Regarding the manipulation of online data in line with the national personal data protection proclamation 40.5% of the participants reported their neutrality. The remaining 21.4%, 19%, and 19% of the respondents disagreed, strongly agreed, and agreed with the theme, respectively. The central tendency of the responses is 2.64 with a standard deviation of 1.03. This suggests on average the respondents neither strongly agree nor strongly disagree about the compliance with national personal data protection policy with a range of responses. Concerning online data protection interviewee B said

> *"Students' privacy is protected, and online data is secured. Even if AAU does not have its own personal data protection policy, data privacy protection, and security are highly considered in the provision of digital services based on national policies and regulations. For instance, a student's grade is released not by name, but with identification number which is an example of privacy protection. Besides, student service is managed only by authorized people with access and data authentication through a user and password system in place".*

The status of online data security and data privacy protection in AAU is good. This implies the availability of a good network environment in AAU. However, there is work left to be done to achieve the best network environment.

Regarding the availability of digital libraries with local digital content, 50% and 35.7% of the respondents strongly agreed and agreed as portrayed in table 6. The remaining 9.5% and 4.8% of the respondents remained neutral and disagreed with the availability of digital libraries with digital content, respectively. The central tendency of these responses is 1.69 with SD of 0.841 indicating on average the number of respondents who perceived that digital library with digital content is available is relatively low, and the experiences among respondents vary to a considerable extent.

Table 7: Learning support and resources

AAU has a digital library with local digital content.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	21	50.0	50.0	50.0
	Agree	15	35.7	35.7	85.7
	Neutral	4	9.5	9.5	95.2
	Disagree	2	4.8	4.8	100.0
	Total	42	100.0	100.0	
An academic database is available to enhance learning.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	32	76.2	76.2	76.2
	Agree	9	21.4	21.4	97.6
	Neutral	1	2.4	2.4	100.0
	Total	42	100.0	100.0	
Online tutoring services are accessible for students.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Agree	2	4.8	4.9	4.9
	Neutral	7	16.7	17.1	22.0
	Disagree	21	50.0	51.2	73.2
	Strongly disagree	11	26.2	26.8	100.0
	Total	41	97.6	100.0	
Missing	-1	1	2.4		
Total		42	100.0		

About the availability of academic databases that enable to enhance learning 76.2% and 214% of the respondents strongly agreed and agreed with the availability of academic databases to enhance learning. The remaining 2.4% of the respondents remained neutral. The 1.69 mean of the responses with an SD of 0.497 suggests the strong agreement of the respondents with academic database availability which facilitates and enhances learning. Besides, the relatively low standard deviation indicates a low dispersion of responses from the mean and minimal variability among respondents' opinions. Regarding the accessibility of online tutoring in AAU 51.2% and 26.8% of the respondents disagreed with the accessibility of online tutoring services for students. The remaining 17.1% and 4.9% of the respondents described their neutrality and agreement, respectively. The responses have a 4.00 mean with an SD of 0.806. This indicates on average the respondents strongly disagree with the accessibility of online tutoring services for students while there is a range of opinions among the respondents.

The availability of digital library services, though the number of networked computers is unbalanced with the total number of students, and digital academic databases contribute to enhanced learning. However, AAU is reluctant to provide online tutor services that will support students to learn more through self-paced learning.

4.3.2. The Readiness to Implement the New Initiative of Digitalization

Concerning having predefined goals to be accomplished with digitalizing education about 42.9% and 28.6% of the respondents strongly agreed and agreed, respectively as indicated in table 7. About 16.7% and 11.9% of the respondents remained neutral and disagreed with the notion that AAU has predefined goals to be accomplished by digitalizing education, correspondingly. These responses have a mean of 1.98 with an SD of 1.049 indicating the average inclination of the respondents towards agreement but with a range of opinions among the respondents. Respondents were asked if AAU has a comprehensive policy of digitalization in line with the e-Learning Policy of MoE. And about 64.3% and 23.8% of the respondents strongly disagreed and agreed with this notion. The remaining 7.1% and 4.8% expressed their strong agreement and agreement with the availability of a comprehensive institutional policy of digitalization. The responses have a 4.33 mean with 1.183 SD indicating the strong disagreement of the respondents regarding the availability of a comprehensive institutional policy of digitalization in AAU. However, opinions widely vary among the respondents.

With this respect, interviewee B stated

> *"Until now AAU does not have an institutional ICT policy guiding ICT utilization in education. However, following the ratification of the e-learning policy and e-SHE initiative of MoE AAU is designing an e-learning and artificial intelligence (AI) policy which is a bit advanced from the e-learning policy of MoE. This institutional policy will cover data security and personal data protection which is compulsory for digital education. Once the policy is done it will become part of the Senate Legislation and guidelines will be prepared for easy implementation of the policy. This will transform the implementation of digital technology and e-learning from voluntary to compulsory. It will also compel every program and educator to mandatorily integrate ICT into the instructional process. Moreover, the e-learning unit is established as an organizational entity having an allocated budget. This unit will be responsible for implementing an e-learning policy, designing different projects to strengthen AAU's e-learning capacity, building capacity, governing e-learning, and evaluating the overall e-learning implementation."*

AAU is working on an advanced institutional policy that will dictate how to manage the upcoming digital educational environment. This also indicates that the university has a predefined goal to achieve with increased digitalization. This is why the university is devising an institutional e-learning policy. However, those goals are not well recognized by all of the campus community.

