Predicting Secondary School Students' Intention and Actual Learning in Information and Communications Technology Education using Composite Based Structural Equation Modelling

By

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CERTIFICATION

I certify that this dissertation was carried out by Motai, Tumelo Alphoncy at Department of Educational Foundations, Faculty of Education, National University of Lesotho, Roma – Southern Africa.

---------- 5th November 2024

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DEDICATION

I am indebted and grateful to God, The Almighty, for blessing me to come this far. I am also grateful to my wife, Mme 'Makabelo Motai, for her prayers and encouraging words she always whispered into my ears to hold on when the journey was tough. A special vote of thanks is due to my daughters, Kabelo and Lebohang, for allowing me to sacrifice a significant amount of parental time to do this research. Parents on both sides of my family, I am grateful for your amazing support. A big ‘Thank You’ to all of you.

ABSTRACT

Information and Communication Technology (ICT) education is essential for equipping learners with the digital skills required in today's world. This study used the Unified Theory of Acceptance and Use of Technology (UTAUT) model to predict secondary school students' intentions and learning in ICT education. Previous research has not adequately explored the predictors of learners' intentions and learning outcomes specifically in Lesotho secondary schools. This study addresses the research gap by examining the relationships between performance expectancy, effort expectancy, social influence, and facilitating conditions and their impact on behavioural intention and actual learning outcomes in ICT education among secondary school learners in Lesotho. The study surveyed Grade 10 and Grade 11 students from 25 high schools in three Lesotho regions, with 670 students as a sample. The research instrument used was a structured questionnaire with closed-ended questions.

The study found a significant positive relationship between the UTAUT constructs and students' behavioral intentions and learning outcomes in ICT education through data analysis and reliability assessment. Performance expectancy, social influence and effort expectancy all demonstrated strong positive correlations with behavioural intention to learn ICT. Facilitating conditions were positively related to learning outcomes. Additionally, behavioural intention significantly influenced learning outcomes, highlighting the importance of motivational factors in ICT education. Based on the results, it is recommended that the Ministry of Education and Training (MoET) in Lesotho prioritises investments in ICT resources and infrastructure across schools, particularly in underserved regions. Teacher training programmes should be enhanced to equip educators with the skills to teach ICT effectively. Furthermore, incorporating strategies that enhance learners' motivation and intention to engage in ICT education is crucial for improving learning outcomes.

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Acronyms and Abbreviations

AC	: Actual Learning
AI	: Artificial Intelligence
BI	: Behavioural Intention
CAI	: Cambridge Assessment International
CAP	: Curriculum and assessment policy
CAAP 2009	: Curriculum and assessment policy

CMB	: Common Method Bias
COSC	: Cambridge Overseas School Certificate
COVID-19	: Corona Virus Disease
ECCD	: Early Childhood Care and Development
ECoL	: Examinations Council of Lesotho
EDF	: Educational Foundations Department
FC	: Facilitating Conditions
4IR	: Fourth Industrial Revolution
HEIs	: Higher Education Institutions
ICT	: Information and Communications Technology
LASED	: Languages and Social Education Department
LEBECP	: Lesotho Basic Education Curriculum Policy
LCA	: Lesotho Communications Authority
LCE	: Lesotho College of Education
LGCSE	: Lesotho General Certificate of Secondary Education
MoET	: Ministry of Education and Training
NSDP	: National Strategic Development Plan
NTTC	: National Teacher Training College
PE	: Performance Expectancy
Sci Ed.	: Science Education
SEM	: Structural Equation Modelling
SI	: Social Influence
SPSS	: Statistical Package for Social Sciences
SRMR	: Standardized Root Mean Squared Residuals
TAM	: The Technology Acceptance Model
TAM2	: The Extension of Technology Acceptance Model
TEDDICS	: Teachers' Emphasis on Developing students' Digital Information and Communication Skills
TRA	: The Theory of Reasoned Action
TPB	: The Theory of Planned Behaviour
UB	: Use Behaviour
UBLS	: University of Botswana, Lesotho and Swaziland
UTAUT	: Unified Theory of Acceptance and Use of Technology

CHAPTER 1

1.1 Introduction

The swift expansion of digital technologies has reshaped the educational landscape, especially in the realm of Information and Communications Technology (ICT) education. Digital skills have become increasingly essential for personal and professional development. Secondary schools have incorporated ICT education to prepare students for the demands of a knowledge-based economy in Lesotho. However, understanding the factors influencing students' intention to learn and actual learning outcomes in ICT education remains a complex challenge, one that requires detailed analysis to ensure effective curriculum design and delivery.

Despite the growing emphasis on ICT education, previous research revealed that students' engagement, motivation, and learning outcomes in the subject are inclined to a range of variables, comprising prior experience with technology, attitudes towards ICT, and self-efficacy in using digital tools. The main focus for educators and policymakers relevant to this study is to identify students' intention and actual learning to improve students' willingness to engage in ICT education.

The purpose of this study is to engage the composite-based structural equation modeling (SEM) to predict Lesotho secondary school students' intention and actual learning outcomes in ICT education. Using SEM, can evaluate the relationships among latent variables influencing ICT education learning, providing insights into how intention and actual learning interact and affect one another. Such an approach offers a robust framework for understanding and improving student engagement and outcomes in ICT education.

This study is significant as it contributes to the limited empirical literature on predictors of intention and actual learning outcomes in ICT education, specifically in Lesotho, using advanced analytical tools to address this gap. The findings could guide educational strategies, enabling educators and policymakers to develop more efficient ICT initiatives that are customized to the requirements and interests of Lesotho secondary school students.

The sections that follow, the background to the study, statement of the problem, objectives of the study, research hypothesis, scope and significance of the study, conceptual definition of terms and chapter summary.

1.2 Background to the study

In the 21st century, individuals have become consumers of digital innovations, necessitating their adoption and adaptation to thrive in the digital society. This philosophical understanding is emphasised by Reddy et al. (2022), while Weiss (2017) complements that mere familiarity with the latest technologies is insufficient for survival; digital literacy is an essential skill needed by all. Radovanović et al. (2020) further explain that Sustainable Development Goal 4 targets an increased number of youth and adults who possess relevant survival competences, such as technical and vocational skills for employment, decent jobs, and entrepreneurship. They also highlight the goal of increasing the percentage of youth and adults achieving at least a minimum level of proficiency in digital literacy skills. Ndibalema (2020) concurs, that the goal aims to increase the proportion of youth and adults with information and communications technology (ICT) skills.

Higher education institutions (HEIs) play a pivotal role in developing digital skills within societies. As Ndibalema (2020) argues, significant investment in ICT across all education levels is crucial, recommending a collaborative approach among HEI stakeholders to equip youth with the 21st-century skills. Aligning with this, the Lesotho Education Sector Plan (2016–2026) aims to enhance the relevance of higher education programmes by integrating ICT across schools and educational departments. This strategic plan intends for HEIs to produce computer-literate graduates, thus accelerating the facilitation of ICT equipment and facilities in these institutions, MoET (2016). Agenda 2063, Africa's blueprint for sustainable socio-economic development over the next 50 years highlights the transformative potential of globalisation and the information technology revolution. With appropriate policies, countries can make significant strides, lifting many out of poverty and driving economic and social transformations (Ufomba, 2020). The COVID-19 pandemic, however, exposed a lack of digital literacy among both students and teachers (Okagbue et al., 2023). Therefore, developing digital skills for educational platforms is essential, as noted by Blayone (2018) and Habibi et al (2022). In the post-COVID-19 era, enhancing digital literacy skills among students in Lesotho is critical to advancing the country's 21st-century industrial goals (CAP, 2009). This is further supported by Molefi and Ayanwale (2023), who assert that sub-Saharan countries like Lesotho are still in the early stages of implementing the Fourth Industrial Revolution (4IR). Thus, ICT education in schools is vital for national policy implementation.

The Lesotho Basic Education Curriculum Policy (LBECP) (2021) emphasises using multimedia instruction, including ICT. The policy promotes modern educational pedagogies

that foster creativity, independence, and survival skills in students. One of the LBECP's aims is to equip learners with the knowledge, skills, values, and attitudes needed to respond to socio-economic and technological changes (LBECP 2021). To achieve these goals, the policy advocates a shift from teaching to facilitating learning, from memorising facts to knowledge production, and from information recall to analysis, synthesis, evaluation, and application. This approach encourages the development of knowledge, skills, values, and attitudes in students. Before its review, the Curriculum and Assessment Policy (CAP) 2009 underscored the increasing importance of technology in the economic sector of developing countries, including Lesotho. Education was seen as essential in equipping students with technological skills to meet individual and societal needs (Ministry of Education and Training, 2009). CAP 2009 emphasised that education should respond to technological advancements by incorporating ICT into the curriculum. Consequently, students have been assessed in ICT education through the Lesotho General Certificate of Secondary Education (LGCSE), a local version of the former Cambridge Overseas School Certificate (COSC). The Lesotho integrated curriculum was piloted in phases from 2012, starting with Grade 1, and was fully implemented at the primary education level by 2016 (Mokotso, 2020). The curriculum was then extended to junior secondary education between 2017 and 2019 (Ministry of Education and Training, 2016). During this period, there were two types of students: those who underwent a five-year programme from Form A to Form E and those who completed four years of schooling under the COSC/LGCSE system, also known as "Grade students." Both groups were taught concurrently until they sat for their respective high-stakes examinations. The schools that piloted the integrated curriculum in 2016 administered Grade 11 examinations in 2019, with others following in 2022.

The International General Certificate of Secondary Education (IGCSE) ICT (0417) was introduced in the Lesotho education curriculum in 2015. This subject is offered at Form E (end of COSC) and Grade 11 (end of LGCSE), with the LGCSE and Grade 11 qualifications considered equivalent to the IGCSE, administered by Cambridge Assessment International (CAI). ICT education is an elective subject at the LGCSE level, serving as a prerequisite for further studies at universities and colleges in Lesotho and abroad (Raselimo & Thamae, 2018). The primary concern addressed in this study is the current trends in students' ICT performance at the lower General Certificate of Secondary Education (LGCSE) level. These trends raise significant questions about students' the genuine interest in learning ICT and whether their actual learning outcomes align with their stated intentions. The research aims to investigate this

discrepancy and shed light on the factors influencing the students' intentions and actual learning outcomes in ICT education in Lesotho secondary schools. Table 1.1 below shows the number of students enrolled in ICT education since its introduction in 2015 through to 2023. The LGCSE qualification awards grades A*, A, B, C, D, or E, with A being the highest and E the lowest. Performance below grade E is not recorded on certificates (Nketekete, 2021). Admission to universities and colleges requires grades A* to C, making grade C a critical boundary for further studies.

Table 1.1 Students' ICT education performance from 2015 to 2023

Years	No. of Schools per year	Total students registered for ICT education per school	Number of students each year per grade range			
			A* – B	C	D – E	F – U
2015	11	639	0.78 %	3.60 %	14.60 %	81.06 %
2016	9	549	6.38 %	10.75 %	30.42 %	52.46 %
2017	10	673	11.59 %	13.67 %	29.57 %	45.17 %
2018	10	631	16.32 %	17.75 %	28.84 %	37.08 %
2019	12	822	7.91 %	12.41 %	25.18 %	54.50 %
2020	16	681	18.36 %	21.88 %	24.52 %	35.24 %
2021	18	823	16.16 %	13.73 %	33.41 %	33.70 %
2022	25	976	10.76 %	9.63 %	17.01 %	62.60 %
2023	31	1258	14.60 %	10.25 %	16.77 %	58.35 %

Source: Examinations Council of Lesotho (2023)

During the initial introduction of ICT education in Lesotho secondary schools in 2015, 11 schools participated in the ICT examinations. However, in 2016, the number of schools declined to nine. In 2017 and 2018, only 10 schools registered. A notable increase occurred in 2019, with the number rising to 12 schools. From 2020 to 2023, the number of schools registering candidates for this examination significantly increased from 16 to 31, marking a 53% growth and a substantial rise in the enrolment of ICT schools across the country. According to the data presented, grades are classified into ranges: A* - B, C, D – E, and F – U. An analysis of the number of students per grade range, in 2015 indicates that no candidates achieved grades A* or A. Only 0.78% obtained grade B, 3.6% achieved grade C, 14.6% fell within the D – E range, and the majority, 81.06%, received the lowest band F – U. In 2016,

549 candidates sat for the examination. Of these, 6.38% obtained grades A* – B, 10.75% obtained grade C, 30.42% fell within the D – E range, and 52.46% were in the lower range F – U. The years 2017 and 2018 were similar in terms of candidature enrolment. In 2017, 11.59% of candidates achieved grades A* – B, while in 2018, this figure rose to 16.32%. For grade C, 13.67% and 17.75% of candidates were successful in 2017 and 2018, respectively. The lower range D – E was obtained by 29.57% of candidates in 2017 and 28.84% in 2018. The candidates who did not pass the examinations (grades F – U) accounted for 45.17% in 2017 and 37.08% in 2018 signifying a substantial number of candidates who did not pass the examination in both years.

In 2019, despite an increase in enrolment to 822, the number of candidates passing declined compared to the previous four years. There was a decrease of 8.41% in the grade boundary A* - B, with only 7.91% of candidates scoring within this range. Additionally, only 12.41% of candidates obtained grade C, while 25% and 54.50% of the candidates scored within the D – E and F – U ranges, respectively. The year 2020 recorded better performance compared to all previous years since the inception of ICT examinations. Of the 681 candidates who wrote the examination, 18.36% scored higher grades A* – B, 21.88% obtained grade C, and 24.52% scored within the D – E range. A comparatively lower percentage of 35.24% scored between F – U. In 2021, more schools registered for the examination compared to the previous years. Some 16.16% of the candidates obtained grades A* – B, 13.73% achieved grade C, 33.41% fell within the D – E range, and 33.70% scored grades F – U. In 2022, a higher number of students was recorded compared to 2021, with 976 candidates sitting for the ICT examination. Of these, 10.76% scored grades A* – B, 9.63% achieved grade C, 17.01% fell within the D – E range, and 62.60% scored grades F – U. In 2023, there was significant growth in the number of schools registering for ICT. Thirty schools participated, and 1,258 candidates enrolled for the examination. Of these, 14.6% obtained grades A* – B, 10.25% achieved grade C, 16.77% fell within the D – E range, and 58.35% scored lower grades of F – U.

Presented in a graph, the above information is shown in Figure 1 below.

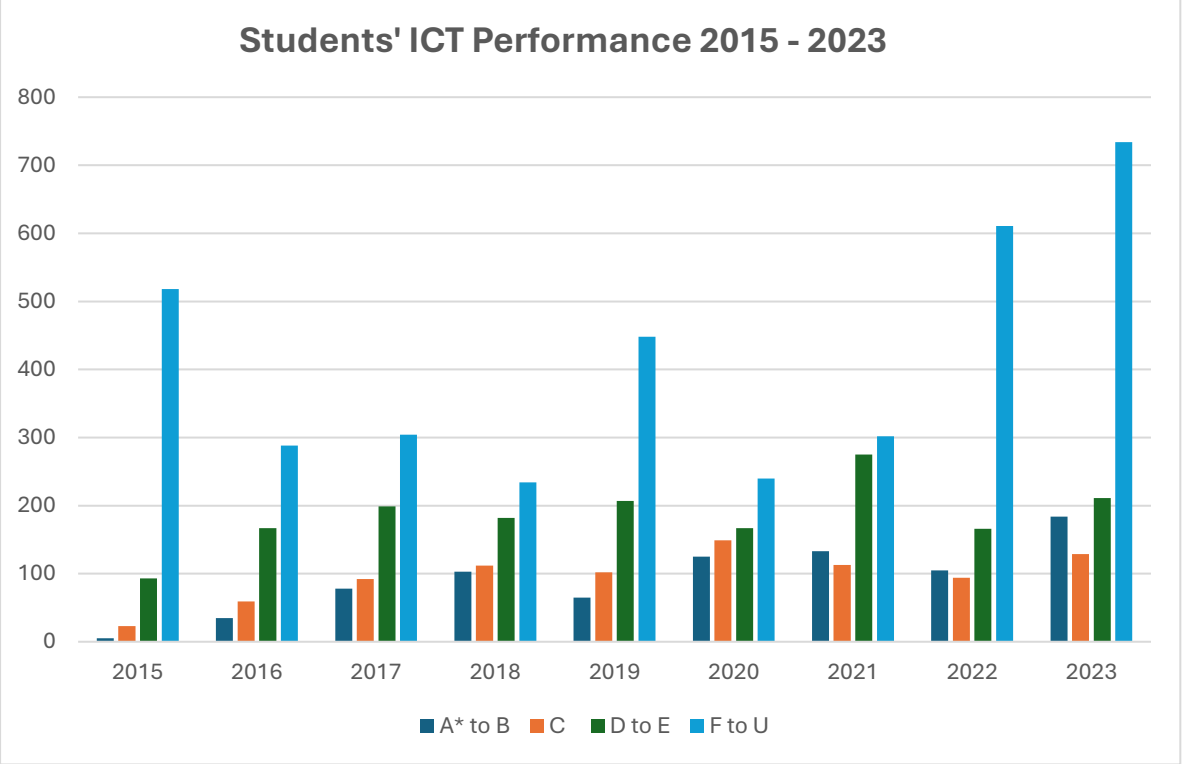


Figure 1.1 – Students' ICT education performance – 2015 to 2023

Source: Examinations Council of Lesotho, (2023)

Previous studies have researched the reasons behind students' underperformance in ICT and have proposed positive solutions over the years Gómez-Fernández & Mediavilla (2021) and Gorjón & Osés, (2022). However, despite these efforts, there has been no significant improvement in performance. In the context of Lesotho, research has not focused on or examined the factors that predict the learners' intention to study ICT and their actual learning outcomes. Two studies have been referenced in this study to establish the research gap. Santos et al. (2019) aimed to determine the relationships between various dimensions of ICT literacy, such as internet literacy, computer literacy, and information literacy. They explored the importance of parental and teacher support in using the internet as a pedagogical tool, as well as the influence of these factors on school performance. Essentially, they investigated how ICT literacy influences school performance. The research sample consisted of 808 students from the 7th to the 12th grade in the district of Vila Real, Portugal. The findings revealed that the use of the internet as a pedagogical instrument is a major factor in school performance, and that parental and teacher support have a positive influence on ICT literacy among students.

Another study by Senkbeil (2022) examined the incremental validity of different ICT-related personal characteristics over and above intelligence and prior achievement when predicting ICT literacy. This German-based research involved a sample of 14,436 fifteen-year-old students who provided self-reports on various ICT-related variables such as access, usage motives, experience, self-confidence, breadth of usage, and usage at home and at school. To determine the extent to which various ICT-related characteristics predict ICT literacy cross-sectionally as well as longitudinally, structural equation modelling techniques and path analyses were used. The results revealed that, cross-sectionally, all ICT-related variables incrementally predicted ICT literacy after controlling for intelligence. Longitudinally, ICT self-confidence, ICT-related usage motives, breadth of ICT usage, ICT usage at school, and ICT experience incrementally predicted ICT literacy after controlling for intelligence and prior achievement.

1.3 Statement of the problem

The integration of ICT education in secondary schools is essential for preparing students to succeed in the digital era. However, the factors influencing the intention and actual learning outcomes of Lesotho secondary school students in ICT education remain understudied. This research aims to bridge this gap by using a composite-based structural equation modelling (SEM) approach to predict students' intentions and actual learning in ICT. The problem arises from the limited research on the drivers of students' intentions and actual learning in ICT education, specifically within the context of secondary schools in Lesotho. While previous studies have focused on ICT adoption in various sectors, they have not explored the predictors of students' intentions and learning outcomes in this educational setting. This lack of understanding hampers the development of effective strategies and interventions to enhance students' engagement and performance in ICT education.

By employing the composite-based SEM approach, this study seeks to uncover the key factors influencing students' intention to learn ICT and how these intentions translate into actual learning outcomes. This method enables a comprehensive analysis of multiple variables, providing a deeper understanding of the relationships between different constructs that impact students' intentions and learning in ICT education.

1.4 Theoretical framework

A theoretical framework consists of a systematically organized and interrelated collection of concepts and assumptions, derived from one or more theories, which a researcher constructs to support and guide a study, Varpio, et al (2020). It reflects on the work the researcher engages in to use a theory in each study. This study is hinged on the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al (2023). The theory was used in this study to investigate the intentions and actual learning outcomes of Lesotho secondary school students in ICT education. The model is the most relevant because it is most popular and commonly applied for studies relevant to technology adoption. More discussion on the theoretical framework is in Chapter 2.

1.5 Aim and objectives of the study

Aim of the study:

The aim of this study is to predict secondary school students' intentions and actual learning in ICT education using the composite-based structural equation modelling (SEM) technique.

Specific objectives (variables)

The specific objectives for the study are:

- To investigate the influence of performance expectancy on the behavioural intention of learners to study ICT education.
- To investigate the influence of social influence on the behavioural intention of learners to learn ICT education.
- To explore the impact of effort expectancy on the behavioural intention of learners to study ICT education.
- To investigate the influence of facilitating conditions on the actual learning of ICT education by learners.
- To explore the impact of behavioural intention on the actual learning of ICT education by learners.

1.6 Research hypothesis

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) was adopted for this study. Alshehri et al. (2012) contend that this theory is one of the latest developments in the field of technology acceptance models. As a result, it is deemed relevant for the study under review. Four key variables—performance expectancy, social influence,

effort expectancy, and facilitating conditions—along with behavioural intention, have been adopted. Consequently, the following hypotheses were developed:

In this study, the following research hypotheses guided the study and provided answers to the research problem:

H1. Performance expectancy (PE) has a positive and significant influence on the behavioural intention (BI) of learners to study ICT education.

H2. Social influence (SI) has a positive and significant influence on the behavioural intention (BI) of learners to study ICT education.

H3. Effort expectancy (EE) has a positive and significant influence on the behavioural intention (BI) of learners to study ICT education.

H4. Facilitating conditions (FC) have a positive and significant influence on the actual learning (AL) of ICT education by learners.

H5. Behavioural intention (BI) has a positive and significant influence on the actual learning (AL) of ICT education by learners.

1.7 Research methodology

This research adopts a quantitative approach to predict secondary school students' intention and actual learning in ICT using the composite based SEM. Quantitative methods are appropriate for this study because they enable statistical analysis of survey data to measure the relationships between variables. A descriptive survey design was chosen to gather data from a representative sample of ICT students in Lesotho secondary schools. Data was collected using structured questionnaires distributed to participants physically and online through google forms. A random sampling technique was used to select participants from the grade 10 and 11 from secondary school students who had been exposed to ICT education. This enhanced the generalisability of the findings to a broader population of students in Lesotho.

Descriptive, bivariate, and multivariate data analysis were used to test the research aims and hypotheses. Collected data was analysed using SPSS software to perform correlation and regression analysis, identifying any significant relationships between constructs. The ethical protocol included submitting the research instruments (questionnaire) and the research proposal to the university's ethical committee for evaluation. Participation and involvement in the study was voluntary and maintained strict anonymity and confidentiality in reporting the

study's findings. A letter from the Dean of the Faculty of Education at NUL was obtained to authorize the research study. More on research methodology is discussed in Chapter 3.

1.8 Scope of the study

This study focused on schools offering ICT education in Lesotho, specifically those that offer the adopted ICT International General Certificate of Secondary Education (IGCSE) (0417) syllabus. These schools offered both the old curriculum and the newly introduced integrated curriculum from 2016 until 2022. Schools that offer the IGCSE (0983) syllabus did not form part of this study, as it is a different syllabus studied in only two schools in the country.

1.9 Significance of the study

The study's outcomes will be valuable for policymakers, educators, and stakeholders involved in ICT education in Lesotho. The Ministry of Education and Training (MoET) is expected to affect the necessary interventions to improve the status quo of ICT education performance in Lesotho secondary schools. Identifying the factors influencing students' intentions and learning outcomes will pave a way for targeted interventions that can boost students' motivation, engagement, and achievement in ICT education. This research may contribute to the following areas within the Lesotho education sector:

1.9.1 Educational Policy and Planning

The results of this study could provide crucial insights for educational policymakers and planners in Lesotho. Understanding the factors that influence students' intentions and actual learning outcomes in ICT education may help in developing evidence-based policies and strategies to enhance the quality and effectiveness of ICT education programmes. This study may contribute to the formulation of guidelines and recommendations for curriculum design, teacher training, infrastructure development, and resource allocation.

1.9.2 Curriculum Development and Implementation

By identifying the key factors that drive students' intentions and actual learning in ICT education, this study may inform the development and implementation of ICT curricula that align with students' needs and expectations. The results can help in identifying specific areas that need emphasis and improvement, enabling curriculum developers to create relevant and engaging content that fosters students' interest and active participation in ICT learning.

