

UNIVERSITY OF EDUCATION, WINNEBA

**DEAF STUDENTS' ADOPTION OF LEARNING MANAGEMENT SYSTEM
AT THE UNIVERSITY OF EDUCATION, WINNEBA**



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DEAF STUDENTS' ADOPTION OF LEARNING MANAGEMENT SYSTEM AT
THE UNIVERSITY OF EDUCATION, WINNEBA

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of the requirements for the award of the degree of
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OCTOBER, 2025

DECLARATION

Students' Declaration

I, **Clement Otsiabah**, hereby declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

Signature:

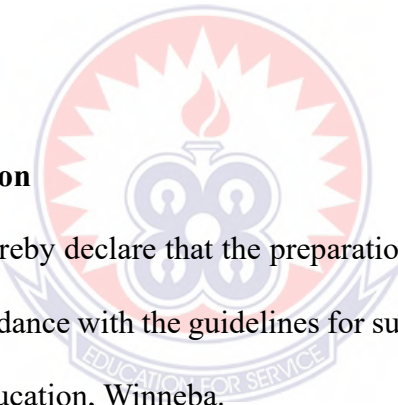
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Supervisors' Declaration

I, **Dr. Frank Twum**, hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.

Signature:

Date:



DEDICATION

I dedicate this work to myself and my family.



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I thank the Lord Almighty for granting me the strength and good health which has brought me this far. To Him be the glory. I am again thankful to my research supervisor, Dr. Frank Twum for his support, flexibility, and patience throughout the period of this study.

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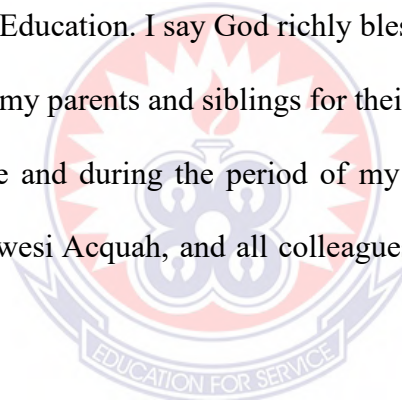
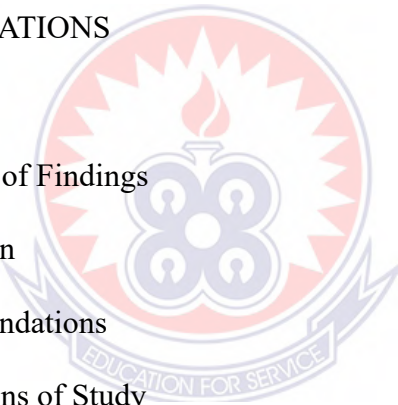


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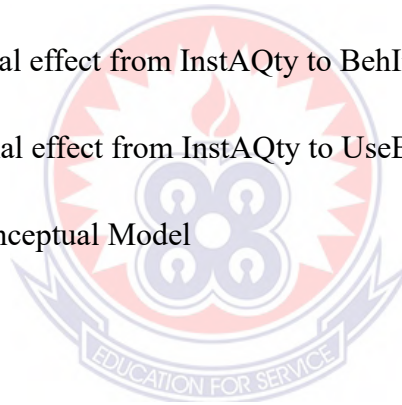
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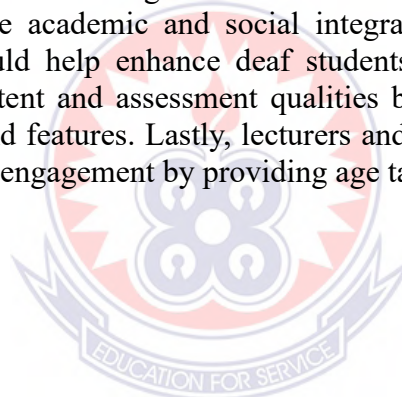
LIST OF ABBREVIATIONS/ ACRONYMS

LMS	-	Learning Management System
UEW	-	University of Education, Winneba
PerfEx/PE	-	Performance Expectancy
EffEx/EE	-	Effort Expectancy
SocInflx/SI	-	Social Influence
FacCond/FC	-	Facilitating Conditions
InstAQty/IAQ	-	Instructional Assessment Quality
InfoQty/IQ	-	Information Quality
BehInt/BI	-	Behaviour Intention
UseBeh/UB	-	Use Behaviour



ABSTRACT

This study investigated deaf students' usage nature on learning management system and the determinants of their engagement with the system. Guided by three research objectives, quantitative approach was adopted and a descriptive correlational design was utilized. Data was gathered from 65 undergraduate deaf students using a questionnaire. Descriptive techniques and regression-based path analysis were employed to analyse participants' responses while ensuring all required ethical protocols. Study revealed; first, a moderate level of LMS usage by deaf students with commonly engaged activities for individual coursework (assignments, accessing materials) while collaborative learning was less used. Secondly, performance expectancy, effort expectancy, and facilitating conditions had direct and indirect significant effect on deaf students' LMS use behaviour while information and instructional assessment qualities informed LMS use only through their behaviour intention, while social influences did not. Thirdly, age moderated the LMS adoption, with younger deaf students' intentions and use behaviours more sensitive on performance expectancy, effort expectancy, and social influence than older deaf students, while gender only moderated performance expectancy and social influence for male deaf students. The study recommended that; deaf students be encouraged to use LMS for more than accessing course materials but as medium to interact and collaborate to facilitate academic and social integration. Also, lecturers and LMS service providers should help enhance deaf students' intention and use behaviour through improved content and assessment qualities by ensuring more inclusive and accessible materials and features. Lastly, lecturers and LMS service providers should enhance deaf students' engagement by providing age tailored strategies.



CHAPTER ONE

1.1 Background to the study

The increased desire to incorporate technology into higher education across a different of fields of study has been realized through the advanced development in the internet and mobile technologies (Azumah, 2016; Hew & Cheung, 2013; Pramana, 2018; Su et al., 2010). Due to the increase in the accessibility to information, knowledge in the digital era and the necessity for the continuation of education in contemporary times, e-learning has become an important integral learning option. Al-Busaidi (2012) defined E-learning as the delivery of learning, training, and assessment through digital resources, which can be web-based, computer-based, or virtual classroom. In light of the significant influence of these applications on higher education in contemporary contexts (Gilroy, 2010; Kunicina et al., 2012), it is essential for institutions to strategically implement e-learning. One of the commonly adopted e-learning platforms is the Learning management systems (LMS), a web-based software programme designed to contain information about users, course and content used to plan, implement, manage, and provide a place for learning process without depending on the time and space boundaries (Sharma, & Vatta, 2013). Most used LMS in the sub-Saharan Africa regions including Ghana are; Sakai, Moodle, Blackboard, and KEWL (Azumah, 2016; Buabeng-andoh & Baah, 2020; Dampson, 2021; Mtebe, 2015).

The University of Education, Winneba (UEW) is one of the tertiary institutions in Ghana that had provide higher education for both hearing and deaf students in the same programme for over 20 years. Deaf students and their hearing colleagues are both exposed to same curriculum, associated materials, and technologies to enhance both their academic and non-academic experience as they journey through the education career. Deaf students are equally adopting the learning management system as their

hearing colleagues in their educational activities and realized the benefit from using these technologies (Emereole, 2022, Khwaldeh, 2011). However, though there are specific tailored learning management systems for deaf students (Emereole, 2022), the majority of learning management system are mostly designed with the hearing student as main targets (Abdallah et al., 2019; Alshawabkeh et al., 2021; Emereole, 2022; Noble, 2010).

These LMS platforms though are widely recognised as tools that can promote inclusive education by providing equitable access to instructional resources and supporting diverse learning needs (Al-Azawei, Serenelli, & Lundqvist, 2016; Burgstahler, 2015). Nonetheless, students with disabilities, particularly deaf students, often encounter significant barriers in such digital learning environments, including limited access to captioning services, inadequate sign language interpretation, and poorly designed instructional content (Abdallah et al., 2019; Alshawabkeh et al., 2021; Noble, 2010; Kent, 2015). These barriers can constrain meaningful engagement and reduce the likelihood of sustained LMS use. However, there is a need to ensure that deaf students in higher education have equal and equitable access to e-learning activities specifically using the learning management system by understanding their usage nature and what informs their adoption, to facilitate its crucial role in enhancing deaf students' educational experience and inclusivity (Kuncoro, Viverita, Hati, & Chalid, 2016; Mohammed, 2023).

Several empirical studies on the adoption of e-learning in higher education institutions have been conducted globally (Kunicina et al., 2012; Lloyd & Robertson, 2012; Bauk, 2015; Dunlap & Lowenthal, 2013). Some of these investigations have explored the nature of students' use of learning management systems (LMS), while others have examined the factors influencing the adoption, success, and utilization of

LMS in higher education. Additionally, certain studies have focused on identifying the barriers and challenges associated with the adoption of learning management systems.

Learning management systems adoption behaviour had showed a myriad of influences as determinant to students' acceptance and usage (Aslan, 2021). Performance expectancy, facilitating conditions, effort expectancy, and social influential factors are some identified factors among others (Binyamin, Rutter, & Smith, 2018; Li, Du, Wang, & Oteng-Darko, 2022). Additionally, usability factors as investigated by scholars are the quality factors which are instructor quality, information quality, system quality, and service quality have also been revealed to influence the adoption of e-learning platform and other technologies by students and other users of a system.

In the adoption of LMS for academic tasks, studies have revealed that demographics factors such as age, gender, users' experience, and voluntary use play crucial effects to influence students' behaviour intention and usage of the technology (Izkair & Lakulu, 2023; Kacorri et al., 2015; Mensah & Onyancha, 2021; Owolabi, 2013; Yadegaridehkordi & Iahad, 2012). There exist interesting and complex differences between male and females in the adoption of technologies for academic tasks, social life, and professional tasks as explored by various studies (Kemp & Grieve, 2014; Liu et al., 2021; Sobieraj & Krämer, 2020; Zhou & Xu, 2007;). These differences had been exploited and found to be influenced by factors such as their digital competencies, motivation, their engagement, and the perceived support received during their adoption of these learning management systems. Studies had revealed that females tend to have a higher self-regulated learning skill and value online learning more than males, which help them plan, monitor, and evaluate their online learning activities (Liu et al., 2021). Similarly, it had be found that males tend to have higher digital

competence and participate more actively and visibly in online learning (Vishnu et al., 2022) which affect their confidence and ease or effort expectancy of use of LMS than their female counterparts. Also, females tend to perceive less teacher support and feedback more than males in online settings, which affect their satisfaction and achievement (Zhou & Xu, 2007). These disparities can have implications for the design, implementation, and evaluation of LMS, as well as for the teaching and learning strategies that are used in online courses. Hence, it is important to consider the gender differences and needs of online learners, and to adopt inclusive and equitable practices that can enhance their online learning experience and outcomes for both males and females.

1.2 Statement of the problem

The increasing in the adoption of LMS in university education has fuelled the expansion of educational opportunities of students everywhere at anywhere, anytime and at pace that benefits both instructors and learners (Adzharuddin, 2013; Afful & Boateng, 2023; Mtebe, 2015; Quansah & Essiam, 2021) and the University of Education, Winneba is one of the institutions utilizing the LMS for academic works. However, for the past two successive academic years, UEW has seen decline in the adoption of the LMS and most of the instructional activities have reverted to the conventional face-to-face method. This contradicts Abumalloh et al., (2021) and Li and Lalani (2020) that postulated that the significant change in global education systems to online education during the pandemic are expected to remain even in the post-pandemic era. This decline in the use of the LMS by university could arise from the low usage by students; including deaf students who are stakeholders in the implementation of LMS.

The researcher as a MPhil student and doubling as a resource staff at the department of special education, a preliminary observation done suggests that deaf students may face unique challenges in fully utilizing LMS tools for educational tasks due to barriers in communication, content accessibility, and instructional design. These barriers encountered by deaf could be attributed to their academic needs as interpreting, captioning, and technical assistance (Burgstahler, 2015; Emereole, 2022; Nobel, 2010) and with the absence of such supports during the online learning activities it could lead to deaf students' indecisive usage of the learning management platform which could affect their academic performance and discontinuity of the LMS adoption in the university.

Despite the growing body of research on LMS adoption in higher education, existing studies in Ghana have largely focused on the general (hearing) student population (Ansong et al., 2017; Buabeng-Andoh, 2018; Buabeng-Andoh & Baah, 2020; Dampson, 2021; Boateng & Tindi, 2022; Quansah & Essiam, 2021) and student with visual impairment (Offei, 2021). Similarly, study conducted on deaf students at the tertiary institution by Emereole (2022) focused on building an intelligent LMS for deaf and did not examine the actual usage of the LMS by the deaf students.

The utilization of LMS by deaf students remain under-researched at UEW and as Burgstahler (2015) and Seale (2014) argued that with the frequently encountered systemic barriers in digital learning environments by students with disabilities including deaf students, inclusive technology studies must move beyond generalised assumptions to consider the experiences of specific disability groups and which in this context are the deaf students.

In particular, little is known about the specific activities deaf students perform on LMS platforms and the frequency with which they engage in these activities. While

prior studies have documented LMS usage patterns among hearing students (Buabeng-andoh, 2018; Buabeng-andoh & Baah, 2020; Dampson, 2021; Quansah & Essiam, 2021), such findings cannot be generalised to deaf students because of differences in communication modalities and academic support requirements. The absence of accessible learning features, such as captioned multimedia content and interpretation services, has been shown to negatively influence engagement and lead to the discontinuance of e-learning systems among deaf students (Alshehri et al., 2020; Abdallah et al., 2019; Alshawabkeh et al., 2021). Therefore, examining the nature and extent of LMS usage among deaf students is essential for assessing the inclusiveness and effectiveness of the platform in supporting their learning needs.

Furthermore, the determinants of LMS adoption among deaf students remain poorly understood. Although theoretical frameworks such as the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology have been widely applied to explain technology adoption behaviours, their application to students with deaf, particularly within developing country contexts, remains limited (Davis, 1989; Venkatesh et al., 2003; Batista & García, 2023). Additionally, critical system-related factors such as usability, information quality, and instructional assessment quality, which are known to influence e-learning adoption (DeLone & McLean, 2003; Opoku et al., 2020), have not been sufficiently examined in relation to deaf students' LMS adoption in Ghanaian universities.

Moreover, the potential moderating role of demographic characteristics, such as age and gender, in shaping LMS adoption among deaf students has not been adequately explored. Existing studies on learning management system adoption suggest that demographic variables can significantly influence users' perceptions, attitudes, and behavioural intentions (Venkatesh et al., 2003; Tarhini et al., 2016). Nonetheless,

empirical evidence regarding the interaction of these factors with the distinct experiences of deaf learners within inclusive digital learning environments is lacking, more particularly from a developing country.

Therefore, with all these gaps identified, there is a cogent need for an empirical investigation of LMS adoption among deaf students at the UEW. Specifically, this study sought to (1) ascertain the usage activities of deaf students on the LMS, (2) examine the predictors influencing their adoption of the LMS, and (3) analyse the moderating effects of demographic factors (age and gender) on the LMS adoption. By addressing these objectives, the study aims to generate context-specific insights that will inform inclusive e-learning design, policy formulation, and institutional practices, thereby enhancing equitable access and participation in higher education for deaf students in Ghana.

1.3 Purpose of Study

The purpose of the study was to investigate the usage activities of deaf students on the learning management system and the factors that predicted their adoption at the University of Education, Winneba.

1.4 Research objectives

The following objectives were raised as focal guide for the study;

1. To ascertain the usage activities on the LMS by deaf students at UEW.
2. To examine the predictors of LMS adoption by deaf students at UEW.
3. To analyse the moderating effect of demographics (age and gender) on LMS adoption by deaf students at UEW.

1.5 Research questions

The study sought to answer the following questions

1. What are the usage activities on the LMS by deaf students' at UEW?
2. What are the predictors of LMS adoption by deaf students at UEW?
3. What are the moderating effects of demographics (age, gender) on the adoption of LMS by deaf students at UEW?

1.6 Significance of study

This study is significant in addressing the limited empirical attention given to the adoption and use of Learning Management Systems (LMS) among deaf students in Ghanaian higher education. While existing research has examined LMS adoption among the general student population, there is a paucity of disability-specific evidence, particularly regarding how deaf students engage with LMS platforms. By focusing on the University of Education, Winneba (UEW), this study provides context-specific insights into the usage activities, adoption behaviours, and experiences of deaf students in an inclusive university setting.

First, this study contributes to the existing body of knowledge by generating empirical evidence on the nature and frequency of LMS usage activities among deaf students. Understanding how these students interact with LMS tools (such as accessing course materials, participating in discussions, and submitting assignments) is essential for evaluating the inclusiveness and effectiveness of the platform in supporting their learning needs of students with disabilities. This directly addresses the existing gap in the literature, where deaf students' engagement patterns remain largely undocumented.

Second, the study examines the predictors influencing LMS adoption among deaf students, drawing on established theoretical frameworks, such as the Technology

Acceptance Model and the Unified Theory of Acceptance and Use of Technology. By doing so, it extends the application of these models to a population that has been underrepresented in technology adoption research, particularly within developing country contexts. The findings will provide a deeper understanding of the technological, instructional, and accessibility-related factors that shape deaf students' adoption of LMS.

Third, this study analysed the moderating effects of demographic characteristics, specifically age and gender, on LMS adoption among deaf students. This offers nuanced insights into how individual differences influence technology use within this group, thereby contributing to a more differentiated and inclusive understanding of the adoption of e-learning.

The findings of this study will be valuable to university administrators, policymakers, and instructional designers. By highlighting the specific needs and challenges of deaf students, this study will inform the design and implementation of more accessible, inclusive, and user-centred LMS environments. This includes improving features such as captioning, sign language integration, and accessible instructional materials, thereby promoting equitable participation in digital learning environments.

Furthermore, the study will support higher-education institutions in Ghana and similar contexts in developing evidence-based policies and practices that ensure the inclusion of students with hearing impairments in technology-mediated learning. By providing insights into the shared and unique needs of deaf and hearing students, this study contributes to fostering an inclusive digital learning ecosystem that aligns with broader educational equity goals.

Finally, this research adds to the growing body of literature on inclusive education and educational technology by foregrounding the experiences of deaf students, an often-overlooked group in LMS adoption studies. This study advances scholarly discourse on disability-inclusive e-learning and provides a foundation for future research in this area.