Table 8: Institutional ICT Strategy

AAU has predefined goals to be accomplished with digitalizing education					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	18	42.9	42.9	42.9
	Agree	12	28.6	28.6	71.4
	Neutral	7	16.7	16.7	88.1
	Disagree	5	11.9	11.9	100.0
	Total	42	100.0	100.0	
AAU has a comprehensive policy of digitalization in line with the e-Learning Policy of MoE.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	3	7.1	7.1	7.1
	Agree	2	4.8	4.8	11.9
	Disagree	10	23.8	23.8	35.7
	Strongly disagree	27	64.3	64.3	100.0
	Total	42	100.0	100.0	
AAU's ICT strategic plan is aligned with the organizational strategic plan.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	19	45.2	45.2	45.2
	Agree	13	31.0	31.0	76.2
	Neutral	10	23.8	23.8	100.0
	Total	42	100.0	100.0	
AAU leadership allocates adequate finance to support digital initiatives.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	28	66.7	66.7	66.7
	Agree	9	21.4	21.4	88.1
	Neutral	3	7.1	7.1	95.2
	Disagree	2	4.8	4.8	100.0
	Total	42	100.0	100.0	
AAU has a continuous professional development program to enhance digital skills.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	15	35.7	35.7	35.7
	Agree	16	38.1	38.1	73.8
	Neutral	4	9.5	9.5	83.3
	Disagree	6	14.3	14.3	97.6
	Strongly disagree	1	2.4	2.4	100.0
	Total	42	100.0	100.0	
AAU has adequate capable ICT professionals to support the digitalization of education.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	12	28.6	28.6	28.6
	Agree	14	33.3	33.3	61.9
	Neutral	8	19.0	19.0	81.0
	Disagree	8	19.0	19.0	100.0
	Total	42	100.0	100.0	

In addition to institutional ICT policy, it is compulsory to integrate the ICT strategic plan with the organizational strategic plan. With this regard, 45.2% and 31% of the respondents described their agreement with the alignment of the ICT plan with the organizational strategic plan. The remaining

23.8% of the respondents remained neutral with this notion. These responses have an average of 1.79 with a SD of 0.813. This suggested that most respondents perceived some level of alignment between the two plans but not necessarily a perfect alignment. The SD suggested the deviation of responses from the mean and variability of opinions among the respondents.

The implementation of institutional strategy requires adequate budget allocation since ICT infrastructures are capital intensive. With this regard, 66.7% and 21.4% of the respondents strongly agreed and agreed with the impression that AAU leadership allocates adequate finance to support digital initiatives and strategy, correspondingly. On the contrary, 7.1% and 4.8% of the respondents remained neutral and disagreed with this notion, respectively. These responses have a mean of 1.50 and a SD of 0.834 suggesting the inclination of the respondents to strongly agree with this impression while there is a considerable level of variability among the respondents' opinions.

Concerning the ICT strategic plan's alignment with the organizational strategic plan and leadership's ability to allocate adequate finance to support digital initiatives interviewee A said

> *"The ICT strategic plan is aligned with the big institutional strategic plan. AAU has a five-year strategic plan, and digitalization is one theme. With this strategic theme, AAU has intended to achieve a digitally supported teaching-learning system through the provision of infrastructure, the creation of a conducive learning environment, and educational programs. Creating a conducive classroom environment by making classrooms smart is a priority in 2024. By the end of this academic year (June 2024), AAU has planned to create 50 smart classrooms with interactive features on all campuses. AAU leadership is highly committed to the digitalization of education in AAU. Therefore, the ICT strategic plan and its implementation are under constant monitoring of the strategic management. Besides, an adequate budget is allocated for the digitalization process. E-learning implementation is being financed from the internal budget and outside sources through partnerships. It is obvious that resource scarcity is always there, and budget allocation is done with priority."*

The continuous professional development program is one part of the institutional strategy. The respondents were asked if AAU has a CPD program to enhance digital skills. About 38.1% and 35.7% of the respondents agreed and strongly agreed with the existence of a CPD program to enhance digital skills. On the contrary, the remaining 14.3% and 2.4% of the respondents disagreed and strongly disagreed with this notion, respectively. These responses have a mean of 2.10 with a

SD of 1.122 suggesting the respondents leaning towards agreement though not very strong with a wide range of opinions among the respondents. With this respect, interviewee B said

> *"Capacity building is one of the components of the e-SHE initiative which is being implemented in AAU integrating technological and pedagogical skills. In cooperation with Arizona State University, three weeks of master class training has been given to educators. Besides, three weeks of online course development training with certification was provided for all teachers, but not all teachers took the training yet due to different reasons. Furthermore, online certified training of trainers was given to 6 facilitators who will facilitate educators' training which was previously done by Arizona State University. Moreover, 8 months of instructional designing training was given to 4 educators. Those 4 trained educators become online content developers who become technologically fit and pedagogically skilled. In addition to these, 6 months of student management information system training is given to those who manage online student services. The student management information system is integrated with the learning management system which enables online course management. AAU also established an e-learning partnership with China to continuously develop educators' and facilitators' digital skills."*

The existence of predefined goals with digitalization, the start of designing institutional e-learning policy, the alignment of ICT strategic plan with the institutional plan, the establishment of a state-of-the-art or audio-visual studio for enhanced teaching and learning, the existence of a professional development program to improve educators' digital skill indicates AAU's readiness to embrace change and integrate digitalization with educational activities. This also portrays AAU's commitment to the implementation of the e-SHE initiative.

Regarding the availability of an adequate number of ICT professionals to support the digitalization of education 33.3% and 28.6% of the respondents agreed and strongly agreed with the notion that AAU has adequate capable ICT professionals to support the digitalization of education, respectively. On the other hand, 19% and 19% of the respondents expressed their neutrality and disagreement with this impression. These responses have a mean of 2.29 with a SD of 1.088 suggesting that the respondents lean towards agreement even though the agreement is not very strong. The SD suggested a deviation from the mean and variability among the respondent's opinions.

Table 9: Network access

AAU has high-speed internet service for all campus community.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	16	38.1	38.1	38.1
	Agree	14	33.3	33.3	71.4
	Neutral	3	7.1	7.1	78.6
	Disagree	9	21.4	21.4	100.0
	Total	42	100.0	100.0	
AAU has networked computers in libraries.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	6	14.3	14.3	14.3
	Agree	12	28.6	28.6	42.9
	Neutral	7	16.7	16.7	59.5
	Disagree	17	40.5	40.5	100.0
	Total	42	100.0	100.0	

Concerning network access respondents were asked if AAU has high-speed internet service for all campus communities. About 38.1% and 33.3% of the respondents strongly agreed and agreed with this impression, respectively. On the other hand, about 21.4% and 7.1% of the respondents disagreed and remained neutral with this notion, respectively. These responses have a mean of 2.12 with a SD of 1.152 suggesting the respondents are inclined towards agreement with the notion. However, there is a range of opinions among respondents. With this regard, interviewee B said "Internet infrastructure is very rudimentary this time, and it is available for all campus communities. Even it was installed in the student's dormitory. But the service in the dormitory is terminated now, for students waste their night using social media at the expense of their studies".