1.9.3 Teacher Training and Professional Development

Teachers play a vital role in facilitating students' learning experiences in ICT education. The results of this study may contribute to teacher training programmes and professional

development initiatives. By understanding the factors that influence students' intentions and learning outcomes, educators can be equipped with effective pedagogical strategies, instructional approaches, and assessment methods to enhance students' engagement, motivation, and achievement in ICT education.

1.9.4 Resource Allocation

Adequate allocation of resources is crucial for the successful implementation of ICT education programmes. The results of this study may guide policymakers and education administrators in identifying the necessary resources, such as infrastructure, equipment, and digital tools, to support students' intentions and actual learning in ICT education. It can aid in prioritising investments and ensuring that resources are utilised optimally to create a conducive learning environment for students.

1.9.5 Bridging the Digital Divide

Lesotho, like many other developing countries, faces challenges related to the digital divide. This study may shed light on the factors that contribute to students' intentions and actual learning in ICT education, including the barriers and challenges they face. Understanding these factors can inform efforts to bridge the digital divide, promote digital inclusion, and ensure equitable access to ICT education opportunities for all students, regardless of their socio-economic background or geographical location.

1.9.6 Research and Scholarly Contribution

The study's utilisation of a composite-based SEM approach in predicting students' intentions and actual learning outcomes in ICT education can contribute to the existing body of literature in educational research. By employing advanced statistical techniques, this study may offer methodological insights and contribute to the understanding of how different variables interact and influence students' educational experiences and outcomes. It can provide a foundation for further research and exploration in the field of ICT education and related disciplines.

1.10 Definition of terms

Information and Communication Technology (ICT): A diverse set of technological tools and resources used to access, manage, transmit, store, create, and share or exchange data to function in a knowledge society.

Structural Equation Modelling (SEM): A multivariate statistical framework used to model complex relationships between directly and indirectly observed (latent) variables. Kline (2023) describes SEM as a set of statistical techniques for estimating the magnitude and direction of

presumed causal effects in quantitative studies based on cross sectional, longitudinal, experimental or other kinds of research design.

Digital Literacy: Hague & Payton (2010) define digital literacy as the ability to effectively and responsibly use digital tools, technologies, and resources. A learner should be able to define, access, manage, integrate, communicate, evaluate, and create information safely, and ethically through networked digital devices for participation in economic and social life.

Performance Expectancy: The degree to which learners believe that learning ICT education will help them perform well in their future studies. Sewandono et al. (2023) describe PE as the expected impact of a technology's functional advantages.

Social Influence: It refers to the extent to which individuals perceive that important others believe they should use the new system (Venkatesh et al., 2003). The impact of students, teachers, friends, classmates, and family members on learning ICT education in the educational context.

Effort Expectancy: The degree of ease associated with students' learning of ICT education. (Venkatesh et al., 2003) define Effort expectancy as the perceived ease of use of a system.

Facilitating Condition: (Venkatesh et al., 2003) define it as the external factors and resources that make it possible to perform a particular task using a new system or technology. In the context of technology adoption, facilitating conditions comprise the support, infrastructure, policies, and resources available that can encourage a learner to use technology.

Behavioural Intention: Venkatesh and Davis (2000) define behavioural intention as an individual's motivational inclination or commitment to perform a particular behaviour. Behavioral intention is often used in models like the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM) to predict the likelihood of someone adopting the use of a new system or technology.

1.11 Chapter summary

In this chapter background to the study was expounded, highlighting the 21st century, individuals who have become consumers of digital innovations, requiring learners to adopt and adapt to thrive in the digital society. HEI were highlighted as pivotal role players in developing societies to instil the 21st century digital skills to learners. To foster creativity, independence and survival skills, LBECP (2021) emphasises the use of multimedia instruction, including ICT education.

Trends of students' performance in ICT education raised significant questions about the students' genuine interest in learning ICT and whether their actual learning outcomes aligned with their stated intentions. The research aimed to investigate this discrepancy and shed light on the factors influencing the students' intentions and actual learning outcomes in ICT education in Lesotho secondary schools using the UTAUT model. Key areas discussed in this chapter are, background to the study, statement of the problem, theoretical framework, aims and objectives of the study, research hypotheses, research methodology, lastly scope and significance of the study. In chapter two that follow review of literature will be deliberated.

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 Introduction

In Chapter 1, the theoretical framework was introduced and briefly defined. The Unified Theory of Acceptance and Use of Technology (UTAUT) model by Venkatesh et al (2023) is the theory used in this study to investigate the intentions and actual learning outcomes of Lesotho secondary school students in ICT education. More on the model is in this chapter. To predict ICT education intentions and actual learning outcomes of secondary school students the UTAUT model, by Venkatesh et al (2023), served as the foundational framework for the literature review. This chapter provides an overview of the Lesotho educational system, followed by the presentation of the proposed study hypotheses, each supported by relevant literature. The study focused on the UTAUT's four main constructs namely, and the relationships between, actual learning, and behavioural intention are thoroughly discussed.

2.2 Theoretical background

The UTAUT model, proposed by Venkatesh, Morris, Davis, and Davis (2003), posits that the actual use of technology is determined by behavioural intentions. The model provides empirical insight into technology acceptance by comparing prominent technology acceptance theories, which often offer competing or partial perspectives on the subject. The UTAUT demonstrates that proposed factors account for 70 percent of the variance in use intention (Venkatesh et al., 2003), offering stronger predictive power compared to the rest of the models that examine technology acceptance (e.g. (Davis, 1993; Sheppard, Hartwick & Warshaw, 1988).

According to Venkatesh et al. (2003), the perception of technology adoption hinges on four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. Attuquayefio and Addo (2014) note that the UTAUT theory is the most popular and commonly applied model for studying technology adoption. The UTAUT model incorporates elements from several earlier theories, including:

The Theory of Reasoned Action (TRA) **(**Ajzen & Fishbein, 1980)

The Theory of Planned Behaviour (TPB) (Ajzen, 1985)

The Technology Acceptance Model (TAM) (Davis, 1989)

The Extension of Technology Acceptance Model (TAM2) (Venkatesh & Davis, 2000)

This study employs the UTAUT model to investigate the intentions and actual learning outcomes of Lesotho secondary school students in ICT education. Molefi and Ayanwale (2023) affirm that the UTAUT model has been widely validated and used to explore user intention and behaviour across various contexts. In this study, UTAUT serves as a theoretical framework that unifies major theories on information technology acceptance (Batucan et al., 2022). Šumak and Šorgo (2016) and Kalavani et al. (2018) have shown that numerous scholars utilise various theories and models to examine and predict technology adoption, with the UTAUT model being particularly effective and considered one of the most reliable instruments for measuring the success of information technology. The UTAUT model identifies four core determinants that influence behavioural intention (BI) to use technology: performance expectancy, social influence, effort expectancy, and facilitating conditions (Venkatesh et al., 2003). For instance, Batucan et al. (2022) used an extended UTAUT (e-UTAUT) model to examine factors affecting the adoption of an online learning system during the COVID-19 pandemic in the Visayas region of the Philippines. Their findings underscored the model's relevance in explaining how the pandemic influenced higher education and online learning adoption, particularly in a developing economy context.

2.3 Conceptual Review

2.3.1 Lesotho Education System

The national objectives of the Lesotho Education System aim to ensure that all Basotho children obtain basic education to develop their social and individual competencies (Taolane, 2023). Formal education in Lesotho began in 1838, following the arrival of Evangelical Missionaries in 1833 (Lekhetho, 2003; Thelejane, 1990). Since then, the system has evolved significantly, incorporating Bible teaching, literacy programmes, and vocational arts from primary to tertiary levels. The education system expanded during the 19th and 20th centuries through the efforts of the Roman Catholic Church and the Anglican Church. Khama (2018) notes that, despite Lesotho's independence in 1966, the education system remained largely under church control, with few structural changes.

Mutebi (2009) asserts that post-independence, Lesotho recognised the need to reform its curriculum to address post-colonial challenges. Mosisili (1981), Nketekete & Motebang (2008), as cited in Raselimo & Mahao (2015), state that curriculum reforms have been ongoing since independence. The government transitioned from a colonial to a post-independence education system based on human capital theory (Mutebi, 2009), which views education as a productive investment for both individuals and society (Rharade, 1997). The Lesotho Basic Education

Curriculum Policy (LBECP) of 2022 outlines the formal education phases as follows: Early Childhood Care and Development (ECCD) for ages 0-5, seven years of primary schooling (Grades 1-7), three years of junior secondary education (Grades 8-10), and two years of senior secondary education (Grades 11-12) (MoET, 2009; Taolane, 2023). After completing senior secondary education, students sit for the Lesotho General Certificate of Secondary Education (LGCSE) examination, which is required for admission to higher education institutions. The LGCSE curriculum includes compulsory subjects (English, Sesotho, Mathematics, Physical Science) and a selection of optional subjects, including ICT, MoET, (2022).

2.3.2 Information and Communication Technology in the Lesotho Education System

Prior to the introduction of the LGCSE, the Junior Certificate (JC) level included a computer literacy course called Computer Education. However, the JC examinations were discontinued in 2022, eliminating early exposure to computer studies. ICT education was formally introduced into the Lesotho curriculum in 2005, following the phase-out of computer technology at the LGCSE level. The Curriculum and Assessment Policy (CAP, 2009) mandated the inclusion of ICT to equip students to respond to social, economic, and technological challenges. The LBECP (2021) further promotes digital literacy competencies and skills among learners. ECoL has administered the Cambridge International General Certificate of Secondary Education (IGCSE) ICT examinations since 2015. The IGCSE ICT syllabus aims to develop an understanding of ICT systems, networks, and safe use, while equipping learners with the skills to gather, process, and manipulate data Cambridge Assessment International Education (CAIE), (2022). Assessment includes three compulsory papers: a theory test (Paper 1) and two practical tests (Papers 2 and 3). This study determined whether performance expectancy (PE), social influence (SI), effort expectancy (EE), and facilitating conditions (FC) impact students' behavioural intentions (BI) and actual learning (AL) in ICT education.

2.3.3 Teacher Training and Professional Development

Lesotho has two primary teacher training institutions: the National University of Lesotho (NUL) and the Lesotho College of Education (LCE). LCE, established in 1975, replaced three denominational teachers' colleges and operates with representation from the Roman Catholic Church, the Lesotho Evangelical Church, and the Anglican Church of Lesotho (Sebatane, 2003; Hardman & Ntlhoi, (2021). LCE trains primary and junior secondary school teachers through pre-service and in-service programmes, offering certificate and diploma qualifications. NUL, founded in 1945, aims to advance human development through knowledge creation and dissemination (Mushonga, 2017; Simelane, 2006). The Faculty of Education at NUL, established

in 1967, produces qualified teachers and education professionals. However, NUL does not currently train teachers specifically for ICT education.

2.3.4 Access to Technology in Lesotho

Lesotho's transport and communications network is closely linked to South Africa. However, financial and infrastructure challenges significantly delay technology rollout. The National Strategic Development Plan (NSDP, 2012/13 – 2016/17) identified ICT as crucial for modern economic development and reducing risks associated with poor infrastructure, poverty, and unemployment. Despite this, a 2016 survey by the Lesotho Communications Authority (LCA) showed that only 32.7% of Lesotho had internet access, with limited ICT resources in schools Gillwald et al (2017). Taolane (2023) argues that the lack of ICT infrastructure, electricity, and internet accessibility hinders effective teaching and learning.

2.3.5 Government Policies and Initiatives

Lesotho's 2005 ICT policy outlines a strategic roadmap to maximise the benefits of ICTs, supporting the country's development objectives as stated in the Poverty Reduction Strategy Papers and the Lesotho Vision 2020 strategy. The policy mandates integrating ICT literacy into core curricula and using ICTs to expand access to and improve the quality of education. MoET 2009 Curriculum and Assessment Policy (CAP) aimed to provide learners with the knowledge, attitudes, and skills to adapt to socio-economic and technological changes, MoET (2008). However, CAP faced implementation, contextual, and resource-based challenges, leading to the development of the Lesotho Basic Education Curriculum Policy (2021). The new policy prioritises developing 21st-century skills, improving pedagogical and assessment approaches, and ensuring accountability and monitoring progress.

2.3.6 Structural Equation Modeling (SEM)

Jöreskog, (1973) is often credited with pioneering SEM in its modern form. Jöreskog developed techniques for estimating SEM models in the 1970s. His contributions to Linear Structural Relations (LISREL) established a crucial basis for SEM by presenting a statistical approach for investigating intricate relationships between latent variables. Jöreskog’s work concluded with the development of the LISREL software, first released in 1973. The software enabled researchers to estimate SEM models using maximum likelihood estimation and was fundamental in making SEM accessible as a practical statistical method. Jöreskog's work laid the foundation for SEM by integrating concepts from factor analysis and path analysis into a unified modeling framework.

Maruyama (1997) defines modeling techniques as tools that allow researchers to examine the plausibility of relationships and impacts using non-experimental data. Hair et al. (2017) describe SEM as a powerful statistical technique that combines aspects of factor analysis and regression, enabling the examination of relationships among measured and latent variables. SEM is particularly useful for testing hypotheses and confirming theories. Schumacker and Lomax (2004) argue that SEM uses various models to depict relationships among observed variables, providing a quantitative test of theoretical models. This study hypothesises that performance expectancy, social influence, effort expectancy, and facilitating conditions influence learners' behavioural intentions in ICT education. SEM is the appropriate technique for predicting secondary school students' intentions and actual learning in ICT education.

2.3.7 Performance Expectancy

Performance expectancy (PE) is defined as the extent to which learners believe that learning ICT education will enhance their future performance. Sewandono et al. (2023) describe PE as the expected impact of a technology's functional advantages. Agarwal and Prasad (1998) and Venkatesh et al. (2003) identify PE as a strong predictor of behavioural intention. This study hypothesises that: H1: Performance expectancy (PE) positively influences secondary school students' behavioural intention (BI) to learn ICT education.

2.3.8 Social Influence

Social influence (SI) refers to the extent to which individuals perceive that important others believe they should use the new system (Venkatesh et al., 2003). Nassar et al. (2019) define SI as the degree to which peers influence system use. This study hypothesises that: H2: Social influence (SI) positively influences students' behavioural intention (BI) to learn ICT education.

2.3.9 Effort Expectancy

Effort expectancy (EE) is defined as the perceived ease of use of a system (Venkatesh et al., 2003). It is expected that increased ease of use will positively impact students' behavioural intentions to learn ICT. This study hypothesises that: H3: Effort expectancy (EE) positively influences students' behavioural intentions (BI) to learn ICT education.

2.3.10 Facilitating Conditions

Facilitating conditions (FC) refer to students' perceptions of the resources and support available to perform a behaviour (Venkatesh et al., 2003). FC is expected to have a positive relationship with both behavioural intention and actual learning. This study hypothesises that: H4: Facilitating conditions (FC) positively influence students' actual learning (AL) of ICT education.

2.3.11 Behavioural Intention

Behavioural intention (BI) is the degree to which individuals formulate a plan to perform a specific future behaviour (Fishbein and Ajzen, 1974; Warshaw and Davis, 1985). Ajzen, I. (2020) refers BI to an individual's perceived likelihood or subjective probability of performing a specific behaviour. It is a key construct in many psychological and social-behavioural models, such as the Theory of Planned Behaviour (TPB) and the Technology Acceptance Model (TAM). This study hypothesises that: H5: Behavioural intention (BI) positively influences students' actual learning (AL) of ICT education.

2.3.12 Actual Learning

Actual learning is defined as scoring a student's task performance or demonstration as it relates to the achievement of a specific learning goal (Elbeck and Bacon, 2015). Abbad et al. (2009) found that system characteristics influence the intention to use and usage behaviour of a system. This study aims to establish whether performance expectancy, social influence, effort expectancy, and facilitating conditions influence actual learning in ICT education.

The hypotheses developed above are presented in the conceptual model below. The model shows the key constructs (variables) and their relationships. There are five hypotheses developed to predict students' intention and actual learning in ICT education.

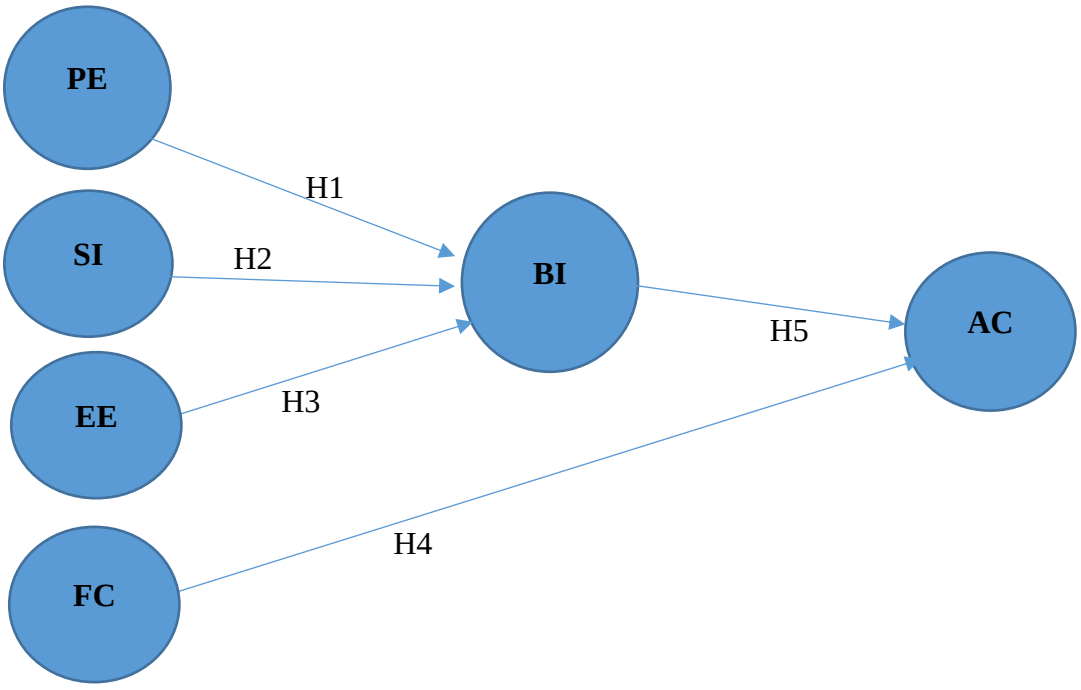


Figure 2.1. Research conceptual model

2.4 Empirical review

Abubakar and Ahmad (2013) confirm that literature on previous studies revealed several variables as factors that influences behavioural intention. Examples are performance expectancy (PE), social influence (SI) and effort expectancy (EE), Lai et al (2009). The study under review focuses on the above four main constructs of the UTAUT. The relationship of these constructs to behavioural intention (BI) were discussed and finally the relationship between facilitating condition (FC) and BI to actual learning was explained.

2.4.1 Relationship between PE and BI

PE is the capability of the technology to provide benefits and enhance the user's performance according to his/her expectations. It implies that the user's behavior will be enhanced to develop a mindful plan to perform specific future behaviours. Marikyan & Papagiannidis (2023) state that performance expectancy (PE) is the strongest predictor of use intention and is significant in voluntary and mandatory settings. The researchers found PE insignificant in influencing behavioural intention. Therefore, the researchers' concluded that previous studies on the relationship between performance expectancy and behavioural intention remained inconclusive, needing further investigation (Li, 2010). In their 2020 study, Rahmaningtyas et al. discovered that perceived ease of use (PE) had a notable impact on behavioural intention (BI). The analysis revealed that PE influenced BI with a coefficient of 0.29, accompanied by a p-value of less than 0.01, indicating statistical significance. This meant that the higher the PE of the user, the higher the desire to use an e-learning system. Based on Venkatesh's research, PE positively and significantly affected the desire to use the system. Another work by Arenas-Gaitan et al. (2015) also found a very strong influence between PE and someone's BI when using a system. The study was on an 'elderly and internet banking: An application of UTAUT2'. Other research by Sattari et al. (2017) also examined determinant factors affecting the acceptance of web-based training by health students, applying the UTAUT model. The findings indicated a statistically significant relationship between students' PE and BI using e-learning. This study, therefore, establishes the relationship between PE and BI in the prediction performance of learners' intention to learn ICT.

2.4.2 Relationship between SI and BI

Social influence (SI) refers to the degree to which individuals perceive that important others believe they should use the new system. SI is related to behavioural intention (BI) since the behaviour of the system user is enhanced when they accept and develop a mindful plan to perform specific future behaviours while using the technology. Shafi and Weerakkody (2009) found a significant relationship between the two constructs. Conversely, the studies by Wang et

al (2010), and Wong et al. (2013) found the relationship between these constructs to be insignificant, which aligns with Birch and Irvine's (2009) earlier findings. Recent research by Rahmaningtyas et al. (2020) revealed that SI significantly affects behavioural intention. They found that the effect of social influence on behavioural intention was 0.16 with a p-value of 0.01, indicating significance. These results are consistent with earlier studies by Venkatesh et al. (2003), which found that social influence directly relates to behavioural intention. Additionally, Williams et al. (2015) found that social influence affects behavioural intention. Their paper reviewed literature on the unified theory of acceptance and use of technology (UTAUT), positing that the relationship between SI and BI is likely because social conditions, such as friendship, environment, lecture procedures, training events, and socialisation, encourage students to use e-learning in every lecture. Based on these findings, this study aims to establish whether there is a relationship between these two constructs in predicting students' intention and actual learning in ICT education.

2.4.3 Relationship between EE and BI

Effort expectancy (EE) is defined as the perceived ease of use of a system. This suggests that students' behaviour and mindset towards using ICT will positively change if they perceive the system as easy to use. According to Venkatesh et al. (2003), past literature findings reveal that the influence of effort expectancy on behavioural intention is stronger among older workers and young women. Consequently, they hypothesised that gender, age, and experience act as moderators between these constructs. A study by Attuquayefio et al. (2014) found that EE is more prominent in the early stages of forming behavioural intention to use ICT for learning among students. The researchers further contended that increased levels of ease of use in ICT will, in turn, enhance behavioural intention to use the system. Rahmaningtyas et al. (2020) demonstrated that EE significantly affects BI. Their study found that the effect of EE on BI was 0.14 with a p-value of 0.02, indicating a significant effect. This finding aligns with research that revealed the performance expectancy (PE) variable had a positive and significant effect on the interest in using information technology, moderated by gender and age (Venkatesh et al., 2003). EE was interpreted as a desire or expectation to use technology based on convenience (Venkatesh et al., 2003). The phenomenon in the field also indicated that students had the desire and expectation to use e-learning because of the system's ease of use. Therefore, it can be concluded that the easier a system is to use, the greater the users' feeling of mastery of it (Ďuranová et al, 2016).

2.4.4 Relationship between FC and AC

Students' views on the resources and assistance available to perform a behaviour are related to facilitating conditions (FC). Thus, when support and resources are available, students' actual learning (AL) in ICT will improve. Marikyan and Papagiannidis (2023) assert that FC has a direct positive effect on the intention to use and actual learning. However, the researchers state that after initial use, the effect becomes nonsignificant. Therefore, the model proposes that facilitating conditions have a direct significant effect on use behaviour (Venkatesh et al., 2003). Although the research by Rahmaningtyas et al. (2020) does not explicitly mention actual learning in their model, they found that facilitating conditions significantly affect use behaviour (UB). In this study, actual learning is related to use behaviour. Consequently, it is relevant to infer that FC has a significant effect on actual learning. Rahmaningtyas et al. (2020) found that FC had a significant effect on UB, with a coefficient of 0.21 and a p-value of less than 0.01. The facilities provided by tertiary institutions to support the use of e-learning systems were excellent. For example, internet connectivity was available at every point in the buildings and classrooms, as well as in all faculties, libraries, and other public facilities. As a result, the presence of these facilities supported students' use of the e-learning system. In their paper titled “Integrating the Task Technology Fit (TTF) and UTAUT Models to Explain Mobile Banking User Adoption,” Zhou et al. (2010) found that performance expectations, job technology compatibility, social influence, and facilitating conditions significantly affect user adoption. This research will establish whether FC has a relationship with actual learning during students’ intention to learn ICT education.

2.4.5 Relationship between BI and AC

Behavioural intention (BI) refers to the degree to which students change their mindset to perform specific future behaviours. When students develop a positive attitude towards learning, they are more likely to achieve specific learning goals in ICT education. In their research on students’ decisions to use an e-learning system, Abbad et al. (2009) adopted the Technology Adoption Model (TAM) and found that actual use and intention to use are similar aspects. In the context of this study, actual use refers to actual learning. Abbad et al. (2009) suggested that system characteristics can influence the intention to use and the usage behaviour of the system. Given this relationship, it can be inferred that BI has an effect on actual learning (AC). In their research, Rahmaningtyas et al. (2020) found that BI significantly affects use behaviour (UB), with a positive and significant effect of 0.15 and a p-value of less than 0.01. Their findings showed that

students' desire to use an e-learning system encouraged them to incorporate it into their lectures. These results were supported by previous research by Banjuradja (2015), which found that only BI significantly affected UB. Additionally, a study by Fauzi et al. (2018) reinforced these findings, showing that BI had a significant effect on UB, with a t-value of 12.70.