1.7 Delimitation

The study was first delimited to the deaf students in UEW and did not include other tertiary institutions that provide education for deaf students because University of Ghana in the Greater Accra region which is in a different geographical area and uses LMS platform (Sakai) which is different from the LMS platform used by UEW and including deaf students from this university had the tendency of influencing the study since they are exposed to different environment and academic experiences. Similarly, Takoradi Technical University also accommodate deaf students but had no LMS platform for e-learning activities thus were not factored to be included in the study. University of Education, Winneba among them had been providing education for deaf and hearing students inclusively longer and currently is the university with the highest population of deaf students and also the geographical location of these institutions would have an influence on the behaviour of the deaf students in that institution.

The study was further delimited to the deaf students in Six departments which are Special Education department, Basic education department, Early grade department, Art education department, Graphic design department and HPSEERS department of the University of Education, Winneba because these were the department who had deaf students enrolled in at least one of the programmes they offered.

The study was further delimited to students from Level 200 through Level 400 as result of them being active students who had use the UEW-LSM at least once for eLearning activities. Students with other form of disabilities than deafness were exempted from the study. This was done because the study intended to study the adoption behaviour of deaf students exempting their colleagues with or without any form of disability. Although there are other department who had provided education for deaf students in previous years but were not included in the study because during the time for the study there was no deaf students currently enrolled in any of their programmes thus were exempted.

1.8 Definition of terms

Adoption: refers to the behaviour intention to use and the use behaviour towards a learning technology in the daily activities of students in the university.

Deaf/deaf student: to the undergraduate student with complete loss of functionality of their hearing mechanism and rely on additional support such as interpreting and content adaptation to be able to fully access, participate and benefit from educational activities.

e-learning: is the type of academic education, training, knowledge sharing, and assessment that is conducted online over the internet for students and faculty members to ensure the continuation of academic tasks and sessions.

Learning Management System (LMS): Learning management system is a software application that enables and facilitate tertiary academic institutions to create, manage, and deliver online learning content for the purpose of continuing education, training and professional and skills development.

Technology adoption: refers to the process of integrating software and service applications into existing systems or practices. It involves individuals, recognizing the

potential benefits of a particular technology and deciding to incorporate it into their lifestyles.

1.9 Layout of the study

This study comprised of five chapters. Chapter 1 presented a background to the study, statement of the problem, purpose of the study, research objectives, research questions and hypotheses, significance of the study, delimitations, definitions of terms, and organization of the remainder of the study. Chapter 2 consists of theoretical and conceptual frameworks and a thorough and relevant review of literature focused on the research objectives raised and topics on technology acceptance and usage theory in relation to the problem identified. Chapter 3 presented the methodological procedures used in the study which comprised the philosophical underpinning, research approach and design, population, sample and sampling procedures, instrumentation, data collection procedure, data analysis, validity and reliability issues, and ethical considerations. Chapter 4 comprised the analysis of data collected presentation of the study's findings and also answered the hypotheses raised. Discussion of the findings from the study was also made situating it to the literature and theory. Finally, chapter 5 provided summaries to the study findings and the theoretical implications of the study, recommendations and suggestions for future research.

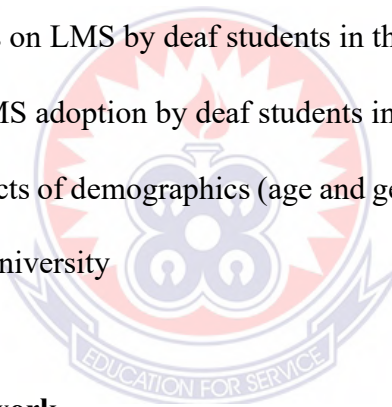
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The study aimed at investigating the frequency of learning management system usage by deaf students and factors that informed deaf students' adoption of the learning management system in the university. This chapter, provide the conceptual model which guided the study and review of relevant related literature based on the objectives of the study. The following are the strands under which literature was reviewed;

- Theoretical framework
- Conceptual model
- Usage Activities on LMS by deaf students in the university
- Predictors of LMS adoption by deaf students in the university
- Moderating effects of demographics (age and gender) on LMS adoption by deaf students in the university



2.2 Theoretical framework

In the context of this study, the adoption of an appropriate theoretical framework is essential for fostering a comprehensive understanding of the factors influencing the adoption of learning management system among deaf students in the university from a developing country like Ghana. Considering the widespread adoption of learning management systems globally and their capacity to improve productivity and efficiency of students (Rankapola, 2022) it is essential to understand the behaviours exhibited by deaf students in adoption of these technologies in a less technological regions, like UEW in Ghana. Theories of technology acceptance have been extensively examined by scholars in numerous studies concerning online learning and the use of electronic

learning technologies, with the objective of facilitating their integration within educational settings (Mutsvunguma, 2019). The choice of a theoretical framework that offers an organized method for researching the phenomenon being studied is a basic element of any academic study.

The Unified Theory of Acceptance and Use of Technology [UTAUT] model formed the theoretical basis for the current study. The UTAUT model is a technology-driven model developed by Venkatesh et al., in 2003. The UTAUT model describes the fundamental concepts that can improve the successful use of technology in any organization. According to Bhatiasevi (2016), UTAUT model effectively fosters a comprehensive understanding of technology adoption and integration inside an organization. This theory was chosen due to its potency to provide more clarity for the technology acceptance among users of a technology across various institutions than other similar theories, making it an excellent fit for this research (Bhatiasevi, 2016). As argued by Venkatesh et al. (2003), various previous technology acceptance models have described the adoption of technology only at 40 percent among the technology users however UTAUT could explain up to 70 percent of the factors that influence the intention and use behaviour of technology users. The UTAUT model offers a robust framework for analysing the intention and use of technology within organizations. The systematic integration of eight key theories distinguishes UTAUT as a comprehensive and theoretically grounded model capable of explaining the utilization of various learning management systems in diverse contexts. By employing UTAUT, researchers can gain valuable insights into the factors that influence the intention to use and actual use of learning management systems among deaf students in the university (Venkatesh et al., 2012).

The UTAUT model provides in-depth clarification on why people accept and use technology efficiently, regardless of the elements that influence its use; thus, UTAUT is substantial and significantly dependable to back any study (Bhatiasevi, 2016) and as scholars asserted that the utility, appropriateness, comprehensiveness, and reliability of the UTAUT model contribute to the acceptance and utilization of technology for effective curriculum delivery in institutions of higher education, particularly in the current digital era (Holtz & Krein, 2011; Jeng & Tzeng, 2012). Moreover, several studies have employed UTAUT to validate its efficacy in understanding the intention and use of technology such as LMS for learning activities in diverse educational contexts within higher education institutions (Evans, 2013; Owolabi, 2016; Quadri & Garaba, 2019) but its utilization in the context of deaf students is still understudied.

2.3 Conceptual Framework

The researcher adapted the UTAUT model (Venkatesh et al., 2003) by including two usability qualities which are Information Quality [IQ] and Instructional Assessment Quality [IAQ] (Binyamin, 2019; DeLone & McLean, 2003) and removing the moderating variables (experience and voluntariness of use) to investigate the adoption of the LMS by deaf students as learning platform to enhance efficient and continuous education. This theory and the usability qualities is essential to explained deaf students' adoption of the LMS to foster learning in higher institutions, and also provide insight into how to design and implement this platform to ensure effective use, positive attitude, and benefit to all stakeholders.

UTAUT composites eight earlier technology acceptance models, such as the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), and

Innovation Diffusion Theory (IDT) into a unified framework that predicts technology use behaviour (Ventakatesh et al., 2003) through four core constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions which influence Behaviour Intention and Use Behaviour. The original model also identifies demographic and experiential moderators such as gender, age, experience, and voluntariness of use. However, for the context of this study, the four original UTAUT constructs were retained and this was because they addressed key perceptual and contextual factors influencing technology use.

Performance Expectancy (PE) refers to a user's belief that utilizing technology to perform a task will enhance their performance; Effort Expectancy (EE) represents the perceived ease with which a user can employ technology to accomplish a function; Social Influence (SI) describes a user's perception of the importance of technology in performing a task, influenced by social factors such as peers, instructors, and other important individuals the user deem esteem; and Facilitating Conditions (FC) pertain to the extent to which a user believes that organizational resources and support the use and adoption of such technology.

In addition, the model is extended with two usability context-specific constructs. Information Quality (IQ) which refers to the accuracy, clarity, timeliness, and accessibility of content within the LMS, which is crucial for deaf students who rely heavily on clear visual and textual information (Binyamin, 2019; DeLone & McLean, 2003). Instructional Assessment Quality (IAQ) looks at the extent to which the LMS provides fair, accessible, and meaningful assessment methods, including feedback formats that accommodate visual communication needs (Binyamin, 2019). Consistent with UTAUT, Behaviour Intention served as a mediating variable, linking the six independent variables to Use Behaviour. Also, the two demographic factors (age and

gender) from the original UTAUT model were retained as moderators to explore whether demographic differences influence adoption patterns among deaf students. By integrating both general technology acceptance factors and accessibility-specific educational quality measures, this adapted framework offers a comprehensive approach to understanding LMS adoption in the deaf student population. Figure 1.1 presents the conceptual model for this study from the adaptation of the UTAUT model with quality antecedents.

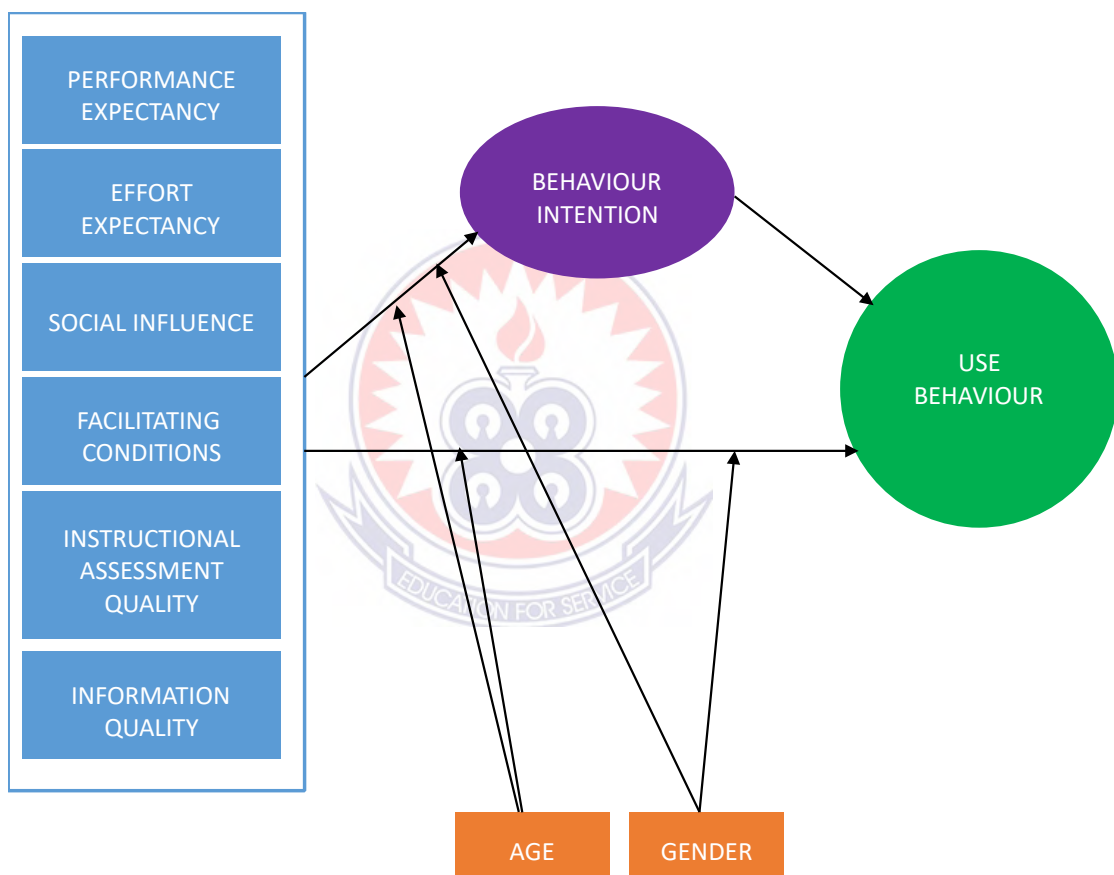


Figure 1.1: The Proposed Conceptual Model

2.4 Usage Activities on Learning Management System by Deaf Students in the University

The continuous and increasing integration of educational technologies in higher education, LMS have become fundamental tools for delivering and managing online

learning experiences such as providing students with access to course materials, interactive discussions, assessments, and real-time feedback, enabling flexible and self-paced learning (Liu & Yu, 2023). Research indicates that LMS usage patterns, such as login frequency, resource access, assessment taking, and participation in online discussions, are strong indicators of student engagement and academic performance (Nguyen et al., 2021). Understanding students' LMS activities and usage levels is essential for educators, system developers, and institution policy makers and management to assess learning behaviours, identify at-risk students, and develop data-driven interventions to enhance learning outcomes (Romero & Ventura, 2020) and through the examination of LMS activity and the use frequency of deaf students, understanding of the ways in which deaf students participate in digital learning platforms like learning management systems is had evident in literature.

There is a diverse and multifaceted usage nature of LMS use by university students, including used in accessing course materials, participating in discussion forums, submitting assignments, and collaborating on group projects (Al-Busaidi & Al-Shihi, 2010; Ifinedo, 2017; Machado & Tao, 2007).

Patel et al., (2022) evaluated the extent to which students interact with LMS features. The study revealed that 80% of students accessed LMS for assignment submissions, while 60% used it for tracking their grades. Interactive features like polls and surveys were less utilized, with only 25% of students engaging with them. Singh et al., (2023) explored LMS usage patterns among first-year university students. The study found that students commonly used LMS for viewing grades (80%), submitting assignments (85%), and accessing course announcements (90%). Interactive activities, such as participating in polls and discussion boards, were less common, with only 40% of students engaging.

Ahmed et al., (2021) explored the role of LMS in course management activities among university students. They found that 88% of students used LMS to check course schedules, access syllabi, and keep track of deadlines. About 72% of students utilized LMS for submitting assignments, while only 40% participated in peer review tasks. Garcia et al., (2021) also studied the prevalence of assessment activities in LMS usage. Findings showed that 85% of students frequently used LMS for taking online quizzes and submitting essays. About 60% of students utilized LMS to receive grades and feedback on assignments.

Johnson & Taylor, (2020) explored the extent of LMS usage among deaf students in online learning programs. Data collected from 80 participants indicated that 42% of students used LMS daily, while 38% accessed the system weekly. The study identified a preference for video-based modules with captions and interactive features such as quizzes and discussion boards. Brown et al., (2020) investigated the patterns of student activities on LMS at a large public university. The research showed that 92% of students used LMS to download course materials, 75% used it for exam preparation via online practice quizzes, and 56% engaged with multimedia resources such as video lectures. Only 28% of students utilized LMS tools for peer collaboration, such as group work or wikis.

Kim et al., (2019) investigated the use of LMS for collaborative projects. The study found that 68% of students used LMS tools like file sharing and group chat to collaborate on assignments, but only 45% used the platform for peer feedback activities. Aljedaani et al, (2021) investigated the e-learning experiences of deaf students at the Technical and Vocational Training Corporation in Saudi Arabia during the pandemic. This research highlighted usage trends among deaf students at the vocational training institutions. Most students used LMS platforms to download lecture notes (88%) and

track grades (72%), with lower participation in collaborative activities like group projects (25%). However, these deaf students faced challenges including lack of training and inadequate customization options for deaf learners. The study also revealed issues such as internet access problems, inadequate support, and inaccessible content within learning systems.

Drigas et al. (2005) study introduced an LMS tailored specifically for deaf learners by incorporating Greek Sign Language (GSL) videos corresponding to textual content. The system emphasized bilingual information delivery, high visualization, and interactive learning. Deaf students were found to frequently use the system for video lectures (89%) and peer discussions through video conferencing (65%). The system achieved high user engagement and this was attributed to the system catering for the visual and linguistic needs of deaf learners, which was found to be encouraging more frequent interactions with course materials. This enabled deaf students to access educational material in their native sign language aiding in address of the unique learning needs of deaf individuals, promoting lifelong vocational and educational training. National Deaf Centre in 2019 provided a guide which explored LMS accessibility challenges faced by deaf university students. Most students used LMS for accessing recorded lectures (87%) and assignment submissions (76%). Frequency of usage dropped for features like discussion boards (35%) due to the lack of sign language support.

Kumar et al., (2023) study focused on peer-to-peer communication tools within LMS platforms. Deaf students were found to actively engage in use of LMS chat features (70%) to discuss assignments, while only 40% participated in peer review activities. The limited frequency of group discussions was attributed to the absence of sign language integration in real-time communication tools. Ahmed & Hasegawa

(2022) also designed an LMS platform incorporating sign language translations for course materials. The platform supported frequent use of video-based content (92%), interactive quizzes (65%), and discussion boards (40%). Usage frequency increased when students had access to sign language videos accompanying textual instructions, emphasizing the importance of bilingual resources. Suryanto et al. (2024) investigated how deaf students used learning management systems (LMS) for online learning during the COVID-19 pandemic, with a particular focus on the difficulties experienced by these students. The key activities found included the use of the LMS in accessing course materials (95%), watching lecture recordings (85%), and submitting assignments (70%). However, only 30% of students used the LMS to participate in discussion forums. Challenges identified included the necessity to navigate multiple applications, lack of understanding of LMS functionalities, insufficient notifications, mismatched materials, unstable internet connections, and inadequate training on LMS usage. To overcome these barriers, students employed strategies such as self-study, submitting assignments email, seeking assistance from peers, utilizing additional applications, and participating in group discussions through platforms like WhatsApp.

2.5 Predictors of LMS Adoption by Deaf Students in the University

Numerous studies have examined the factors that influence an individual's urge to use a particular technology to facilitate the attainment of a specific objective (Adzharuddin, 2013; Afful & Boateng, 2023; Mtebe, 2015; Quansah & Essiam, 2021; Yakubu et al, 2020). Several determining factors for acceptance, integration and use of LMS in education has stemmed from several technology adoption research models and theories.