Regarding the availability of networked computers in libraries, 40.5% of the respondents disagreed. On the contrary, 28.6% and 14.3% of the respondents expressed their agreement and strong agreement with the availability of networked computers in libraries. The remaining 16.7% and 14.3% of the respondents remained neutral and strongly agreed with this impression. These responses have a mean of 2.83 with an SD of 1.124. This suggested the respondents' inclination towards slight agreement with the variability of opinions among the respondents. The data from observation indicates that all libraries are networked since network access is available. This allowed students to use the network connection using their personal belongings. However, the number of networked computers in libraries is not adequate for all students. There are also networked computer laboratories that provide service for all students during business hours.

Concerning the protection of every computer by licensed anti-virus, 35.7% of the respondents agreed whereas 23.8% of the respondents disagreed with this notion. The remaining 19%, 16.7%, and 4.8%

of the respondents strongly agreed, strongly disagreed, and remained neutral, correspondingly. The mean of 2.83 and SD of 1.43 of these responses suggested the inclination of the respondents towards an agreement with the notion with a wide range of opinions among the respondents.

Table 10: Networked campus

Every computer is protected by a licensed anti-virus.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	8	19.0	19.0	19.0
	Agree	15	35.7	35.7	54.8
	Neutral	2	4.8	4.8	59.5
	Disagree	10	23.8	23.8	83.3
	Strongly disagree	7	16.7	16.7	100.0
	Total	42	100.0	100.0	
AAU has an institutional firewall.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Agree	7	16.7	16.7	16.7
	Neutral	20	47.6	47.6	64.3
	Disagree	13	31.0	31.0	95.2
	Strongly disagree	2	4.8	4.8	100.0
	Total	42	100.0	100.0	
Website information is frequently updated.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	1	2.4	2.4	2.4
	Agree	9	21.4	21.4	23.8
	Disagree	24	57.1	57.1	81.0
	Strongly disagree	8	19.0	19.0	100.0
	Total	42	100.0	100.0	
There is frequent online interaction between the campus and stakeholders.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	5	11.9	11.9	11.9
	Agree	21	50.0	50.0	61.9
	Neutral	7	16.7	16.7	78.6
	Disagree	8	19.0	19.0	97.6
	Strongly disagree	1	2.4	2.4	100.0
	Total	42	100.0	100.0	

Regarding the availability of institutional firewalls in AAU, 47.6% of the respondents expressed their neutrality whereas 31% of the respondents disagreed. The remaining 16.7% and 4.8% of the respondents agreed and strongly disagreed with this impression, respectively. These responses have a mean of 3.24 with a SD of 0.79. This suggests the inclination of the respondents toward slight disagreement with medium variability among the respondent's opinions.Regarding frequent updating of website information, 57.1% of the respondents disagreed with the idea that website information gets frequently updated. Whereas 21.4% of the respondents agreed, 19% of the respondents strongly disagreed as indicated in table 9. The remaining 1% of the respondents strongly

agreed. These responses have a mean of 3.69 with a SD of 1.093. This suggested that most of the respondents tend to disagree with this notion. However, the standard deviation implied a range of opinions among the responses of the respondents. Besides, about 50% of the respondents agreed that there is frequent online interaction between the campus and stakeholders. About 19%, 16.7%, 11.9%, and 2.4% of the respondents disagreed, remained neutral, strongly agreed, and strongly disagreed with the notion, respectively. The mean and SD of these responses were 2.50 and 1.018, correspondingly suggesting respondents' inclination towards neutrality with considerable dispersion of ideas of the respondents.

Table 11: Networked learning

AAU has implemented a learning management system effectively.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	1	2.4	2.4	2.4
	Agree	7	16.7	16.7	19.0
	Neutral	2	4.8	4.8	23.8
	Disagree	23	54.8	54.8	78.6
	Strongly Disagree	9	21.4	21.4	100.0
	Total	42	100.0	100.0	
ICT is greatly integrated into curricula.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	2	4.8	4.8	4.8
	Agree	6	14.3	14.3	19.0
	Neutral	9	21.4	21.4	40.5
	Disagree	17	40.5	40.5	81.0
	Strongly disagree	8	19.0	19.0	100.0
	Total	42	100.0	100.0	
ICT is being utilized in the classroom.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	6	14.3	14.3	14.3
	Agree	9	21.4	21.4	35.7
	Neutral	2	4.8	4.8	40.5
	Disagree	19	45.2	45.2	85.7
	Strongly disagree	6	14.3	14.3	100.0
	Total	42	100.0	100.0	
Students use ICT in their projects.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Strongly agree	12	28.6	28.6	28.6
	Agree	12	28.6	28.6	57.1
	Neutral	1	2.4	2.4	59.5
	Disagree	17	40.5	40.5	100.0
	Total	42	100.0	100.0	

Regarding the effective implementation of the learning management system in AAU 54.8% and 21.4% of the respondents agreed and strongly disagreed with the effective implementation of LMS.