2.5 Appraisal of literature and gaps

Several studies have been conducted internationally to explore the challenges of ICT in education. This section outlines the findings from studies relevant to the research topic under review. A study by Attuquayefio and Addo (2014) was conducted on 400 students in the Social Studies and Business Administration Faculties of Methodist University College in Ghana. The paper aimed to understand the issues surrounding the acceptance of ICT by students at tertiary institutions. The researchers employed the UTAUT model to determine the strength of predictors for students' intention to accept and use ICT for learning and research. The measurement and structural model were considered using SEM. The findings revealed that EE significantly predicted BI to use ICT, while SI and PE were statistically insignificant. Furthermore, BI did not significantly predict use behaviour (UB). However, FC significantly influenced UB.

Ayanwale et al. (2022) conducted research on teachers' readiness and intention to teach artificial intelligence (AI) in Nigerian schools. The study provided insights into the factors influencing the BI and readiness of Nigerian in-service teachers to teach AI. Three hundred and sixty-eight teachers, from elementary to high school, participated in the study. The researchers used a quantitative methodology with variance-based structural equation modeling to understand the relationships among eight variables: AI anxiety, perceived usefulness, AI for social good, attitude towards using AI, perceived confidence in teaching AI, relevance of AI, AI readiness, and behavioural intention. The study revealed that confidence in teaching AI predicts the intention to teach AI, while AI relevance strongly predicts the readiness to teach AI. However, anxiety and social good did not predict teachers' intention and readiness to implement AI in classrooms. Closer to home, research by Molefi & Ayanwale (2023) examined high school teachers' acceptance of e-learning after COVID-19 in Lesotho using composite structural equation modeling. The study aimed to explore high school teachers' acceptance of continuing to teach through e-learning platforms after the pandemic, based on the UTAUT framework. The findings revealed that practitioners and researchers need to raise pre-service teachers' behavioural intention to learn cybersecurity by helping them realise its implications for their personal lives and society. In light of these studies conducted beyond South Africa, there is limited research in Lesotho on predicting students' performance in ICT at the examination level

and beyond. This study seeks to use the UTAUT by Venkatesh et al. (2003) to predict secondary school students' intention and actual learning in ICT education in Lesotho.

2.6 Chapter summary

Chapter 2 offered a comprehensive examination of the theoretical foundations and conceptual analysis. The theoretical framework addressed several critical topics, such as the education system in Lesotho, the integration of ICT in education within the country, teacher training and professional development, accessibility to technology, government policies, and the constructs pertinent to the study as outlined in the UAUT model. The section dedicated to the empirical review emphasized the connections between constructs as proposed in the hypothesized conceptual model. Performance expectancy, social influence, and effort expectancy were utilized to establish relationships with behavioural intention. Relationships between facilitating condition and behavioural intention were discussed. Finally, the chapter explored the identification of gaps in the existing literature. In the next chapter, the research discusses issues related to methodology used.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In chapter 2 the UAUT model was expounded to establish relationship between constructs and hypotheses were developed. Chapter 3 presents a comprehensive overview of the research design and methodologies employed in this study. It encompasses discussions on the research study area, research design, research paradigm, variables in the study, population, sampling technique, and sample. The chapter further discusses documentation reliability and validity and methods of data collection. Additionally, it addresses crucial issues related to data collection and data analysis methods. The study begins with a brief history of the country where the research was undertaken and the research study area.

3.2 Research methodology

Research methodology is a plan outlining how research is to be undertaken and identifying the methods to be used. Mishra and Alok (2022) contended that research methodology is a scientific approach adopted for conducting research. Essentially, the procedures by which researchers describe, explain, and predict phenomena are termed research methodology (Igwenagu, 2016; Tummons & Duckworth, 2012). According to Tummons and Duckworth (2012), the methodology section is crucial in research as it demonstrates the plan to address research objectives. To ensure the validity of the results, researchers must anticipate appropriate study designs and methods.

3.3 Research study area

Lesotho is a developing country landlocked by South Africa. It is a mountainous nation with a population of about two million citizens. Peterson (2021) describes Lesotho's stunning mountainous terrain as "The Kingdom in the Sky." More than eighty percent of the country lies 1,800 meters (5,900 feet) above sea level. According to Nkuebe (2020), Lesotho is rich in minerals such as water, and diamonds, which are exported to overseas countries, thereby boosting the economy for the well-being of the Basotho people. Lesotho is made up of ten districts, with three located primarily in the highlands and seven in the lowlands. Infrastructure such as roads, bridges, power lines, and telecommunication networks are still under construction in many parts of the country. Due to the ongoing construction, most areas lack access to electricity, resulting in schools and homes being without the ICT infrastructure, such

as Wi-Fi facilities. Therefore, it is crucial to explore the intentions and actual learning of learners in ICT education in Lesotho to improve infrastructure development.

Oketch-Oboth (2021) noted that online learning challenges include internet connectivity problems, inadequate training on online platforms, unreliable power supply, high cost of internet bundles, and a lack of ICT equipment such as laptops. A study conducted in the Philippines revealed that during the COVID-19 outbreak, the educational landscape changed, forcing learning institutions to shift from traditional face-to-face teaching to online teaching-learning modalities (Wan et al., 2020). However, these changes presented unprecedented transition challenges, especially in developing economies. The research highlighted insufficient internet infrastructure as one of the most significant barriers (Costan et al., 2021; Szopiński & Bachnik (2022).

In Lesotho, Ayanwale et al. (2023) found that many schools are not adequately equipped with computers, hindering students' ability to learn ICT. They note that there is a serious lack of resources necessary to facilitate ICT learning in the country. Many students come from rural areas and vulnerable families, making e-learning a significant challenge due to their disadvantaged socio-economic backgrounds (Hlojeng & Makura, 2020). Additionally, schools lack sufficient computers to support students' learning needs. Based on the findings from this study, interventions by education stakeholders are essential to improve the ICT education performance in Lesotho. Below is a map of Lesotho showing the geographical location of the ten districts.

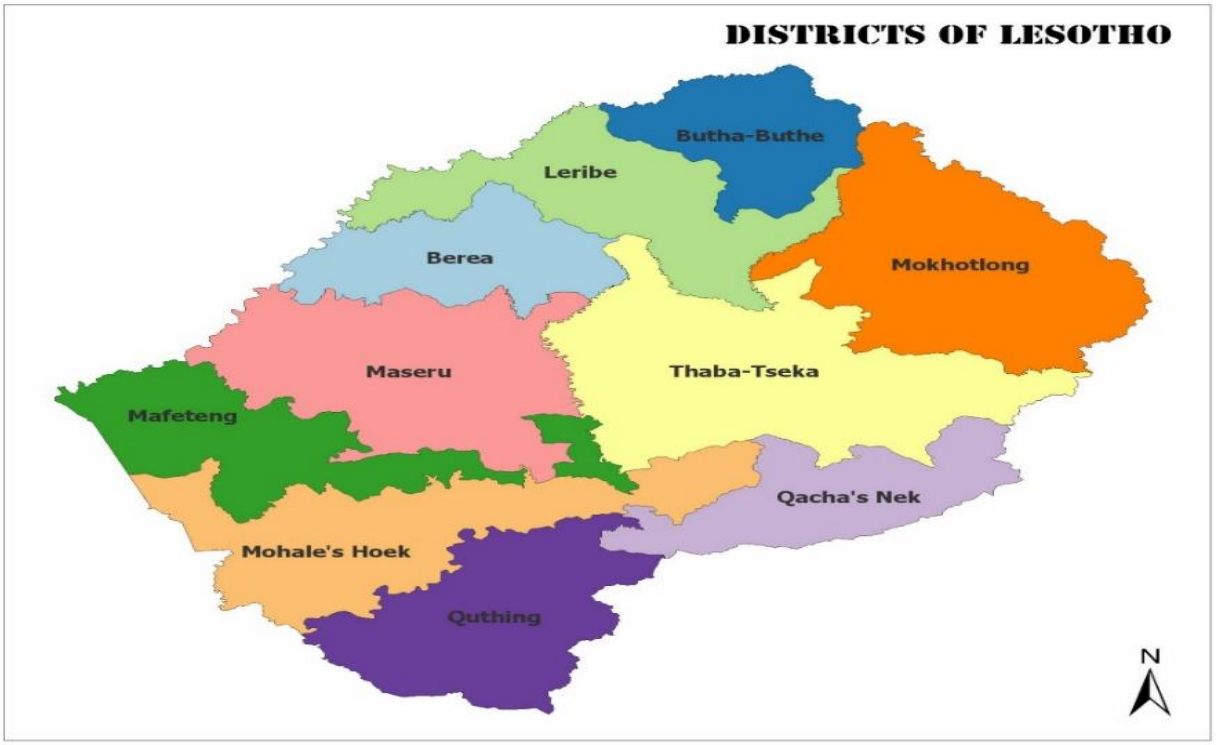


Figure 3.1 Google. (2023). Districts of Lesotho, 4 September, from https://images.app.goo.gl/1YyRztfRv7RKdzJ86

Districts	Colour code on map	No of schools per year								
		2015	2016	2017	2018	2019	2020	2021	2022	2023
Butha-Buthe		1	1	1	1	1	1	1	1	1
Leribe		5	4	5	5	5	5	6	9	11
Berea		1	0	0	0	0	1	0	0	1
Maseru		4	3	3	3	5	5	6	8	10
Mafeteng		0	0	0	0	0	1	2	3	4
Mohale's Hoek		0	1	1	1	1	2	2	3	3
Quthing		0	0	0	0	0	1	1	1	1
Qacha's Nek		0	0	0	0	0	0	0	0	0
Thabatseka		0	0	0	0	0	0	0	0	0
Mokhotlong		0	0	0	0	0	0	0	0	0
Total number of schools		11	9	10	10	12	16	18	25	31

Table 3.1. Number of ICT-offering schools per district year from 2015 - 2023

(Source: Examinations Council of Lesotho, 2024)

Table 3.1 demonstrates that since the introduction of ICT (0417) education into the Lesotho curriculum in 2015, the Leribe district has consistently had a higher number of schools enrolling for the subject, averaging five schools per year. Maseru, the capital city, has registered an average of four schools. Botha-Bothe and Mohale's Hoek have each had one school participating. Mafeteng district began participating more recently, with one school in 2020 and two schools in both 2021 and 2022. Berea had one school in 2015 and another in 2020. Quthing had one school participating in both 2019 and 2020. The remaining three districts, Qacha's Nek, Thaba-Tseka, and Mokhotlong, do not have any schools that assess ICT education. Based on the results of this study, it is recommended that the Lesotho Ministry of Education and Training (MOET) focus on capacitating schools located in the highlands to introduce ICT education, as it is essential for learners in the information age to study this subject.

3.4 Research paradigm

The quantitative research design, grounded in positivism, offers a robust framework for investigating the factors that influence secondary school students' intentions and actual learning in ICT education in Lesotho. Positivism represents a research paradigm grounded on the belief that knowledge is derived from observable and objective realities, which can be measured and validated through empirical approaches. This paradigm asserts that the scientific method, which emphasizes observation, experimentation, and quantifiable outcomes, is applicable to the study of the social world in a manner analogous to that of the natural sciences. Creswell, J. W & Creswell, J. D. (2018). This paradigm is particularly well-suited for this study as it enables the precise measurement and analysis of various variables that impact students' ICT learning outcomes. The study adopted the ontological stance of realism, positing that there is an objective reality regarding students' ICT learning intentions and outcomes that can be observed and measured, Bhaskar, R. (2013). The epistemological stance of positivism guides the research, asserting that knowledge about these educational phenomena can be gained through empirical evidence and statistical analysis. This approach allows for the development of generalisable findings that can inform educational policies and interventions in Lesotho. The methodological approach for this study involves several key components aligned with the quantitative research paradigm:

Hypothesis Testing: Central to this study is the development and testing of hypotheses related to the Unified Theory of Acceptance and Use of Technology (UTAUT). Hypotheses include the influence of performance expectancy, social influence, effort expectancy, and facilitating

conditions on behavioural intention and actual learning in ICT education (Venkatesh et al., 2003).

Operationalisation: Variables such as performance expectancy, social influence, effort expectancy, facilitating conditions, behavioural intention, and actual learning are clearly defined and operationalised. This involves specifying the procedures and instruments used to measure each variable, ensuring accurate and reliable data collection.

Measurement: The study employs structured instruments, such as surveys and questionnaires, to gather numerical data from secondary school students in Lesotho. These tools are designed to measure the various constructs outlined in the UTAUT model.

Sampling: Random sampling techniques are used to select participants from the target population of secondary school students who have been exposed to ICT education. This enhances the generalisability of the findings to the broader population of students in Lesotho.

Data Analysis: Statistical techniques, including descriptive statistics, inferential statistics, and structural equation modeling (SEM), are employed to analyse the data and test the hypotheses. These methods enable the identification of patterns and relationships between variables, providing a robust analysis of the factors influencing ICT education outcomes.

Replication: The structured nature of this study allows for replication, which is essential for verifying the results and building a cumulative body of knowledge on ICT education in Lesotho.

3.5 Quantitative research approach

Quantitative research is a systematic investigation that quantifies relationships, behaviours, and phenomena within a specific context. The quantitative approach is foundational in many scientific disciplines, including social sciences, health sciences, and education (Creswell, 2018). The quantitative research approach is integral to this study, which investigated the factors influencing secondary school students' intentions and actual learning outcomes in ICT education in Lesotho. This approach is characterized by its reliance on structured methodologies, precise measurement, and statistical analysis, all essential for deriving objective and reliable results. This research approach employs structured methodologies to ensure systematic data collection and analysis. This study used a survey to gather data from secondary school students across various districts in Lesotho. The survey instrument included closed-ended questions to measure specific constructs related to the Unified Theory of Acceptance and Use of Technology (UTAUT). This structured format ensures consistency in

responses and facilitates the quantification of variables, making it possible to analyse relationships and test hypotheses statistically. Precise measurement is a cornerstone of the quantitative research approach. This study clearly defined and operationalised key constructs such as performance expectancy, social influence, effort expectancy, facilitating conditions, behavioural intention, and actual learning. Each construct was measured using multiple items on a Likert scale, which allows for the precise capture of variations in students' attitudes, perceptions, and behaviours.

3.6 Research Design

Abutabenjeh and Jaradat (2018) define research design as a blueprint outlining how a study will proceed from the research questions to the results. They further contend that research design is a comprehensive planning process used by researchers to collect and analyse data, thereby improving understanding of a given topic. According to Wahyuni (2012), research design involves combining methodology with research methods to answer research questions or address research hypotheses. Bellamy (2011) describe research methods as a set of techniques recognised by most social scientists for creating, collecting, coding, organising, and analysing data. This research study adopted a cross-sectional quantitative research design of a correlational nature. Friedman (2006) states that correlational studies aim to determine if there are differences in the characteristics of a population based on whether its subjects have been exposed to an incident of interest in a naturalistic setting. This type of research design seeks to investigate relationships between variables without the researcher controlling or manipulating any of them, as they are assessed in their natural state.

3.7 Sampling technique and Sample

The study utilised intact class sampling to select Grade 10 and Grade 11 learners from 25 high schools in Lesotho. According to Achor et al. (2024), intact class sampling involves selecting an existing class as a group, with the entire group representing a larger population. Oludipe (2012) notes that this technique is advantageous because it minimises disruptions to the normal school schedule, a concern for most school principals. Consequently, the researcher was able to gather data from entire classes, especially during lessons, without causing significant disruptions. Two-thirds of the schools that offer ICT education were selected from the three regions of Lesotho: the northern region, the central region, and the southern region. Data was collected from both male and female ICT education learners in these schools. An exception was made for a girls' school located in the Leribe district in the northern region of Lesotho. However, three mountainous districts—Qacha’s Nek, ThabaTseka, and Mokhotlong—were

not represented in the study as they do not have schools offering ICT education. Participation in the study was entirely voluntary, and participants were free to withdraw at any time if they wished to. This approach ensured that the ethical standards were maintained and that the data collection process was respectful of the participants' autonomy.

3.8 Variables in the study

There are both exogeneous and endogenous variables in this study. Exogeneous variables are generally considered external forces or inputs and are assumed to affect the dependent variables or outcomes without being affected in return. Stock & Watson (2015). Exogeneous variables include performance expectancy (PE), social influence (SI), effort expectancy (EE), and facilitating condition (FC). (Greene, 2012) content that endogenous variables are variables whose values are influenced by other variables within the model. Unlike exogenous variables, which are determined outside the system, endogenous variables are outcomes or dependent variables that respond to changes within the system. An endogenous variable is behavioural intention (BI). Using the adopted UTAUT model, hypotheses were formulated based on these variables and were used to predict their influence on behavioural intention (BI) in relation to learners' intention and actual learning in ICT education in Lesotho secondary schools.

3.9 Population

According to Casteel and Bridier (2021), the research population encompasses all individuals who meet the criteria defined by the researcher for inclusion in the study. Within this broader population is the target population, which Zhao et al. (2013) define as all individuals who specifically meet the boundary parameters set for the research. For this study, the target population consisted of learners who sat for the IGCSE ICT examinations at the end of the 2023 academic year in Lesotho. This group primarily included learners in grade 11, marking the completion of their LGCSE qualification. Additionally, Grade 10 learners were included in the target population to provide a comprehensive understanding of the educational context and the factors influencing ICT learning outcomes.

3.10 Instrumentation

The primary instrument used for data collection in this research study was a questionnaire. The questionnaire was meticulously designed to align with the study’s research objectives and hypotheses. It consisted of closed questions presented in a matrix format, as suggested by Chawla and Sodhi (2011). The questionnaire was divided into two main sections. Section A focused on the biographical data of the respondents, including general questions about ICT

students. The items in this section were formulated as ordinal and nominal variables. Following a pilot test, the instrument was modified to accommodate students who did not identify strictly as male or female, ensuring inclusivity. Section B comprised questions specifically addressing the research hypotheses. These questions were designed as ordinal variables centered on students' intentions and actual learning in ICT education, which were the primary constructs of the study. Each variable in this section was measured through six to eight statements. Responses were captured using a 6-point Likert scale, ranging from (1) strongly disagree to (6) strongly agree, to accurately reflect the respondents' attitudes and perceptions. To assess the feasibility and effectiveness of the research design, a pilot study (questionnaire pre-testing) was conducted. The insights gained from this pilot study were instrumental in refining the questionnaire and ensuring its validity and reliability. The research instrument is provided as Appendix B.

3.11 Validity and reliability

To ensure the robustness of the research methodology, several critical steps were undertaken. Firstly, a missing value analysis was performed, as recommended by Tabachnick and Fidell (2007), to assess the randomness of missing data. Addressing missing values is essential because they can compromise the accuracy of statistical estimates and affect the interpretability of the data. By examining the patterns of missing data, researchers can gain insights into their distribution and identify potential causes. The second step involved assessing the reliability of the data collection instrument. Reliability refers to the consistency of a measurement process in producing the same results under the same conditions (Babbie & Mouton, 2017; Mellinger & Hanson, 2020). Sürücü and Maslakçı (2020) assert that a measurement is reliable if it consistently yields the same results when applied repeatedly. Achieving this in social sciences can be challenging due to the dynamic nature of social systems (Veal, 2011). Kumar (2014) and Wagner et al. (2013) define dependability as the degree to which a research instrument consistently produces the same results on multiple occasions. To test this, a pilot survey was conducted in which five questionnaires were administered at a nearby school in the district of Maseru. Subsequently, the researcher used Cronbach's alpha to evaluate the internal consistency of the measurement constructs (Sürücü & Maslakçı, 2020). This widely used method helps determine the reliability of a set of variables. IBM SPSS software version 26 and composite-based structural equation modeling were employed to assess the measurement's construct validity and reliability, as well as the structural model (Kock, 2023). According to Collier (2020), few measures are as effective in assessing the validity and reliability of a

measurement model. Validity in empirical research is achieved when the measures accurately reflect the true meaning of the concept being studied (Babbie & Mouton, 2017). Bernard (2013) describes validity as the accuracy and integrity of the study tools, data collected, and findings presented. Validity is divided into internal and external categories. Internal validity refers to the extent to which the study can identify and assess all relevant variables without bias (Ezeuduji, 2013; Veal, 2011). This was enhanced by using variables identified in the literature and those derived from the researcher's knowledge. External validity, which pertains to the generalisability of the study results to a larger population, was maximised by using a relatively large sample size of 670 respondents, with 40 completing the questionnaires online (Findley et al., 2021).

3.12 Method of data collection

To ensure a high response rate in data collection, the researcher implemented several procedures. Initially, respondents were briefed on the study's objectives and their rights as participants. This step was particularly important for students who were being taught at the time of data collection, as it helped them understand the study's context before receiving the questionnaire. Next, the questionnaire was distributed to those respondents who indicated their willingness to complete it independently. This distribution was facilitated by the ICT teacher at each school. For respondents who were unable or unwilling to read and write the responses themselves, the researcher read the questions aloud and recorded their answers. This approach aligns with Maxfield and Babbie's (2017) recommendation to use face-to-face interviews when literacy levels are low. It was especially useful for Grade 10 students who might not have understood the technical language used in the questionnaire. Thus, the researcher employed both respondent-completed and interviewer-completed structured questionnaires. When

respondents were unable to complete the questionnaire in English, the researcher translated it into Sesotho and recorded their answers. Additionally, some respondents were provided with a Google Form link to submit their responses online. The link used was: https://docs.google.com/forms/d/1uLp4BMSi14d8v0D1bs1wnLYRIplG9t5n9hrmj_61gFE/prefill

Placing the questionnaire on Google Docs ensured ease of access for respondents from schools with internet connectivity, thereby accommodating different preferences and ensuring comprehensive data collection.

3.13 Method of data analysis

Simran (2021) views data analysis as a systematic application of statistical and logical techniques to describe the data scope, modularise the data structure, condense the data representation, illustrate via images, tables, and graphs, evaluate statistical inclinations, probability data, and draw meaningful conclusions. Descriptive, bivariate, and multivariate data analysis were used to test the research aims and hypotheses.

3.13.1 Data integrity assessment

An analysis of missing values was conducted to address concerns stemming from incomplete data. If missing values are not adequately taken into account in any dataset, estimated statistics may be less precise (Dong & Peng, 2013). This study used the single imputation method to analyse missing values using Expectation-Maximisation (EM). EM is considered by Kang (2013) and Singh et al (2022), as the type of the maximum likelihood technique that can be used to generate a new data set by imputing all the missing values, estimated using maximum likelihood methods.

3.13.2 Common method bias

To investigate the possibility of Common Method Bias (CMB) in this study, the researcher used Harman's single factor test (Aguirre-Urreta, 2019). This test helps determine whether there is a single underlying factor that explains the majority of the variance in the data, which may suggest bias. The test results showed that when all measurement items were loaded at the same time, they accounted for 37.291% of the total variation. This dropped below the frequently recognised threshold of 50% to detect CMB, implying that the self-reported data was not biassed (Ayanwale et al., 2024).

3.13.3 Descriptive analysis/statistics of respondents

The descriptive statistics was used to produce percentage, frequencies, standard deviation, and mean scores of responses. Descriptive statistics is a type of quantitative analysis used to summarise the characteristics of a sample (Mishra et al, 2019). Mishra et al. (2019) classify descriptive statistics into three categories: frequency measures, central tendency measures, and dispersion or variation measures (variance, SD, standard error etc.) In this research, the descriptive data analysis was used to generate frequency of respondents' profile (in percentages), mean scores and standard deviations of responses.

Cronbach's Alpha reliability test was used to check for the level of internal consistencies of variables used to explain different research dimensions. Furthermore, missing data analysis and partial least squares structural modeling (PLS-SEM) were conducted in two stages. The first stage was achieved using IBM's SPSS version 28 software (IBM

Corporation, 2021), while the second stage tested the measurement (which is construct validity and reliability) and structural model using composite-based structural equation modeling.

3.13.4 Preliminary analysis

The analysis provided answers to the following questions:

(a) How does the study scale perform in terms of convergent and discriminant validity, as well as reliability?
(b) How much variance do the variables in the model account for in the criterion variables?
(c) Is the measurement model which describes the causal relationship among the variables in the model fit?

To address the research question (a) above, a measurement model was employed within the context of Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM assessments have two unique stages: the first stage focuses on measurement models, while the second stage covers structural models. As with research question (b) using the adjusted R2 value provided insight into the predictive power of the predictor variables. The results indicated that the predictor variables jointly explained approximately 23.4% and 55.2% of the variance observed in actual learning of ICT education and behavioural intention to learn it, respectively. Lastly to address question (c) the assessment of model fit in PLS-SEM involved evaluating various categories of fit. The results revealed that SRMR was less than 0.08, and both d_ULS sat < est and d_G sat < est adhered to these specified criteria for model fit. This alignment underscores the validity of the model fit assessment, in accordance with recommendations by Henseler et al. (2015).