Review on studies on technology use in learning in the early stages of the 20th century, indicated that for technology-mediate learning to be a success, there certainly might be several issues influencing factors (Dilon & Gunawardena, 1995; Selim, 2007; Wan et al., 2007; Webster & Hackly, 1997). These influential factors identified were categorized under technology factors, learner factors, instructor factors, course factors, classmate factors, and institutional factors (Al-Busaidi, 2012). Park (2009) on “analysis of the technology acceptance model in understanding university students’ behavioural intention to use e-learning” also classified factors in the adoption of e-learning platforms into three main categories; organization factors, social influence factors, and technological factors (Park, 2009). Similarly, In the study "Learner's perspective on critical factors to LMS success in blended learning: An empirical investigation," Al-Busaidi (2012) also classified the factors that influence the adoption of learning management systems (LMSs) into six categories: learner characteristics, instructor characteristics, LMS or system characteristics, course characteristics, classmate (social) characteristics, and organization characteristics. However, in this study, the review of literature on determinants of the adoption of LMS by deaf students in the university are presented under four main categories; user factors, technology factors, social influence factors, and organization factors (Al-Busaidi, 2012; Park, 2009).

2.5.1 User factors

The adoption of Learning Management Systems (LMS) by students has been a significant area of research, particularly in the context of higher education (Zacharis, 2020). While various factors influence LMS adoption, user factors remain central to understanding students’ willingness and ability to engage with these platforms. User factors include perceived ease of use, which is comparable to effort expectancy,

perceived usefulness, a concept that is comparable to performance expectancy (Venkatesh et al., 2003), technology self-efficacy, motivation, attitude, and previous technology experience (Venkatesh et al., 2003; Venkatesh et al., 2012). These elements determine students' interaction with LMS and influence their adoption behaviours and understanding these factors allows educational institutions to design better strategies for LMS implementation, ensuring that students have the necessary support to adopt and engage with these digital learning platforms effectively (Giannini, 2023).

2.5.1.1 Performance and Effort Expectancies of the LMS Platform

The UTAUT model (Venkatesh et al. 2003) and the Technology Acceptance Model [TAM] (Davis, 1989) identifies two important factors that influence the adoption of technology: performance expectancy (perceived usefulness) and effort expectancy (perceived ease of use). Performance expectancy, also known as perceived usefulness, relates to how much users believe a system improves their performance, whereas effort expectancy, also known as perceived ease of use, measures how much a user believes utilizing a system will require (Davis, 1989; Venkatesh et al. (2003). Research has consistently demonstrated that students are more likely to adopt an LMS if they believe it to be user-friendly and helpful for their learning (Park, 2009; Tarhini et al, 2016; Abdullah & Ward, 2016).

The acceptance and satisfaction levels of faculty and students with Blackboard as an LMS in Jordanian universities were investigated by Jwaifell & Gasaymeh (2013) using a survey data from 400 participants. Performance expectancy and effort expectancy were the two important factors influencing acceptance of the LMS. Using the UTAUT model, Alharbi & Drew (2014) investigated the variables affecting the adoption of LMS in Saudi universities. Their study, involved a survey of 289 students and found that performance expectancy and effort expectancy were significant

predictors of LMS usage. According to these findings, students at Saudi universities were more likely to adopt LMS if they believed it would improve their academic performance. Similarly, the study by Mtebe and Raisamo (2014), with data gathered from 375 students extended the UTAUT model to examine behaviour intention for mobile LMS adoption among students in East Africa and the results revealed a comparable finding showing that students' behaviour intention to use LMS was significantly influenced by performance expectancy and effort expectancy. Using the UTAUT model as the framework for their study, Raman and Don (2013), investigated the acceptance of LMS among Malaysian distance learners with 410 students' data and analysed using structural equation modelling. The findings showed that the most critical predictors of distance education students' intention to use an LMS were performance expectancy and effort expectancy.

In 2020, Buabeng-Andoh and Baah developed and evaluated a model to determine the elements affecting students' real use of learning management systems. Using a survey, they collected data from 148 university students analysed with structural equation modelling to predict students' behaviour. The findings showed that performance and effort expectations had a positive effect on students' system usage. Samaila et al. (2022) examined postgraduate students' intention to use learning management systems in Malaysian universities. Performance expectancy and effort expectancy were also found to have a significant prediction on behaviour intention. This was also the case by Balogun et al. in 2023 on their study which examined students' thoughts about learning management systems and how this influenced their learning behaviour during the COVID-19 pandemic. With data from 303 students, they found that students' perceptions on the use of the LMS included enhancing their learning performance, was user-friendly, met their learning needs, and had a positive impact on

their academic performance. According to this, learning management systems can significantly improve students' learning habits and can be useful tool in remote learning situations.

2.5.1.2 Technological Self-Efficacy

Self-efficacy, particularly technological self-efficacy, plays a crucial role in LMS adoption (Al-Hattami, 2023). Students who are confident in their ability to use digital platforms are more likely to explore and adopt LMS for their learning activities (Bandura, 1997). According to recent research, technological self-efficacy positively impacts students' attitudes towards LMS and their actual use behaviour (Sun & Rueda, 2012). Furthermore, students with low self-efficacy may experience anxiety toward using LMS, leading to resistance in adoption (Chu & Chen, 2016).

Liaw (2008) examined how satisfied students were with the Blackboard LMS and what their behaviour intentions were about. A survey was conducted using 202 students and used multiple regression analysis to analyse the data. The results showed that perceived satisfaction and self-efficacy were the main indicators of the effectiveness of the LMS and thus students who were more confident about their technical skills reported greater satisfaction and planned to use the system more often. Panergayo and Aliazas (2021) also used a technology acceptance model to analyse the factors influencing the intention to use LMS among high school students. Using mediation analysis, data from 470 students were explore and the results showed that time management, the use of technology, the self-efficacy factors of online learning, and the online learning environment all had a significant impact on the behavioural intentions of students. Self-efficacy factors and intentionality were mediated by perceived utility and utility.

2.5.1.3 Attitude towards Technology

The adoption of a technology is strongly influenced by the user's attitude towards it (Patel, 2020). The theory of rational action (TRA) states that beliefs shape attitudes, which in turn influence the behaviour (Fishbein and Ajzen, 1975). Alharbi & Drew (2014) asserted that students are more likely to adopt LMS platforms when they are positive about the e-learning environment. Also, previous experience, peer pressure and the supposed benefits of the system all influence attitudes (Sanchez & Hueros, 2010).

Al-Anezi (2021) examined the attitudes of Saudi Arabian university lecturers and students towards e-learning and distance learning, as well as their knowledge of technology. Data was gathered from 1,787 respondents via an online survey and descriptively analysed to understand participants attitudes. The study found that the participants' positive attitude towards e-learning was reflected in their high technological aptitude. The study also found that students had a positive attitude towards distance learning and that there were significant differences in the technical skills and attitudes of male and female students, as well as between younger and older students. Trayek and Syed Hassan (2013) investigated students' attitudes towards learning management systems (LMS) at the International Islamic University in Malaysia. Data collected from a total of 120 participated and analysed using descriptive statistics, t-tests, multiple regression analysis revealed that both perceived ease of use and perceived usefulness significantly influenced students' attitudes toward LMS. No significant attitude differences were found between -time and distance learning students.

2.5.1.4 Motivation and Engagement

Intrinsic motivation, which includes personal interest and enjoyment, drives students to engage with LMS beyond mandatory requirements (Deci & Ryan, 1985).

Extrinsic motivation, such as academic requirements, grades, and faculty encouragement, also contributes to adoption rates (Al-Rahmi et al., 2018).

Continuous advancement of technology in education has seen the introduction of gamification as motivation to enhance the engagement of students in the usage of learning management systems (Nacional, 2023). Brown and O'Shea, (2018) examined the impact of gamification on student engagement in lifelong learning at a US university. The researchers introduced gamified elements such as badges, leader boards, and rewards within the LMS environment for 300 students over one semester. Results indicated that students exposed to gamification were 45% more likely to access the LMS regularly compared to those in the control group. These gamified systems also improved the motivation and participation in online discussions, hence highlighting gamification as a promising strategy to enhance LMS adoption and usage.

2.5.1.5 Prior Experience, Digital Literacy and User Resistance to LMS Adoption

Students' prior experience with technology and digital literacy levels directly impacts their readiness to adopt LMS (Selwyn, 2007). Students who are familiar with similar digital platforms, such as social media, online forums, and virtual learning tools, tend to adopt LMS more quickly (Joo et al, 2011). Conversely, those with limited exposure to technology face challenges in navigating LMS functionalities, resulting in a slower adoption process (Iqbal & Qureshi, 2012).

Despite the benefits of LMS, some students resist adoption due to various user-related factors. Resistance to change, lack of perceived relevance, and fear of technology are common barriers (Raman et al., 2014). Additionally, students who are accustomed to traditional learning methods may perceive LMS as an additional burden rather than a facilitator of learning (Mtebe & Raisamo, 2014). Addressing these resistance factors through targeted training and support can enhance LMS adoption.

2.5.2 Technology factors

The adoption of Learning Management Systems by students is influenced by several factors, among which technological characteristics play a crucial role (Coleman & Mtshazi, 2017). Several technology adoption models, such as TAM, UTAUT and the DeLone and McLean IS Success model, have highlighted the importance of technical features in determining the uptake of LMS (Yakub et al., 2020). Technology factors refer to the design, functionality, system quality, accessibility, and security of LMS platforms, all of which affect students' adoption and continued use. Mohammadi (2015), stated that there are several issues hindering in the adoption of LMS, such as system downtime, software bugs, and lack of technical support, negatively impacting user experience. In addition, the digital divide, including differences in internet access and device availability (Beetham & Sharpe, 2013), also creates obstacles for students from under-served communities, and addressing these issues requires continuous technological improvements and inclusive policies, ensuring equal access to the LMS.

2.5.2.1 Quality Factors and Performance

Information quality of an LMS platform is one critical determinant of student adoption and continued use in the university. Quality of information within LMS impacts deaf students trust, engagement, decision-making, cognitive management enhancing error reduction, self-directed learning, and even social acceptance. High-quality information in learning management systems makes them seem easier and more beneficial to use, and promotes adoption and participation (Roca et al., 2006). The DeLone and McLean (2003) IS Success Model posits that information quality directly influences user satisfaction which is strongly linked to positive behaviour intention to use, a critical antecedent of actual system usage (Al-Khatib &

Lee, 2013). Teo, (2010) stated that students who perceive the information provided in an LMS as accurate and dependable exhibit positive attitudes towards the LMS, influencing their adoption behaviours. This positive attitude arises when student trust the information provided in the system. As posit by Alraimi et al. (2015), trust is foundational in building positive perceptions about the LMS's dependability and reliability which is influenced by the high information quality in the LMS platforms, encouraging students to integrate these systems into their daily academic practices.

Poor information quality, including outdated or unclear course content, inaccurate or incomplete information, has been linked to frustration and disengagement, and miscommunication among students and can have serious academic repercussions, such as missed deadlines and misunderstood assignments, and increases students' cognitive load, diverting their attention from learning tasks to information searching and processing. Hence, LMS environments that maintain high information quality through logical organization, consistency, and clarity enable students to focus cognitive resources on knowledge acquisition rather than navigation challenges as underscored by Al-Fraihat et al. (2020) that high information quality significantly reduces the incidence of such errors, thereby supporting academic integrity and learning efficiency. Students depend on timely and complete information to make effective academic decisions. Sun et al., (2008) stated that information clarity and relevance are key determinants of cognitive engagement in LMS environments, since a well-organized, concise, and current information facilitates easier learning processes and enhances intrinsic motivation for LMS usage. According to Chaka and Govender (2017), high-quality information enables students to efficiently plan their study schedules, prioritize assignments, and prepare adequately for assessments. Inadequate information quality,

by contrast, creates uncertainty, leading to reduced trust and decreased system usage (Petter et al., 2013).

Information quality also enforces accessibility and inclusivity, ensuring that LMS content is usable by diverse student populations, including those with deafness. Al-Azawei et al (2017), demonstrated that when LMS content is clearly formatted, multilingual, and compatible with assistive technologies, adoption rates among marginalized groups significantly improve, highlighting the ethical imperative of maintaining high information standards. Information quality also enforces self-directed learning by deaf students which is an essential skill in higher education, and LMS platforms play a critical role in supporting this mode of learning when they offer rich, relevant, and high-quality information (Ahmed & Hasegawa, 2022). Ahmed and Hasegawa, (2022) emphasized that access to credible and comprehensive information empowers deaf students to take ownership of their learning pathways, thus fostering autonomy and deep learning. Sustaining the LMS usage has often been a function of habitual behaviour, which is influenced by consistent positive experiences with the system as argued by Limayem et al. (2007) argue that the habit formation in information system usage is dependable upon the system's reliability and consistence in delivery of quality information to users, reinforcing users' trust and confidence, eventually influencing them embedding LMS use as a routine academic behaviour.

Another quality factor found to improve the acceptance and success of LMS adoption is the quality of the training assessments, but little research has been done on this. The effectiveness of teaching appraisal has a major influence on the uptake and continued use of LMS platforms in higher education. High-quality assessment practices ensure that students' learning experiences are both meaningful and engaging, enhancing motivation and academic success. Similarly, Almarashdeh (2016) found that when

LMS assessments were perceived as equitable and reflective of course objectives, students' satisfaction and perceived usefulness of the platform improved. The study, employing the Technology Acceptance Model (TAM), highlighted assessment quality as a crucial determinant of LMS acceptance (Almarashdeh, 2016).

According to earlier research by Sun et al (2008), user satisfaction and the intention to continue using e-learning systems are correlated with perceived assessment quality. Despite being a little out of date, their findings are still crucial for comprehending how assessment affects LMS adoption (Sun et al. (2008). Alkharang and Ghinea (2013) showed that constructive feedback mechanisms within LMS platforms, a component of assessment quality, were highly valued by students and significantly influenced system loyalty and academic persistence (Alkharang & Ghinea, 2013). Similar to this, Bao (2020) investigated how people learned online during the COVID-19 pandemic and discovered that prompt feedback and clear assessment were crucial for sustaining student engagement and performance in online learning platforms.

Wu and Chen (2017) personalized assessments that adapt to individual learning pathways within LMS environments not only improve student satisfaction but also promote higher rates of LMS adoption and sustained use (Wu & Chen, 2017). Lonn and Teasley (2009) emphasized the importance of formative assessments delivered through LMS systems, revealing that immediate, actionable feedback enhances students' perceptions of system effectiveness and overall academic performance (Lonn & Teasley, 2009). In addition, Liaw et al. (2007) found that assessment strategies that incorporate interactive elements, such as quizzes and discussion forums, enhance learner motivation and perceived system value, both of which are critical to successful LMS adoption (Liaw et al., 2007).

Al-Fraihat et al. (2020) reiterated that the quality of assessments within an LMS framework significantly affects system success and user satisfaction, recommending continuous improvement in assessment design to meet diverse student needs (Al-Fraihat et al., 2020). The significance of instructional assessment quality is further supported by Ifinedo (2017), who suggested that effective assessments act as reinforcing agents that motivate students to continually engage with LMS platforms for academic activities (Ifinedo, 2017). Kintu et al. (2017) concluded that when LMS assessments are well-aligned with learning outcomes, students demonstrate higher levels of self-efficacy and academic achievement, leading to greater LMS adoption rates.



2.5.2.2 User Interface Design and Usability Features

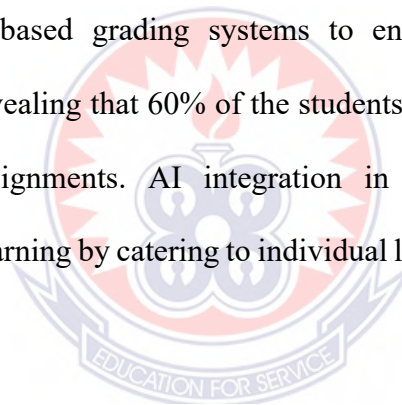
The usability and interface design of an LMS significantly impact students' adoption behaviour. A well-designed LMS should be intuitive, easy to navigate, and provide a seamless user experience (Hassanzadeh et al., 2012). Research has found that user-friendly interfaces increase student engagement, while complex and poorly structured designs hinder adoption (Zanjani, 2017). Additionally, customization options that allow users to personalize their LMS experience have been shown to improve satisfaction and usage (Park, 2009). The study by Sabri (2021) revealed the importance of quality factors such as information, service, and system qualities on the success of LSM in the university, however, students expressed concerns about the platform's outdated interface and navigation difficulties demotivated them in engaging with the system, hence suggested the modernization of the system's user interface to enhance engagement.

With the increasing use of mobile devices, LMS compatibility with multiple devices, including smartphones, tablets, and desktops, is a crucial factor affecting adoption (Iqbal & Qureshi, 2012). Mobile-friendly LMS platforms provide students with greater flexibility and accessibility, allowing them to engage with learning materials anytime and anywhere (Mtebe & Raisamo, 2014). Studies indicate that LMS systems optimized for mobile use significantly enhance student learning experiences and encourage adoption (Cavus & Uzunboylu, 2009).

Seamless integration with external tools enhances the functionality of an LMS, making it more attractive to students. Tondeur et al. (2016) pointed out that integration capabilities of the LMS with other digital tools, such as video conferencing software, digital libraries, and third-party applications, influence the adoption of LMS. Similarly, the study by Almaiah et al. (2020) revealed that students prefer LMS platforms that

support tools like Zoom, Google Drive, and Turnitin, as these integrations facilitate collaboration and streamline academic tasks.

Organizational measures to ensure security and data privacy also impact students' trust in LMS platforms as shown in studies that data security and privacy significantly affect students' willingness to adopt LMS (Tarhini et al., 2016). Almaiah and Almulhem, (2018) asserted that a secure LMS should incorporate encryption, user authentication, and role-based access to protect student data. Fear of data breaches or unauthorized access can discourage students from fully engaging with LMS platforms (Barker et al, 2016; Tarhini et al., 2016). Garcia et al. (2021), also studied the prevalence of assessment activities in LMS usage and recommended providing instant feedback through AI-based grading systems to enhance the assessment process following the study revealing that 60% of the students utilized LMS to receive grades and feedback on assignments. AI integration in LMS is expected to further revolutionize digital learning by catering to individual learning needs (Zawacki-Richter et al., 2019).



2.5.3 Social influence factors

The engagement and utilization of Learning Management Systems (LMS) by students have been a subject of extensive research, with various factors influencing their acceptance and use. Among these factors, social influence has a significant impact on whether or not students will engage and continue using an LMS. Venkatesh et al. (2003) defined social influence as the extent to which an individual's behaviour is shaped by the opinions, behaviours, and expectations of others. In the educational settings, where peer interactions, instructor recommendations, and institutional support shape students' behaviour toward technology adoption, social influence is particularly

important, where students are more likely to adopt an LMS when their peers actively use it and share positive experiences.