About 16.7%, 4.8%, and 2.4% of the respondents agreed, remained neutral, and strongly agreed, respectively. These responses have a mean of 3.76 with a SD of 1.055 indicating the inclination of the respondents towards disagreement with this notion. The SD indicates that while the average response leans towards disagreement, a wide range of opinions among respondents is available. With this respect, interviewee B said

> *"LMS is applied in AAU. Educators can upload and manage courses online using the open index. It is a cloud-based virtual school comprising a registrar, administration, and classroom system. However, teachers' participation in using LMS is very low since its use is optional. Until now online classrooms do not have institutional support and LMS implementation is voluntary. But the customized e-learning policy will change this by making online education part of the Senate Legislation and institutionalizing e-learning. This policy will make the integration of technology in the instructional process a requirement for cost-efficient education."*

About the integration of ICT into curricula 40.5% of the respondents disagreed with this idea and 21.5 of the respondents remained neutral. The remaining 19%, 14.3%, and 4.8% of the respondents strongly disagreed, agreed, and strongly agreed with this notion. These responses have a mean of 3.55 with a SD of 1,109 suggesting the disagreement with the notion and the range of opinions among the respondents. In this regard, the data obtained from the interviews indicated that the curriculum needs to be redesigned to integrate ICT into the learning process. Program review is already done, and curriculum redesigning will be the next step in AAU.

Regarding the utilization of ICT in the classroom 45.2% of the respondents disagreed with the implementation of ICT in the classroom whereas 21.4% of the respondents agreed with this notion. The remaining 14.3%, 14.3%, and 4.8% of the respondents strongly agreed, strongly disagreed and remained neutral. These responses have a mean of 3.24 with a SD of 1.34 indicating that the respondents are leaning towards disagreement with a wide range of opinions among the respondents. About the use of ICT in students' projects 40.5% of the respondents disagreed whereas 28.6% and 28.6% of the respondents strongly agreed and agreed that students use ICT in their projects. The remaining 2.4% of the respondents remained neutral with this notion. These responses have a mean of 2.55 with a SD of 1.292. This suggested that the respondents generally tended to agree with this notion even though there was a wide range of variation among respondents' ideas. With this respect, interviewee B said

"Educator readiness to integrate technology into the classroom is not promising. Improved educators' readiness to integrate ICT takes time, and awareness creation is being conducted to achieve it. Students initiate to use of technology, especially telegram as a learning and information exchange platform. Educators share materials for enhanced learning using this online platform and it is efficient in terms of time and cost".

The inability of educators to effectively utilize the learning management system; the reluctancy of AAU to integrate ICT into curricula, and the scanty utilization of ICT in the classroom indicate that AAU has a long way to go and a lot of work to do to change educators' attitude and announce the mandatory utilization of LMS and compulsory integration of ICT in the classroom learning. Besides, AAU is a way behind the digitalization of the education system since curricula integration of ICT is one measure to be taken to digitalize the education system.

4.3.3. Challenges of Implementing Digital Technologies in Academic Aspects

Regarding challenges of implementing digital technologies in academic aspects 9 challenges were identified, and respondents were asked to rate each from highly critical to low critical. As portrayed in table 12, about 66.7% and 16.7% of the respondents rated the challenge of lack of leadership commitment for the integration of digital technologies in the education system as low critical and minor critical, respectively. The remaining 9.5% and 7.1% of the respondents rated this challenge as critical and highly critical, respectively. These responses have a mean of 4.26 with a SD of 1.289 suggesting that on average the respondents rate this challenge as low critical. However, there is some variability among respondents' opinions indicating the minority potentially criticizes the leadership commitment.

With this respect, interviewee B said

"Leadership commitment is not a challenge to integrate ICT into the education system and digitalize the teaching-learning process in AAU. In reverse, the leadership of AAU is highly informed about the benefits of digitalizing education in terms of improving access to HE and providing HE service in a cost-efficient manner. Therefore, the university is working to digitalize education with the strong support of the institutional legal framework."

Table 12: Challenges of implementing digital technologies in academic aspects

AAU leadership is not committed to the integration of digital technologies in the education system.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	3	7.14	7.14	7.14
	Critical	4	9.52	9.52	16.66
	Minor critical	7	16.67	16.67	33.33
	Low critical	28	66.67	66.67	100
	Total	42	100	100	
There is resistance to change in the university.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	23	54.76	54.76	54.76
	Critical	11	26.19	26.19	80.95
	Minor critical	7	16.67	16.67	97.62
	Low critical	1	2.38	2.38	100
	Total	42	100	100	
Educators are not willing to let go of the old method of instruction.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	17	40.48	40.48	40.48
	Critical	14	33.33	33.33	73.81
	Moderate	3	7.14	7.14	80.95
	Minor critical	6	14.29	14.29	95.24
	Low critical	2	4.76	4.76	100
	Total	42	100	100	
Educators are reluctant to integrate technology into the learning process.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	17	40.5	40.5	40.5
	Critical	14	33.3	33.3	73.83
	Moderate	3	7.1	7.1	80.93
	Minor critical	6	14.3	14.3	95.23
	Low critical	2	4.8	4.8	100
	Total	42	100	100	

Regarding the challenges of resistance to change 54.8% and 26.2% of the respondents rated it as a highly critical and critical challenge in AAU. The remaining 16.7% and 2.4% of the respondents rated this challenge as moderately critical. A mean of 0.924 with an SD of 1.69 suggested the inclination of the respondents towards rating resistance to change as a highly critical challenge even though there is variability among respondents' opinions since responses are dispersed from the mean. Concerning this, interviewee B said

"Resistance to change will always be there. For instance, educators' engagement in using LMS is reported as very low even if the system is already installed to be utilized. State-of-the-art or modern multimedia studio is built. It solved the problem of preparing recorded learning materials. However, the tendency of teachers to use it is not promising. But this will be managed by raising awareness and making it a legally compulsory requirement through Senate Legislation."

The other challenge i.e., educators' reluctance to integrate technology into the learning process was rated as highly critical and critical by 40.5% and 33.3% of the respondents correspondingly. The remaining 14.3%, 7.1%, and 4.8% of the respondents rated this challenge as minor critical, moderate and low critical, respectively. The mean of 2.10 with a SD of 1.226 suggested that on average the respondents were inclined to rate this challenge as critical. However, there is some level of dispersion or variability in the respondents' opinions.