3.13.5 Research hypotheses

The study provided some insight into the following research hypotheses

1. H1: Performance expectancy (PE) has a positive and significant influence on behavioural intension (BI) of learners to learn ICT education.
2. H2: Social influence (SI) has a positive and significant influence on behavioural intension (BI) of learners to learn ICT education.
3. H3 Effort expectancy (EE) has a positive and significant influence on behavioural intension (BI) of learners to learn ICT education.

4. H4 Facilitating condition (FC) has a positive and significant influence on actual learning (AC) of ICT education by learners.
5. H5 Behavioural Intention (BI) has a positive and significant influence on actual learning (AC) of ICT education by learners.

The research study established the relationship between the constructs within each research hypothesis. The results of the relationships between the contracts are discussed in Chapter 4.

3.14 Ethical considerations

Research ethics can be defined as the principles of moral and legal acceptability that guide research practices (Showkat and Parveen, 2017). According to Akaranga and Makau (2016), researchers are responsible for designing studies that uphold the rights and safety of participants. In line with this, Humphries and Truman (2017) emphasize that ethical research must adhere to moral standards that respect individuals. Consequently, researchers must follow established protocols to advocate for, promote, and protect the rights of participants (Akaranga & Makau, 2016; Shah, 2011). Creswell (2014) adds that ethical research involves respecting privacy and confidentiality while being transparent about data usage. To address the ethical considerations in this study, the researcher rigorously adhered to the expected ethical standards and principles. The performance data of ICT students, used in various tables and figures throughout the chapters, was formally requested for research purposes. This request was made in writing to the Research and Development Unit Manager at the Examinations Council of Lesotho, who then instructed the Statistician to release the data to the researcher. Screenshots of these email communications are provided in Appendix C. The ethical protocol included submitting the research instruments (questionnaire) and the research proposal to the university's ethical committee for evaluation. This ensured that all data collection methods were ethical, and that the participants' involvement was voluntary. The researcher maintained strict anonymity and confidentiality in reporting the study's findings, assuring participants that their information would remain private and confidential. Additionally, the research followed stringent referencing guidelines to avoid plagiarism. A letter from the Dean of the Faculty of Education at the National University of Lesotho was obtained to authorize the research study. Participants were assured that their data would be confidential, that there would be no risk involved in participating, and that their participation was entirely voluntary. Despite these measures, the study encountered some limitations, which are discussed in the next section.

3.15 Chapter summary

Chapter 3 offered valuable insights into various aspects of research methodology. It covered essential topics such as research paradigms, approaches, designs, and sampling techniques. Additionally, the chapter provided a detailed examination of the study's variables, target population, and the instruments used for data collection. Important considerations regarding validity and reliability, as well as methods for data collection and analysis, were thoroughly discussed. Finally, ethical considerations were highlighted to ensure the study adhered to established research protocols. In Chapter 4, the subsequent results and discussions are presented.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

The previous chapter established research protocols including ethical considerations to ensure that the study was conducted in an ethical manner. The current chapter presents results and discussion from the utilised a self-reported questionnaire to explore the relationships among various constructs pertaining to ICT education. The constructs were (PE), (SI), (FC), (EE), (BI), and (AC). Two stages of analysis were conducted: first, data integrity was ensured using Statistical Package for Social Science (SPSS) software version 26 (IBM SPSS, 2020), followed by measurement and structural model assessments using SmartPLS version 4.1.0.0, a widely employed tool for Partial Least Squares Structural Equation Modeling (PLS-SEM) (Ringle et al., 2024). SmartPLS was chosen due to its intuitive interface, comprehensive reporting features, and ability to handle both observed and latent variables, as well as non-normal data and complex models. PLS-SEM was deemed suitable for its capability in theory development, variance explanation, and management of intricate relationships. The measurement model evaluated construct reliability through examination of factor loadings, average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha (α). Subsequently, the structural model was analyzed to assess its fit and the interrelations among constructs. This methodology aligns with prior research underscoring the effectiveness and explanatory power of PLS-SEM in unraveling complex phenomena (Amusa & Ayanwale, 2021; Ayanwale & Oladele, 2021 Hair et al., 2014;).

4.2 Data integrity assessment

Understanding why certain information is unavailable to researchers during data analysis can be an intriguing endeavor. Sometimes, missing data can mask underlying intentions, such as respondents opting not to answer rather than providing irrational responses, prompting questions about potential concealment. It is crucial to consider such possibilities before delving into the true potential of data analysis. Investigating why someone is withholding information can be particularly exhilarating. In this study, a missing value analysis was conducted, following a suggestion by Tabachnick and Fidell (2007) to assess the randomness of missing values, which they deem a fundamental assumption. Addressing concerns arising from incomplete data is essential, as neglecting missing values can compromise the accuracy of statistical estimates and consequently impact the interpretability of data. Researchers typically

examine missing data patterns to gain insights into their distribution and analyse the reasons behind their occurrence. In terms of missing data mechanisms, researchers seek to understand why data is missing and explore correlations between variables with and without missing values. Figures 4.1 and 4.2 provide an overview of the overall summary and the pattern of missing values, respectively.

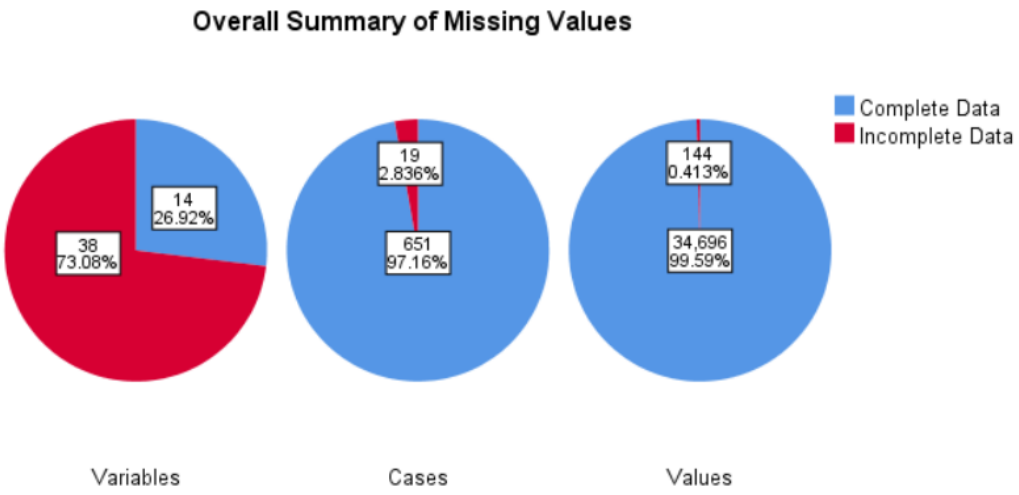


Figure 4.1 Overall summary of missing values

Figure 4.1 provides an overview of missing values across variables, cases, and dataset entries. The pie chart illustrates those 38 variables (73.08%) exhibit evidence of missing values, indicating a notable presence of missingness in the dataset. Regarding cases, 19 respondents (2.84%) had missing values, while the majority, comprising 651 cases (97.16%), did not. Additionally, across the entire dataset, 144 entries (0.41%) were missing. This underscores the prevalence of missing data in the dataset. Baraldi and Enders (2010) distinguish between random and non-random missing data situations, categorising them as Missing Completely At Random (MCAR), Missing At Random (MAR), and Missing Not At Random (MNAR). In their framework, missing data mechanisms assume that the likelihood of missingness is related to other variables in the dataset (MAR) or to the variable itself (MNAR). The probability of a variable having a missing value is higher when it exhibits a greater frequency of missing data. As per a guideline proposed by Hair et al. (2010), missing responses per variable typically fall within the range of 0.4% to 5%, which is considered normal. This assertion was further corroborated through the variable summary presented in Table 4.1

	N	Mean	Std. Deviation	Missing		No. of Extremesa	
				Count	Percent	Low	High
PE1	670	5.62	.660	0	.0	8	0
PE2	670	5.49	.771	0	.0	14	0
PE3	670	5.17	.981	0	.0	35	0
PE4	670	5.16	1.032	0	.0	45	0
PE5	670	4.40	1.332	0	.0	81	0
PE6	670	5.15	1.140	0	.0	56	0
PE7	670	5.45	.911	0	.0	27	0
SI1	667	4.75	1.210	3	.4	12	0
SI2	666	4.91	1.095	4	.6	8	0
SI3	667	4.93	1.090	3	.4	7	0
SI4	666	4.93	1.190	4	.6	13	0
SI5	666	4.70	1.236	4	.6	16	0
SI6	666	5.04	1.121	4	.6	55	0
SI7	666	5.21	1.024	4	.6	40	0
SI8	665	5.32	.895	5	.7	29	0
FC1	667	5.22	1.155	3	.4	57	0
FC2	667	5.12	1.057	3	.4	46	0
FC3	666	5.04	1.092	4	.6	59	0
FC4	666	4.94	1.201	4	.6	73	0
FC5	667	4.72	1.305	3	.4	22	0
FC6	666	4.34	1.361	4	.6	88	0
FC7	667	5.14	1.076	3	.4	55	0
FC8	667	4.48	1.656	3	.4	57	0
EE1	667	5.02	1.215	3	.4	67	0
EE2	666	5.24	.992	4	.6	37	0
EE3	667	5.02	1.158	3	.4	62	0
EE4	667	5.09	1.083	3	.4	53	0
EE5	667	4.66	1.321	3	.4	18	0
EE6	667	4.46	1.359	3	.4	84	0

EE7	667	4.56	1.581	3	.4	46	0
EE8	667	5.18	1.040	3	.4	45	0
BI1	664	5.02	1.284	6	.9	78	0
BI2	664	5.20	.981	6	.9	39	0
BI3	664	5.06	1.082	6	.9	51	0
BI4	664	5.10	1.067	6	.9	47	0
BI5	664	4.25	1.431	6	.9	115	0
BI6	664	4.43	1.371	6	.9	85	0
BI7	664	4.51	1.599	6	.9	52	0
BI8	664	5.27	1.029	6	.9	39	0
AC1	668	5.21	.968	2	.3	36	0
AC2	668	5.35	.852	2	.3	25	0
AC3	667	5.34	.935	3	.4	30	0
AC4	668	5.28	.917	2	.3	30	0
AC5	668	5.00	1.142	2	.3	55	0
AC6	668	5.13	1.126	2	.3	57	0
GL	670			0	.0		
AG	670			0	.0		
GD	670			0	.0		
PK_ICT	670			0	.0		
LE_ICT	670			0	.0		
ST	670			0	.0		
SL	670			0	.0		

Table 4.1 Summary of study variables univariate statistic

**Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR)

Table 4.1 provides a comprehensive summary of variables with missing values and their respective percentages. A thorough analysis of the table indicates that all variables, as shown in column 6, fall within the acceptable range of 0.4% to 5% of missing values per variable, as suggested by Hair et al. (2010). This result is reinforced by the examination of missing value patterns, as illustrated in Figure 4.2.

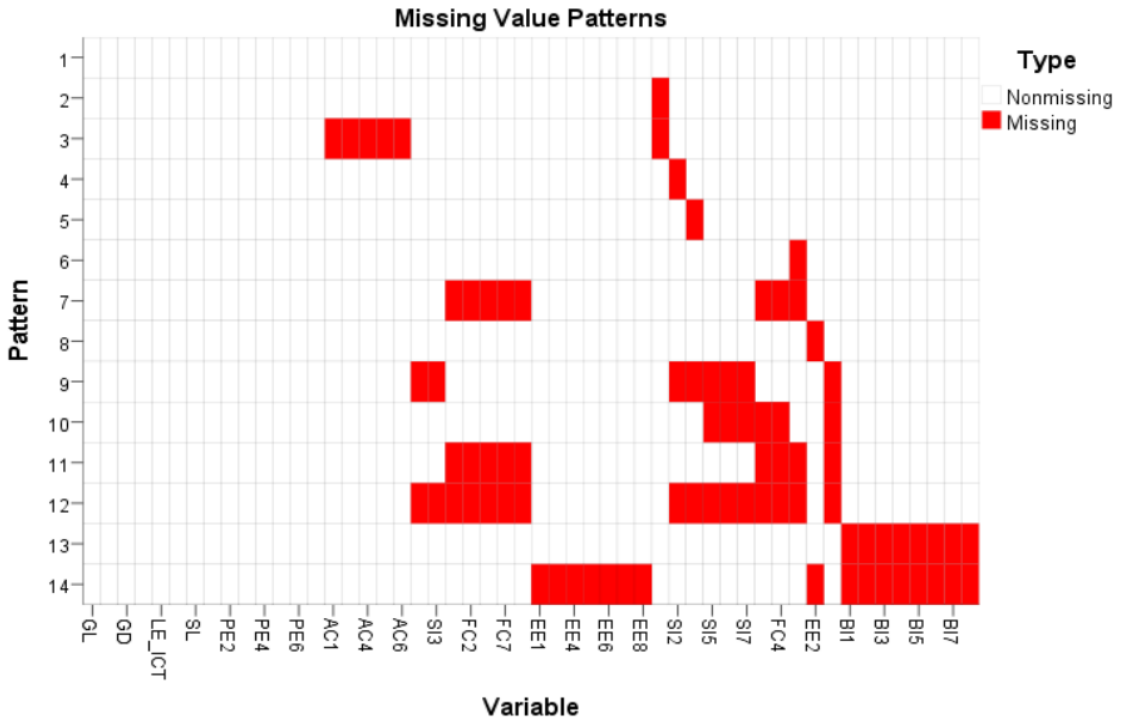


Figure 4.2. Missing value patterns

Figure 4.2 displays a scattered distribution of missing values across the graph. This pattern indicates that the missingness is consistent with Missing Completely At Random (MCAR), corroborating the results from the univariate statistics which revealed missingness percentages below 5%. Consequently, it can be inferred that the missing values in the dataset are inconsequential. Furthermore, the study formulated the alternative hypothesis (H1) for Little's MCAR test, positing that the dataset exhibits Missing Completely At Random (MCAR), where the pattern of missing values is independent of the data values. The results of Little's MCAR test indicated a Chi-Square value of 629.866 with 503 degrees of freedom and a significance level of 0.00, supporting the hypothesis. Thus, the significance value being less than 0.05 led to the conclusion that the data were indeed missing completely at random. Subsequently, the missing values were addressed using the Expectation-Maximization (EM) method implemented in SPSS version 26 to obtain a complete dataset for further analysis.

4.3 Common method bias (CMB)

To assess the potential for Common Method Bias (CMB) in this study, the researcher conducted Harman's single factor test. This test helps determine if there is a single underlying factor that explains most of the variance in the data, which could indicate bias. The analysis showed that when all measurement items were loaded simultaneously, they accounted for 37.291% of the total variation. Since this fall below the commonly used threshold of 50% to

indicate CMB, it suggests that there is no bias in the self-reported data collected (Ayanwale, 2023; Ayanwale et al., 2024; Podsakoff et al., 2003).

4.4 Descriptive statistics of respondents

Variables	Categories	Frequency	Percent
Grade level	Grade 10	87	13.0
	Grade 11	583	87.0
Age group	10 - 13 years	8	1.2
	14 - 17 years	388	57.9
	18 years and above	274	40.9
Gender	Male	253	37.8
	Female	411	61.3
	Not prefer to say	6	.9
Prior Knowledge of ICT education	Yes	543	81.0
	No	127	19.0
Learner ICT Proficiency	Beginner	237	35.4
	Intermediate	346	51.6
	Advanced	87	13.0
School type	Public school	69	10.3
	Mission school	533	79.6
	Private school	68	10.1
School location	North	232	34.6
	Central	288	43.0
	South	150	22.4

Table 4.2. Demographic profile of the respondents

Table 4.2 presents a demographic profile of the respondents and provides valuable insights into the characteristics of the sample population. Most respondents were in Grade 11 (87.0%), indicating that most students were in their penultimate year of secondary education. The largest proportion of respondents falls within the age range of 14 to 17 years (57.9%), which is typical for secondary school students. In terms of gender, the sample was relatively balanced, with slightly more female respondents (61.3%) than male respondents (37.8%) and a small percentage choosing not to disclose their gender (0.9%). Most respondents (81.0%) reported having prior knowledge of ICT education, indicating that a significant portion of the sample

was familiar with or had experience with ICT concepts and technologies. This could influence their intention to engage with ICT education and their actual learning outcomes.

Moreso, the respondents reported varying levels of ICT proficiency, with the majority classified as Intermediate (51.6%) or Beginner (35.4%). In terms of school type, the majority of respondents attended Mission schools (79.6%), followed by public schools (10.3%) and Private schools (10.1%). The respondents were distributed across different geographic regions, with the highest proportion located in the Central region (43.0%), followed by the North (34.6%) and South (22.4%). Understanding these demographic characteristics is essential for tailoring educational interventions and support services to meet the students' specific needs and preferences, thereby optimizing their intention to engage and their actual learning outcomes in ICT education.

4.5 Preliminary analysis

4.5.1 How does the study scale perform in terms of convergent and discriminant validity, as well as reliability?

To address the research question, a measurement model was employed within the context of Partial Least Squares Structural Equation Modeling (PLS-SEM). In PLS-SEM assessments, the process involves two distinct stages: the first stage focuses on measurement models, while the second stage addresses structural models. Validity and reliability of measurement models can be evaluated using either reflective or formative approaches. Reflective measurement models, the primary focus of this analysis, estimate the outer loadings of latent constructs and directly relate these constructs to their indicators. Conversely, formative measures are characterized by their outer weights, with indicators represented by arrows pointing toward the construct. In this analysis, all indicators were measured reflectively. The assessment of reflective models considered composite reliability, internal consistency reliability, and construct validity (including convergent and discriminant validity). Figure 4.3 illustrates the proposed or hypothesized model, wherein exogenous variables such as performance expectancy, social influence, facilitating conditions, and effort expectancy directly causally influence behavioral intention to learn ICT education, which serves as the endogenous variable. Furthermore, behavioral intention to learn ICT education is directly linked to actual learning of ICT education, representing the criterion variable.

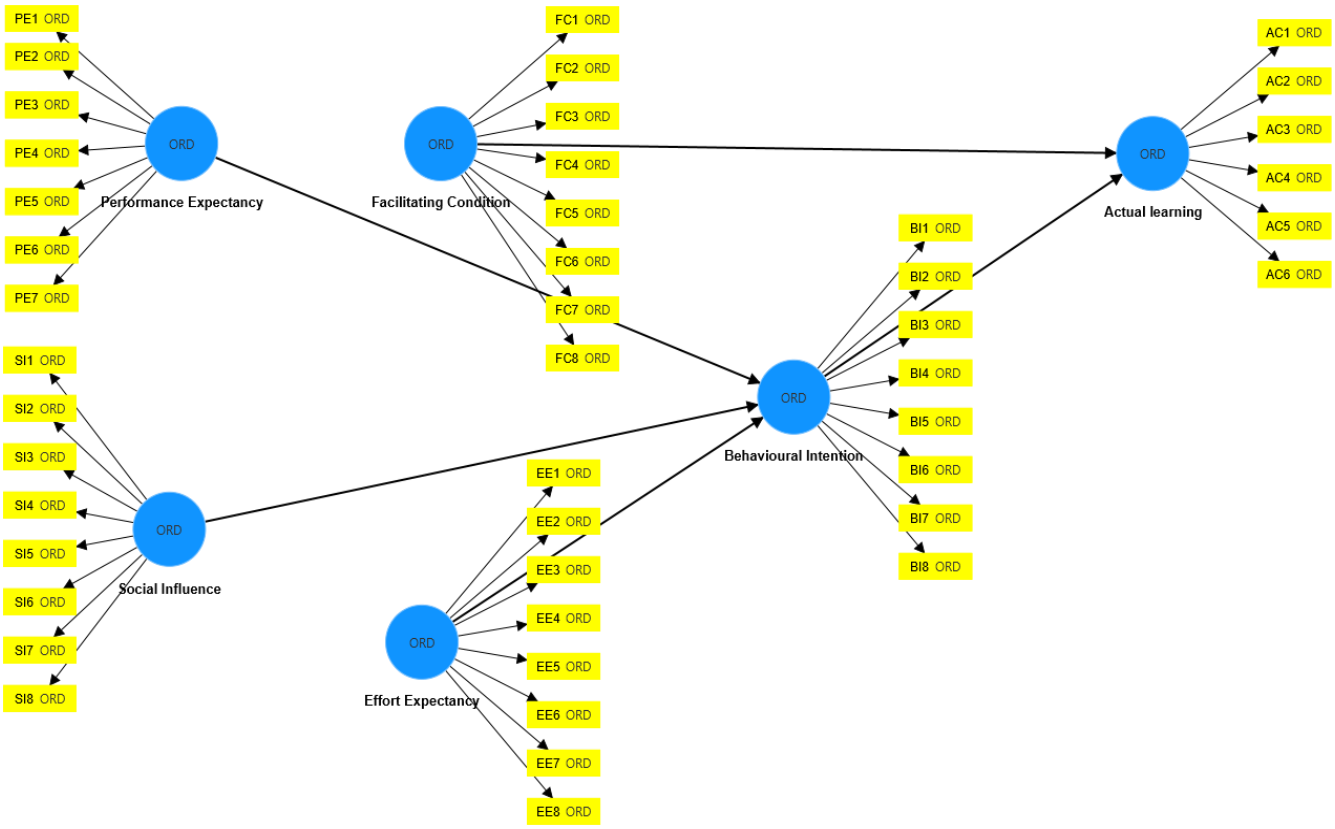


Figure 4.3. Hypothesized measurement model

To evaluate the validity and reliability of the scales, the assessment proceeded in two stages: Firstly, factor analysis was employed to extract factor loadings of the scales, identifying significant factors and items. Secondly, Partial Least Squares Structural Equation Modeling (PLS-SEM) was utilized to model the hypothesized model, assessing both convergent and discriminant validity. Figure 4.4 depicts the estimates of the measurement model, presenting a visual representation of the analysis outcomes.

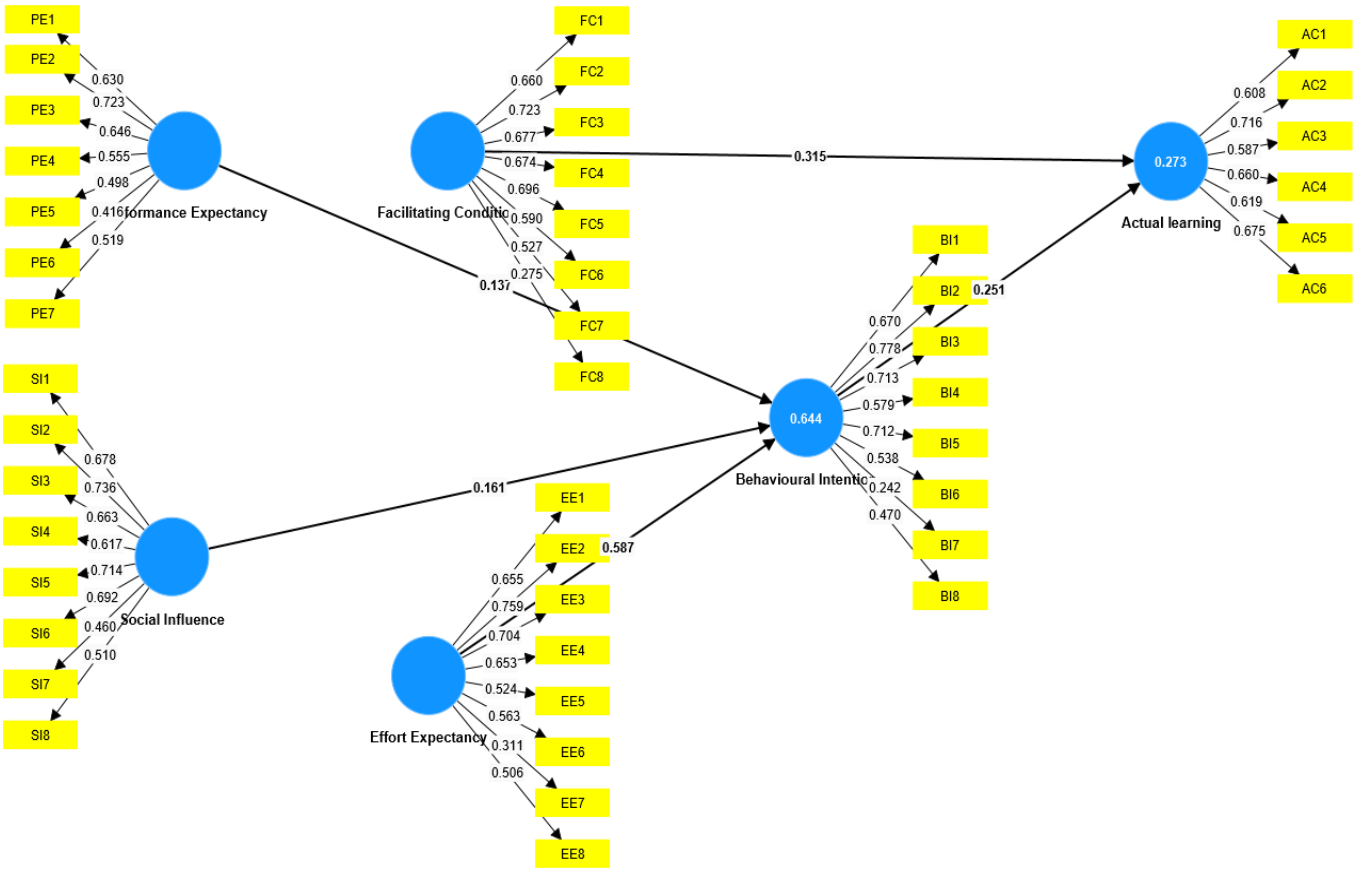


Figure 4.4. Estimates of the measurement model

Figure 4.4 illustrates the model assessment estimates for each construct and their respective indicators, elucidating the causal relationships within the hypothesized model. According to Hair et al. (2010), the reliability of an indicator can be assessed based on its factor loading in the underlying construct. Ayanwale and Molefi (2024) and Hair et al. (2022) argued that an item demonstrates reliability if its outer loading exceeds 0.70, though a loading of 0.60 is deemed acceptable. Regarding Cronbach's alpha (α) and composite reliability (CR), higher values signify greater reliability. Hair et al. (2022) recommended reliability levels between 0.70 and 0.95 for exploratory research, while values ranging from 0.60 to 0.70 were considered acceptable. Convergent validity, assessed using average variance extracted (AVE), measures the extent to which variance can be explained by the underlying construct in an item (Ayanwale et al. 2024a, 2021; Fornell and Larcker, 1981). Hair et al. (2017) suggested a minimum AVE value of 0.50 to be substantial, although an AVE of 0.40 is acceptable for exploratory studies. The resulting construct validity and reliability of the model are presented in Table 4.3.