Ajzen's (1991) Theory of Planned Behaviour (TPB), described subjective norms a concept which underpinned social influence concept as one's perception of whether important others believe they should perform a behaviour affect technology acceptance (Thapa, 2024). Park (2009) also described subjective norm as an attribute under the social influence factors which constitute the behaviours that are engaged in response to the recognition of the actions of other people. If students perceive that their peers find an LMS beneficial, they may feel compelled to adopt it as well (Al-Rahmi et al., 2018).

Instructors are crucial to the adoption of LMSs because they offer direction and enforce the use of particular platforms for coursework. The Unified Theory of Acceptance and Use of Technology (UTAUT) suggests that social influence is particularly strong in mandatory use settings (Venkatesh et al., 2012; Wu & Chen, 2017). When educators integrate LMS functionalities into their teaching and emphasize its advantages, students may be more inclined to use it effectively.

2.5.4 Organization facilitating conditions and factors

Organizational factors refer to institutional support, infrastructure, policies, and strategic implementation of LMS technologies within educational institutions. Jarry (2024) asserted that students' adoption of LMS is influenced by multiple factors, including organizational elements that shape the accessibility, usability, and effectiveness of LMS platforms. Organizational factors such as institutional support, technical infrastructure, faculty engagement, and security measures play a vital role in ensuring effective LMS integration in higher education and significantly influence

students' adoption of the LMS. According to studies, one of the key variables in predicting behaviour intention and actual LMS usage in higher education institutions is facilitating conditions (Al-Khatib and Lee, 2013) and despite it been a major determinant of LMS adoption, other studies have found that they have no significant impact on LMS adoption. Samaila et al. (2022), in their study on postgraduate students' intentions to use LMS in Malaysian universities found that facilitating conditions did not influenced students' behavioural intention.

Institutional support has been identified to have significant role in students' LMS adoption. When universities provide technical assistance, training programs, and user support, students are more likely to engage with LMS platforms effectively (Al-Rahmi et al., 2018). University policies that mandate the use of LMS for coursework, assignments, and communication further drive adoption (Tarhini et al., 2016). Institutions that integrate LMS into their academic structure create an environment that fosters technological acceptance and usage. Supporting this is a study by Buabeng-Andoh and Baah (2020), which identified factors influencing students' actual use of LMS by surveying 148 university students. The study revealed that institutional support positively impacted system usage.

The availability of robust technical infrastructure is essential for LMS adoption. Reliable internet connectivity, server capacity, and mobile accessibility influence students' engagement with LMS platforms (Venkatesh et al., 2003). Poor infrastructure, including frequent downtime and lack of mobile compatibility, can deter students from utilizing the LMS effectively (Davis, 1989). Ensuring seamless access across devices enhances student participation and learning outcomes.

The availability of technical support is another crucial factor influencing LMS adoption. Students often face technical difficulties while using LMS, and the prompt

resolution of these issues is essential for continued engagement (Salloum et al., 2019). Institutions that provide 24/7 technical support, user manuals, and helpdesk services improve students' confidence in using LMS (Machado & Tao, 2007). Research suggests that a lack of technical assistance is one of the leading reasons students abandon LMS platforms (Pituch & Lee, 2006).

The role of faculty and administrative staff in promoting LMS usage cannot be overlooked. Faculty members who actively use LMS tools for delivering content, assessments, and feedback encourage students to adopt the system (Venkatesh et al., 2012). Similarly, administrative efforts in providing LMS training sessions and integrating LMS into academic policies reinforce its adoption (Al-Rahmi & Zeki, 2017). When instructors model consistent LMS usage, students perceive the platform as an essential part of their learning process (Al-Rahmi & Zeki, 2017).

2.6 Moderating Effects of Demographics on LMS Adoption by Deaf Students in the University

Evans (2013) and Morathi (2021) posit that age and gender are moderating variables in the application of the Unified Theory of Acceptance and Use of Technology (UTAUT) among potential users of an information technology. While the influence of age and gender on LMS adoption by higher education students had been extensively investigated that of deaf students within same higher institution remains scantily discussed in the literature, especially deaf students in developing countries like Ghana and other African countries. However, existing research on age and gender differences in LMS adoption and the need for accessible LMS for students (both with and without deafness) in the university suggests that age and gender may indeed influence the LMS adoption by deaf students at the university.

2.6.1 Age moderating effect on LMS adoption by students in the university

The effect of age on the adoption of Learning Management Systems (LMS) university students is a multifaceted issue. The influence of age on LMS adoption by university students has shown a nuance relationship (Jarry, 2024). While some research suggests age is not a moderating factor (Binyamin et al., 2020), other studies indicate that age can significantly influence LMS adoption (Dampson, 2021; Han & Shin, 2016). These contradicting results underscore the need for more understanding the relation between age variable and its interaction with technological and other factors to affect LMS adoption in higher education institutions.

For instance, older students may have different levels of comfort with technology or varying needs that affect their engagement with LMS platforms as found in the foundational study on developing the UTAUT model (Venkatesh et al., 2003), which investigated the moderating effects of age on the adoption of an information system. The authors found that age moderated the relationship between facilitating conditions and LMS use, with older users benefiting more from institutional support and training programs than younger users. The study concluded that understanding demographic differences can help design more inclusive and effective systems. Similarly, Alshahrani et al., (2019), found that age was a significant moderator in the adoption of LMS, with younger students being more responsive to social influence and older students relying more on facilitating conditions among a Saudi Arabia university students. The authors then suggested LMS designer to emphasize on tailoring LMS training and marketing strategies based on these demographic insights.

From the study by Tarhini et al., (2015), on examining the moderating effects of age and gender in LMS adoption among students in Lebanon using the UTAUT

model. The findings indicated that age moderated the relationship between effort expectancy and behaviour intention, with younger students demonstrating higher sensitivity to system usability. Chu and Chen, (2016) in their investigation on LMS adoption using the UTAUT model among university students in Taiwan found out that age moderated the effects of effort expectancy, with older students requiring more user-friendly designs to engage with LMS platforms effectively.

Ahmad et al. (2023) in their study explored the moderating effects of age and gender on LMS adoption in Middle Eastern universities, focusing on students and faculty members. Age showed a strong moderating effect, as younger users were more adaptive to technological change and responded positively to gamified and interactive LMS tools. Older users required detailed training and technical support to develop confidence in system use. The study henceforth recommended the designing of LMS interfaces to be intuitive and visually appealing for younger users while integrating detailed tutorials and support options for older users.

2.6.2 Moderating effect of gender on LMS adoption by students in the university

The influence of gender on the adoption of Learning Management Systems by deaf students at the university settings has not been exhaustively addressed in the technology adoption papers. Patel (2020) studied the broader impact of gender on LMS adoption and usage patterns among students, which offered insights into potential gender-related differences in the context of students. Lim et al. (2020) examines gender differences in LMS use patterns, finding that male students used the LMS more than females, which could imply that gender differences may also exist among deaf students in their use of LMS. Additionally, Shah et al. (2022) indicated that gender disparities

moderately hindered the acceptance of LMS during the Covid-19 pandemic, which could be extrapolated to suggest that similar disparities might affect deaf students.

Studies have identified gender to be moderating performance expectancy, effort expectancy in the adoption of learning management system by students in the higher educational institutions (Buabeng-Andoh & Baah, 2020). In the foundational study on UTAUT model developing, age and gender were found to have significant moderating effects on the adoption of the information system (Patel, 2020; Venkatesh et al., 2003). The study found that men strongly moderated the performance expectancy in technology adoption, while effort expectancy was more influential for women (Patel, 2020; Venkatesh et al., 2003). Also, in the study by Alshahrani et al., (2019) who applied the UTAUT model to examine LMS adoption among university students in Saudi Arabia, found a significant gender differences where male students were more influenced by performance expectancy, while female students were more influenced by effort expectancy and social influence.

Ahmad et al. (2023) in their exploration study on LMS adoption in Middle Eastern universities, focused on the moderating effects of age and gender on students and faculty members. The study found that male participants were more influenced by performance expectancy, with LMS use driven by perceived usefulness for improving academic efficiency. Female participants placed greater emphasis on effort expectancy, with ease of navigation and support features being critical factors.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter looked at the: research paradigm, research approach and design, population, sample size and sampling technique, instrumentation, validity and reliability of instrument, data collection procedure, data analysis procedure, and ethical considerations.

3.2 Research Paradigm

The positivist paradigm underpinned this study as the philosophical position of the researcher. Positivism emphasises the use of quantitative measures to gather and analyse empirical data from a desired sample to explain human behaviour (Kivunja & Kuyini, 2017).

The choice of the positivist research paradigm for this study on the adoption of Learning Management Systems (LMS) by deaf students in the university was primarily informed by the study's aim to investigate the relationships among a set of quantifiable variables within a theoretical framework. Positivism holds the view that reality is objective, external, and can be measured through empirical observation and statistical analysis (Creswell, 2014; Creswell & Creswell, 2018). This worldview is linked to deductive theory, the dominant approach to the relationship between theory and research (Bryman & Bell, 2015), where the researcher identifies a specific theory, develops hypotheses, determines measurements, and draws conclusions (Bryman, 2016) which aligns well with the nature of the present study, which employs an adapted Unified Theory of Acceptance and Use of Technology model to predict and explain

learning management system adoption behaviours among deaf students in the university.

Also, the positivist paradigm is particularly suitable for studies grounded in established theoretical models that rely on use of inferential statistics and hypothesis testing to examine relationships among variables. In this study, constructs such as performance expectancy, effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality were treated as independent variables that influence behaviour intention and eventually inform their use behaviour. These constructs were operationalized through a validated survey instrument, and their relationships were tested using statistical techniques such as regression and path analysis. This emphasis on measurement and objectivity reflects the core tenets of positivism (Bryman, 2016).

Additionally, the inclusion of mediating (behaviour intention) and moderating (age, and gender) variables, support the use of the positivist approach, as these require the application of statistical models to test for the indirect and interaction effects. The ability to quantify the strength and direction of these relationships is crucial to advancing the understanding of learning management system adoption theory within the deaf student population, a group that remains underrepresented in technology-related higher education research (Alraimi et al., 2015; Burgstahler, 2015; Šumak et al., 2011).

3.3 Research Approach

The researcher took the quantitative approach for this study as driven by the need to objectively deal with data that needed statistical analysis to understand deaf students' adoption of learning management system. Quantitative approach as grounded

in the positivist paradigm, enable the usage of statistical analysis for the examination numerical data to understand frequency of use and causal relationships among variables (Creswell & Creswell, 2018). Given that the study employed an adapted UTAUT model, which included multiple independent variables (e.g., performance expectancy, effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality), as well as mediating and moderating variables (e.g., behaviour intention, age, and gender), a quantitative approach is most suitable for analysing such complex interrelations.

The use of the quantitative research method also allowed for the collection of numerical data through structured instruments, ensuring objectivity, reliability, and replicating the core principles of positivist research (Bryman, 2016). Furthermore, quantitative analysis facilitates generalisation of findings across similar populations, providing evidence-based insights into technology adoption among a typically underrepresented group such as deaf students in digital education research at the higher education level. By adopting this approach, the study contributes empirical evidence to the discourse on inclusive educational technology, thereby supporting data-informed decisions in higher education settings.

3.4 Research Design

The researcher used a descriptive correlational survey design for this study combining both descriptive and casual-correlational designs to extensively address the objectives that guided the study. The reason for choosing this design aligned with the dual nature of the study: (1) to find out deaf students' usage nature and frequency with the LMS and (2) to explore the underlying determinants of the LMS adoption by deaf students using a theoretically grounded model.

The first objective of the study was to explore the frequency and nature of LMS usage activities among deaf students at the university. A descriptive survey design was aimed to gather and analyse data to know the usage patterns such as types of learning activities and how often deaf students engaged in those activities through the LMS. Descriptive statistics such as frequencies and means with standard deviations were applied to describe the nature of case understudied (Creswell, 2014). This was done due to its being non-experimental and observational in nature, aiming to narrating "what is" regarding the LMS usage without establishing causality (Cohen, Manion, & Morrison, 2018).

The second and third objectives focused on examining the determinants of LMS adoption using a conceptual framework which comprised of six independent variables, one mediating variable, two moderating variables, and one outcome variable. To test for the statistical relationships among these variables, a causal-correlational research design was a best fit hence its employment. Specifically, path analysis techniques was used due to its capacity to assess complex relationships involving mediation and moderation (Hair, Black, Babin, & Anderson, 2019; 2010).

The combination of descriptive and casual-correlational designs strengthens the overall validity of the study with the descriptive phase providing foundational insight into student LMS usage nature, while the casual-relationship phase allowed for theory testing and understanding the predictors of their adoption. The integrated design ensured that the study does not merely describe phenomena but also explained the relationships that informed them, which are essential for practical and theoretical implications.

3.5 Study Site

The University of Education, Winneba sited in the Winneba in the Efutu municipality of the Central region of Ghana, is well known for being the pacesetter in practicing inclusive education at the university level where learners with or without any special needs (this case deaf students) are educated in the same environment. Education of deaf students and other students with disabilities at the university level has been part of the university community since its establishment. Enrolment of deaf students in UEW has increase every year and so has the various programmes that deaf students can offer. Hence, it has become a suitable ground for research to look into how these students' academic needs are met regarding the usage of technology for academic tasks.

3.6 Study Population

In this study, the targeted population was the regular undergraduate level 200 to level 400 deaf students enrolled in various academic programmes across departments in the University of Education, Winneba at the time of the study. This population was chosen in accordance with the inclusion and exclusion criteria set by the researcher which was to include all deaf students who had used the LMS for at least one academic year and excluded deaf students who did not meet these criteria. The University of Education, Winneba in 2023/2024 academic year had 69 undergraduate deaf student population from level 200 to level 400 of which 42 were males and 27 were females.

Creswell and Creswell (2018) refers to a target population as the entire group of individuals or objects to which researchers are interested in generalizing their findings. The target population usually exhibits varying characteristics and it is also known as the theoretical population. It consists of a total number of elements or units from or about whom survey information is collected.

3.7 Sample Size and Sampling Technique

3.7.1 Sample Size

Given the relatively small and accessible size of the population of deaf students enrolled at UEW, sample size of 65 undergraduate deaf students from level 200 to level 400 consisting of 24 females and 41 males at the UEW was used for the study.

Fink (2009) asserted that the choice of sample size in survey research should be guided by the study's objectives, the size and characteristics of the population, and the practical constraints of the research context. In cases where the population is small and fully accessible, Fink recommends that researchers prioritize the inclusion of all members to enhance accuracy and avoid sampling error. Since the aim of this study was to obtain a comprehensive understanding of the LMS usage and adoption factors among all deaf students at the university, complete inclusion of the entire population was both feasible and methodologically sound. The choice of this approach guaranteed full representation of the population, reduced potential bias, and ensure a strong statistical justification. These reasons align with Fink's guidance to justify sample size decisions based on research purpose and available resources.

3.7.2 Sampling Technique

A census was adopted in the selection of participants which consisted of deaf students who had engaged in e-learning activities with the use of the LMS at UEW and were studying across various programmes in the university for at least one academic year.

The reason for the choice of the census sampling technique was due to the nature of the study which intended to investigate the deaf students' LMS adoption and the data required a statistical interpretation hence enough participants were needed which in the

case of this study, the population were 69 therefore were automatically included in the study. Also, census sampling reduces sampling biases and enables you study the entire population rather than a representative of them and this is possible when the population is relatively small, feasible, and easily reachable (Creswell & Guetterman, 2019; McMillan & Schumacher, 2014) which was the case of the participants in the study.

3.8 Instrumentation

The study adopted questionnaire as the instrument to gather data from the study's participants. The questionnaire for the survey was an adaptation of an existing questionnaire rooted in the Unified Theory of Acceptance and Use of Technology model (Venkatesh et al., 2003) and quality factors (Binyamin, 2019) established to influence the success of adopting an information system. This was to help answer the research questions and meet the purpose and objectives of the study.

The questionnaire was in three parts. The first part centred on demographic information, while the second part focused on the learning management system usage activities and frequency level. This section of the questionnaire consisted of six questions on a 5-point Likert scale from 1 = Never, 2 = Rarely, 3 = Once a month, 4 = Once a week or two weeks, 5 = Daily. The third part was on the factors that inform LMS adoption in University of Education, Winneba. This section of the questionnaire for the survey was designed based on the research model rooted on the UTUAT model and quality factors of information system adoption in order to achieve the objectives of the research. For this part of the questionnaire, there were 35 questions asked on a 5-point Likert Scale ranging from, 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. Measurement items for each construct were adapted from previously validated instruments to ensure construct validity and reliability.

This was done to enable the researcher undertake a survey which in the quantitative study is very crucial as it helped to gather data from the large number of participants within short period of time. The nature of questions and the number of questions under each construct can be accessed at appendix A.

3.8.1 Pre-testing of Questionnaire

After the initial face and content validity done by the research supervisor and lecturers in information and communication technology, the second stage of refinement to ensure reliability and validity was through a pilot testing of the instrument. Consequently, the questionnaire was pre-tested using 20 deaf students from the Akenten Appiah Menka University of Skills Training and Entrepreneurial Development (AAMUSTED) in the Ashanti Region of Ghana where set of the questionnaires were to deaf students to complete and analyse. The pilot study sample size was determined using the commonly recommended guideline of 10–20% of the main study sample, which is considered adequate for testing the reliability and clarity of research instruments before the main survey (Gay et al., 2012; Hertzog, 2008). The aim of this activity was also to test the, legibility, comprehensibility, clarity and to help reveal issues such as time of response. The result from the pilot test as shown in tables 3.1, 3.2, and 3.3 indicated a substantial degree of content validity (Creswell & Creswell, 2018) hence, suggesting that the instrument valid and adequately measured the intended construct thus ready for data collection.

3.9 Validity and Reliability

3.9.1 Validity

To ensure that the instrument used in the study was valid, the research employed several measures to check the validity. The researcher initially presented the instrument to the supervisor to assess the items for face and content validity to be sure the



statements actually measured the intended objectives raised for the study. Two copies of the instruments were also given out, one to a Special Education (Deaf Education) lecturer and another to an Information and Communication Technology Lecturer to also examine the content and face validity of the questionnaire in terms of ambiguities, grammatical errors and these were incorporated in putting the instrument to shape before the pre-testing of instrument and actual data collection. Prior to determining the construct validity of the questionnaire, the researcher addressed the issues raised concerning the items in the instrument by the research supervisor and two other lecturers and then proceeded to measure the construct validity of the instrument which the result showed a consistent alignment with literature. An Exploratory Factor Analysis (EFA) was conducted using the Principal Axis Factoring with Oblimin rotation and this was done to analyse the correlation between items on the scale used to measure the LMS adoption. Prior to the EFA, an evaluation of the suitability of the dataset for factor analysis was done using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity.