Regarding the challenges of lack of competent ICT technicians who can administer the digital environment 34.1%, 22% and 19.5% of the respondents rated this challenge as minor critical, highly critical, and moderate, respectively as indicated in table 13. The remaining 14.6% and 9.8% of the respondents rated it as critical and low critical, respectively. The mean of 2.95 with a SD of 1.341 indicates the general inclination of the respondents towards rating this challenge as moderately critical while there is variability of opinions. Regarding the lack of educators capable of utilizing educational technologies 35.7% and 23.8% of the respondents rated it as low critical and minor critical, respectively. The remaining 16.7%, 16.7%, and 7.1% of the respondents rated it as moderate, critical, and highly critical, respectively. The mean of 3.64 with a SD of 1.322 suggested that on average the respondents are leaning towards rating this challenge as minor critical with considerable variability of responses.

Regarding the challenge of the inadequate number of capable online content developers 26.2% and 23.8% of the respondents rated it highly critical and low critical, respectively. The other 19%, 16.7%, and 14.3% of the respondents rated this challenge as minor critical, moderately critical, and critical, correspondingly. These responses have a mean of 3.00 with a SD of 1.546 suggesting the average inclination of the respondents towards rating this challenge as moderately critical while there is considerable variability among respondents' responses.

Table 13: Digital competence and language barrier

AAU does not have competent ICT technicians who can administer the digital environment.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	9	21.4	22.0	22.0
	Critical	6	14.3	14.6	36.6
	Moderate	8	19.0	19.5	56.1
	Minor critical	14	33.3	34.1	90.2
	Low critical	4	9.5	9.8	100.0
	Total	41	97.6	100.0	
Missing	System	1	2.4		
Total		42	100.0		
AAU does not have educators capable of utilizing educational technologies.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	3	7.1	7.1	7.1
	Critical	7	16.7	16.7	23.8
	Moderate	7	16.7	16.7	40.5
	Minor critical	10	23.8	23.8	64.3
	Low critical	15	35.7	35.7	100.0
	Total	42	100.0	100.0	
AAU does not have an adequate number of capable content developers for online education.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	11	26.2	26.2	26.2
	Critical	6	14.3	14.3	40.5
	Moderate critical	7	16.7	16.7	57.1
	Minor critical	8	19.0	19.0	76.2
	Low critical	10	23.8	23.8	100.0
	Total	42	100.0	100.0	

Regarding the content developed fully in English challenging students with low English language proficiency, about 38.1%, 28.6% and 19% of the respondents rated the challenge as critical, highly critical, and moderately critical, respectively. The remaining 11.9 and 2.4% rated this challenge as low critical and minor critical. These responses have a mean of 2.31 with a SD of 1.259. This suggests that on average the respondents are inclined towards rating this challenge as critical with a moderate level of variability among the respondent's opinions.

Regarding the challenge of low capacity to finance the cost of digital education technological infrastructure 47.6%, 21.4%, and 19% of the respondents rated it as low critical, minor critical, and moderately critical, correspondingly. The other 9.5% and 2.4% of the respondents rated this challenge as critical and highly critical. The mean of 4.02 with the SD of 1.137 indicates the average leaning of the respondents towards rating the challenge as low critical with some level of response variability.

Table 14: Language barrier and financial constraint

Contents developed fully in English will be difficult for students with low English language skills.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	12	28.6	28.6	28.6
	Critical	16	38.1	38.1	66.7
	Moderate critical	8	19.0	19.0	85.7
	Minor critical	1	2.4	2.4	88.1
	Low critical	5	11.9	11.9	100.0
	Total	42	100.0	100.0	
AAU cannot finance the cost of digital education technology infrastructure.					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Highly critical	1	2.38	2.38	2.38
	Critical	4	9.52	9.52	11.9
	Moderate critical	8	19.05	19.05	30.95
	Minor critical	9	21.43	21.43	52.38
	Low critical	20	47.62	47.62	100
	Total	42	100	100	

Regarding the challenges of implementing digital technologies in academic aspects of AAU, interviewee B said

"Since AAU is not fully engaged in digitalizing education challenges are not yet critically identified. But based on the available circumstances it is possible to indicate some possible challenges. Currently, AAU has only 4 certified online content developers. Until now only 2 modules i.e. Mathematics for Natural Science and Emerging Technology are prepared for online courses. AAU has planned to start online courses in blended form for distance programs very soon. During implementation, online content development will become a challenge since online content developers are quite few. Besides, human factors like resistance to change, reluctance to attend training, and disinclination to utilize educational technology for better learning will be there even with the existence of a guiding policy that will abide the digital education. Furthermore, the dynamic nature of technology is identified as a possible challenge. When technology changes constantly, replacing the outdated with the latest technologies will become compulsory. However, it will not be possible to afford the latest technologies every time it gets changed due to scarcity of financial resources. Moreover, AI is feared to be a great challenge. Students will do everything using AI without exerting their effort which will increase their technology dependency without developing their cognitive capacity. Unless monitoring mechanisms are in place, even online assessment will be a challenge since students will use AI to take the exam for them. Besides, human behavior will be affected if everything gets managed online without human interaction."

AAU has digitalized the student service which is part of the administrative service. However, it is lagging behind the digital education world in terms of integrating education into the curricula. The digitalization of the academic system is challenged by resistance to change. This is a great bottleneck for implementing digital technologies into the higher education system. Educators' meager willingness to let go of the old method of instruction and mainstream technology into classroom learning is the manifestation of resistance to change.

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Summary of Major Findings

5.1.1. The Implication of Digitalization on Enhancing Student Service

AAU has an online portal for digital student services that is being effectively implemented. Using this portal students access different kinds of student services including admission, registration, placement, examination, and accessing grade reports from anywhere. The online portal enables students to save time by avoiding in-person appearances to get those services. AAU's implementation of digital student services includes an online portal for accessing various services improving accessibility and efficiency (Alharbi & Drew, 2014). In AAU the availability of mobile applications for online student services is not unwavering.