Constructs	Indicators	Outer loadings	Cronbach (α)	Composite reliability (CR)	AVE	VIF
Actual learning	AC1	0.608	0.719	0.810	0.417	1.238
	AC2	0.716				1.421
	AC3	**0.587**				1.208
	AC4	0.660				1.318
	AC5	0.619				1.214
	AC6	0.675				1.283
Behavioural Intention	BI1	0.670	0.739	0.815	0.372	1.552
	BI2	0.778				1.907
	BI3	0.713				1.678
	BI4	**0.579**				1.203
	BI5	0.712				1.618
	BI6	**0.538**				1.312
	BI7	**0.242**				1.079
	BI8	**0.470**				1.152
Effort Expectancy	EE1	0.655	0.732	0.810	0.359	1.409
	EE2	0.759				1.856
	EE3	0.704				1.621
	EE4	0.653				1.317
	EE5	**0.524**				1.280
	EE6	**0.563**				1.277
	EE7	**0.311**				1.068
	EE8	**0.506**				1.184
Facilitating Condition	FC1	0.660	0.755	0.825	0.382	1.476
	FC2	0.723				1.750
	FC3	0.677				1.524
	FC4	0.674				1.394
	FC5	0.696				1.559

	FC6	**0.590**				1.363
	FC7	**0.527**				1.206
	FC8	**0.275**				1.061
Performance Expectancy	PE1	0.630	0.661	0.773	0.334	1.391
	PE2	0.723				1.569
	PE3	0.646				1.274
	PE4	**0.555**				1.167
	PE5	**0.498**				1.108
	PE6	**0.416**				1.114
	PE7	**0.519**				1.170
Social Influence	SI1	0.678	0.792	0.845	0.410	1.533
	SI2	0.736				1.633
	SI3	0.663				1.447
	SI4	0.617				1.314
	SI5	0.714				1.585
	SI6	0.692				1.419
	SI7	**0.460**				1.215
	SI8	**0.510**				1.260

Table 4.3. Construct validity and reliability of the measurement model

Table 4.3 presents the validity and reliability assessments of variables within the model. Notably, certain items of the constructs exhibited outer loadings less than 0.60, indicating potential unreliability for measuring the constructs. Furthermore, the constructs of behavioral intention, effort expectancy, facilitating condition, and performance expectancy demonstrated average variance extracted (AVE) values below 0.40, suggesting inadequate explanatory power. The diminished AVE levels in these constructs may be attributed to the low outer loadings of certain indicators, as evidenced in Table 4.3 (highlighted by bold item loadings). Consequently, the items with loadings below 0.60 were deemed unreliable for measuring the constructs, thereby rendering them unsuitable for testing the hypothesized model. As a result of these results, several items were identified for deletion based on their low loadings. These include AC3 (0.587), BI4 (0.579), BI6 (0.538), BI7 (0.242), BI8 (0.470), EE5 (0.524), EE6 (0.563), EE7 (0.311), EE8 (0.506), FC6 (0.590), FC7 (0.527), FC8 (0.275), PE4 (0.555), PE5

(0.498), PE6 (0.416), PE7 (0.519), SI7 (0.460), and SI8 (0.510). Upon removal of these items, the model exhibited improved specifications for the hypothesised structure. An enhanced measurement model has been re-specified and validated in Figure 4.5.

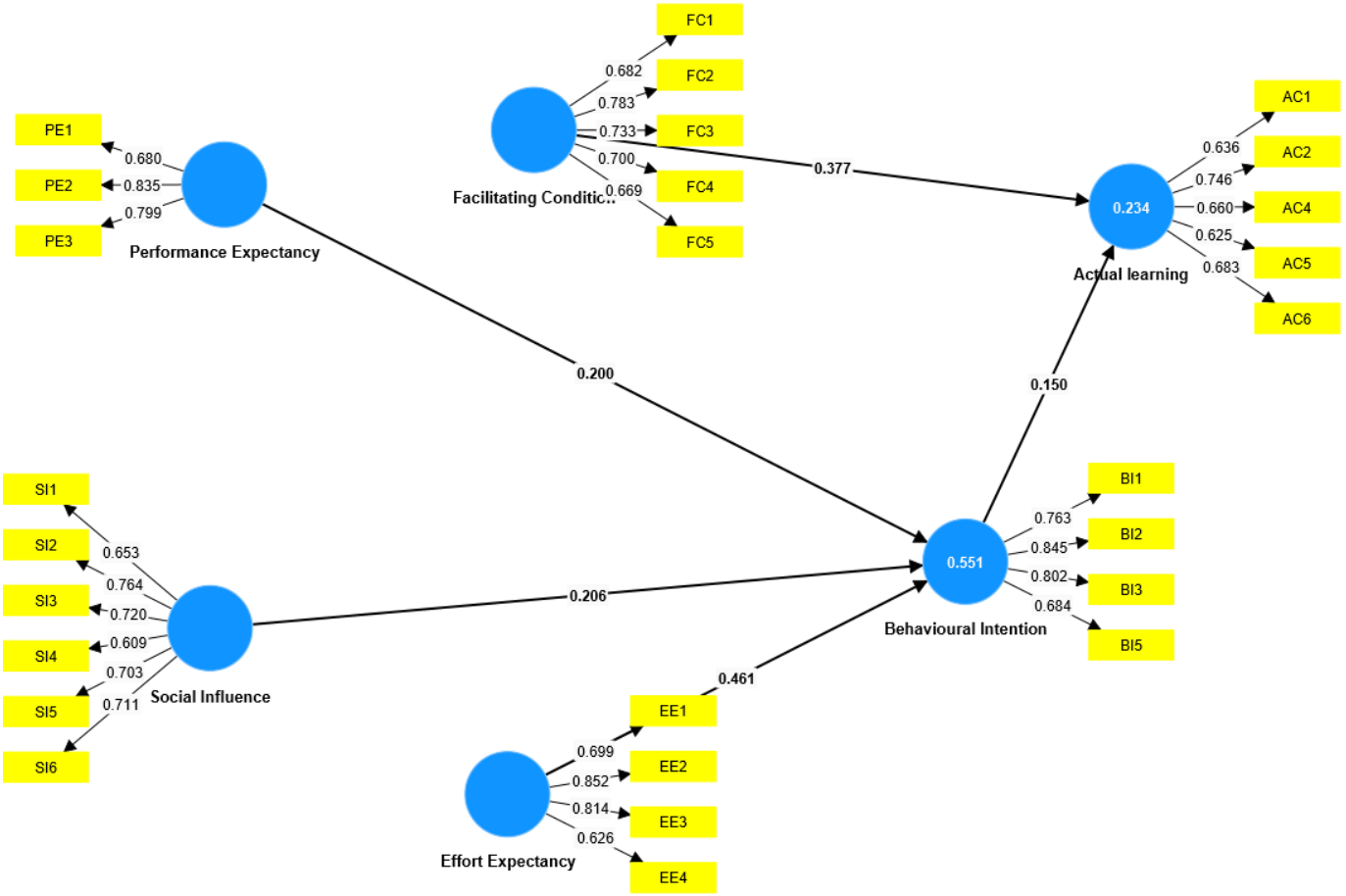


Figure 4.5. Re-specified/validated measurement model

Figure 4.5 depicts the assessment of the fit of the re-specified and validated hypothesis to empirical data. Each construct and its corresponding measures undergo evaluation to determine their adequacy in explaining causal relationships within the hypothesized model. Consequently, the model exhibits both validity and reliability, as indicated in Table 4.4 Also, Figures 4.6a, 4.6b, and 4.6c present bar charts illustrating the values of Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's alpha, respectively. These visual representations provide further insight into the construct validity and reliability of the model.

Constructs	Indicators	Outer loadings	Cronbach (α)	Composite reliability (CR)	AVE	VIF	Adj. R^2
Actual learning	AC1	0.636	0.694	0.803	0.450	1.225	0.234
	AC2	0.746				1.407	
	AC4	0.660				1.303	
	AC5	0.625				1.207	
	AC6	0.683				1.232	
Behavioural Intention	BI1	0.763	0.778	0.857	0.602	1.540	0.551
	BI2	0.845				1.828	
	BI3	0.802				1.663	
	BI5	0.684				1.313	
Effort Expectancy	EE1	0.699	0.744	0.838	0.567	1.354	
	EE2	0.852				1.831	
	EE3	0.814				1.600	
	EE4	0.626				1.242	
Facilitating Condition	FC1	0.682	0.759	0.839	0.511	1.438	
	FC2	0.783				1.740	
	FC3	0.733				1.506	
	FC4	0.700				1.371	
	FC5	0.669				1.333	
Performance Expectancy	PE1	0.680	0.672	0.817	0.600	1.330	
	PE2	0.835				1.528	
	PE3	0.799				1.253	
Social Influence	SI1	0.653	0.787	0.848	0.483	1.444	
	SI2	0.764				1.600	
	SI3	0.720				1.433	
	SI4	0.609				1.309	
	SI5	0.703				1.551	
	SI6	0.711				1.379	

Table 4.4 Validated construct validity and reliability

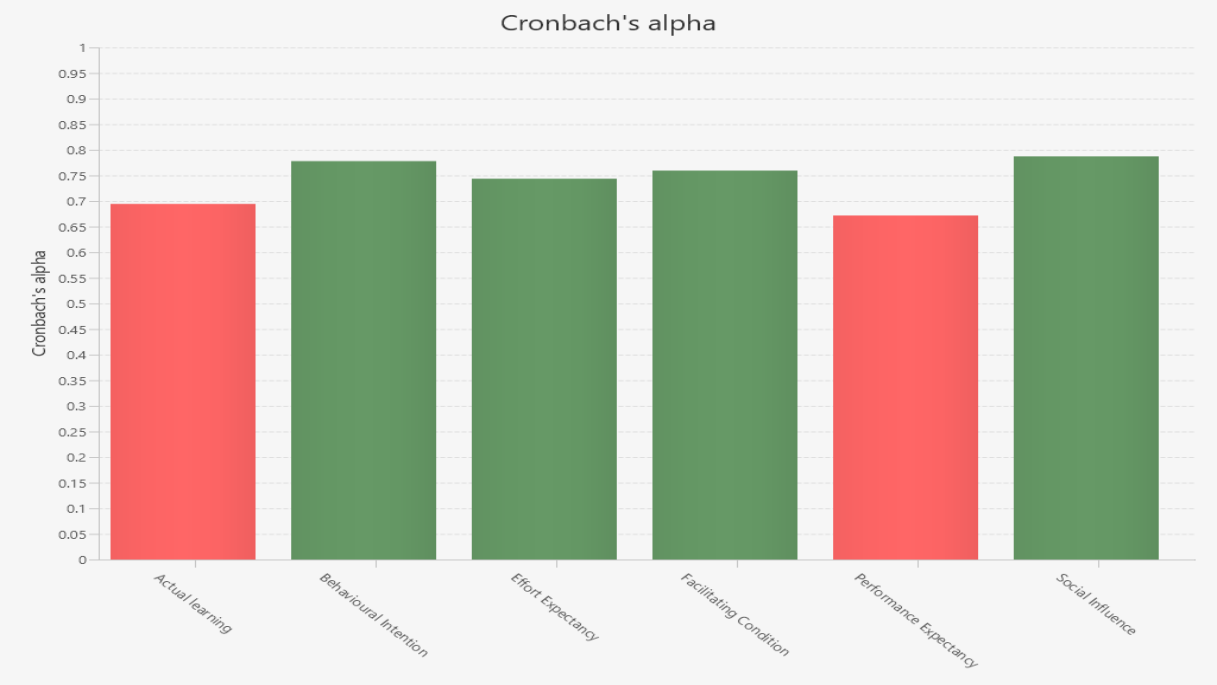


Figure 4.6a. Bar chart showing Cronbach alpha for all the variables in the model

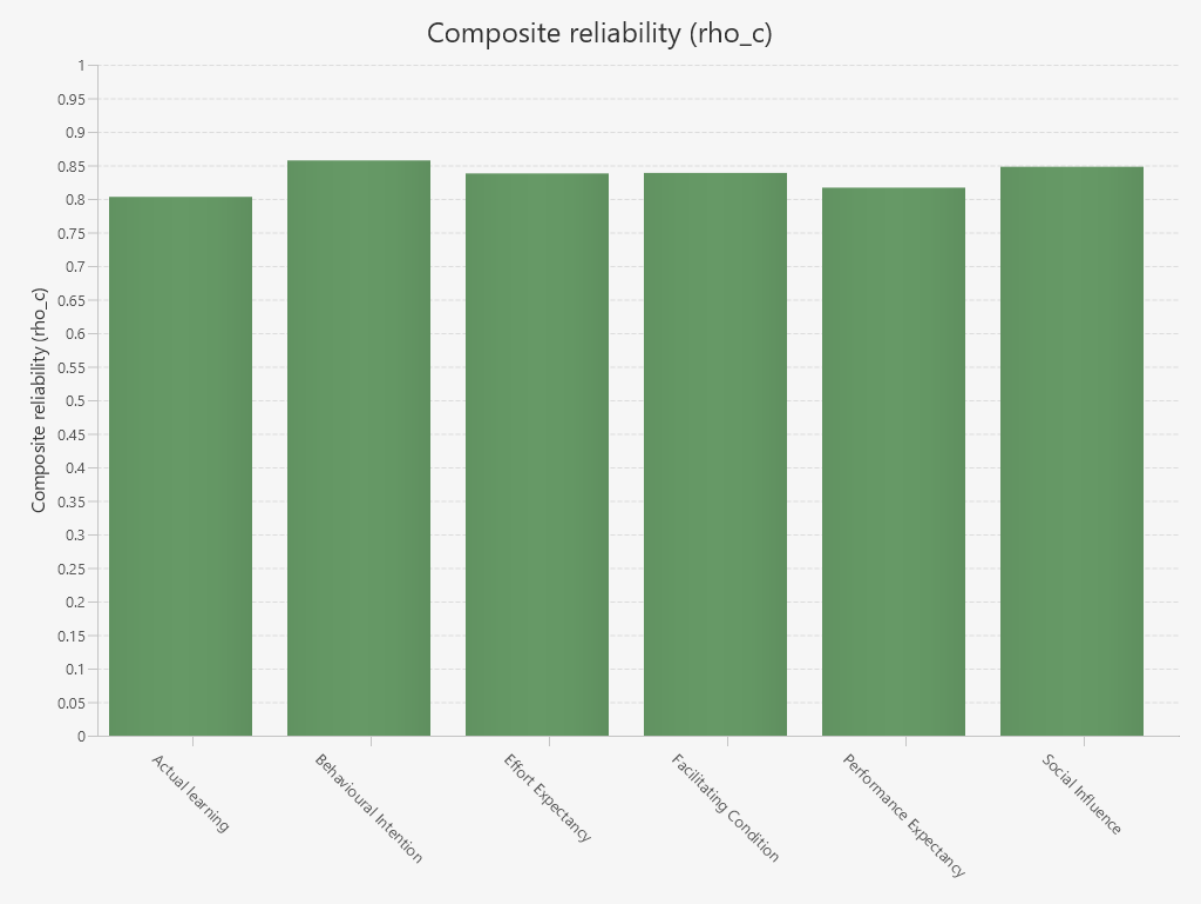


Figure 4.6b. Bar chart showing composite reliability for all the variables in the model

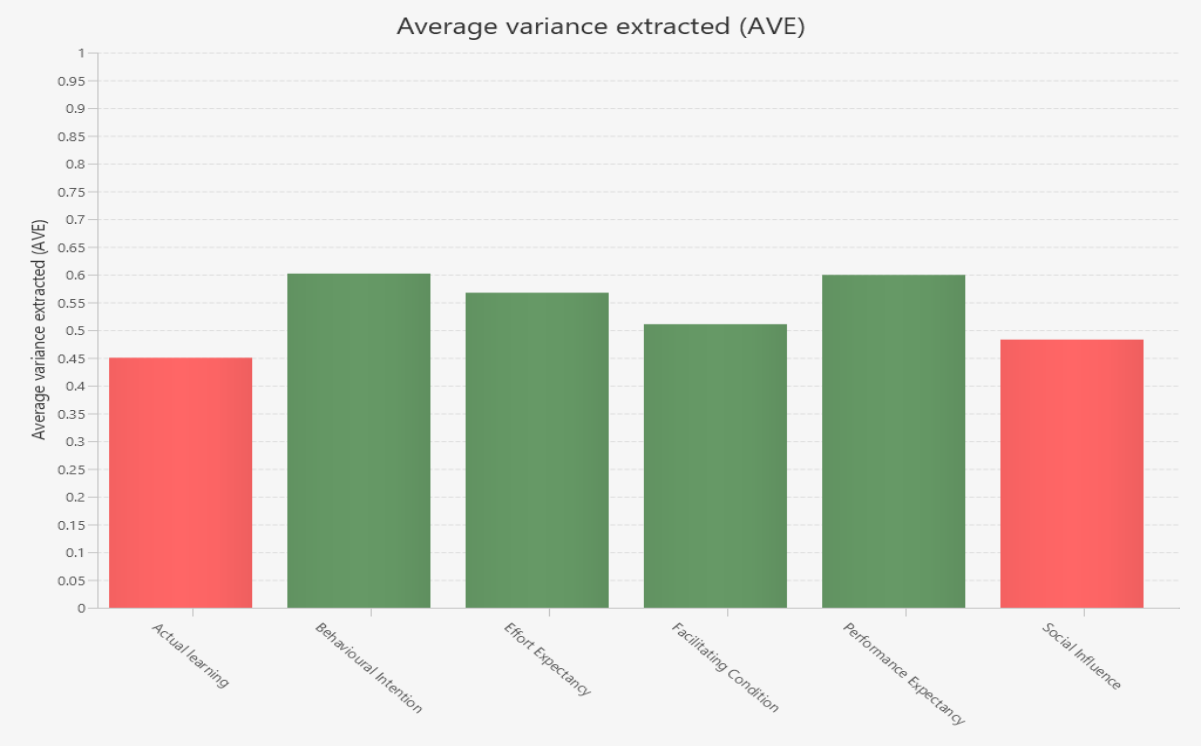


Figure 4.6c. Bar chart showing average variance extracted for all the variables in the model

As indicated in Table 4.4, all factor loadings surpass the recommended threshold of 0.60, in accordance with guidelines by Hair et al. (2022). Furthermore, the Average Variance Extracted (AVE) values for assessing convergent validity range from 0.450 to 0.602. Following the elimination of unreliable indicators, all constructs exhibit AVE values exceeding 0.40, as advised by Hair et al. (2017). Regarding reliability, Cronbach's alpha (α) values range from 0.672 to 0.787, which are deemed reasonable (Ayanwale et al., 2022, 2023; Hair et al., 2022). Additionally, all Composite Reliability (CR) values, ranging from 0.803 to 0.857, surpass the recommended threshold of 0.70, as advocated by Henseler et al. (2009) and Molefi and Ayanwale (2023). Furthermore, the Variance Inflated Factor (VIF) values (see Table 4.4) for each item fall below 3.0, indicating the absence of multicollinearity in the study, consistent with the suggestion of (Hair et al., 2016) that VIF values below 3.0 indicate no evidence of multicollinearity.

Discriminant validity is assessed using the Fornell-Larcker criterion, where the square root of AVE should exceed the correlation of the reflective construct with all other constructs. Additionally, cross-loadings are examined to ensure that indicators primarily load onto their associated constructs. However, the HeteroTrait-MonoTrait ratio of correlations (HTMT) has gained prominence in assessing discriminant validity, as it offers superior performance compared to traditional methods (Ayanwale et al., 2023; Henseler et al., 2015). In this study,

HTMT was emphasized, with a threshold value of 0.90 established for discriminant validity (Henseler et al., 2015). Table 4.5 presents the assessment of discriminant validity for the constructs in the model.

Constructs	Actual learning	Behavioural Intention	Effort Expectancy	Facilitating Condition	Performance Expectancy	Social Influence
Actual learning						
Behavioural Intention	0.514					
Effort Expectancy	0.572	0.892				
Facilitating Condition	0.641	0.798	0.829			
Performance Expectancy	0.497	0.726	0.731	0.682		
Social Influence	0.511	0.726	0.808	0.727	0.609	

Table 4.5 Discriminant validity- HeteroTrait-MonoTrait ratio of correlations

The present analysis confirmed the model's discriminant validity by finding HTMT ratio values below the benchmark of 0.90, as shown in Table 4.5 Overall, the variables in the model exhibit both convergent and discriminant validity, as well as reliability. Therefore, factor loadings, Average Variance Extracted, Composite Reliability, and Cronbach's alpha (Construct Reliability) values are used to measure the reliability and validity of the data analysis. Once the validity criteria are met, the second stage involves using the latent scores from the measurement model to assess the structural model and establish the relationships, as well as test the hypotheses raised for the study.

4.5.2 How much variance do the variables in the model account for in the criterion variables?

Utilizing the adjusted R2 value provided insight into the predictive power of the predictor variables. The results indicated that the predictor variables jointly explained approximately 23.4% and 55.2% of the variance observed in actual learning of ICT education and behavioral intention to learn ICT education, respectively, as depicted in Table 4.3 and Figure 4.5. Effort expectancy (46.2%) and social influence (20.5%) emerged as robust predictors of behavioral intention to learn ICT education, surpassing the predictive power of performance expectancy (20.0%). Conversely, facilitating condition (37.7%) exhibited stronger predictive capabilities

for actual learning of ICT education compared to behavioral intention to learn ICT education (14.9%). Additionally, the strong predictive capability of facilitating conditions on actual learning outcomes highlights the critical role of providing adequate resources, infrastructure, and support systems to facilitate effective ICT learning experiences. Schools and educational institutions need to ensure access to ICT resources, such as computers, internet connectivity, and educational software, as well as provide training and support for teachers and students to effectively integrate ICT into teaching and learning processes. Moreover, the disparity in predictive power between performance expectancy and other predictors suggests the need for targeted interventions to address students' perceptions of the usefulness and relevance of ICT education. Educators should emphasize the practical applications and benefits of ICT skills in enhancing academic performance, employability, and future career prospects to increase students' motivation and engagement with ICT learning.

4.5.3 Is the measurement model which describes the causal relationship among the variables in the model fit?

To address this question, Table 4.6 presents the overall measurement model fit.