Table 3.1: Test of Suitability of Data for Factor Analysis

KMO and Bartlett's Test		PE	EE	SI	FC	IAQ	IFQ	BUI	AU
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.581	0.685	0.506	0.606	0.500	0.635	0.531	0.644
Bartlett's Test of Sphericity	Approx. Chi-Square	20.837	27.314	51.202	50.291	75.435	23.771	58.290	105.386
	df	6	6	10	10	10	6	6	6
	Sig.	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000

Source: Survey data (Otsiabah, 2024)

The KMO values generated 0.58 for PE, 0.69 for EE, 0.51 for SI, 0.61 for FC, 0.50 for IAQ, 0.64 for IFQ, 0.53 for BIU, and 0.64 for AU which were all within the threshold of 0.50 and 1.0 and are considered high and recommendable (Hair et al., 2019; Kline, 2011), suggesting they met the criteria for sampling adequacy. Also, the Bartlett's Test of Sphericity results as shown in table 3.1 were statistically significant for all items, indicating that the correlation matrix was not an identity matrix and that factor analysis was appropriate for exploratory purposes as suggested by Field (2018), a significant Bartlett's Test confirms that the variables are adequately correlated and suitable for factor analysis when the significance value ($p < .05$). Also, the nine factors extracted based on the criterion of eigenvalues was greater than 1, cumulatively accounting for 71.26% of the total variance in the data. Despite the small sample, the communalities for most items were above .50, indicating that individual items shared meaningful variance with the identified factors. The result for the factor analysis showed factors loadings 0.50 to 0.70, meaning that all items in the scale well loaded on their respective components and that the instrument for this study met the requirement for construct validity and deem for conducting an exploratory factor analysis.

3.9.2 Reliability

In this study, a pilot test of the research instrument was conducted using a sample of 20 deaf students from the AMMUSTED. This number was used because the general guideline according to (Gay et al., 2012; Hertzog, 2008) suggests that it is acceptable to use 10% to 20% of your full-scale survey sample size and the 20 deaf students used in the pilot study represented 30% of the study's sample making it acceptable to use. AAMUSTED was chosen because, it is one of the tertiary education institutions that provide education and training for both deaf and hearing students and shares similarities with UEW which employed the LMS for e-learning activities during

the Covid-19 pandemic and subsequently used it after the Covid-19 period. Collaborating with a resource colleague from the AAMUSTED, the researcher successfully reached out to the administrators of the university, provided introductory letter and briefed them on the study's purpose and the need for the test.

Following the pre-testing, the researcher analysed the collected data with SPSS and obtained the Cronbach's alpha coefficient to assess the overall internal consistency of the questionnaire items. The results for the reliability test from the pre-test are presented in table 3.2 and table 3.3.

Table 3.2: Reliability statistics for Usage Activities on LSM by deaf students

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.815	.818	6

Source: Survey data (Otsiabah, 2024)

Table 3.3: Reliability statistics for items on LSM adoption determinants

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.909	.909	35

Source: Survey data (Otsiabah, 2024)

3.10 Data Collection Procedure

The researcher obtained an official letter of introduction from the Department of Special Education, University of Education, Winneba, and submitted this letter to the Coordinator of the Resource Centre for Students with Special Needs (RCSSN) to sought for ethical clearance for conducting the study involving deaf students in their unit. Subsequently, the researcher visited the resource centre for students who are deaf with an official letter of introduction (Appendix B) and had informal interaction with the interpreters to request for their assistance in interacting with the deaf students and also with the distribution and retrieving of the questionnaire from the deaf students.

The researcher then provided an overview of the study to the deaf students with the assistance from the sign language interpreters. The two sign language interpreters whom the researcher employed their assistance agreed to distribute and retrieve the questionnaire to the deaf students together and in the absence of the researcher. Sixty-nine (69) sets of questionnaires were distributed to deaf students in level 200 to level 400 and were all to be submitted after completion. However, the submission was to be within three weeks, when the researcher revisited the office of the sign language interpreters to retrieve the completed questionnaires. The instrument was to be completed within 45 minutes. Out of the 69 distributed questionnaires, 65 were received within the stipulated period for collection of data. The data collection spanned for a period of three weeks which was from 15th May, 2024 to 5th June, 2024 giving enough time to allow for the completion of the questionnaires and be returned. After close examination, all 65 responded questionnaires were considered valid for the analysis. No questionnaire was sent after the given period and the researcher started inputting the responses from the questionnaires into the SPSS and the analysis was started afterwards.

Respondents were instructed to indicate their level of agreement with each question by marking the appropriate response. Throughout the process of administering the instruments, the researcher maintained open and transparent communication with the participants. The purposes and uses of the collected data were clearly explained, and the participants were assured of the confidentiality of their responses. These measures were implemented to ensure that the research was conducted under standardized conditions and to instil trust and compliance among the participants.

3.11 Data Analysis

Data analysis was done using the Statistical Package for Social Science (SPSS) version 26.0 where both descriptive and inferential statistical analysis were utilized to understand the data collected. The data was coded and entered into SPSS which was followed by data cleaning to ensure no missing data were recorded. The first stage of the data analysis was done to describe the demographic characteristics of the research participants with the outcome presented in frequency and equivalent percentages (Gravetter & Forzano, 2016). Also, skewness and kurtosis were done to check for normal distribution in the data set. In answering research objective one, the Likert-scale responses ranging from Never (1) to Daily (5) were recoded into a dichotomous variable where “Never” and “Rarely” were grouped and recoded as 1=No, indicating no or limited use of the LMS and responses of “Once in a Month”, “Once in a week or two weeks”, and “Daily” were recoded as 2 = Yes, representing meaningful or regular use of the LMS. This recoding was done to allow for clearer categorization of engagement of the LMS (Boone & Boone, 2012). A descriptive analysis with frequencies and percentage was then used to analyse the six items on the usage activities on the LMS by deaf students in the university.

To ensure the data was clear and met the criteria for conducting a path analysis, multicollinearity was tested to assess the intercorrelation between the predictor variables and to check it did not inflate the standard errors and compromise the interpretability of regression coefficients (Field, 2013; Hair et al., 2014). A preliminary multiple linear regression analysis including all predictor variables was conducted and the results indicated a non-problematic multicollinearity, with the two commonly used diagnostic indicators; Tolerance and Variance Inflation Factor (VIF) which both showed an acceptable range. All VIF values ranged between 1.17 and 4.58, and tolerance values

exceeded 0.20., which were below the critical threshold of 5.0, and of 0.20, for VIF and tolerance respectively.

A path analysis was conducted using multiple regression technique to analyse data to answer the research questions two and three. Path analysis using the multiple regression was appropriate for this phase as it accommodates latent variables, offers model fit assessment, and allows for robust hypothesis testing (Byrne, 2016). In conducting the path analysis, the researcher used the PROCESS Macro v4.2 (Hayes, 2022) in SPSS to test for the direct and indirect relationships between the independent variables (performance expectancy, effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality), the mediating variable (behaviour intention), and the outcome variable (use behaviour). Hayes (2022) asserted that a regression-based path analysis tool like PROCESS Macro can estimate the coefficients of a model using ordinary least squares regression for continuous outcomes or maximum likelihood logistic regression for dichotomous outcomes and is effective when dealing with small sample size which would have been difficult using structural equation model to understand the direct and indirect influences of independent variables to an outcome variable. Importantly, PROCESS uses bootstrapping, which was appropriate to use in the present study for three reasons. First, it does not require that the sampling distribution be normally distributed, which allows for testing moderation and mediation in cases where there is asymmetry in the distribution (Hayes, 2013; MacKinnon et al., 2004). Second, it has greater statistical power than some approaches (e.g., Sobel test), while also minimizing the Type I error rate (Hayes, 2013; MacKinnon et al., 2004). Thirdly, PROCESS bootstrapping has the ability to estimate the conditional effects in complex moderated mediation models, which are exploratory analyses and with small sample size which is that case of this

present study (Koopman, Howe, Hollenbeck, & Sin, 2015; Preacher, Rucker, & Hayes, 2007; Tibbe & Montoya, 2022).

In analysing data to answer the research question 2, the model 4 of the PROCESS macro was conducted to understand path analysis for the six independent variables individually to analyse the relationship between each independent variable (performance expectancy, effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality) directly to the dependent variable (use behaviour) and indirectly through the mediator (Behaviour Intention). The variable performance expectancy was loaded into the model as an independent variable together with behaviour intention (mediator) and the use behaviour (outcome variable) with the option for interaction effect and total effect and bootstrap sample of 5000. This was repeated for each of the remaining predictors (effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality). Similarly, to answer the research question 3, the model 8 of the PROCESS macro was conducted to examine the effect of the moderators (age and gender) in determining the direction and strength of the effect of each six independent variables (performance expectancy, effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality) directly to the dependent variable (use behaviour) and indirectly through the mediator (Behaviour Intention). Each predictor variable was loaded into the model as an independent variable together with behaviour intention (mediator), age as the moderator and use behaviour (outcome variable) with a bootstrap sample of 5000. This was repeated for each of the gender moderating variable across each predicting variable.

3.12 Ethical Consideration

When collecting data from the deaf students at the University of Education, Winneba the researcher considered the following ethical considerations: The researcher conducted the research with the necessary professional competence and expertise. Guidance and collaboration were sought from the supervisor and other relevant expertise including lecturers in the department of special education and the resource centre for students with special needs to ensure the research procedure aligned with ethical standards. Ethical approval in a form of an introductory letter was obtained from the Head of Department of Special Education, University of Education, Winneba which was presented to the head of Deaf unit at the Resource Centre for Students with Special Needs (RCSSN) before conducting data collection for the research. The researcher complied with the guidelines and regulations set forth by the relevant offices and addressed any concerns or recommendations they may have. The researcher communicated the purpose, scope, and expected outcomes of the research to participants. Transparency about the potential benefits, risks, and limitations of the study was ensured.

The researcher obtained informed consent from the participants, ensuring they understood the purpose of the research, their rights as participants, and the voluntary nature of their participation and involvement. Clear and concise information about the study was provided, and participants were allowed to ask questions before giving their consent. The researcher emphasized that participation in the study was entirely voluntary, and participants had the right to withdraw at any time without negative consequences. Any form of coercion or pressure to participate was avoided. The researcher treated participants with respect, dignity, and sensitivity. The cultural, social, and professional backgrounds of participants were considered, and any power

imbalances that may affect their willingness to express their views openly were taken into account.

The researcher ensured the confidentiality of participants' information and maintained their anonymity by ensuring that none of the participants provided any form of identification such as name, index number, or alias and also none of the data reached a third party aside the persons stationed at returning point in the absence of the researcher. The researcher took the necessary measures to secure and protect the data collected. The researcher ensured accurate and transparent reporting of the findings, avoiding any misrepresentation or manipulation of the data. The data was presented in a way that respects the participants' perspectives and avoids stereotypes or stigmatization.



CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

PART I: RESULTS

4.1 Introduction

This chapter deals with the presentation of the analysis result and discussion of findings from the study. The presentation of results was done in accordance of the research questions and this was followed by the discussion of the findings which was also presented in accordance with the research questions and the hypothesis raised in the chapter of the study. The first section of the result presentation focused on the demographic characteristics of the study participants which dealt with participants' age, gender, current education level, departments, experience on smart phone and computer usage, training on LMS usage, and afterward proceeded to report on the findings based on the research objectives refer to page 8.

4.2 Demographic Characteristics of the Study Participants.

The demographical characteristics of the participants in the study are presented in table 4.1.

Table 4.1: Demographic Characteristics of the Participants

Variable	Category	Frequency (N)	Percentage (%)
Gender of Participants	Female	24	36.9%
	Male	41	63.1%
	Total	65	100.0%
Age Category of Participants	20-25 Years	19	29.2%
	26-30 Years	37	56.9%
	31-35 Years	7	10.8%
	36-40 Years	2	3.1%
	Total	65	100.0%
Departments of Participants	Special Education	48	73.8%
	Basic Education	2	3.1%
	Early Childhood Education	2	3.1%

	Art Education	3	4.6%
	Graphic Design	5	7.7%
	Home Economics	2	3.1%
	Education		
	Food and Nutrition	2	3.1%
	Education		
	Clothing and Textiles	1	1.5%
	Education		
	Total	65	100.0%
Current Level of Participants	Level 200	18	27.7%
	Level 300	31	47.7%
	Level 400	16	24.6%
	Total	65	100.0%
Computer and Smartphone usage	Less than 1 year	6	9.2%
	1 to 2 years	7	10.8%
	2 to 3 years	14	21.5%
	3 to 4 years	18	27.7%
	More than 4 years	20	30.8%
	Total	65	100.0%
Training on use of LMS	Never	17	26.2%
	1 to 2 times	22	33.8%
	3 to 4 times	16	24.6%
	5 times	4	6.2%
	More than 5 times	6	9.2%
	Total	65	100.0%

Source: Survey Data, 2024

The table 4.1 reveals that 65 deaf students were involved in the survey. Based on gender, there were 41 males and 24 females. This number protrudes into males being the majority of the gender in the university representing 63.1% of the total participants and females making up the remaining 36.9%. The modal age group consisted of deaf students aged 26-30 years, making up for 56.9% of the total participants. The 20-25 years age group made up 29.2% of the participants, while the 31-35 years and 36-40 years age groups had the smallest representation at 10.8% and 3.1% respectively. This

age distribution suggests that the majority of the deaf students admitted and trained in the university were relatively young, with a significant portion falling within the 20-30 age range. Regarding academic departments and levels, the data shows deaf students are admitted and educated in 8 different departments in the university community with that the majority of participants revealed to be in the department of Special Education, with number of 48 (73.8%) of the study participants. Deaf students were found to be in others departments with department of Graphic design 5(7.7%) being the next department with higher number of deaf students receiving training and education. Departments of Basic Education (2), Art Education (3), Early Childhood Education (2), Home Economics (2), and Food and Nutrition (2), all accumulating 11 deaf students which represent 17% of the entire study participants. At the extreme department of Clothing & Textiles constituted (1) 1.5% of the study sample indicating the department with the least number of deaf students in the university. The result of the analysis revealed that most of the deaf students who participated in the study were in their third year of study in the university with a majority of 31 deaf students making up of 47.7% of the participants. This indicates that the majority of the deaf students were pursuing bachelor's degree in their various departments.

The remaining participants of the study were found in the level 200 and level 400 with the second largest group, consisting of 18 deaf students followed by 16 deaf students representing 27.7% and 24.6% in level 200 and 400 respectively. The number of years participants have been exposed and used computers and smart phones were investigated to find out participants level of smart devices use. On the computer and smart phone usage, it was found that majority of the deaf participants had used computer or smart phone for more than 4 years with responds rate of 20 which made up 30.8% of the entire participants. The next category of participants was those who

had used computer or smart phone between 3-to-4 years 18 (27.7%) followed by users between 2-to-3 years 14 (21.5%). Those with a smaller number of years of computer and smart phone use experiences were found to be within 1-to-2 years and less than one year use with each making up for 7 (10.8%) and 6 (9.2%) of the participants. This suggests a diverse range of computer and smart phone use experience among the participants, with greater number of the participants having more than 4 years of use experience. The participants were also asked to respond to the statement on how many times they have received any form of training on the use of learning management system in the university. Twenty-two deaf students out of the 65 deaf students who participated in the study responded that they have received training on the use of the LMS on a number 1-2 times. This respondent constituted 33.8% of the entire participants and this indicate that most of the deaf student did not receive much training on the use of the LMS.

The next category of students with least training on the use of the LMS were those who responded that they have never received any form of training on the use of learning system and this was accounted for with responses from 17 participants representing 26.2%, while 16 (24.6%) of the participants reported that there had been training on the use of the LMS for them on 3-to-4 times. A constituting number of 4 (6.2%) and 6 (9.2%) were found to have received training on the use of the LMS in various form. These participants responded that they have had training for 5 different times and more than 5 times respectively. This distribution indicates that training on the use of the LMS was low as 39 (60%) of the deaf students had never or received training on the use of the learning management system not more than twice throughout their academic experiences in the university even though 10 (15.4%) of the deaf

students reported to have more training on the usage of the LMS, leaving the remaining 16 (24.6%) to have received moderate training on the LMS usage.

4.3 Usage Activities on LMS by Deaf students

The response rate is in line with the recommended minimum threshold of 80% for survey research as proposed by Stedman et al. (2019). The data gathered are presented on Table 4.2.

Table 4.2: Usage Activities on LMS by Deaf students

Variable	Low Usage	Usage
Access and Use of Materials on LMS	24 (36.9%)	41 (63.1%)
Attend live lectures on LMS	22 (33.8%)	43 (66.2%)
Submit assignments on LMS	16 (24.6%)	49 (75.4%)
Take test and quiz on LMS	25 (38.5%)	40 (61.5%)
Interact with colleague students on LMS	28 (43.1%)	37 (56.9%)
Overall use of LMS	20 (30.8%)	45 (69.2%)

Source: Field Data, 2024

The table 4.2 presents analysis on the activities and frequency of use of the learning management system (LMS) by deaf students. The descriptive statistics summarize the frequency and variability of five LMS usage activities and the overall engagement among the 65 participants.

The use of the LMS for accessing and using academic materials was one of the commonly engaged activities by deaf students (63.1%) suggesting that many deaf students utilized the LMS to as a mean to access and use learning materials for their study.

Attend live lectures on LMS: Participants also has a relatively high participation in using the LMS for lectures (66.2%), indicating that, deaf students fairly used the LMS for live engagement in instructional periods.

Submit assignments on LMS: With a frequency of 75.4%, submitting assignments using the LMS appears to be the most frequently utilized feature among the participants, indicating that deaf students found it convenient and safe to use the LMS to submit their assignments.

Take tests and quizzes on LMS: The 61.5% usage by deaf students shows a moderate use of the LMS for assessment purposes, indicating that deaf students used the LMS to complete assessment when it was needed.

Interact with colleague students on LMS: The least activity deaf students use on the LMS was for interacting with colleagues and instructors (56.9%), suggests that interacting and communicating with fellow students and instructors on the LMS was the least frequently utilized feature.

Overall use of LMS: The frequency of 69.2% was recorded for the overall usage of the LMS, indicating a moderate level of LMS engagement among the deaf students. This suggests that while there is variation in participants' engagement with the LMS features, their overall usage level was moderate.