Regarding the inclusive and accessible features of the digital services for specially-abled students in AAU, the respondents showed their neutrality on average. This indicates the unsolidity of the accessible and inclusive features of digital student service for specially-abled students. However, the data from the interviews indicated the availability of inclusive online student services. To reconcile these two ideas, the student portal was navigated. The researcher found out that the online portal has a platform for online disability services requests. However, the portal itself lacks assistive technologies such as screen readers, voice recognition software, and keyboard navigation. This shows that the online portal user interface lacks inclusivity.

Data privacy and security are other prominent requirements of digital service. The e-learning policy obliges HEIs to manage data and information with maximum security and confidentiality. Through the awareness creation of privacy and data security continuously, installation of access control, authentication, fraud management as well as data backup system, and management of student data adhering to national and international data protection and privacy laws and regulations (MoE, 2023). In compliance with this policy requirement, the respondents agreed that online data is secured in AAU. The respondents also agreed that students' privacy is protected, and personal data is being manipulated adhering to the national personal data protection regulations even though AAU does not have its institutional policy for now. Personal data protection will be part of the customized e-learning and AI policy which is under preparation. This will enable the issue of personal data

protection to be managed by institutional policy soon. In general, in AAU online personal data is protected and data security is ensured through access control and authentication mechanisms.

The respondents agreed with the availability of a digital library with local digital content and academic databases that enable enhanced learning through the provision of extensive learning resources. However, the respondents strongly disagreed with the accessibility of online tutoring services for students. This indicated that AAU has learning support and resources that allow students to access different types of digital learning materials. However, it does not have a tutoring service which should be a future area of intervention.

5.1.2. The Readiness to Implement the New Initiative of Digitalization

According to (Kashorda & Waema, 2011) the digital readiness of HEI can be measured in terms of institutional ICT strategy which can be described in terms of having pre-defined goals with the use of ICT, an ICT strategic plan best integrated with an institutional plan, institutional policy of digitalization, and human resource development strategy. Accordingly, AAU has predefined goals that will be achieved with the digitalization of education services. It has also a strategic ICT plan that is aligned with the big institutional plan. Digitalization is one of the biggest themes of the five-year strategic plan. Accordingly, it is planned to digitalize education services, establish 50 smart classrooms on all campuses, and start online education for distance programs. This is to ensure a cost and time-efficient education system that suits the era of digitalization.

The implementation of digitalization is under the close supervision of strategic management. However, AAU does not have its institutional digitalization policy in effect. Institutional e-learning and AI policies are under preparation following the ratification of the national e-learning policy and the e-SHE initiative of the MoE. The E-learning unit that is responsible for the overall governance of e-learning is established as an organizational entity. At the completion and ratification of this policy, digital education will become part of the Senate legislation. This will make the integration of digital technologies into the learning process and the provision of online education have institutional support and become compulsory. This policy will enable to achieve educational goals as well as manage digital initiatives efficiently as described by (Qizi & Sharofat, 2021; Rodrigues, 2019).

Financing digitalization is part of the institutional ICT strategy. AAU leadership allocates adequate finance for the digitalization of education. The digital initiative is being financed from internal sources as well as external funds through e-learning partnerships. These indicate a good leadership attitude about digitalizing HE and an extensive understanding of the technical, curricular, administrative, and social dimensions of ICT utilization in education which is mandatory for the successful integration of ICT in education as described by (Kundi & Nawaz, 2014; Tino, 2003). Moreover, the CPD program to enhance digital skills is in effect at AAU. The ICT Policy for HE and TVET obliges to enhance students', teachers', and educational leaders' digital literacy and ICT competencies (FDRE Ministry of Science and Higher Education, 2020).

Accordingly, educators are trained in online course development and designing, ToT for online training facilitation, and instructional designing through the e-SHE projects package. ToT given for online training facilitators enables the university to manage the educators' online training by itself which was managed by Arizona State University. This will make AAU to be self-reliant in facilitating educators' online training. Besides, the student management information system training for experts in student service enables to enhancement of the digital skills of those experts. Furthermore, the e-learning partnership with China will enable the digital literacy of educators and support service providers. This is a good indicator of the digital readiness of the university through elevating its human capital. Digitalization must be part of teachers' training and HDP to address skills with particular applications; integration into the existing curricula and change in curricula, instructional design, teachers' role, and underpinning educational theories as suggested by (Tino, 2003). But this is not yet practical at AAU.

Network access is another parameter to measure the digital readiness of HEI as described by (Kashorda & Waema, 2011). ICT Policy for HE and TVET and E-Learning Policy for HE also dictate the mandatory provision of ICT access. Given that, AAU has already installed internet infrastructure and provided the service for all campus community. Libraries are networked which allows students to use internet service for their learning using their belongings. Networked computers are also available in libraries but not adequate since AAU has a large number of students in different programs.

A networked campus requires licensed anti-virus protection, institutional firewall, constant website updating, and frequent online interaction as illustrated by (Kashorda & Waema, 2011). AAU uses

licensed antivirus for each computer. However, since the respondents' agreement is not strong, a gap in using fully licensed antivirus for each computer might be there. The availability of institutional firewalls is also under question. In addition to this, respondents also resented the frequent updating of website information. The respondents' inclination towards neutrality about frequent online interaction between the campus and stakeholders also indicates gaps in this area.

The LMS is installed in the university; however, its effective implementation is not yet in effect. It is open for educators to upload and manage courses in a cloud-based virtual system. Nevertheless, teachers are reluctant to use it. This is mainly due to the lack of an institutional legal framework regulating the mandatory implementation of digital systems. But teachers' efforts to use technologies must be improved as described by (Alenezi, Wardat, & Akour, 2023). ICT is not greatly integrated into the curriculum. Alenezi, Wardat, & Akour (2023) described that the curricula of many countries are far behind digital education which is also evident at AAU. A program review is conducted and the need to redesign the curriculum is recognized. Designing the curriculum to best integrate ICT and best suit e-learning is mandatory for networked learning as depicted by (Kashorda & Waema, 2011).