	Saturated model (sat)			Estimated model (est)		
Indices	Value	HI 95	Interpretation	Value	HI 95	Conclusion
SRMR < 0.08	0.068	0.048	Supported	0.068	0.051	Supported
d_ULS sat < HI 95	0.300	0.502	Supported	0.300	0.621	Supported
d_G sat < HI 95	0.470	0.401	Supported	0.570	0.691	Supported

Table 4.6 Overall measurement model fit

The assessment of model fit in PLS-SEM typically involves evaluating various categories of fit. Specifically, researchers utilize estimated values of latent constructs and measured variables to gauge the goodness of fit of the composite PLS model (Oluwajana et al., 2019; Sanusi et al., 2024). A good model fit is indicated when several criteria are met, including Standardized Root Mean Squared Residuals (SRMR) less than 0.08 and squared Euclidean distance (d_ULS) from the saturated model being less than bootstrapped at a 95% confidence level, as well as geodesic discrepancies (d_G) from the saturated model being less than bootstrapped at 95% confidence level of the estimated model (Henseler et al., 2016). As presented in Table 4.6, the results reveal that SRMR is less than 0.08, and both d_ULS sat < est and d_G sat < est adhere to these

specified criteria for model fit. This alignment underscores the validity of the model fit assessment, in accordance with the recommendations by Henseler et al. (2016).

4.5.4 Structural model assessment

The researcher employed structural equation modeling using smartPLS to test the proposed structural model (see Figure 4.7).

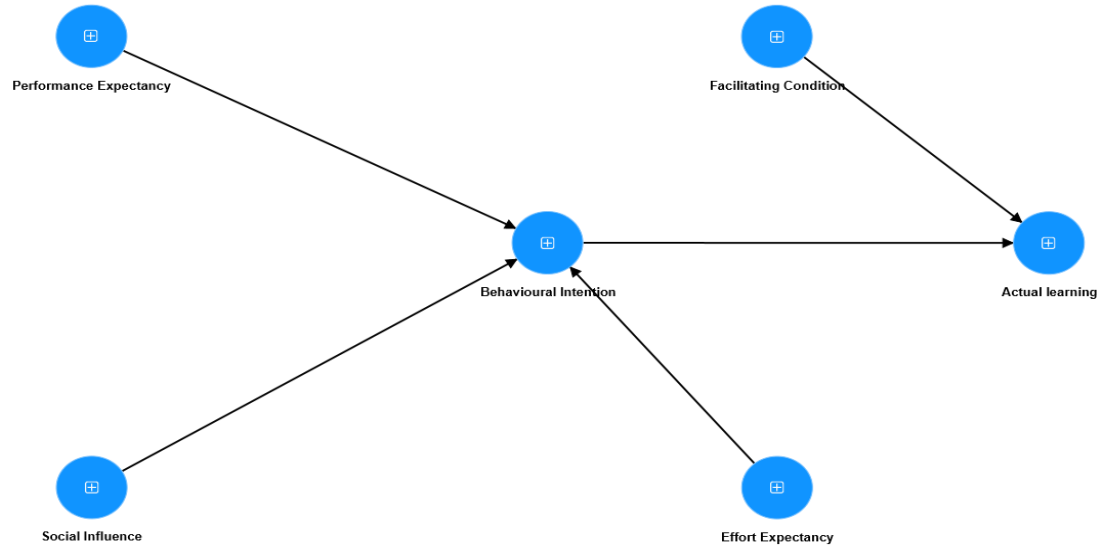


Figure 4.7. Structural model

The significance of path coefficients denotes the confidence with which a variable establishes a causal relationship with another variable within the model. In Partial Least Squares Structural Equation Modeling (PLS-SEM), the significance of path coefficients is assessed through bootstrap p-values. This technique involves obtaining a series of random samples from the original dataset, with replacement, to estimate the average values of the parameters. These estimates are then compared with those of the original sample to determine the statistical significance of the original parameters. In this study, a total of 10,000 bootstrap resamples were utilized, exceeding the original sample size of 670, in accordance with the criteria outlined by Hair et al. (2017). Each subsample's size matched that of the original sample. Figure 4.8 and Table 4.6 present the results of the structural model assessment and hypothesis testing based on the 10,000 bootstrap resamples. These results provide insights into the significance of the relationships between variables in the structural model, enabling researchers to determine the strength and direction of causal effects within the model with a high level of confidence.

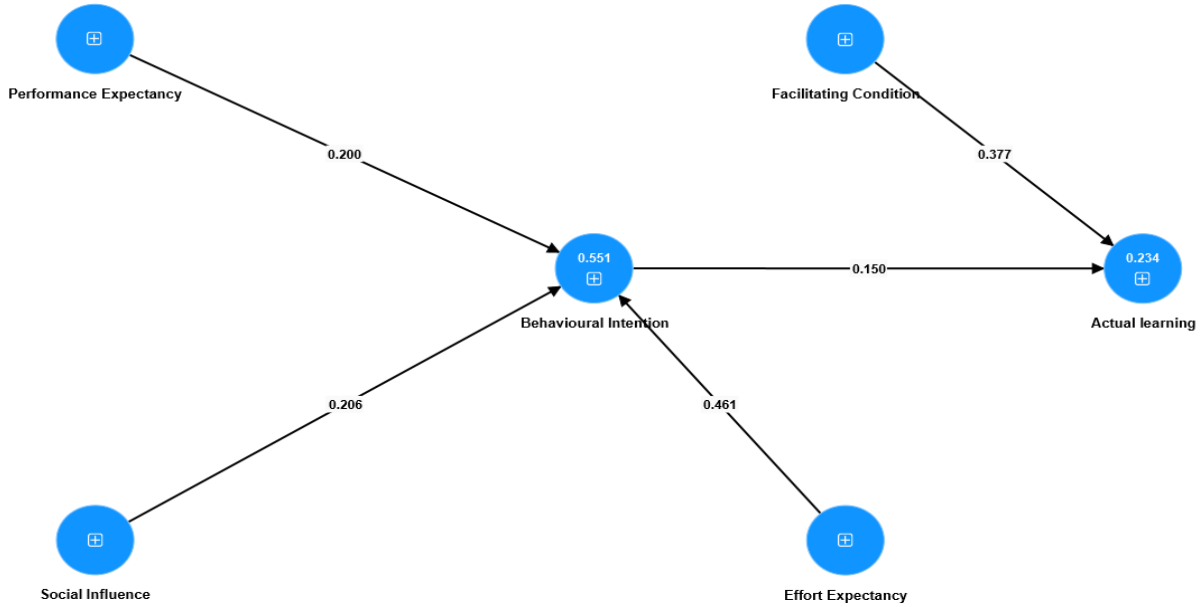


Figure 4.8. Structural model parameter estimates (beta values)

Hypothesis	Relationships	Beta	Standard deviation	T statistics	5.0%	95.0%	P values	Remarks
HI	Performance Expectancy → Behavioural Intention	0.200	0.052	3.818	0.122	0.294	0.000	Supported
H2	Social Influence → Behavioural Intention	0.206	0.043	4.827	0.135	0.276	0.000	Supported
H3	Effort Expectancy → Behavioural Intention	0.461	0.059	7.756	0.352	0.551	0.000	Supported
H4	Facilitating Condition → Actual learning	0.377	0.061	6.186	0.282	0.482	0.000	Supported
H5	Behavioural Intention → Actual learning	0.150	0.057	2.650	0.056	0.244	0.004	Supported

Table 4.7 Relationship between variables in the model

4.6 Research hypothesis

This study tested the following research hypothesis:

4.6.1: Hypothesis One

Performance expectancy (PE) will have a positive and significant influence on behavioural intension (BI) of learners to learn ICT education.

Table 4.6 reveals that the path coefficient ($\beta = 0.200$, $t = 3.818$, $p < 0.05$) indicates a positive and statistically significant relationship between performance expectancy and behavioural intention to learn ICT education, thus supporting the hypothesis. This implies that for every unit increase in performance expectancy, behavioural intention increases by 0.200 for every 0.052 standard deviations while controlling for other variables. This result corroborates previous research by Arenas-Gaitan et al. (2015), which found a strong influence of performance expectancy on individuals' behavioural intention to use internet banking systems. Similarly, research by Abikari et al. (2023) on "Negative emotions and consumer behavioural intention to adopt emerging e-banking technology" demonstrated that performance expectancy is a crucial determinant of consumers' behavioural intention to adopt emerging e-banking technology. The study also found that effort expectancy significantly explains variations in consumers' performance expectancy, indicating that consumers perceive new e-banking technology as a tool to improve their financial performance, a perception bolstered by their effort expectancy. Further support comes from a study by Mohd et al. (2023) on "Use and behavioural intention using digital payment systems among rural residents," which indicated a significant correlation between performance expectancy and behavioural intention to use digital payment systems among rural residents. This finding aligns with earlier research by Upadhyay et al. (2022), Manrai et al. (2021), and Gupta and Arora (2020), showing that rural residents intend to use digital payment systems because they enhance their daily financial transactions. In addition, the study by Anthony Jr et al. (2023) on "Predicting Academic Staffs Behavioural Intention and Actual Use of Blended Learning in Higher Education: Model Development and Validation" suggested that performance expectancy positively influences lecturers' behavioural intention towards using blended learning for teaching. This result is consistent with prior studies by Abu-Al-Aish and Love (2013) and Lakhal et al. (2013), which found that performance expectancy relates to the extent to which academic staff believe their teaching performance would influence their perception towards using blended learning for teaching activities. In contrast, a study by Hunde et al. (2022) on "Behavioral intention to use e-learning and its associated factors among health science students in Mettu University, southwest Ethiopia, using the modified UTAUT model," found no relationship between performance expectancy and behavioural intention. This is further supported by Marikyan and Papagiannidis (2023), who also found performance expectancy to be insignificant in influencing behavioural intention.

4.6.2: Hypothesis Two

Social influence (SI) will have a positive and significant influence on behavioural intension (BI) of learners to learn ICT education.

Table 4.6 reveals that the path coefficient ($\beta = 0.206$, $t = 4.827$, $p < 0.05$) demonstrates a significant positive association between social influence and behavioural intention to learn ICT education. This indicates that for every unit increase in social influence, behavioural intention increases by 0.206 for every 0.043 standard deviations while controlling for other variables. This result is consistent with previous studies. For instance, research by Al-shami et al. (2019), Radovan and Kristl (2017), and Tarhini et al. (2017) established a significant relationship between social influence and behavioural intention to use blended learning. Their study, "Predicting Academic Staffs Behaviour Intention and Actual Use of Blended Learning in Higher Education: Model Development and Validation," supports these results. Similarly, Mohd et al. (2023) found a relationship between social influence and behavioural intention to use digital payment systems. Their findings were consistent with prior research on technology adoption intention, such as studies by Sitar-Taut and Mican (2021), Alowayr (2022), and Rahman et al. (2022). These studies indicate that rural residents are more likely to use digital payment systems when encouraged by their social circle. Additionally, Williams et al. (2015) highlighted the effect of social influence on behavioural intention, noting that social conditions such as friendship, environment, lecture procedures, and training events related to the use of the system play a role in encouraging students to use e-learning in every lecture. However, contrasting results have also been reported. Candra (2024) found that social influence had no significant impact on behavioural intention, diverging from the typical results in IT adoption studies. Similarly, Tan et al. (2014) found that social factors did not affect the behavioural intention to adopt mobile learning. Hameed et al. (2024) concluded that social impact negatively moderates, rather than strengthens, the association between attitudes towards mobile learning (ATML) and behavioural intention to adopt mobile learning (BITML) in students.

4.6.3: Hypothesis Three

Effort expectancy (EE) will have a positive and significant influence on behavioural intension (BI) of learners to learn ICT education.

Table 4.6 reveals that the path coefficient ($\beta = 0.461$, $t = 7.756$, $p < 0.05$) indicates a strong positive relationship between effort expectancy and behavioural intention to learn ICT education. This means that for every unit increase in effort expectancy, behavioural intention increases by 0.461 for every 0.059 standard deviations while controlling for other variables.

This result aligns with previous research by Abikari et al. (2023), who identified a significant relationship between effort expectancy and behavioural intention in their study on "Negative emotions and consumer behavioural intention to adopt emerging e-banking technology." Similarly, Rahmaningtyas et al. (2020) found that effort expectancy positively affected students' desire and expectation to use e-learning systems due to their perceived ease of use. Additionally, research by Camilleri (2024) on factors affecting performance expectancy and intentions to use ChatGPT found significant causal paths between effort expectancy and intentions to use ChatGPT, though to a lesser extent. This aligns with the work of Attuuayefio et al. (2014), which suggested that effort expectancy is more prominent in the initial stages of behavioural intention to use ICT for learning. Venkatesh et al. (2003) also postulated that the effort expectancy construct is significant during the early stages of technology adoption, in both mandatory and voluntary contexts. Conversely, Salifu et al. (2024) found that effort expectancy had no discernible influence on the behavioural intention of economics students to use the AI tool ChatGPT. This finding is consistent with research by Mohd et al. (2022), who found that students' desire to utilise AI-based tools, such as chatbots, was unaffected by effort expectancy.

4.6.4: Hypothesis Four

Facilitating condition (FC) will have a positive and significant influence on actual learning (AC) of ICT education by learners.

Table 4.6 reveals that the path coefficient ($\beta = 0.377$, $t = 6.186$, $p < 0.05$) demonstrates a significant positive relationship between facilitating conditions and actual learning of ICT education. This means that for every unit increase in facilitating conditions, actual learning increases by 0.377 for every 0.061 standard deviations while controlling for other variables. The results from this study align with the results of Rahmaningtyas et al. (2020), which indicated that facilitating conditions had a significant effect on use behaviour. Their study highlighted that the facilities provided by tertiary institutions, such as widespread internet access, supported online learning effectively. Similarly, Zhou's research on integrating the Task Technology Fit (TTF) and Unified Theory of Acceptance and Use of Technology (UTAUT) models to explain mobile banking user adoption found that facilitating conditions significantly impacted user adoption. Furthermore, Persada et al. (2019) explored the facilitation condition factor and found it to be a dominant influence on behavioural intention, which in turn led to actual learning. Another relevant study by Anthony Jr. et al. (2023), titled "Predicting Academic Staffs' Behaviour Intention and Actual Use of Blended Learning in Higher

Education: Model Development and Validation," confirmed that facilitating conditions positively influence actual blended learning (BL) usage. Additionally, Cabellos et al. (2024) found that school facilitating conditions significantly affected both ICT use and teachers' emphasis on developing students' digital information and communication skills (TEDDICS). The study noted an interaction effect between school facilitating conditions and attitudes towards ICT, indicating that better school facilitating conditions amplify the positive effects of attitudes on ICT use and TEDDICS. The results underscored the importance of facilitating conditions in teachers' practices and concluded that a lack of such conditions might lead to reduced ICT use in teaching, even among teachers with positive attitudes towards ICT.

4.6.5: Hypothesis Five

Behavioural Intention (BI) will have a positive and significant influence on actual learning (AC) of ICT education by learners.

Table 4.6 reveals that the path coefficient ($\beta = 0.150$, $t = 2.650$, $p = 0.004$) indicates a positive and significant relationship between behavioural intention and actual learning of ICT education. This means that for every unit increase in behavioural intention, actual learning increases by 0.150 for every 0.057 standard deviations while controlling for other variables. The results support the observations of Rahmaningtyas et al. (2020), which identified a positive and significant effect of behavioural intention on use behaviour. Their study showed that students' desire to use an e-learning system encouraged its use in their lectures. This was further supported by research from Banjuradja (2015), which found that behavioural intention significantly affected actual learning. The study demonstrated that performance expectancy, job technology compatibility, social influence, and facilitating conditions significantly impacted user adoption. This submission aligns with previous findings by Abbad (2021) in the study "Using the UTAUT Model to Understand Students' Usage of E-Learning Systems in Developing Countries." Abbad's research found that behavioural intentions had the most direct and significant effect on students' usage of Moodle. The study highlighted those students with high levels of behavioural intentions also exhibited high levels of usage of e-learning systems.

4.7 Chapter summary

Chapter 4 presented results and discussion from data provided by the self-reported questionnaire which was used to explore the relationships among various constructs pertaining to ICT education. The constructs were PE, SI, FC, EE, BI, and AC. The study surveyed Grade 10 and Grade 11 students from 25 high schools in three Lesotho regions, with 670 students as

a sample. The research instrument used was a structured questionnaire with closed-ended questions.

Hypothesis 1 revealed that PE had a positive and significant influence on BI of learners to learn ICT education. Hypothesis 2 also proved that SI had a positive and significant influence on BI of learners to learn ICT education. Hypothesis 3 EE showed a positive and significant influence on BI of learners to learn ICT education. Hypothesis 4 FC had a positive and significant influence on AC of ICT education by learners. Hypothesis 5 proved that BI had a positive and significant influence on AC of ICT education by learners. Based on the results and discussions from this chapter, the following chapter provides summary of results, conclusion, recommendation and implications.

The findings of hypothesis 1 indicated that PE exerted a positive and significant effect on BI of learners to engage in ICT education. Similarly, hypothesis 2 demonstrated that SI also had a positive and significant impact on learners' BI in ICT education. Furthermore, hypothesis 3 established that EE positively and significantly influenced learners' BI in learning ICT education. Hypothesis 4 confirmed that FC positively and significantly affected learners' AC of ICT education. Lastly, hypothesis 5 validated that BI significantly and positively influenced learners' AC of ICT education. Drawing from the results and discussions presented in this chapter, the subsequent chapter will offer a summary of results, conclusion, recommendations, and implications.

CHAPTER 5

SUMMARY OF RESULTS, CONCLUSION, RECOMMENDATION AND IMPLICATIONS

5.1 Introduction

This chapter presents a summary of the results outlined in Chapter 4, drawing conclusions from the key findings of this research. It also provides recommendations and implications for further research on the ICT education intentions and actual learning of Lesotho secondary school students. Key points addressed focused on summary of hypotheses. Thereafter, the study provides conclusion and recommendations, and limitations for future research.

5.2 Summary of Results

The majority of respondents in this study were in Grade 11, indicating that they were in their final year of secondary education, which suggests a higher level of maturity and academic preparedness compared to lower graders. The largest proportion of respondents fell within the age range of 14 to 17 years, indicating an adolescent population with varying levels of technological familiarity and cognitive development, potentially influencing their participation in ICT education.

The gender distribution in the sample was relatively balanced, with slightly more female respondents than male respondents and a small percentage choosing not to disclose their gender. This balance highlights potential gender differences in technology use and attitudes toward ICT education, which may impact student behaviour and learning outcomes. The respondents reported varying levels of ICT proficiency, with the majority classified as intermediate or beginner. This diversity in skill levels suggests the need for additional support or instruction to enhance ICT skills among Grade 11 students.

Regarding school type, most respondents attended mission/church schools, followed by public schools and then private schools. The differences in access to resources, teaching methodologies, and exposure to ICT education among these school types may impact student engagement and learning outcomes. Geographically, respondents were distributed across three regions: Central, North, and South. The highest proportion was located in the Central region, followed by the North and the South. Regional differences in infrastructure, socioeconomic status, and educational policies may affect access to ICT resources and opportunities, influencing students' engagement and learning outcomes in ICT education. These demographic variables are crucial for tailoring educational interventions and support services to meet

students' unique needs and preferences, maximizing their intention to engage in and benefit from ICT education.

Hypothesis Summaries

Hypothesis 1: The study tested whether performance expectancy (PE) positively and significantly influences behavioural intention (BI) to learn ICT education. Results confirmed a positive and statistically significant relationship, suggesting that students' perceptions of the usefulness and benefits of ICT education enhance their intention to engage in such learning activities. Educational interventions aimed at highlighting the performance benefits of ICT education can effectively promote student participation.

Hypothesis 2: The study examined if social influence (SI) positively and significantly impacts behavioural intention (BI) to learn ICT education. Findings demonstrated a significant positive association, indicating that peer influence and social networks play a crucial role in shaping students' attitudes and intentions toward ICT learning. Leveraging social dynamics within educational settings can foster a supportive learning environment and encourage student engagement in ICT education.

Hypothesis 3: The study investigated whether effort expectancy (EE) positively and significantly affects behavioural intention (BI) to learn ICT education. Results revealed a strong positive relationship, suggesting that students' perceptions of the ease of use and the effort required for ICT learning significantly influence their intention to participate in such activities.

Hypothesis 4: The study explored if facilitating conditions (FC) positively and significantly impact actual learning (AC) of ICT education. Results indicated a significant positive relationship, implying that the availability of resources, infrastructure, and support systems significantly contributes to students' actual learning outcomes in ICT education. Ensuring access to ICT resources and providing adequate support and training for students and teachers are essential for promoting effective ICT learning experiences and improving learning outcomes.

Hypothesis 5: The study aimed to determine if behavioural intention (BI) positively and significantly influences actual learning (AC) of ICT education. Results showed a positive and significant relationship, suggesting that students' intentions to engage in ICT learning activities positively impact their actual learning outcomes. Enhancing students' motivation and intention

to participate in ICT education initiatives may lead to improved learning outcomes in this domain.

5.3 Conclusion and Recommendations

The UTAUT model used for the study suggests that the tested hypotheses are supported by the results. The relationships between the constructs performance expectancy, behavioural intention, social influence, effort expectancy, and facilitating conditions are validated. Efforts to enhance the usability and accessibility of ICT tools and resources may effectively increase students' motivation and intention to learn ICT education. Ensuring access to ICT resources and providing adequate support and training for teachers are crucial for improving ICT learning experiences. Interventions from the Ministry of Education and Training should focus on enhancing both students' and teachers' motivation and intention to engage in ICT education.

5.4 Limitations and Future Work

This study aimed to predict secondary school students' intentions and actual learning in ICT education using Composite Based Structural Equation Modeling The study supported measures from Venkatesh's information technology adoption paradigm, previously validated in academic literature. The UTAUT model, focused on performance expectancy, social influence, effort expectancy, facilitating conditions, and behavioural intention. These constructs had not yet been used in a structured model related to Lesotho's educational set-up, particularly at the secondary education phase. The findings provide information about the reliability and validity of the constructs employed, demonstrating the strength of the theoretical framework. Future researchers are encouraged to replicate this work in diverse scenarios.

5.5 Implications

The results from this study have significant implications for the Ministry of Education and Training (MoET). To bridge the digital divide, MoET is expected that robust interventions will improve the performance of ICT education in Lesotho secondary schools. Key focus areas include teacher training, professional development, and resource allocation in Lesotho secondary schools. Like other developing countries, Lesotho faces challenges related to the digital gap. Understanding factors that contribute to students' intention and actual learning in ICT education, including barriers and challenges, are crucial. These insights may inform efforts needed to bridge the digital divide, promote digital inclusion, and ensure equitable access to ICT education opportunities for all students, regardless of their socioeconomic background or geographical location.

5.6 Conclusion

This study found a significant and positive relationship between the UTAUT constructs and students' behavioural intentions and learning outcomes in ICT education in Lesotho secondary education. Performance expectancy, social influence and effort expectancy all demonstrated strong positive correlations with behavioural intention to learn ICT education. Facilitating conditions were positively related to learning outcomes. Additionally, behavioural intention significantly influenced learning outcomes, highlighting the importance of motivational factors in ICT education. The study's outcomes are valuable for policymakers, educators, and stakeholders involved in ICT education in Lesotho. The Ministry of Education and Training is expected to put in place the necessary interventions in improving the status quo of ICT education performance in Lesotho secondary schools.

REFERENCES

Abbad, M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. Education and information technologies, 26(6), 7205-7224.

Abbad, M., Morris, D., & Al-Ayyoub, A. E. (2009). Students Decisions to Use an eLearning System: A Structural Equation Modeling Analysis. International Journal of Emerging Technologies in Learning (iJET), 4(4), 4-13.

Abikari, M., Öhman, P., & Yazdanfar, D. (2023). Negative emotions and consumer behavioural intention to adopt emerging e-banking technology. *Journal of Financial Services Marketing*, *28*(4), 691-704.

Abu-Al-Aish, A., & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. *International Review of Research in Open and Distributed Learning*, *14*(5), 82-107.

Abubakar, F. M., & Ahmad, H. B. (2013). The moderating effect of technology awareness on the relationship between UTAUT constructs and behavioural intention to use technology: A conceptual paper. *Australian journal of business and management research*, *3*(2), 14-23.

Abutabenjeh, S., & Jaradat, R. (2018). Clarification of research design, research methods, and research methodology: A guide for public administration researchers and practitioners. Teaching Public Administration, 36(3), 237-258.

Achor, E. E., Jack, G. U., & Uzomah, T. N. Use of Context-Based Learning Strategy and Secondary Students' Academic Achievement in Physics.

African Union. (2015). *Agenda 2063: The Africa we want*. Retrieved from https://au.int/en/agenda2063/overview

Agarwal, R., & Prasad, J. (1998). The antecedents and consequents of user perceptions in information technology adoption. *Decision support systems*, *22*(1), 15-29.

Aguirre-Urreta, M. I., & Hu, J. (2019). Detecting common method bias: Performance of the Harman's single-factor test. ACM SIGMIS database: the DATABASE for Advances in Information Systems, 50(2), 45-70.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control: From cognition to behavior* (pp. 11-39). Berlin, Heidelberg: Springer Berlin Heidelberg.

Ajzen, I., & Fisbbein, M. (1974). Factors influencing intentions and the intention-behavior relation. *Human relations*, *27*(1), 1-15.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Prentice-Hall.