4.4 Predictors of LMS adoption by deaf students

The research question 2 of the study aimed to examine the factors that determined the learning management system adoption by deaf students in the university. To address this research question, respondents were provided with thirty-five (35) items, anchored on a 5-point Likert scale ranging from 1 (Strongly disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) to 5 (Strongly Agree). Using PROCESS Macro v4

in SPSS a path analysis with regression models was conducted to understand the path and the effect size of each predictor factor to the outcome variable (use behaviour) of the learning management system by deaf students. The results of the data analysis for the research question two are presented in tables and their interpretation provided subsequently.

For understanding the direct and indirect effects of the predictors on the outcome variable in the adoption of LMS, a path analysis was conducted using the model 4 of the PROCESS Macro due to its tendency to analyse the effect on both the direct path and indirect paths through a mediating variable. In answering this research question, there were eight variables of which six were independent variables (performance expectancy, effort expectancy, social influence, facilitating conditions, instructional assessment quality, and information quality), one mediating variable (behaviour intention), and one dependent variable (use behaviour). The analysis results are presented in Tables 4.4a, 4.4b, 4.4c, 4.4d, 4.4e, and 4.4f.

Table 4.4a: Mediation Path Analysis of Performance Expectancy, Behaviour Intention and Use behaviour

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
PerfEx -> BehInt	0.703	0.418	0.285	0.101	0.489	4.488	Partial Mediation
BehInt -> UseBeh	(0.000)	(0.002)					

Source: Field Data, 2024

NOTE: PerfEx=Performance Expectancy, BehInt=Behaviour Intention, UseBeh=Use Behaviour

The study assessed the relationship between performance expectancy and use behaviour of the LMS and also the mediating role of behaviour intention on this relationship and the result is presented in table 4.4a. There was a strong positive and

significant overall effect of performance expectancy towards the use behaviour of the system ($b = 0.703$, $p < 0.001$). The direct effect of performance expectancy on the use behaviour of the LMS was also found significant ($b = 0.418$, $p = 0.002$). Furthermore, the results revealed a significant indirect effect of performance expectancy through behaviour intention on use behaviour of the learning system ($b = 0.285$, $CI = 0.101, 0.489$). This suggest that behaviour intention partially mediated the relationship between performance expectancy and the use behaviour of the user towards the system. This connote that even though performance expectancy had a positive direct and significant effect on the use behaviour of the participants but the presence of an indirect effect increases the effect size of the participant's performance expectancy to the usage behaviour towards the system.

Table 4.4b: Mediation Path Analysis of Effort Expectancy, Behaviour Intention, and Use behaviour

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
EffxEx -> BehInt	0.642	0.340	0.302	0.150	0.459	4.917	Partial Mediation
BehInt -> UseBeh	(0.000)	(0.006)					

Source: Field Data, 2024

NOTE: EffxEx=Effort Expectancy, BehInt=Behaviour Intention, UseBeh= Use Behaviour

The regression analysis result in table 4.4b report on the effect size of effort expectancy on the use behaviour of the participants towards the LMS. There was a moderate positive and significant overall effect of effort expectancy towards the use behaviour of the system ($b = 0.642$, $p < 0.001$). It also revealed that the direct effect of

effort expectancy on the use behaviour on the LMS was also significant ($b = 0.340$, $p = 0.006$). The results further revealed a significant indirect effect of effort expectancy through the behaviour intention on the use behaviour of the learning management system ($b = 0.302$, $CI = 0.150, 0.459$). This indicates that effort expectancy informs the LMS use behaviour directly while this effect increases with the presence of the mediating variable of behaviour intention, causing a partial indirect effect between participants' effort expectancy and the use behaviour of systems.

Table 4.4c: Mediation Path Analysis of Social Influence, Behaviour Intention, and Use behaviour

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
SocInfx -> BehInt -> UseBeh	0.300 (0.104)	0.047 (0.744)	0.253	-0.061	0.542	1.648	Not significant

Source: Field Data, 2024

NOTE: SocInfx=Social Influence, BehInt=Behaviour Intention, UseBeh=Use Behaviour

The table 4.4c shows the regression analysis of the relationship between social influences, behaviour intention and use behaviour of the LMS. The results revealed a weaker and non-significant total effect of social influence on the use behaviour of the LMS. The direct effect of the social influence on use behaviour was also found non-significant ($b = 0.047$, $p < 0.744$). Furthermore, the indirect effect of social influence through behaviour intention on usage behaviour of the learning management system was also found to be non-significant ($b = 0.253$, $CI = -0.061, 0.542$) as there was a presence of zero between the lower and upper bounds which suggest that behaviour

intention does not mediate the relationship between social influence and the use behaviour of the system. This result connotes that there is no significant relationship between social influence and the use behaviour of the learning management system by participants even in the presence of a mediating factor of behaviour intention.

Table 4.4d: Mediation Path Analysis of Facilitating Conditions, Behaviour Intention, and Use behaviour

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
FacCond -> BehInt	0.898	0.507	0.391	0.203	0.661	6.464	Partial Mediation
BehInt -> UseBeh	(0.000)	(0.001)					

Source: Field Data, 2024

NOTE: FacCond=Facilitating Condition, BehInt=Behaviour Intention, UseBeh=Use Behaviour

The regression analysis results presented in Table 4.4d report on the relationship between facilitating conditions and the use behaviour of the LMS by the deaf students. The results revealed an overall strong positive and significant effect between the facilitating conditions and the use behaviour of the LMS ($b=0.898$, $p<0.001$). Also, the direct effect of facilitating condition on the use behaviour of the LMS was also found positive and significant ($b = 0.507$, $p = 0.001$). Furthermore, there was also a significant indirect effect of facilitating condition through behaviour intention on the use behaviour of the learning management system ($b= 0.391$, $CI = 0.203, 0.661$). This indicate that the relationship between facilitating conditions and the use behaviour is strong with direct higher influence and partially mediated by the behaviour intention towards the use of the learning management system.

Table 4.4e: Mediation Path Analysis of Instructional Assessment Quality, Behaviour Intention, and Use behaviour

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
InstAQty BehInt UseBeh	-> 0.574 -> (0.001)	0.252 (0.070)	0.322	0.107	0.541	3.602	Full Mediation

Source: Field Data, 2024

NOTE: InstAQty=Instructional Assessment Quality, BehInt=Behaviour Intention, UseBeh=Use Behaviour

The regression result presented in table 4.4e shows the total, direct, and indirect effect of behaviour intention on the relationship between instructional assessment quality and the use behaviour of participants on the learning management system adoption. The results revealed a significant total effect of instructional assessment quality on use behaviour ($b=0.574$, $p=0.001$). This significant total effect was contributed by a positive and significant indirect effect through behaviour intention on the use behaviour ($b= 0.322$, $CI= 0.107, 0.541$). Contrary, the direct effect of instructional assessment quality on the LMS usage behaviour was found non-significant ($b = 0.252$, $p < 0.070$). This suggest that the relationship between instructional assessment quality and the use behaviour is fully mediated by behaviour intention towards the LMS.

Table 4.4f: Mediation Path Analysis of Information Quality, Behaviour Intention, and Use behaviour

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval (CI)		t-statistics	Conclusion
				Lower Bound	Upper Bound		
InfoQty -> BehInt	0.512 (0.001)	0.142 (0.291)	0.370	0.181	0.559	3.463	Full Mediation
UseBeh							

Source: Field Data, 2024

NOTE: InfoQty = Information Quality, BehInt = Behaviour Intention, UseBeh = Use Behaviour

The table 4.4f shows the direct relationship between information quality and use behaviour and the indirect effect through the mediating role of behaviour intention on the relationship between information quality and use behaviour of the learning management system. The results revealed a significant total effect of information quality on use behaviour (b=0.512, p=0.001). This significant total effect was contributed by a significant indirect effect of information quality through behaviour intention on use behaviour of the learning management system (b= 0.370, CI = 0.181, 0.559). Contrary, the direct effect of information quality on the use behaviour of the LMS was found to be positive but non-significant (b = 0.142, p < 0.291). This indicate that behaviour intention fully mediated the relationship between information quality and the use behaviour of the learning management system.

4.5 Moderating Effects of Demographics on LMS adoption factors

The research question three of the study aimed to examine the moderating effects of demographic variables (age and gender) on the factors of adoption of the learning management system by deaf students in the university. To address this research

question, a regression-based path analysis with the model 8 of the PROCESS Macro was used to analyse the moderating effect of age and gender on the relationship between the independent variables to behaviour intention and the use behaviour variables on the learning management system by deaf students. The results of the data analysis for the research question three are presented in tables and their interpretation provided subsequently under two subheadings which are the moderating effects of age and the moderating effects of gender respectively.

4.5.1 The moderating effect of age on factors of LMS adoption by deaf students

4.5.1a: The moderating effect of age on performance expectancy and behaviour intention and system use behaviour

This analysis examined the effects of performance expectancy (PerfEx) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of age. The results of the model for a-path and c'-path are presented in table 4.5a, and figures 1.1a and 1.1b showing the effect and the significance level of the input variable (PerfEx), moderating variable (Age), and the interaction term (PerfEx * Age) on the outcome variables (BehInt and UseBeh).

Table 4.5a: Regression results for the a-path from Performance Expectancy to Behaviour Intention and for the c'-path from Performance Expectancy to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
PerfEx	1.36	0.39	< .001	-0.09	0.40	> .05
Age	1.58	0.62	< .05	-0.60	0.60	> .05
PerfEx * Age	-0.49	0.19	< .05			
PerfEx * Age				0.25	0.18	> .05
		b	SE	LLCI	ULCI	
Index of MM		-0.38	0.15	-0.68	-0.12	

Source: Field Data, 2024

Note: N = 65, Model for the a-path $R^2 = 0.21$, F (5.32), $p < .01$, Model for c'-path $R^2 = 0.57$, F (19.77), $p < .001$, Index of MM = Index of Moderated Mediation

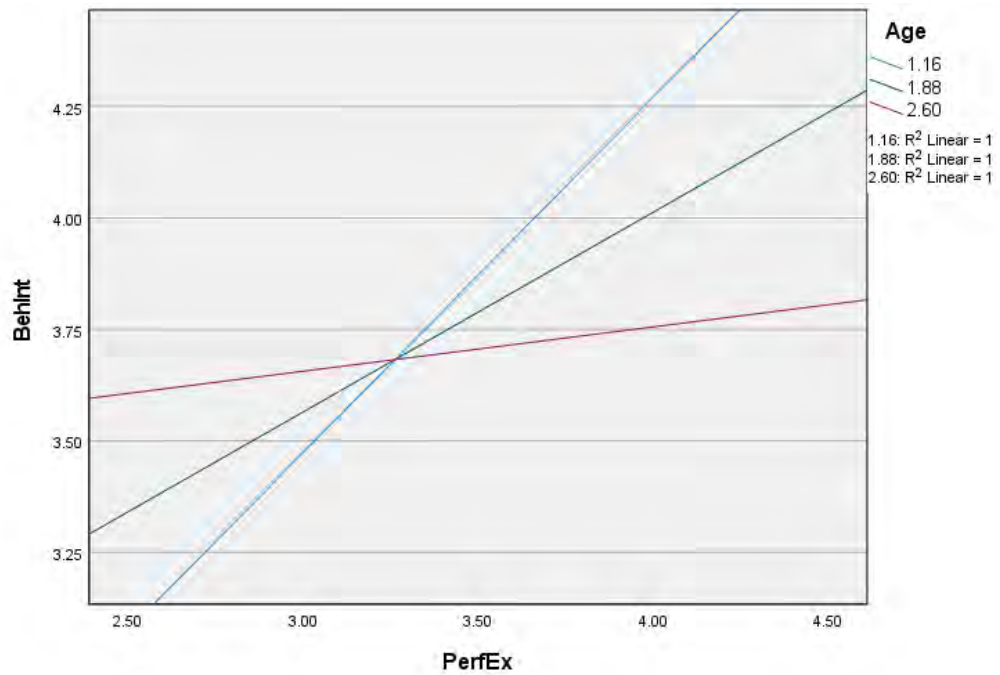


Figure 1.1a: Conditional effect from PerfEx to BehInt

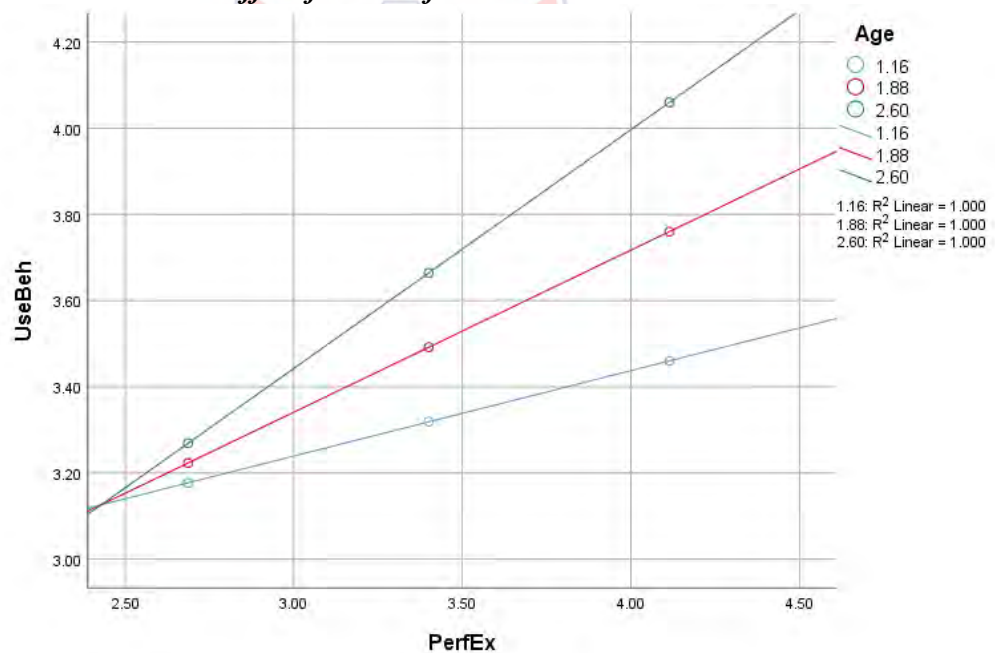


Figure 1.1b: Conditional effect from PerfEx to UseBeh

The table 4.5a reveals that on the a-path from performance expectancy to behaviour intention there was a significant interaction between performance expectancy, age, and behaviour intention. There is a positive and significant direct effect of performance expectancy on the behaviour intention ($b = 1.36$, $p < .001$)

depicting that higher performance expectancy is associated with higher behaviour intention of the participants. It also shows that age had a positive and significant effect on the participants' behaviour intention ($b = 1.58, p < .05$). There was a negative but significant interaction effect of performance expectancy and age on the behaviour intention, ($b = -0.49, p < .05$) and this conditional effect varies depending on the age. The conditional effect of performance expectancy on behaviour intention (figure 1.1a) was the strongest for younger age (1.16 SD below mean), $b = 0.80, p < .001$, it was weaker but still significant for middle age (at the mean), $b = 0.45, p < .001$. However, it was weaker and non-significant for older age (1.16 SD above mean), $b = 0.10, p > .05$. This indicates that as age increases the influence of performance expectancy on behaviour intention reduces.

The index of moderated mediation was significant even though it was negative, $b = -0.38, CI [-0.68, -0.12]$, providing evidence for a moderated mediation. This shows that the indirect effect of performance expectancy on use behaviour through behaviour intention is weaker in strength with the presence of the moderating variable which in this case is the age, suggesting that as age increases the effect of performance expectancy through behaviour intention to the usage behaviour decreases. The negative conditional indirect effect is stronger for younger age (1.16 SD below the mean) $b = 0.62, CI [0.36, 0.93]$, it was weaker but still significant for middle age (at the mean), $b = -0.35, CI [0.18, 0.55]$ but for older age group (1.16 SD above the mean), it was weaker and non-significant $b = 0.8, CI [-0.21, 0.33]$.

The table 4.5a also shows the result on the c' -path from performance expectancy to use behaviour, and this reveals a negative and non-significant effect, $b = -0.09, p > .05$, suggesting that performance expectancy does not directly influence use behaviour of participants. Also, age was found not to directly influence use behaviour, ($b = -0.60,$

$p > .05$). The result further revealed an overall non-significant moderating effect of age on the performance expectancy to use behaviour relationship ($b = 0.25, p > .05$). This designate that the direct effect of performance expectancy on use behaviour does not vary based on age. However, some particular age group were found to have a significant moderating effect on the performance expectancy to use behaviour (figure 1.1b) showing a conditional effect of performance expectancy on use behaviour to be stronger for older age group (1.16 SD above mean), $b = 0.55, p < .01$, it was weaker but still significant for middle age (at the mean), $b = 0.38, p < .01$. However, it was weakest and non-significant for younger age group (1.16 SD below mean), $b = 0.20, p > .05$. This suggest that older age group exhibited a direct high-performance expectancy to system use behaviour than younger age group.

4.5.1b: The moderating effect of age on effort expectancy and behaviour intention and system use behaviour

This analysis examined the effects of effort expectancy (EfftEx) on behaviour intention (BehInt) and use behaviour (UseBeh), in the presence of the moderating variable (age). The results of the model for a-path and c'-path are presented in table 4.5b and figures 1.2a and 1.2b showing the effect and the significance level of the input variable (EfftEx), moderating variable (Age), and the interaction term (EfftEx * Age) on the outcome variables (BehInt and UseBeh).

Table 4.5b: Regression results for the a-path from Effort Expectancy to Behaviour Intention and for the c'-path from Effort Expectancy to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
EfftEx	1.05	0.29	< .05	-0.12	0.31	> .05
Age	1.17	0.52	< .05	-0.63	0.52	> .05
EfftEx * Age 1	0.35	0.15	< .05			
EfftEx * Age 2				0.25	0.16	> .05
		b	SE	LLCI	ULCI	
Index of MM		-0.26	0.13	-0.53	-0.02	

Source: Field Data, 2024

Note: N = 65. Model for the a-path $R^2 = .26$, $F(7.31)$, $p < .001$, Model for c'-path $R^2 = .56$, $F(19.29)$, $p < .001$, Index of MM = Index of Moderated Mediation.