The effective integration of ICT into classroom learning is also under question. This indicates the reluctance of teachers to integrate technologies into the instructional process. But the use of technologies in students' projects is promising which indicates student's enthusiasm to use digital gadgets in their learning process. This will improve student engagement, motivation, communication, and teamwork (Timotheou, et al., 2023) and create a learner-centered self-directed, and collaborative learning environment (Fu, 2013) if it is promoted and effectively supported.

5.1.3. Challenges of Implementing Digital Technologies in Academic Aspects

The implementation of digital technologies will be challenged by bottlenecks. Lack of leadership commitment to the integration of ICT in the education system is not a challenge in AAU. On the contrary, the leadership has well-understood the importance of digitalizing higher education for the provision of an accessible and efficient education system. The leadership is supporting the digitalization process and working to make the digitalization of education part of the Senate Legislation. This shows the strong commitment of the university leadership.

Resistance to change is identified as a highly critical challenge in AAU. This is manifested by low teachers' participation in using LMS, integrating digital technologies into classroom learning, and using multimedia studios for enhanced learning. Kundi & Nawaz (2014) and Juniu (2005) asserted that resistance to change and resistance to integrating technology in the learning process is a great challenge in the digitalization of education.

Educators' inability to let go of conventional teaching and integrate technology into the instructional process is a critical challenge in AAU which is also related to change management as identified by (Kundi & Nawaz, 2014). The lack of competent ICT technicians who can administer the digital environment will be a moderately critical challenge in the course of implementing e-learning in AAU. In this regard, Shrivastava & Shrivastava (2022) expressed that greater demand for capable IT professionals who ensure online data security and maximum connectivity with minimum cyber security will be a challenge for the digitalization of higher education. In addition, the lack of educators capable of utilizing educational technologies will be a minor critical challenge for implementing digital education in AAU. This indicates educators are capable enough to utilize educational technologies in the instructional process. If there is a skill gap it can be filled with training since they can grasp it easily. However, disinclination not to attend training will be a challenge in the form of resistance to change. But all forms of resistance to change will be solved eventually with the creation of better awareness as well as the inclusion of digitalization policies and guidelines in the Senate Legislation.

The inadequate number of digital instructional designers will be a challenge when AAU starts to provide blended and online education. AAU has 70 undergraduates, 221 master's and 72 PhD programs, and various specializations in health sciences (AAU, 2024). It will be a great challenge to manage online instructional designing for all these programs with 4 experts. Online content and instruction fully developed in English will be a critical challenge for students with low English language proficiency. Face-to-face classroom learning is used to help those students, for instructors translate into the local language which most of the students could understand. However, online education might not provide this opportunity. This will greatly affect students with them.

Furthermore, as described by Butryn, Katarzyna, Sobinska, & Martini (2022) financial and technological aspects are great challenges in digitalizing higher education. Lack of finance to invest in digital education is determined as a low critical challenge in AAU. This indicates AAU does not

have a critical financial problem to finance educational technologies for now since it is starting to digitalize education. It is a matter of priority in current circumstances. However, the financial problem will be greatly related to the dynamic nature of technologies. Constant technology change aspires constant investment to make the latest digital gadgets in place. This will be a challenge for AAU in the future. This calls for attentiveness and cautious planning of the need for change and installing appropriate infrastructure and continuous technical support (Butryn, Katarzyna, Sobinska, & Martini, 2022).

Despite the good opportunities of digitalizing education, social alienation due to excessive engagement with computers losing human relations and huge cheating opportunities are challenges of digital education (Shrivastava & Shrivastava, 2022). In alignment with this, AI is identified as a great challenge of the very near future of AAU. It will be a threat by increasing technology dependency, reducing the cognitive skill of the learners, making assessment difficult, and affecting human behavior by eliminating human interaction.

5.2. Conclusion

AAU has fully digitalized student services via an online portal, ensuring efficient service delivery. However, expanding mobile accessibility remains inconsistent. Service quality is commendable, yet inclusiveness for specially-abled students needs improvement, lacking adequate assistive technologies. Data privacy is maintained through access controls, although a specific policy is overdue. Digital resources like networked libraries are available, but computer availability isn't evenly distributed, hindering access for students without personal devices. Online tutoring services are absent, despite the university's advanced infrastructure. AAU's institutional ICT strategy is robust, focusing on digital education and supported by internal funds and partnerships. Preparation of an e-learning and AI policy is underway, aiming to integrate technology into education mandates once formalized. While infrastructure supports networked learning, challenges include data security gaps and underutilized ICT in the curriculum. Resistance to digital tools among educators and future resource needs pose ongoing challenges.

5.3. Recommendations

The following recommendations are provided to be performed by Addis Ababa University.

- **Enhance Digital Accessibility:** Develop mobile apps for easy student service requests; enrich the online portal with assistive technologies for specially-abled students.

- **Data Protection Policy:** Implement a personal data protection policy aligned with e-learning initiatives to manage data securely and efficiently.
- **Balanced Computer Access:** Ensure libraries have enough networked computers to bridge digital divides, enhancing access to digital resources for all students.
- **Online Tutoring Services:** Initiate online tutoring to improve student learning experiences and utilize audio-visual capabilities for enhanced education.
- **E-learning and AI Policy:** Expedite development and implementation through Senate Legislation to institutionalize digital education and elevate AAU's academic standards.
- **Digital Literacy in HDP:** Integrate digital literacy into the Higher Diploma Program (HDP) to enhance educators' skills for effective digital teaching.
- **Data Security Measures:** Deploy licensed antivirus and institutional firewall technology to safeguard campus computers and prevent cyber threats.
- **Stakeholder Engagement:** Regularly update website information and promote online interactions to foster a networked campus environment.
- **Assessment and Support:** Assess digital behavior and provide continuous support to manage resistance to technological change among educators, students, and staff.
- **Training for Instructional Designers:** Increase trained online instructional designers to effectively implement e-learning initiatives across a broader spectrum.
- **Hybrid Education Approach:** Design hybrid education programs to balance automation with human interaction, ensuring a holistic learning experience.
- **Cautious Digitalization Strategy:** Conduct comprehensive cost-benefit analyses and consider socio-economic factors before adopting new technologies for digital education.