Akaranga, S. I., & Makau, B. K. (2016). Ethical considerations and their applications to research: A case of the University of Nairobi. *Journal of educational policy and entrepreneurial research*, *3*(12), 1-9.

Alowayr, A. (2022). Determinants of mobile learning adoption: extending the unified theory of acceptance and use of technology (UTAUT). *The International Journal of Information and Learning Technology*, *39*(1), 1-12.

Al-shami, S. S. A., Muhamad, M. R., Majid, I., & Rashid, N. (2019). Women's entrepreneurs' micro and small business performance: insights from Malaysian microcredit. *International Journal of Entrepreneurship and Small Business*, *38*(3), 312-338.

Alshehri, M., Drew, S., Alhussain, T., & Alghamdi, R. (2012). The Effects of Website Quality on Adoption of E-Government Service: An Empirical Study Applying UTAUT Model Using SEM. *arXiv preprint arXiv:1211.2410*.

Amusa, J.O., & Ayanwale, M. A. (2021). Partial Least Square Modeling of Personality Traits and Academic Achievement in Physics. Asian Journal of Assessment in Teaching and Learning, 11(2), 77-92. https://doi.org/10.37134/ajatel.vol11.2.8.2021

Anthony Jr, B., Kamaludin, A., & Romli, A. (2023). Predicting academic staffs' behaviour intention and actual use of blended learning in higher education: Model development and validation. *Technology, Knowledge and Learning*, *28*(3), 1223-1269.

Arenas-Gaitán, J., Peral Peral, B., & Ramón Jerónimo, M. (2015). Elderly and internet banking: An application of UTAUT2. Journal of Internet Banking and Commerce, 20 (1), 1-23.

Attuquayefio, S., & Addo, H. (2014). Using the UTAUT model to analyze students' ICT adoption. *International Journal of Education and Development using ICT*, *10*(3).

Ayanwale, M. A. (2023). Evidence from Lesotho Secondary Schools on Students' Intention to Engage in Artificial Intelligence Learning, IEEE AFRICON, Nairobi, Kenya, 2023, pp. 199-204, doi: 10.1109/AFRICON55910.2023.10293644

Ayanwale, M. A., Molefi, R. R., & Matsie, N. (2023). Modeling secondary school students' attitudes toward TVET subjects using social cognitive and planned behavior theories. Social Sciences & Humanities Open, 8(1), 100478.

Ayanwale, M. A., Mosia, P. A., Molefi, R. R., & Shata, L. (2023). Reliability components of online teaching and learning tools in Lesotho higher education institutions: A systematic review. Pertanika Journal of Science and Technology, 31(1), 595–614. https://doi.org/10.47836/pjst.31.1.34

Ayanwale, M.A, Sanusi, I.T., Adelana, O.P., Aruleba, K., & Oyelere, S.S. (2022). Teachers' Readiness and Intention to Teach Artificial Intelligence in Schools. Computers and Education: Artificial Intelligence, 3: 1-11. https://doi.org/10.1016/j.caeai.2022.100099

Ayanwale, M.A. & Molefi, R.R. (2024). Exploring intention of undergraduate students to embrace chatbots: from the vantage point of Lesotho. Int J Educ Technol High Educ 21, 20 (2024). https://doi.org/10.1186/s41239-024-00451-8

Ayanwale, M.A. & Oladele, J.I. (2021). Path Modeling of Online Learning Indicators and Students' Satisfaction during Covid-19 Pandemic. International Journal of Innovation, Creativity and Change, 15(10), 521-541. https://www.ijicc.net/images/Vol_15/Iss_10/151038_Ayanwale_2021_E1_R.pdf.

Ayanwale, M.A., Frimpong, E.K., Opesemowo, O.A.G, & Sanusi, I.T. (2024). Exploring factors that support pre-service teachers' engagement in learning Artificial Intelligence. Journal for STEM Education. DOI: 10.1007/s41979-024-00121-4.

Ayanwale, M.A., Molefi, R.R., & Liapeng, S. (2024). Unlocking educational frontiers: Exploring higher educators' adoption of google workspace technology tools for teaching and assessment in Lesotho dynamic landscape. Heliyon Journal. HLY_e30049

Baraldi, A. N., & Enders, C. K. (2010). "An introduction to modern missing data analyses." *J Sch Psychol* 48 (1): 5–37. https://doi:10.1016/j.jsp.2009.10.001

Batucan G. B, Gonzales G. G, Balbuena M. G, Pasaol K. R. B, Seno D. N. and Gonzales R. R. (2022). An Extended UTAUT Model to Explain Factors Affecting Online Learning System Amidst COVID-19 Pandemic: The Case of a Developing Economy. Front. Artif.Intell.5: 768831.doi:10.3389/frai.2022.768831

Bellamy, C. (2011). Principles of methodology: Research design in social science.

Bhaskar, R. (2013). *A realist theory of science*. Routledge.

Birch, A., & Irvine, V. (2009). Preservice teachers' acceptance of ICT integration in the classroom: Applying the UTAUT model. *Educational media international*, *46*(4), 295-315.

Blayone, T. (2018). Re-examining digital-learning readiness in higher education: Positioning digital competencies as key factors and a profile application as a readiness tool. In *International Journal on E-Learning* (Vol. 17, No. 4, pp. 425-451). Association for the Advancement of Computing in Education (AACE).

Cabellos, B., Siddiq, F., & Scherer, R. (2024). The moderating role of school facilitating conditions and attitudes towards ICT on teachers' ICT use and emphasis on developing students' digital skills. Computers in Human Behavior, 150, 107994.

Cambridge Assessment International Education. (2022). *Cambridge IGCSE ICT 0417 syllabus*. Cambridge University Press. https://www.cambridgeinternational.org

Camilleri, M. A. (2024). Factors affecting performance expectancy and intentions to use ChatGPT: Using SmartPLS to advance an information technology acceptance framework. Technological Forecasting and Social Change, 201, 123247.

Candra, S., Frederica, E., Putri, H. A., & Loang, O. K. (2024). The UTAUT approach to Indonesia's behavioral intention to use mobile health apps. *Journal of Science and Technology Policy Management*.

Casteel, A., & Bridier, N. L. (2021). DESCRIBING POPULATIONS AND SAMPLES IN DOCTORAL STUDENT RESEARCH. *International Journal of Doctoral Studies*, *16*(1).

Chawla, D., & Sodhi, N. (2011). *Research methodology: Concepts and cases*. Vikas Publishing House.

Chere-Masupha, J. & Makafane, D. (2021). COVID-19 crisis and teachers' micro politics of online learning in one tertiary education institution in Lesotho: African perspective of Research in teaching and learning.

Collier, J. (2020). *Applied structural equation modeling using AMOS: Basic to advanced techniques*. Routledge.

Costan, E., Gonzales, G., Gonzales, R., Enriquez, L., Costan, F., Suladay, D., ... & Ocampo, L. (2021). Education 4.0 in developing economies: a systematic literature review of implementation barriers and future research agenda. *Sustainability*, *13*(22), 12763.

Creswell, J. (2018). Educational research: Planning, conducting and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River, NJ: Pearson Prentice Hall

Creswell, J. W. (2021). *A concise introduction to mixed methods research*. SAGE publications.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. Technological Forecasting and Social Change, 173, 121092.

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user

Department of Education. (2009). *Curriculum and assessment policy*. Government Publisher. :https://planipolis.iiep.unesco.org/sites/default/files/ressources/lesotho_curriculum_and_assessment_policy_framework.pdf

Deslauriers, L., McCarty, L. S., Miller, K., Callaghan, K., & Kestin, G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. Proceedings of the National Academy of Sciences, 116(39), 19251-19257.

Dong, Y., & Peng, C. Y. J. (2013). Principled missing data methods for researchers. *SpringerPlus, 2*, 1-17.

Ďuranová, L., Ohly, S., Ďuranová, L., & Ohly, S. (2016). Empirical findings. *Persistent Work-related Technology Use, Recovery and Well-being Processes: Focus on Supplemental Work After Hours*, 35-59.

Elbeck, M., & Bacon, D. (2015). Toward universal definitions for direct and indirect assessment. Journal of Education for Business, 90(5), 278-283. https://doi.org/10.1080/08832323.2015.1034064

Examinations Council of Lesotho. (2023). *IGCSE results 2015 - 2023*.

Ezeuduji, I. O. (2013). Nigerian tourists to South Africa: challenges, expectations and demands. *Acta Commercii*, *13*(1), 1-9.

Fauzi, A., Baharun, H., Mundiri, A., & Manshur, U. (2018, November). E-Learning in pesantren: Learning transformation based on the value of pesantren. In *Journal of Physics: Conference Series* (Vol. 1114, No. 1, p. 012062). IOP Publishing.

Findley, M. G., Kikuta, K., & Denly, M. (2021). External validity. *Annual Review of Political Science*, *24*(1), 365-393.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 18(3), 382–388

Friedman, L., Stern, H., Brown, G. G., Mathalon, D. H., Turner, J., Glover, G. H., ... & Potkin, S. G. (2008). Test–retest and between-site reliability in a multicenter fMRI study. *Human brain mapping*, *29*(8), 958-972.

Gillwald, A., Mothobi, O., & Deen-Swarray, M. (2017). The State of ICT in Lesotho.

Gómez-Fernández, N., & Mediavilla, M. (2021). Exploring the relationship between Information and Communication Technologies (ICT) and academic performance: A multilevel analysis for Spain. *Socio-Economic Planning Sciences*, *77*, 101009.

Google. (n.d.). Lesotho [Google Maps]. Retrieved September 4, 2023, from

Gorjón, L., & Osés, A. (2022). The negative impact of ICT overuse on student performance: evidence from OECD countries.

Greene, W. H. (2012). 201 1. Econometric Analysis.

Gupta, K., & Arora, N. (2020). Investigating consumer intention to accept mobile payment systems through unified theory of acceptance model: An Indian perspective. *South Asian Journal of Business Studies*, *9*(1), 88-114.

Habibi, A., Yaakob, M. F. M., & Sofwan, M. (2022). Student use of digital libraries during COVID-19: Structural equation modelling in Indonesian and Malaysian contexts. *The Electronic Library*, *40*(4), 472-485.

Hague, C., & Payton, S. (2010). *Digital literacy across the curriculum* (Vol. 4, No. 1, pp. 1-63). Bristol: Futurelab.

Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. European business review, 26(2), 106-121.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Sage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (2nd ed.). Sage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (3rd ed.). Sage.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2016). PLS-SEM: Indeed a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139-151.

Hair, J.F., Black, W.C., Babin, B.J. & Anderson, R.E. (2010) Multivariate Data Analysis. 7th Edition, Pearson, New York.

Hameed, F., Qayyum, A. & Khan, F.A. (2024). A new trend of learning and teaching: Behavioral intention towards mobile learning. J. Comput. Educ. 11, 149–180. https://doi.org/10.1007/s40692-022-00252-w

Hammarberg, K., Kirkman, M., & de Lacey, S. (2016). Qualitative research methods: when to use them and how to judge them. *Human Reproduction, 31*(3), 498-501.

Hardman, J., & Ntlhoi, T. (2021). Online Quizzes as Mediating Tools for Teaching Information Communication Technology to First Year Students at a College of Education in the Developing Context of Lesotho. *Asia Research Network Journal of Education*, *1*(2), 50-60. Retrieved from https://so05.tci-thaijo.org/index.php/arnje/article/view/251470

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. Industrial Management & Data Systems, 116(1), 2–20

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics, & P. N. Ghauri (Eds.), Advances in international marketing (Vol. 20, pp. 277–320).

Henseler, J., Ringle, C.M. & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. J. of the Acad. Mark. Sci. 43, 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hlojeng, M. A., & Makura, A. H. (2020). Out-of-school factors contributing towards academic underachievement of vulnerable learners in lesotho high schools. *Proceedings of ADVED, 2020*(6th).
https://images.app.goo.gl/1YyRztfRv7RKdzJ86
Humphries, C., & Truman, B. (2017). Re-thinking social research: Research in an unequal world. In *Re-thinking social research* (pp. 1-20). Routledge.

Hunde, M. K., Demsash, A. W., & Walle, A. D. (2023). Behavioral intention to use e-learning and its associated factors among health science students in Mettu university, southwest Ethiopia: Using modified UTAUT model. Informatics in Medicine Unlocked, 36, 101154.

IBM Corp. (2020). IBM SPSS Statistics for Windows (Version 26.0) [Computer software]. IBM Corp.

IBM Corporation. (2021). IBM SPSS Statistics for Windows (Version 28.0) [SPSS]. IBM Corporation. https://www.ibm.com/products/spss-statistics

Igwenagu, C. (2016). *Fundamentals of research methodology and data collection*. LAP Lambert Academic Publishing.

Johnson, R. B., & Christensen, L. (2020). *Educational research: Quantitative, qualitative, and mixed approaches (7th ed).* United States: Sage Publications, Inc.
Jöreskog, K. G. (1973). LISREL 8: Structural equation modeling with the SIMPLIS command language. *Scientific Software International*.

Kalavani, A., Kazerani, M., & Shekofteh, M. (2018). Acceptance of evidence based medicine (EBM) databases by Iranian medical residents using unified theory of acceptance and use of technology (UTAUT). *Health Policy and Technology*, *7*(3), 287-292.

Kang, P. (2013). Locally linear reconstruction based missing value imputation for supervised learning. *Neurocomputing*, *118*, 65-78.

Khama, D. (2018). Church and state relations in the development of education system in Lesotho: A Historical Perspective. M. Lekhetho. Educationina comparative and globalizing world education in Lesotho: Prospects and Challenges, 13-32.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.

Kock, N. (2023). Using logistic regression in PLS-SEM: Dichotomous endogenous variables. *Data Analysis Perspectives Journal*, *4*(4), 1-6.

Lai, D. C., Lai, I. K., & Jordan, E. (2009). An extended UTAUT model for the study of negative user adoption behaviours of mobile commerce.

Lakhal, S., Khechine, H., & Pascot, D. (2013). Student behavioural intentions to use desktop video conferencing in a distance course: integration of autonomy to the UTAUT model. *Journal of Computing in Higher Education*, *25*, 93-121.

Lekhetho, M. (2003). The impact of the education management system on the effectiveness of secondary schools in Lesotho. Unpublished doctoral thesis. University of South Africa, Pretoria, South Africa.

Lekhetho, M. (2018). Education in Lesotho: An overview. M. Lekhetho. Education in Lesotho: Prospects and Challenges, 1-11.

Marikyan, D. & Papagiannidis, S. (2023) Unified Theory of Acceptance and Use of Technology: A review. In S. Papagiannidis (Ed), TheoryHub Book. Available at https://open.ncl.ac.uk / ISBN: 9781739604400

Maruyama, G. (1997). Basics of structural equation modeling. Sage.

Maxfield, M. G., & Babbie, E. R. (2017). *Research methods for criminal justice and criminology*. Cengage Learning.

Mellinger, C. D., & Hanson, T. A. (2020). Methodological considerations for survey research: Validity, reliability, and quantitative analysis. *Linguistica Antverpiensia, New Series–Themes in Translation Studies*, *19*.

Meta-Analysis of Past Research with Recommendations for Modifications and Future

Ministry of Education and Training (2009). Curriculum and Assessment Policy: Education for individual and social development. Maseru: MoET

Ministry of Education and Training (2016). Education Sector Plan 2016 - 2026: Maseru: MoET

Ministry of Education and Training (2022). Lesotho Basic Education Curriculum Policy. Maseru: MoET

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of cardiac anaesthesia*, *22*(1), 67-72.
Mishra, S. B., & Alok, S. (2022). Handbook of research methodology.

Mohd, H. A. O., Muhammad Y. Y., & Nur S. I. (2023). Use and behavioural intention using digital payment systems among rural residents: Extending the UTAUT-2 model, Technology in Society, Volume 74, Available at: https://doi.org/10.1016/j.techsoc.2023.102305.

Mohd, N. I., A. Iahad, N., Yusof, A. F., & A. Al-Sharafi, M. (2022). AI-based chatbots adoption model for higher-education institutions: A hybrid PLS-SEM-neural network modeling approach. *Sustainability*, *14*(19), 12726.

Mokotso, R. I. (2020). New Lesotho integrated curriculum: the missed but not lost opportunity for decoloniality of religious education. *Pharos Journal of Theology*, *101*(1), 1-9.

Molefi, R.R. & Ayanwale, M.A. (2023). Using composite structural equation modeling to examine high school teachers' acceptance of e-learning after Covid-19. New Trends and Issues Proceedings on Humanities and Social Sciences. 10(1), 01-11. https://doi.org/10.18844/prosoc.v10i1.8837

Mosisili. P. B. (1981). A curriculum development process: The Lesotho experience. Unpublished MEd thesis. Burnaby: Simon Faser University.

Mushonga, M. (2017). Government, community and the university in Africa today: the case of the National University of Lesetho (Doctoral dissertation, University of the Free State).

Mutebi, R. (2019). *The readiness of Lesotho high schools' management teams to implement The Curriculum and Assessment Policy of 2009* (Doctoral dissertation, University of the Free State).

Nassar, A. A., Othman, K., & Nizah, M. A. B. M. (2019). The impact of the social influence on ICT adoption: Behavioral intention as mediator and age as moderator. *International Journal of Academic Research in Business and Social Sciences*, *9*(11), 963-978.

Ndibalema, P. (2022). Constraints of transition to online distance learning in Higher Education Institutions during COVID-19 in developing countries: A systematic review. *E-learning and digital media*, *19*(6), 595-618.

Nketekete, M. E. & Motebang, M. B. (2008). Entrepreneurship education in Lesotho secondary schools: Pedagogic challenges. Education, Knowledge and Economy.

Nketekete, M. E. (2021). A Discourse Analysis of Accounting Syllabuses to Assess the Extent of Curriculum Change: The Case of Lesotho General Certificate of Secondary Education. International Journal of Educational Reform, 10567879211064870.

Okagbue, E. F., Ezeachikulo, U. P., Nchekwubemchukwu, I. S., Chidiebere, I. E., Kosiso, O., Ouattaraa, C. A. T., & Nwigwe, E. O. (2023). The effects of Covid-19 pandemic on the education system in Nigeria: The role of competency-based education. International Journal of Educational Research Open, 4, 100219.

Oketch-Oboth, J. W. (2021). Online Learning Challenges, Stress Experience and Coping Strategies Among University Students During the Lockdown Due to COVID-19 Pandemic. *Journal of Pedagogy, Andragogy and Heutagogy in Academic Practice*, *2*(1), 15-27.

Oludipe, D. I. (2012). Gender difference in Nigerian junior secondary students' academic achievement in basic science. *Journal of educational and social research*, *2*(1), 93-99.

Oluwajana, D., Idowu, A., Nat, M., Vanduhe, V., & Fadiya, S. (2019). The adoption of students' Hedonic motivation system model to gamified learning environment. Journal of Theoretical and Applied Electronic Commerce Research, 14(3), 156–167

perceptions and behavioral impacts. International Journal of Man-Machine Studies, 38 (3),

Persada, S. F., Miraja, B. A., & Nadlifatin, R. (2019). Understanding the Generation Z Behavior on D-Learning: A Unified Theory of Acceptance and Use of Technology (UTAUT) Approach. *International Journal of Emerging Technologies in Learning*, *14*(5).
Peterson, S. (2021). Case study of gravity-fed mountain spring tap system in Ha Leronti, Lesotho, Africa.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Queirós, A., Faria, D., & Almeida, F. (2017). Strengths and limitations of qualitative and quantitative research methods. *European Journal of Education Studies*, *3*(9), 369-387.

Radovan, M., & Kristl, N. (2017). Acceptance of Technology and Its Impact on Teachers' Activities in Virtual Classroom: Integrating UTAUT and CoI into a Combined Model. *Turkish Online Journal of Educational Technology-TOJET*, *16*(3), 11-22.

Radovanović, D., Holst, C., Belur, S. B., Srivastava, R., Houngbonon, G. V., Le Quentrec, E., ... Noll, J. (2020). Digital Literacy Key Performance Indicators for Sustainable Development. Social Inclusion, 8(2), 151-167. https:// doi.org/10.17645/si.v8i2.2587

Rahman, M., Ismail, I., Bahri, S., & Rahman, M. K. (2022). An empirical analysis of cashless payment systems for business transactions. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 213.

Rahmaningtyas, W., Mulyono, K. B., Widhiastuti, R., Fidhyallah, N. F., & Faslah, R. (2020). Application of UTAUT (Unified Theory of Acceptance and Use of Technology) to understand the acceptance and use of the e-learning system. *International Journal of Advanced Science and Technology*, *29*(4), 5051-5060.

Raselimo, M., & Mahao, M. (2015). The Lesotho curriculum and assessment policy: Opportunities and threats. *South African Journal of Education*, *35*(1), 1-12.

Raselimo, M., & Thamae, C. G. (2018). Content analysis of the LGCSE Geography and Sesotho syllabi for alignment with the Lesotho Curriculum and Assessment Policy. South African Journal of Education, 38(3).

Reddy, P., Chaudhary, K. C., Sharma, B. N., & Chand, R. (2022). Talismans of digital literacy: A statistical overview. *The Electronic Journal of eLearning*, *20*(5), 570-587.

Research. Journal of Consumer Research, 15 (3), 325.

Ringle, C. M., Wende, S., & Becker, J.-M. (2024). SmartPLS 4. Bönningstedt: SmartPLS. Retrieved from https://www.smartpls.com/

Salifu, I., Arthur, F., Arkorful, V., Abam Nortey, S., & Solomon Osei-Yaw, R. (2024). Economics students' behavioural intention and usage of ChatGPT in higher education: a hybrid structural equation modelling-artificial neural network approach. Cogent Social Sciences, 10(1). https://doi.org/10.1080/23311886.2023.2300177

Sanusi, I.T., Ayanwale, M.A., & Tolorunleke, A.M. (2024). Investigating pre-service teachers' artificial intelligence perception from the perspective of planned behavior theory. Computers and Education: Artificial Intelligence. https://doi.org/10.1016/j.caeai.2024.100202

Schumacker, R. E., & Lomax, R. G. (2004). A beginner's guide to structural equation modeling. psychology press.

Sebatane, E. M. (2003). *Developing an ECCD Teacher Training Curriculum in Lesotho as Part of a College Education Program* (Doctoral dissertation, University of Victoria).

Senkbeil, M. (2022). ICT-related variables as predictors of ICT literacy beyond intelligence and prior achievement. Education Information Technology 27, 3595–3622 (2022). https://doi.org/10.1007/s10639-021-10759-x

Sewandono, R. E., Thoyib, A., Hadiwidjojo, D. *et al.* (2023). Performance expectancy of E-learning on higher institutions of education under uncertain conditions: Indonesia context. *Educ Inf Technol* 28, 4041–4068 (2023). https://doi.org/10.1007/s10639-022-11074-9

Shafi, A. S., & Weerakkody, V. (2009, January). Understanding citizens' behavioural intention in the adoption of e-government services in the state of Qatar. In *ECIS* (Vol. 1, pp. 1618-1629).

Sheppard, B. H., Hartwick, J. & Warshaw, P. R. (1988). The Theory of Reasoned Action: A

Showkat, N., & Parveen, H. (2017). In-depth interview. *Quadrant-I (e-text)*, 1-9.
Simelane, S. S., & eDE, M. (2006). The University of.

Sitar-Taut, D. A., & Mican, D. (2021). Mobile learning acceptance and use in higher education during social distancing circumstances: An expansion and customization of UTAUT2. *Online Information Review*, *45*(5), 1000-1019.

Stock, J. H., & Watson, M. W. (2015). Introduction to econometrics (3rd updated edition). *Age (X3)*, *3*(0.22).

Šumak, B., & Šorgo, A. (2016). The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre-and post-adopters. *Computers in Human Behavior*, *64*, 602-620.

Sürücü, L., & Maslakci, A. (2020). Validity and reliability in quantitative research. *Business & Management Studies: An International Journal*, *8*(3), 2694-2726.

Szopiński, T., & Bachnik, K. (2022). Student evaluation of online learning during the COVID-19 pandemic. *Technological forecasting and social change*, *174*, 121203.

Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental designs using ANOVA* (Vol. 724). Belmont, CA: Thomson/Brooks/Cole.

Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics (Vol. 5, pp. 481-498). Boston, MA: pearson.

Tan, G. W. H., Ooi, K. B., Leong, L. Y., & Lin, B. (2014). Predicting the drivers of behavioral intention to use mobile learning: A hybrid SEM-Neural Networks approach. *Computers in Human Behavior*, *36*, 198-213.

Taolane, B. M. (2023). Integrating Information and Communication Technologies into the teaching and learning of science in Lesotho [Unpublished doctoral thesis]. Bloemfontein: University of the Free State. Available at: <https://scholar.ufs.ac.za/server/api/core/bitstreams/d62fc92b-0bf6-403e-80ec-4f13ad57993d/content> [Accessed on 10 January 2024]

Tarhini, A., Hone, K., Liu, X., & Tarhini, T. (2017). Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: a structural equation modeling of an extended technology acceptance model. *Interactive Learning Environments*, *25*(3), 306-328.