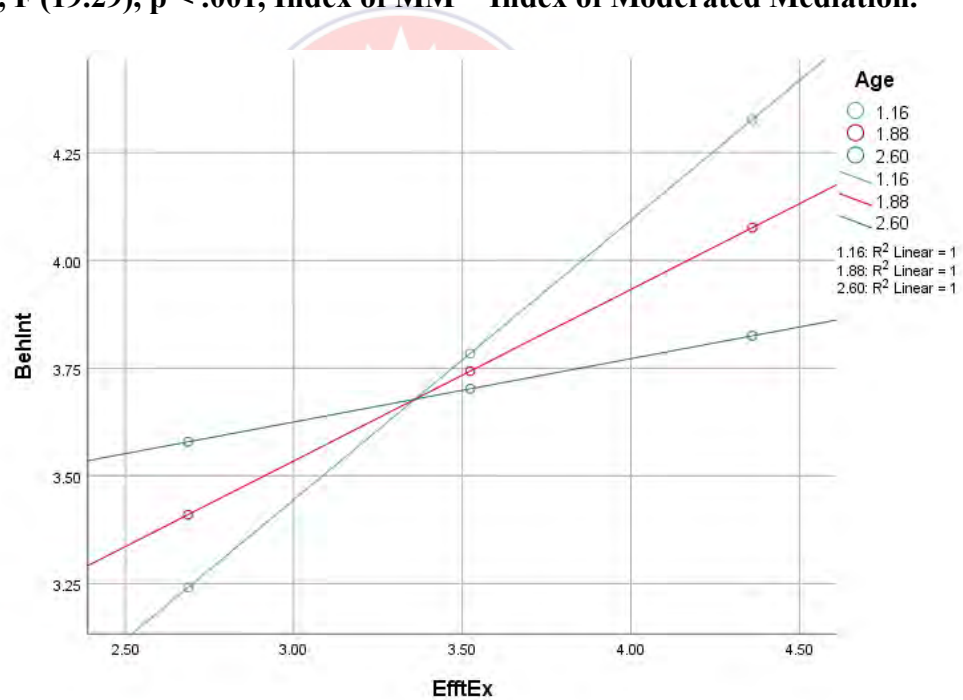


Figure 1.2a: Conditional effect from EfftEx to BehInt

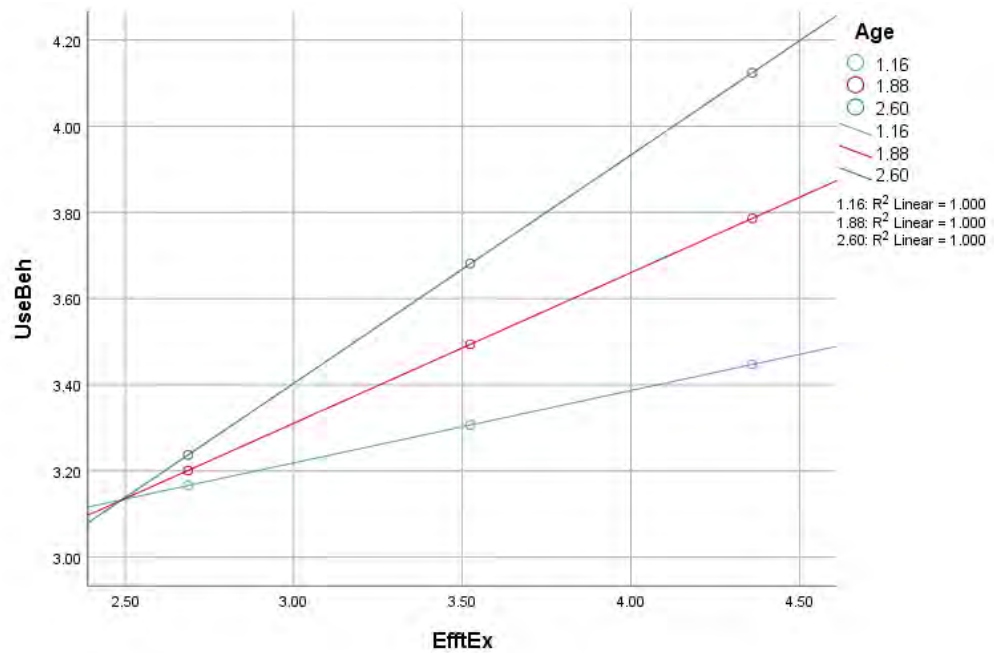


Figure 1.2b: Conditional effect from EfftEx to UseBeh

The table 4.5b shows the a-path from effort expectancy to behaviour intention and c'-path from effort expectancy to use behaviour with the presence of a moderator (age) on both paths. From a-path, there is a positive and significant direct effect of effort expectancy on the behaviour intention ($b = 1.05$, $p < .05$) depicting that higher effort expectancy is associated with higher behaviour intention of the participants. It also shows that age had a positive and significant effect on the participants' behaviour intention ($b = 1.17$, $p < .05$). However, there was a negative but significant interaction effect of effort expectancy and age on the behaviour intention ($b = -0.35$, $p < .05$) and this conditional effect varied across different age group. The conditional effect of effort expectancy on behaviour intention (figure 1.2a) was the strongest for younger age (1.16 SD below mean), $b = 0.65$, $p < .001$, it was weaker but still significant for middle age (at the mean), $b = 0.40$, $p < .001$, but weaker and not significant for older age (1.16 SD above mean), $b = 0.15$, $p > .05$. This suggest that as age increases the relationship between effort expectancy and behaviour intention reduces for older age group.

The table 4.5b also shows that the index of moderated mediation was significant even though it was negative, $b = -0.26$, CI [-0.53, -0.02], indicating an evidence of

moderated mediation. This shows that the relationship between effort expectancy the use behaviour through behaviour intention is negatively influenced by age connoting that as age increases the indirect effect of effort expectancy to use behaviour through behaviour intention becomes weaker in the presence of age. This negative conditional indirect effect was found to be stronger and significant for younger age (1.16 SD below the mean) $b = 0.49$, CI [0.282, 0.683], it was weak but still significant for middle age (at the mean) of the moderator, $b = -0.30$, CI [0.156, 0.452] but for older age (1.16 SD above the mean) of the moderator, $b = 0.8$, CI [-0.159, 0.383] it was weaker and non-significant.

Again, from the table 4.5b, the result for the c' -path from effort expectancy to use behaviour, which reveals a negative and non-significant effect, $b = -0.12$, $p > .05$, suggesting that effort expectancy does not directly influence use behaviour in the presence of age as a moderator. Also, age was found not to directly influence the system use behaviour of participants ($b = -0.60$, $p > .05$). The result further revealed an overall non-significant moderating effect of age on the effect expectancy to use behaviour relationship ($b = 0.25$, $p > .05$). This connotes that the relationship between effort expectancy and the use behaviour does not vary based on age. Despite this non-significant interaction effect, two age groups exhibited a significant moderating effect on the relationship between effort expectancy and use behaviour (figure 1.2b). These groups older age (1.16 SD above mean) $b = 0.53$, $p < .01$, and middle age (at the mean) $b = 0.35$, $p < 0.01$, showed a conditional effect on the direct relationship between effort expectancy and the use behaviour.

4.5.1c: The moderating effect of age on social influence and behaviour intention and system use behaviour

This analysis examined the relationship between social influence (SocInflx) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of age. The result of the model for a-path and c'-path is presented in table 4.5c and figure 1.3a showing the effect and the significance level of the input variable (SocInflx), moderating variable (Age), and the interaction term (SocInflx * Age) on the outcome variables (BehInt and UseBeh).

Table 4.5c: Regression results for the a-path from Social Influence to Behaviour Intention and for the c'-path from Social Influence to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
SocInflx	1.21	0.34	< .01	-0.67	0.37	> .05
Age	1.24	0.44	< .01	-0.75	0.45	> .05
SocInflx * Age 1	-0.41	0.14	< .01			
SocInflx * Age 2				0.32	0.15	< .05
		b	SE	LLCI		ULCI
Index of MM		-0.38	0.13	-0.60		-0.09

Source: Field Data, 2024

Note. N = 65. Model for the a-path $R^2 = .18$, $F(4.43)$, $p < .01$, Model for c'-path $R^2 = .52$, $F(16.09)$, $p < .001$.

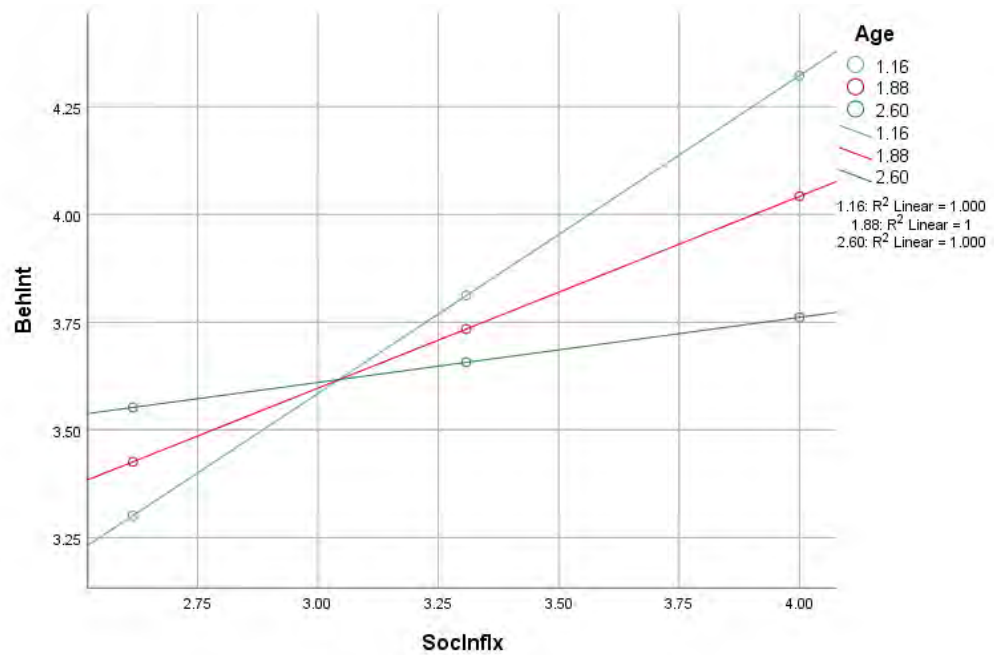


Figure 1.3a: Conditional effect from SocInflx to BehInt

Table 4.5c shows the analysis on a-path from social influence to behaviour intention and c'-path from social influence to use behaviour with the moderating role by age on both paths. Increased social influence is linked to increased behaviour intention among participants, as evidenced by the positive and significant direct influence of social influence on behaviour intention ($b = 1.36, p < .01$). Additionally, data demonstrates that participants' behaviour intention was positively and significantly influenced by age ($b = 1.58, p < .05$). The interaction between age and social influence shows a negative but significant interaction effect on behaviour intention ($b = -0.41, p < .01$) which this conditional effect varies with age. It is seen (figure 1.3a) to be stronger and significant for younger age group (1.16 SD above mean), [$b = 0.74, p < .01$], moderate for middle age group (at the mean) [$b = 0.45, p < .01$], but weaker and not significant for the older age group (1.16 SD above mean) [$b = 0.15, p > .05$]. This suggest that the effect of social influences on behaviour intention is influenced by age.

The index of moderated mediation was significant even though it was negative, $b = -0.38, CI [-0.60, -0.09]$, which suggest evidence of moderated mediation. This

shows that social influences increase the behaviour intention which in turn leads to increase in use behaviour. The negative conditional indirect effect is stronger for younger age (1.16 SD below the mean) of the moderator, $b = 0.69$, CI [0.18, 0.99], moderate and significant for middle age (at the mean), $b = 0.41$, CI [0.39, 0.64] but for older age group (1.16 SD above the mean) of the moderator, $b = 0.14$, CI [-0.19, 0.38] it was weaker and non-significant as there is zero in between the lower bound and upper bound of the confidence interval levels.

The result presented on the c' -path from social influence to use behaviour reveals a negative and non-significant effect, $b = -0.67$, $p > .05$, suggesting that social influence does not directly influence use behaviour. Also, age was found not to directly influence use behaviour, ($b = -0.75$, $p > .05$). However, the result revealed a positive and significant moderating effect of age on the relationship between social influence to use behaviour ($b = 0.32$, $p < .05$) but there was no significant effect across various age groups. This suggest that the relationship between social influence and use behaviour does not vary based on age.

4.5.1d: The moderating effect of age on facilitating condition and behaviour intention and system use behaviour

This analysis examined the relationship between facilitating conditions (FacCond), behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of age. Table 4.5d and figures 1.4a and 1.4b present the model's results for a-path and c' -path, showing the effect and significance level of the moderating variable (Age), the interaction term (FacCond * Age) of the input variable (FacCond) and moderating variable on the outcome variables (BehInt and UseBeh).

Table 4.5d: Regression results for the a-path from Facilitating Condition to Behaviour Intention and for the c'-path from Facilitating Condition to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
FacCond	1.41	0.34	< .01	0.31	0.43	> .05
Age	1.37	0.67	< .05	-0.23	0.76	> .05
FacCond * Age 1	0.39	0.17	< .05			
FacCond * Age 2				0.08	0.19	> .05
		b	SE	LLCI	ULCI	
Index of MM		-0.24	0.14	-0.56	-0.14	

Source: Field Data, 2024

Note. N = 65. Model for the a-path $R^2 = .40$, $F(13.63)$, $p < .001$, Model for c'-path $R^2 = .55$, $F(18.41)$, $p < .001$.

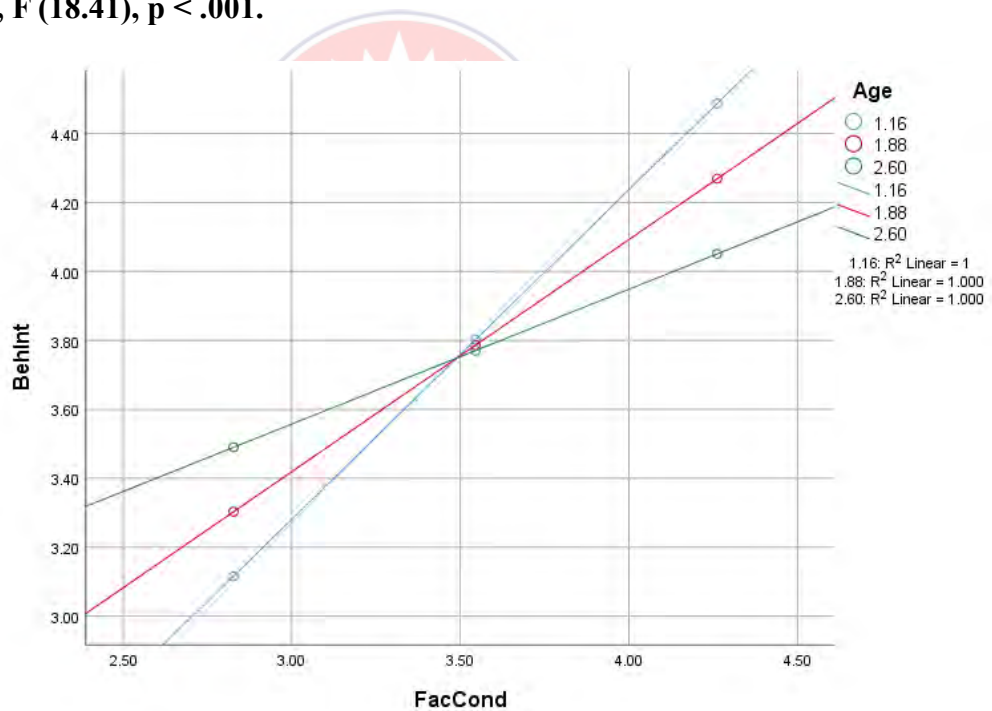


Figure 1.4a: Conditional effect from FacCond to BehInt

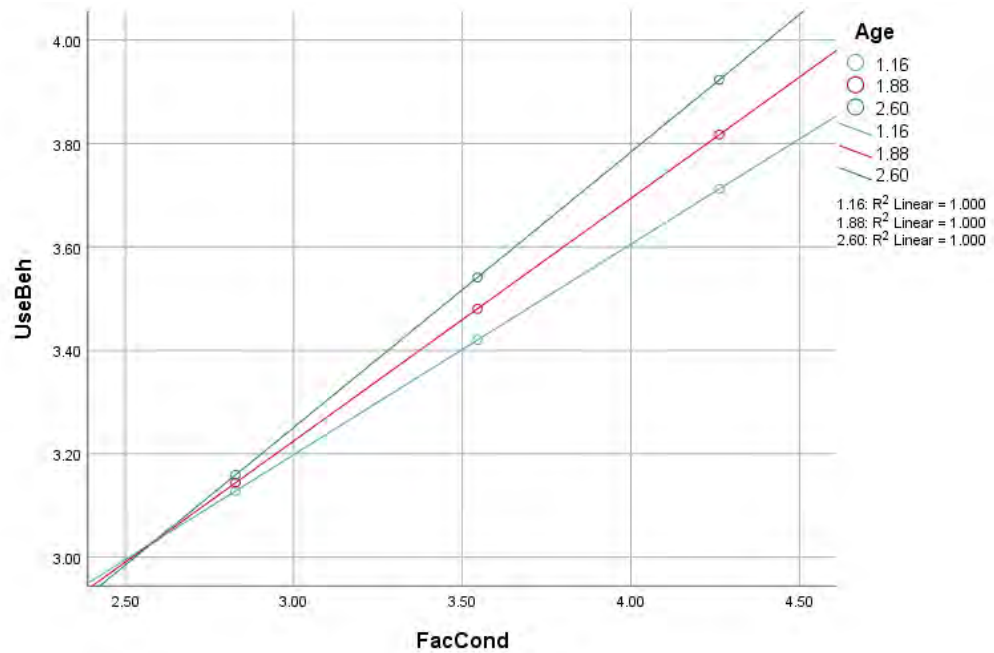


Figure 1.4b: Conditional effect from FacCond to UseBeh

The table 4.5d shows the a-path from facilitating conditions to behaviour intention and c'-path from facilitating conditions to use behaviour with the presence of a moderator (age) on both paths. On the a-path, there is a positive and significant direct effect of facilitating condition on the behaviour intention ($b = 1.41, p < .01$) indicating that higher facilitating conditions is associated with higher behaviour intention towards system use. It also shows that age had a positive and significant effect on the participants' behaviour intention ($b = 1.37, p < .05$). However, a negative but significant interaction effect of facilitating conditions and age on the behaviour intention ($b = -0.39, p < .05$) was observed and this conditional effect varied across different age group and these conditional effects of facilitating conditions on behaviour intention (figure 1.4a) was strongest for younger age (1.16 SD below mean), $b = 0.96, p < .001$, it was moderate and significant for middle age (at the mean), $b = 0.67, p < .001$, but weaker and still significant for older age (1.16 SD above mean), $b = 0.39, p < .05$. This shows that the relationship between facilitating conditions and behaviour intention is moderated by age and significant across different age groups.