Future Research Recommendation

The study explored how digitalization impacts student services at AAU, focusing on insights from its leaders. It found positive effects of digitalization but noted gaps. While AAU's overall digital readiness was satisfactory, the study recommends a more comprehensive approach for future research. Including perspectives from teachers and students through in-depth interviews and focus groups is essential. This broader investigation would provide a holistic understanding of AAU's digital readiness across stakeholders, enhancing insights into its educational framework.

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Appendices

Appendix 1 Questionnaire

Addis Ababa University
College of Education and Behavioral Studies
Department of Educational Planning and Management
Graduate Program of Educational Leadership and Management

Questionnaire to be filled by college deans, school and institute heads, and department heads

Good day! My name is Emebet Hailemichael, and I am currently studying for a master's degree in Educational Leadership and Management at Addis Ababa University. I am researching the role of digitalization in higher educational institutions in the case of Addis Ababa University. The purpose of the study is to analyze what role digitalization is playing in higher education. Filling out this questionnaire will take no longer than an hour. Your response will only be used for research purposes. All responses will be kept anonymous, and no one will be identified in the research.

Please tick the box provided to show your consent to be part of the research. ☐

Part 1– Biographic Information or General Fact

Sex Male ☐ Female ☐

Age 18-25 ☐ 26-33 ☐ 34-41 ☐ 42-49 ☐ 50-58 ☐ More than 59 ☐

Marital Status Single ☐ Married ☐ Widowed ☐ Divorced ☐

Education Level BA/BSC Degree ☐ MA/MSC ☐ PhD ☐

Academic Rank Lecturer ☐ Assistant Professor ☐ Associate Professor ☐ Professor ☐

Current Position _____

Part 2 – *Main Thematic Questions*

I. The implication of digitalization on enhancing student service

S. No	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	An online portal is available for digital student service.					
2.	Mobile applications are accessible for online student services					
3.	The digital student service is speedy.					
4.	The online student service is reliable.					
5.	The digital service has accessible features for specially-abled students (students with disability).					
6.	Online data are secured.					
7.	Students' privacy is protected.					
8.	Online data are manipulated in line with Ethiopia's data protection proclamation.					
9.	AAU has a digital library with local digital content.					
10.	An academic database is available to enhance learning.					
11.	Online tutoring services are accessible for students.					

II. The readiness and commitment to implement the new initiative of digitalization.

S. No	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	AAU has predefined goals to be accomplished with digitalizing education.					
2.	AAU has a comprehensive policy of digitalization in line with the e-Learning Policy of MoE.					
3.	AAU's ICT strategic plan is aligned with the organizational strategic plan.					
4.	AAU leadership allocates adequate finance to support digital initiatives.					
5.	AAU has a continuous professional development program to enhance digital skills.					
6.	AAU has adequate capable ICT professionals to support the digitalization of education.					
7.	AAU has high-speed internet service for all campus community.					
8.	AAU has networked computers in libraries.					
9.	Every computer is protected by a licensed anti-virus.					
10.	AAU has an institutional firewall.					
11.	Website information is frequently updated.					
12.	There is frequent online interaction between the campus and stakeholders.					
13.	AAU has implemented a learning management system effectively.					
14.	ICT is greatly integrated into curricula.					
15.	ICT is being utilized in the classroom.					
16.	Students use ICT in their projects.					

III. Challenges of implementing digital technologies in academic aspects

No	Item	Highly Critical	Critical	Moderate Critical	Minor Critical	Low Critical
1.	AAU leadership is not committed to the integration of digital technologies in the education system.					
2.	There is resistance to change in the university.					
3.	Educators are not willing to let go of the old method of instruction.					
4.	Educators are reluctant to integrate technology into the learning process.					
5.	AAU does not have competent ICT technicians who can administer the digital environment.					
6.	AAU does not have educators capable of utilizing educational technologies.					
7.	AAU does not have an adequate number of capable content developers for online education.					

8.	Contents developed fully in English will be difficult for students with low English language skills.					
9.	AAU cannot finance the cost of digital education technology infrastructure.					

Appendix 2 Semi-Structured Interview Guide

1. What is the implication of digitalization in enhancing the student service of AAU?
    a. What benefits/implications digitalization of student service has brought to Addis Ababa University?
    b. What are the challenges of providing digital student services?
    c. To what extent the digital student service is inclusive and accessible for specially-abled students (students with disability)?
    d. To what extent data protection and security compliance is considered? Does AAU have an organizational data protection policy?
    e. To what extent the digital student service is reliable and responsive?
2. To what extent does AAU possess the readiness and commitment to embrace change towards the new initiative of digitalization?
    a. To what extent AAU leadership is committed to implementing digitalization in the teaching-learning process? How commitment can be manifested?
    b. How far has AAU moved to implement a digital education system? What are the steps taken by AAU?
    c. Does AAU have the financial capacity to afford digital educational technologies? How about the human capital capable of utilizing digital educational technologies?
    d. How can you express the readiness and commitment of educators to integrate ICT into the teaching-learning process?
    e. Do you think curricular change is required to integrate ICT? If so how AAU is dealing with this?
    f. What is the percentage of ICT cost for the total institutional expenditure?
    g. What is the proportion of ICT capital budget from internal sources?
    h. Is there frequent training for ICT staff, admin staff, educators, and students to upgrade their digital skills?
3. What are the challenges of implementing digital technologies in academic aspects of AAU?
    a. How do you describe the challenges and what are the sources of those challenges?
    b. What are the methods being implemented to solve them?
    c. Are those implemented techniques successful? If so, how can you describe the success of upscaling them?

Appendix 3: Observation Checklist

S.No	Item to be observed	Status		
		Available and functional	**Available but not functional**	**Not Available**
1	Established state-of-the-art facilities			
2	Functionality of the installed modern technologies			
3	Learning management system software			
5	Training records of educators training on digital technologies			
6	Training records of admin staff training on digital technologies			
8	Networked computers in all libraries			