Thelejane, T.S. (1990). Implementing educational policies in Lesotho. Washington, D.C.: World Bank.

Tummons, J., & Duckworth, V. (2012). *Doing your research project in the lifelong learning sector*. McGraw-Hill Education (UK).

Ufomba, H. U. (2020). The African union development agenda 2063: can Africa get it right? Brazilian Journal of Development, 6(8), 62626-62648.

Upadhyay, N., Upadhyay, S., & Dwivedi, Y. K. (2022). Theorizing artificial intelligence acceptance and digital entrepreneurship model. *International Journal of Entrepreneurial Behavior & Research*, *28*(5), 1138-1166.

Varpio, L., Paradis, E., Uijtdehaage, S., & Young, M. (2020). The distinctions between theory, theoretical framework, and conceptual framework. *Academic Medicine, 95*(7), 989–994. https://doi.org/10.1097/ACM.0000000000003075

Veal, R. G. (2020). *Construct and predictive validity of the Psychopathy Checklist: screening version in a violent offender population in Australia* (Doctoral dissertation, Swinburne).

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, *46*(2), 186-204.
Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly.

Wagner, J. M., Norris, R. A., Van Dillen, L. R., Thomas, F. P., & Naismith, R. T. (2013). Four square step test in ambulant persons with multiple sclerosis: validity, reliability, and responsiveness. International Journal of Rehabilitation Research, 36(3), 253-259.

Wahyuni, D. (2012). The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of applied management accounting research*, *10*(1), 69-80.

Wan, H., Tang, L., Zhong, Z., & Cao, Q. (2020). Transit Traditional Face-to-Face Teaching to Online Teaching during the Outbreak of COVID-2019. In *2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)* (pp. 355-362). IEEE.

Wang, C. Y., Chou, S. C. T., & Chang, H. C. (2010). Exploring an individual's intention to use blogs: The roles of social, motivational and individual factors.

Warshaw, P. R., and Davis, F. D. (1985). Disentangling behavioral intention and behavioral expectation. J. Exp. Soc. Psychol. 21, 213–228. doi:10.1016/0022-1031(85)90017-4

Wong, K. K. K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing bulletin*, *24*(1), 1-32.

Zhao, L., Tian, L., Cai, T., Claggett, B., & Wei, L. J. (2013). Effectively selecting a target population for a future comparative study. *Journal of the American Statistical Association, 108*(502), 527-539.

Zhou, Tao & Lu, Yaobin & Wang Bin. (2010). "Integrating TTF and UTAUT to explain mobile banking user adoption". Comput. Human Behav. vol 26. pp. 760–767.

3.6 Ethical Declaration

Ethical approval for this study was obtained from the Faculty of Education Review Board at the National University of Lesotho (Approval No.: EDU/23/ICT-001). In conducting this research, we strictly adhered to fundamental ethical principles to ensure the protection of participants' rights and maintain the integrity of our study. Prior to data collection, we secured approval from the Ministry of Education and Training as well as from the principals of all participating schools. Additionally, we sought parental or guardian consent for all student participants, ensuring that they fully understood the purpose of the study and their involvement. We upheld the principle of informed consent by clearly explaining the objectives of the research, the voluntary nature of participation, and the right to withdraw at any stage without any repercussions. Each participant provided written consent before proceeding with the questionnaire. To maintain confidentiality, no personally identifiable information was collected, and all responses were anonymized to prevent any traceability to individual participants. The collected data was securely stored, with access restricted solely to the research team to ensure data security and prevent unauthorized access. Furthermore, we emphasized voluntary participation, ensuring that no student felt coerced or obligated to participate. Participants had the freedom to discontinue their involvement at any point if they felt uncomfortable. Throughout the study, we complied with international research ethics standards by maintaining transparency in our processes, respecting participants' rights, and ensuring that all data collected was handled responsibly.

APPENDICES

Appendix A: Introduction letter

The National University of Lesotho

Telephone: +266 22340601

P.O. Roma 180
Lesotho

Faculty of Education

26th May 2023

_____

_____

_____

RE: Letter of introduction

This letter introduces **Mr. Tumelo Alphoncy Motai,** Student Number **(199600174)** registered in the Faculty of Education for a master's degree program. He is assigned work to collect information on a topic of interest to his study to blend his theory and practice. He will explain the topic of interest to you and will follow all ethical protocols to protect the institution and human participants in the study. He will share with you the following, information letter for

participants detailing the objectives of the study and ethical protocols that would help you make informed consent.

I will be glad if he gets the support needed to complete his study program.

Yours Sincerely

Paseka A. Mosia (D.Ed.)
Associate Professor of Inclusive Education
Dean, Faculty of Education
Cell: +26658969867
Email: mosia296@gmail.com / pa.mosia@nul.ls

Appendix B: Questionnaire

Predicting secondary school students' intention and actual learning in Information and Communications Technology education using the Composite Based Structural Equation Modeling

This survey aims to predict the intention and actual learning of secondary school students in ICT education. The researcher will examine various factors, including performance expectancy, social influence, facilitating conditions, and effort expectancy, to understand their impact on students' intentions and learning outcomes in ICT education.

Please rest assured that your participation is entirely voluntary, and all the information you provide will be treated confidentially. The data collected will be used solely for the purpose of this research work. Your valuable input is greatly appreciated, and the survey is expected to take approximately 15 to 20 minutes of your time.

Thank you for your valuable time and participation in this study.

Tumelo Motai (Mr.)
Principal investigator.

☐
☐

☐
☐
☐

☐
☐
☐

Section A: Demographic Data

Grade level: Grade 10 ☐

Grade 11 ☐

Age group: 10 – 13 years ☐

14 – 17 years ☐

17 years and above ☐

Gender: Male ☐

Female ☐

Prefer not to say

Prior knowledge of ICT education: Yes

No

Learner ICT Proficiency: Beginner

Intermediate

Advanced

School type: Public school

Mission school

Private school

School location/region: North

Central

South

Section B:

Directions:

Please indicate your level of agreement or disagreement with each of these statements related to ICT education at your school. Place an "**x**" or a "✓ " in the box of your answer.

Statements	Strongly agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Performance expectancy to learn ICT education						
1. I believe learning ICT education is important for my studies.						

2. I believe learning ICT education will help me in my future studies.						
3. I believe learning ICT will earn me a good job in the future.						
4. I believe my age is an advantage for me to learn ICT education.						
5. My classmates believe that learning ICT education will help them in their future studies.						
6. I believe that if there are enough computers at my school, I will learn ICT education.						
7. I believe that ICT teachers at my school will assist me in learning ICT education.						

Statements	Strongly agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Social influence to learn ICT education						
1. Parents, teachers and classmates will support me to learn ICT education in future						
2. Parents, teachers and classmates believe that learning ICT education will help me in my future studies						

3. Parents, teachers and classmates believe that learning ICT will earn me a good job in the future						
4. Parents, teachers and classmates believe that my age is an advantage in learning ICT education						
5. Parents and teachers will support me and classmates to learn ICT education in the future						
6. Me and my classmates believe that learning ICT will help us in our future studies						
7. Parents and teachers believe that enough computers at school will help us to learn ICT education						
8. Me and my classmates believe that ICT teachers will assist us in learning ICT education						

Statements	Strongly agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Facilitating condition to learn ICT education						
1. I am motivated to learn ICT education						
2. Learning ICT education will motivate me in my future studies						
3. Learning ICT will motivate me in earning me a good job in the future						

4. My age motivates me to learning ICT education						
5. I am motivated to learn ICT education with my classmates						
6. My classmates are motivated to learn ICT their future studies						
7. ICT teachers are motivated assisting me in learning ICT education						
8. There are enough computers at my school to motivate me to learn ICT education						

Statements	Strongly agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Effort expectancy to learn ICT education						
1. I will easily learn ICT education in future						
2. Learning ICT education will easily help me in my future studies						
3. Learning ICT will easily earn me a good job in the future						

4. My age is an advantage for me to easily learn ICT education						
5. It is easy to learn ICT education with my classmates						
6. My classmates believe that learning ICT will easily help them in their future studies						
7. There are enough computers at my school for me to easily learn ICT education						
8. ICT teachers at my school will easily assist me in learning ICT education						

Statements	Strongly agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Behavioural intention to learn ICT education						
1. I intend to learn ICT education in future						
2. Learning ICT education will help me in my future studies						

3. Learning ICT will earn me a good job in the future						
4. Learning ICT will earn me a good job in the future						
5. My age is an advantage for me in learning ICT education						
6. I intend to learn ICT education with my classmates in future						
7. My classmates believe that learning ICT will help them in their future studies						
8. There are enough computers at my school for me to learn ICT education						
9. ICT teachers at my school assist me in learning ICT education						

Statements	Strongly agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Actual Learning of ICT education						
1. The use of interactive multimedia in ICT classes enhances my understanding of complex concepts.						

2. Integrating real-life projects and practical applications in ICT education makes the learning experience more engaging and relevant.						
3. Regular assessments and feedback in ICT classes help me track my progress and identify areas for improvement.						
4. Access to up-to-date hardware and software in the school's computer lab improves my technical skills in ICT.						
5. Collaborative projects and group activities in ICT classes foster teamwork and communication skills.						
6. The inclusion of coding and programming modules in the curriculum prepares me for future careers in technology-related fields.						

Your participation in this survey is highly appreciated.

Thank you.

Appendix C: Email correspondence with research unit at ECoL

TM

Tumelo Motai

To: Khauta Mokoma

Tue 11/7/2023 9:08 AM

Cc: Maneo Mohale

Good morning Ntt Mokoma.

I am undertaking a research study at the National University of Lesotho. The research is on:

"Predicting Lesotho high school learners' intention and actual learning in ICT using the Structural Equation Modelling technique"

I therefore request data on the performance of schools that offer ICT from 2015 till 2022. Your assistance will be greatly appreciated.

Regards,

Maneo Mohale

To: Tumelo Motai; Khauta Mokoma

Tue 11/7/2023 12:21 PM

Ntate Mokoma,
Kindly assist with the requested data.
Regards!

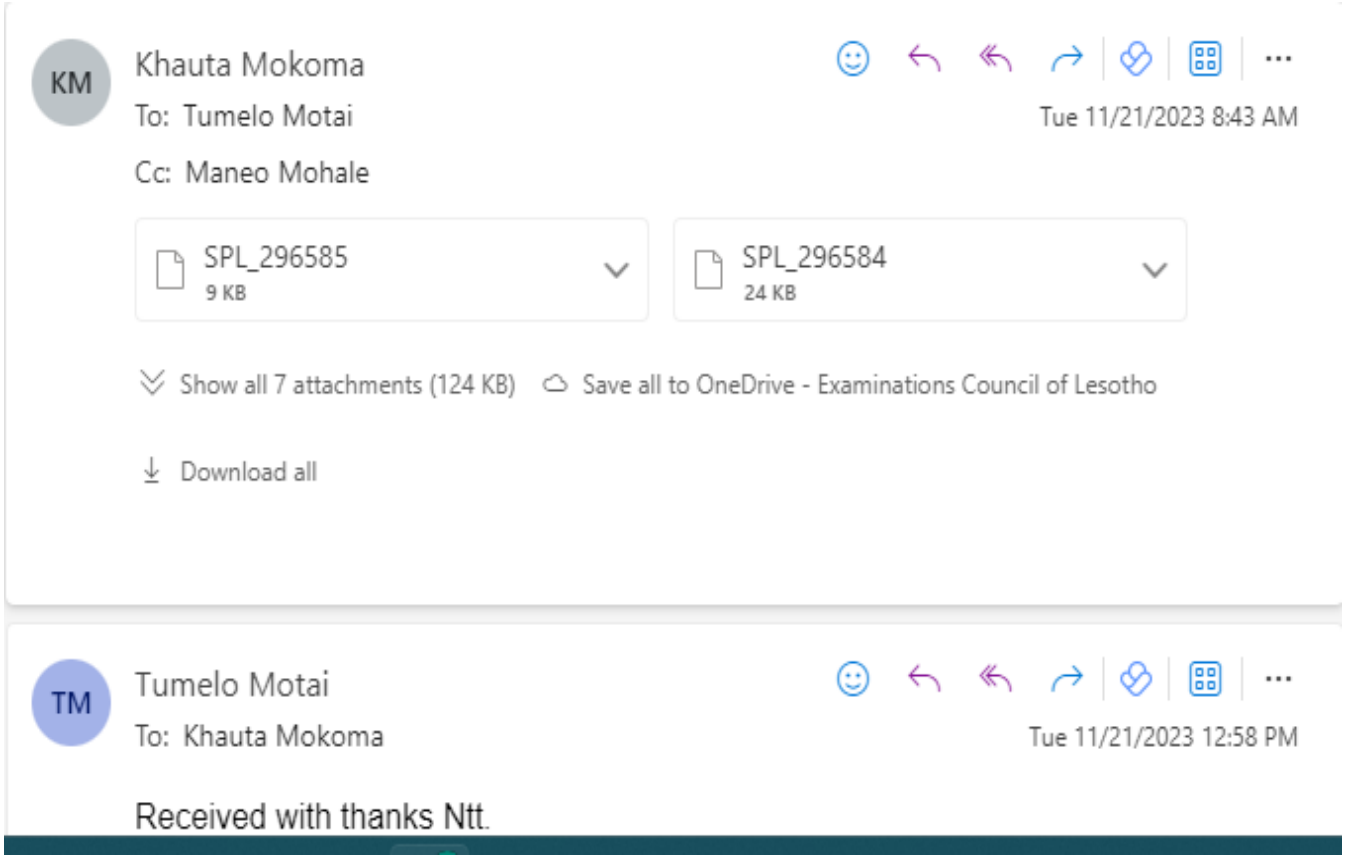
Ms. Maneo Mohale

Manager : Research & Statistics, Examinations Council of Lesotho

T: +266 22312880 | T: +266 52300146 | M: +266 62008084

E: mohalem@examscouncil.org.ls | W: www.examscouncil.org.ls

50 Constitution Road, Maseru 100, Lesotho


KM
Khauta Mokoma
To: Tumelo Motai
Cc: Maneo Mohale
Tue 11/21/2023 8:43 AM
SPL_296585
9 KB
SPL_296584
24 KB
Show all 7 attachments (124 KB)
Save all to OneDrive - Examinations Council of Lesotho
Download all
TM
Tumelo Motai
To: Khauta Mokoma
Tue 11/21/2023 12:58 PM
Received with thanks Ntt.

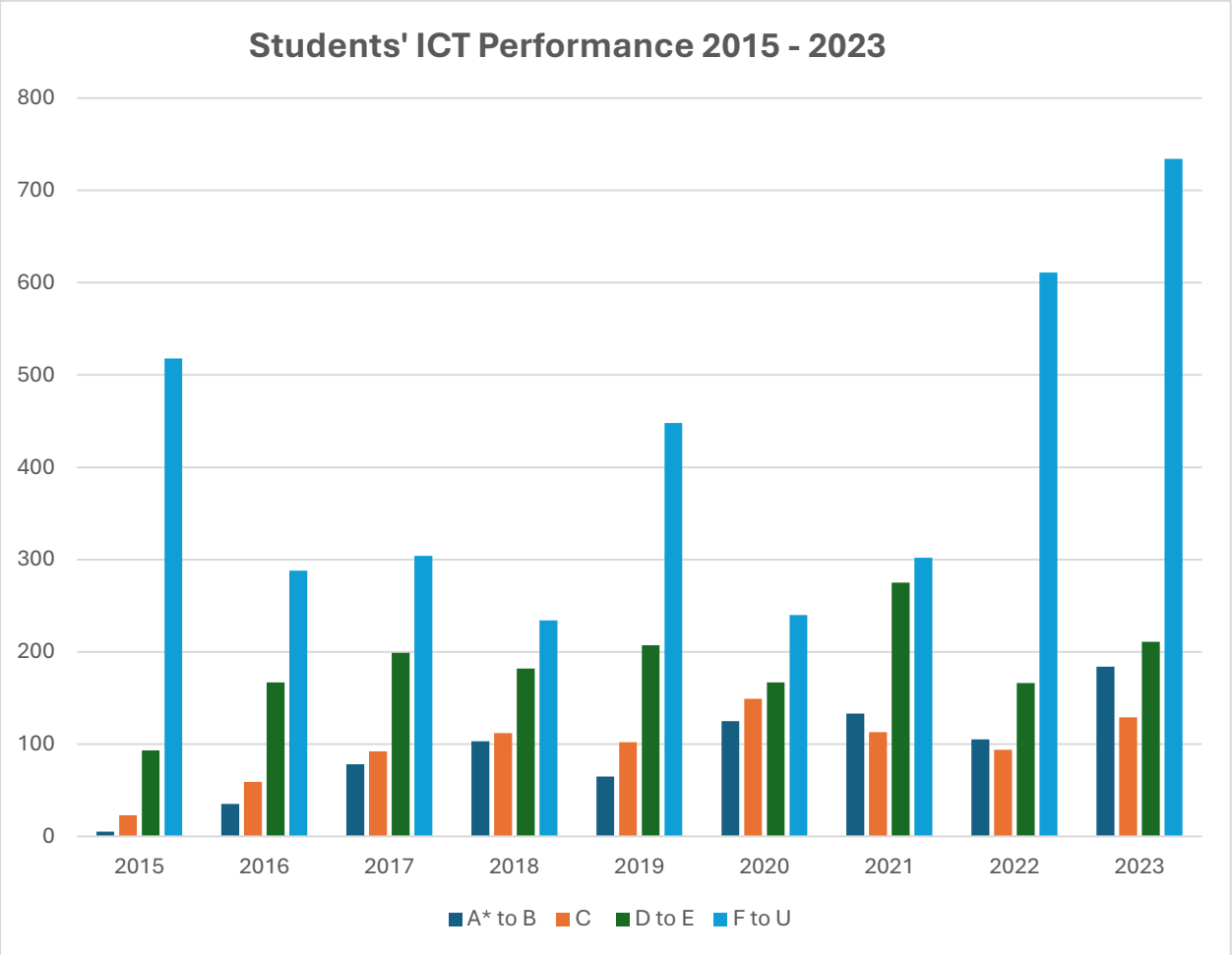
Appendix D: Table of ICT schools per district

Districts	No of ICT schools per year per district								
	2015	2016	2017	2018	2019	2020	2021	2022	2023
Butha-Buthe	1	1	1	1	1	1	1	1	1
Leribe	5	4	5	5	5	5	6	9	11
Berea	1	0	0	0	0	1	0	0	1
Maseru	4	3	3	3	5	5	6	8	10
Mafeteng	0	0	0	0	0	1	2	3	4
Mohale’s Hoek	0	1	1	1	1	2	2	3	3
Quthing	0	0	0	0	0	1	1	1	1
Qacha’s Nek	0	0	0	0	0	0	0	0	0
Thabatseka	0	0	0	0	0	0	0	0	0
Mokhotlong	0	0	0	0	0	0	0	0	0
Total number of schools	**11**	**9**	**10**	**10**	**12**	**16**	**18**	**25**	**31**

Appendix E: Table of ICT education performance 2015 – 2023

	Grade Boundaries			
Years	A* to B	C	D to E	F to U
2015	5	23	93	518
2016	35	59	167	288
2017	78	92	199	304
2018	103	112	182	234
2019	65	102	207	448
2020	125	149	167	240
2021	133	113	275	302
2022	105	94	166	611
2023	184	129	211	734

Appendix F: Graphical presentation of ICT education performance from 2015 – 2023



Appendix G: Proofreading certificate

ERRCD Forum

Motto: *Rethinking Education Research for Inclusive Development*

Our ref..... *Date...*29/07/2024

www.errcd.com
langeditor@errcd.com
Phone Numbers: +270640534022
6A, Stuart Street, Harrismith, South Africa

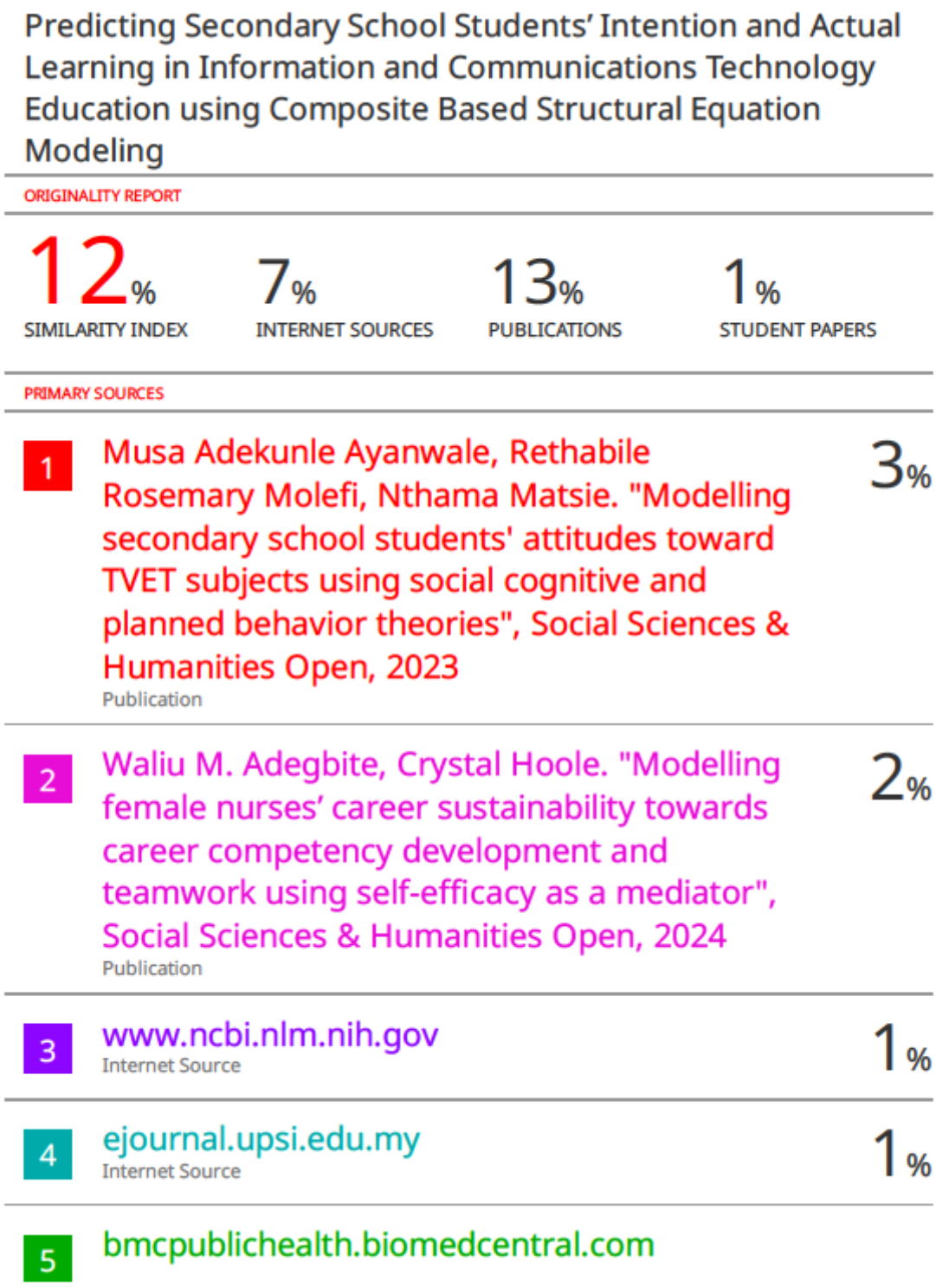
TO WHOM IT MAY CONCERN

This letter confirms that Mr. Tumelo Alphoncy Motai's dissertation titled **"Predicting Secondary School Students' Intention and Actual Learning in Information and Communications Technology Education using Composite Based Structural Equation Modelling"** was edited by a professional English-language editing staff at Education Research and Rural Community Development Forum.

For further information, feel free to contact langeditor@errcd.com

English-language Editor
B. A. & M. A. English and Literary Studies

Appendix H: Plagiarism Report



Predicting Secondary School Students' Intention and Actual Learning in Information and Communications Technology Education using Composite Based Structural Equation Modeling

ORIGINALITY REPORT

12%	7%	13%	1%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Musa Adekunle Ayanwale, Rethabile Rosemary Molefi, Nthama Matsie. "Modelling secondary school students' attitudes toward TVET subjects using social cognitive and planned behavior theories", Social Sciences & Humanities Open, 2023 Publication	3%
2	Waliu M. Adegbite, Crystal Hoole. "Modelling female nurses' career sustainability towards career competency development and teamwork using self-efficacy as a mediator", Social Sciences & Humanities Open, 2024 Publication	2%
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