The table 4.5d again reveals a negative but significant index of moderated mediation, ($b = -0.24$, CI $[-0.56, -0.01]$) on the relationship between facilitating conditions and use behaviour indicating that the effect of the mediating variable of behaviour intention is moderated by age. This suggest that the relationship between facilitating conditions and the use behaviour through behaviour intention is weaken in strength by the influenced of age connoting that as age increases the indirect effect of facilitating conditions on use behaviour through behaviour intention becomes weaker among different age group. This conditional indirect effect was found to be strong and significant for younger age (1.16 SD below the mean) $b = 0.59$, CI $[0.36, 0.98]$, weak and significant for middle age (at the mean) of the moderator, $b = 0.42$, CI $[0.25, 0.68]$ and also for the older age (1.16 SD above the mean) of the moderator, $b = 0.24$, CI $[0.02, 0.58]$ it was weaker but still significant.

Again, from the table 4.5d, the result for the c' -path, from facilitating conditions directly to use behaviour, reveals a negative and non-significant effect, $b = 0.31$, $p > .05$, suggesting that facilitating condition does not directly influence use behaviour in the presence of age as a moderator. Age was found to have weak negative and non-significant direct influence on the use behaviour of ($b = -0.23$, $p > .05$). The result further revealed an overall weak and non-significant moderating effect of age on the facilitating conditions and use behaviour relationship ($b = 0.08$, $p > .05$) suggesting that the relationship between facilitating conditions and the use behaviour does not vary based on age.

4.5.1e: The moderating effect of age on instructional assessment quality to behaviour intention and actual system usage

This analysis examined the effects of instructional assessment quality (InstAQty) on behaviour intention (BehInt) and use behaviour (UseBeh) with presence of a moderator (age). The results of the models for a-path and c'-path are presented in table 4.5e and figures 1.5a and 1.5b showing the effect and the significance level of the input variable (InstAQty), moderating variable (Age), and the interaction term (InstAQty * Age) on the outcome variables (BehInt and UseBeh).

Table 4.5e: Regression results for the a-path from Instructional Assessment Quality to Behaviour Intention and for the c'-path from Instructional Assessment Quality to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
InstAQty	1.19	0.31	< .001	-0.21	0.34	> .05
Age	1.42	0.52	< .05	-0.61	0.54	> .05
InstAQty * Age 1	-0.39	0.15	< .05			
InstAQty * Age 2				0.25	0.15	> .05
		b	SE	LLCI		ULCI
Index of MM		-0.31	0.12	-0.57		-0.09

Source: Field Data, 2024

Note. N = 65. Model for the a-path $R^2 = .24$, F (6.39), $p < .005$, Model for c'-path $R^2 = .54$, F (17.50), $p < .001$.

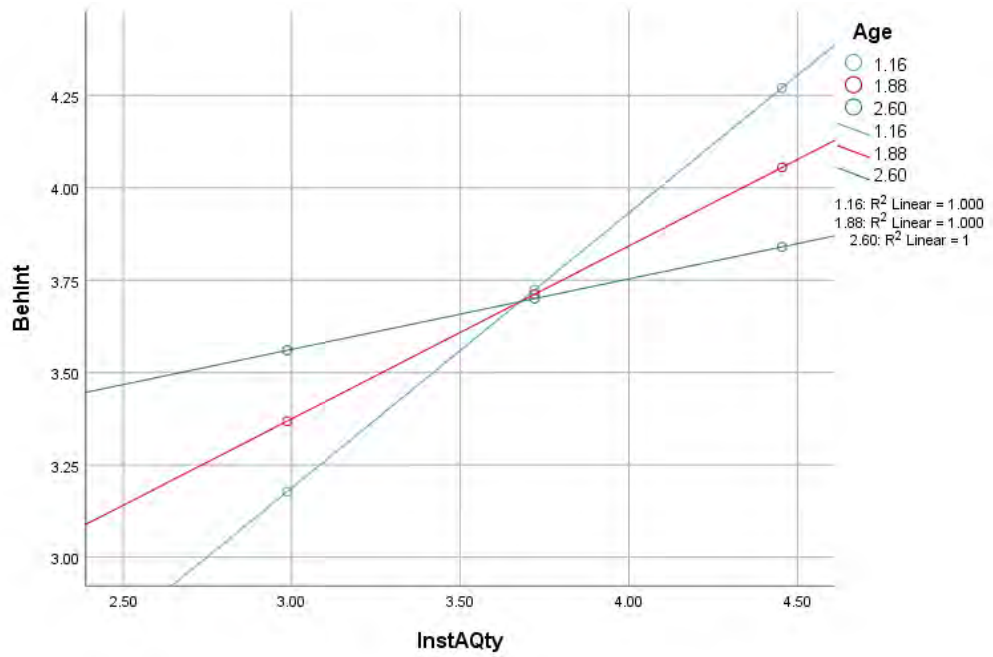


Figure 1.5a: Conditional effect from InstAQty to BehInt

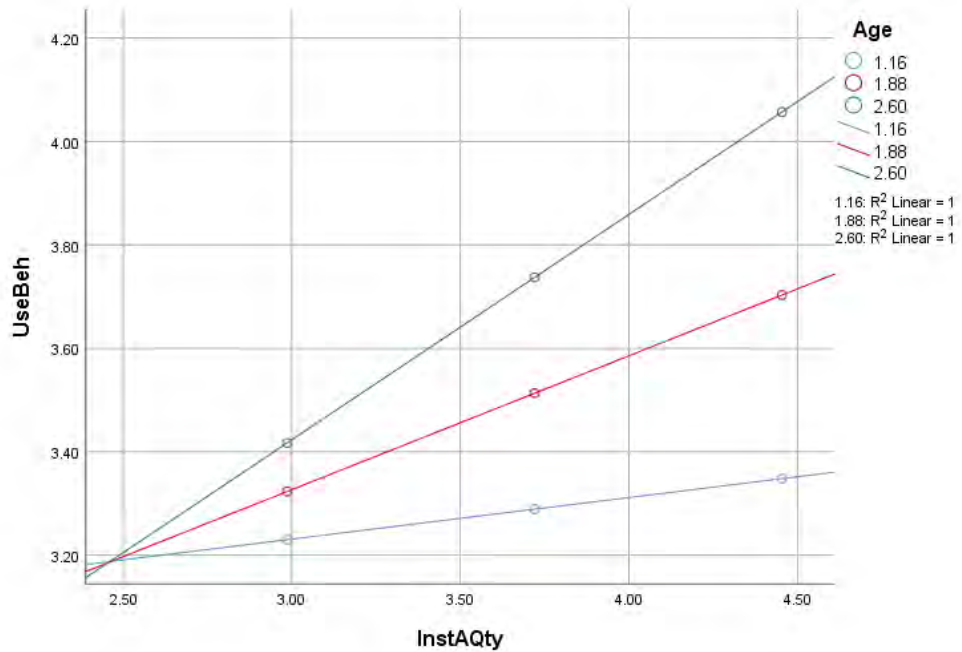


Figure 1.5b: Conditional effect from InstAQty to UseBeh

The results from the table 4.5a revealed that on the a-path from instructional assessment quality to behaviour intention there was a significant interaction between instructional assessment quality, age, and behaviour intention. There is a positive and significant direct effect of instructional assessment quality on the behaviour intention ($b = 1.19, p < .001$) depicting that higher quality of the instructional assessment is associated with higher behaviour intention of the participants. It also shows that age

had a positive and significant effect on the participants' behaviour intention ($b = 1.42$, $p < .05$). There was a negative but significant interaction effect of instructional assessment quality and age on the behaviour intention, ($b = -0.39$, $p < .05$) and this conditional effect varies across age groups. The conditional effect of instructional assessment quality on behaviour intention (figure 1.1a) was the strongest for younger age (1.16 SD below mean), $b = 0.75$, $p < .001$, it was moderate but still significant for middle age (at the mean), $b = 0.47$, $p < .001$. However, it was weaker and non-significant for older age (1.16 SD above mean), $b = 0.19$, $p > .05$. This indicates that as age increases the effect of instructional assessment quality on behaviour intention reduces.

The index of moderated mediation was significant even though it was negative, $b = -0.31$, CI [-0.56, -0.09], indicating an evidence for a moderated mediation by age on the relationship between instructional assessment quality and use behaviour through behaviour intention. This suggests that the relationship between instructional assessment quality and the use behaviour through behaviour intention weakens in strength by the influence of age. This conditional indirect effect was found to be strong and significant for younger age (1.16 SD below the mean) $b = 0.61$, CI [0.32, 0.86], weak but significant for middle age (at the mean), $b = 0.38$, CI [0.15, 0.60] but it was weak and non-significant for the older age (1.16 SD above the mean), $b = 0.16$, CI [-0.17, 0.41].

However, the result of the c' -path, the direct effect from instructional assessment quality to use behaviour, reveals a negative non-significant effect, $b = -0.21$, $p > .05$, suggesting that instructional assessment quality does not directly influence use behaviour of participants with the presence of the moderator (age). Also, age was found not to directly influence use behaviour, ($b = -0.61$, $p > .05$). The result further revealed an overall weak and non-significant moderating effect of age on the relationship

between instructional assessment quality and use behaviour ($b = 0.25$, $p > .05$). This demonstrate that the direct effect of instructional assessment quality on use behaviour does not vary based on age.

4.5.1f: The moderating effect of age on information quality to behaviour intention and actual system usage

This analysis focused on the effects of information quality (InfoQty) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of age. The results of the model for a-path and c'-path are presented in table 4.5f showing the effect and the significance level of the input variable (InfoQty), moderating variable (Age), and the interaction term (InfoQty * Age) on the outcome variables (BehInt) and (UseBeh).

Table 4.5f: Regression results for the a-path from Information Quality to Behaviour Intention and for the c'-path from Information Quality to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
InfoQty	0.91	0.35	< .05	0.16	0.38	> .05
Age	0.69	0.57	> .05	0.24	0.60	> .05
InfoQty * Age 1	-0.21	0.16	> .05			
InfoQty * Age 2				-0.02	0.17	> .05
		b	SE	LLCI		ULCI
Index of MM		-0.17	0.14	-0.38		0.18

Source: Field Data, 2024

Note. N = 65. Model for the a-path $R^2 = .24$, F (6.26), $p < .005$, Model for c'-path $R^2 = .49$, F (14.15), $p < .001$.

Table 4.5c shows the analysis result on a-path from information quality to behaviour intention and c'-path from information quality to use behaviour with the moderating role by age on both paths. A higher information quality is linked to

increased behaviour intention among participants, as evidenced by the positive and significant direct influence of information quality on behaviour intention ($b = 0.91, p < .05$). However, data demonstrates that the direct influence of age on behaviour intention was positive but non-significant ($b = 0.69, p > .05$). Also, the moderation effect of age on information quality and behaviour intention was negative and non-significant ($b = -0.21, p > .05$) suggesting that the influence of information quality on behaviour intention is not affected by change in age.

The index of moderated mediation was negative and non-significant $b = -0.17$, CI $[-0.38, 0.18]$, which suggest no evidence of moderated mediation on the relationship between information quality and use behaviour through behaviour intention.

The result on the c' -path from information quality to use behaviour reveals a weak and non-significant effect, $b = 0.16, p > .05$, suggesting that information quality does not directly influence use behaviour with the presence of a moderator. Also, age was found not to directly influence use behaviour, ($b = 0.24, p > .05$). The result revealed a negative and non-significant moderating effect of age on the relationship between information quality and use behaviour ($b = -0.02, p < .05$) indicating that the relationship between information quality and use behaviour does not vary based on age.

4.5.2 The moderating effect of gender on factors of LMS adoption by deaf students

4.5.2a: The moderating effect of gender on performance expectancy to behaviour intention and actual system usage

This analysis examined the effects of performance expectancy (PerfEx) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of gender. The results of the model for a-path and c' -path are presented in table

4.6a showing the effect and the significance level of the input variable (PerfEx), moderating variable (Gender), and the interaction term (PerfEx * Gender) on the outcome variables (BehInt and UseBeh).

Table 4.6a: Regression results for the a-path from Performance Expectancy to Behaviour Intention and for the c'-path from Performance Expectancy to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
PerfEx	1.36	0.19	> .05	0.33	0.18	> .05
Gender	-1.27	0.92	> .05	-0.39	0.87	> .05
PerfEx * Gender 1	0.28	0.27	> .05			
PerfEx * Gender 2				0.17	0.25	> .05
		b	SE	LLCI		ULCI
Index of MM		0.21	0.19	-0.20		0.57

Source: Field Data, 2024

Note. N = 65. Model for the a-path $R^2 = .17$, $F(4.15)$, $p < .05$, Model for c'-path $R^2 = .55$, $F(18.24)$, $p < .001$, PerfEx= Performance Expectancy, Index of MM= Index of Moderated Mediation

The table 4.6a shows the moderation analysis on the a-path which is from performance expectancy to behaviour intention presenting the effect size and the significance level of interaction between performance expectancy and gender on behaviour intention. There is a weaker positive and non-significant direct effect of performance expectancy on the behaviour intention ($b = 0.26$, $p > .05$) depicting that performance expectancy is not associated with higher behaviour intention with the presence of gender as a moderating variable. It also shows that gender had a negative and non-significant effect on behaviour intention ($b = -1.27$, $p > .05$). The interaction term of performance expectancy and gender on the behaviour intention is found to be weaker and non-significant ($b = 0.28$, $p > .05$) suggesting that the relationship between

performance expectancy and behaviour intention towards LMS does not vary based on gender of participants.

The index of moderated mediation was found to be non-significant ($b = 0.21$, CI [-0.20, 0.57]), providing evidence for no moderated mediation on the relationship between performance expectancy and use behaviour. This shows that the indirect effect of performance expectancy on use behaviour through behaviour intention and with the presence of gender, overall is weaker and do not significantly change the strength and direction of the effect of performance expectancy on the use behaviour. However, this conditional indirect effect was significant for males ($b = 0.40$, CI [0.13, 0.68]), but for females it was non-significant $b = 0.19$, CI [-0.06, 0.47] as there is zero between the lower and upper bounds of the confidence of intervals.

The table 4.6a further shows the result on the c' -path from performance expectancy to use behaviour, and this reveals a positive but non-significant direct effect, $b = 0.33$, $p > .05$ suggesting that performance expectancy does not directly influence use behaviour of participants with the presence of a moderating variable (gender). Also, gender was found not to directly influence use behaviour, ($b = -0.39$, $p > .05$). The result further revealed an overall non-significant moderating effect of gender on the relationship between performance expectancy and use behaviour ($b = 0.17$, $p > .05$). This designate that the direct effect of performance expectancy on use behaviour does not vary based on gender. However, males were found to have a significant moderating effect on the performance expectancy to use behaviour relationship showing a conditional effect of ($b = 0.50$, CI [0.12, 0.88]) but was non-significant for females, ($b = 0.33$, CI [-0.02, 0.68]).

4.5.2b: The moderating effect of gender on effort expectancy to behaviour intention and actual system usage

This analysis examined the effects of effort expectancy (EfftEx) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of gender. The result of the model for a-path and c'-path is presented in table 4.6b, showing the effect and the significance level of the input variable (EfftEx), moderating variable (Gender), and the interaction term (EfftEx * Gender) on the outcome variables (BehInt and UseBeh).

Table 4.6b: Regression results for the a-path from Effort Expectancy to Behaviour Intention and for the c'-path from Effort Expectancy to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
EfftEx	0.23	0.18	> .05	0.39	0.18	< .05
Gender	-1.26	0.85	> .05	0.40	0.84	> .05
EfftEx * Gender 1	0.31	0.23	> .05			
EfftEx * Gender 2				-0.16	0.23	> .05
		b	SE	LLCI		ULCI
Index of MM		0.22	0.16	-0.095		0.552

Source: Field Data, 2024

Note: N = 65. Model for the a-path $R^2 = .23$, $F(6.07)$, $p < .01$, Model for c'-path $R^2 = .55$, $F(18.20)$, $p < .001$, EfftEx = Effort Expectancy, Index of MM= Index of

Moderated Mediation

The results from the table 4.6b shows the moderation analysis on the a-path which is from effort expectancy to behaviour intention presenting the effect size and the significance level of interaction between effort expectancy and gender on behaviour intention. There is a weaker positive and non-significant direct effect of effort expectancy on the behaviour intention ($b = 0.23$, $p > .05$) depicting that effort

expectancy is not associated with behaviour intention in the presence of the moderating variable (gender). It also shows that gender had a negative and non-significant effect on behaviour intention ($b = -1.26, p > .05$). The moderating effect of effort expectancy and gender on the behaviour intention is found to be weak and non-significant ($b = 0.31, p > .05$) suggesting that the relationship between effort expectancy and behaviour intention towards LMS does not vary based on gender of participants.

The index of moderated mediation was found to be non-significant ($b = 0.22, CI [-0.095, 0.552]$), providing evidence for no moderated mediation on the relationship between effort expectancy and use behaviour. This shows that the indirect effect of effort expectancy on use behaviour through behaviour intention and with the presence of gender, overall is weaker and do not significantly change the strength and direction of the effect of effort expectancy on the use behaviour. Despite the non-significant conditional indirect effect, there was traces of significance for males ($b = 0.38, CI [0.16, 0.64]$), but for females it was still not significant ($b = 0.16, CI [-0.07, 0.36]$) as there is zero between the lower and upper bounds of the confidence intervals.

The table 4.6b again shows the result on the c' -path from effort expectancy to use behaviour, and this reveals a positive and significant direct effect ($b = 0.39, p < .05$), suggesting that effort expectancy directly influence use behaviour of participants with the presence of a moderating variable (gender). Gender was however found not to directly influence use behaviour, ($b = 0.40, p > .05$). The result further revealed an overall no significant moderating effect of gender on the relationship between effort expectancy and use behaviour ($b = -0.16, p > .05$). This designate that the direct effect of effort expectancy on use behaviour is not affected by gender of the user.

4.5.2c: The moderating effect of gender on social influence to behaviour intention and actual system usage

This analysis examined the effects of social influence (SocInflx) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of gender. The result of the model for a-path and c'-path is presented in table 4.6c showing the effect and the significance level of the input variable (SocInflx), moderating variable (Gender), and the interaction term (SocInflx * Gender) on the outcome variables (BehInt and UseBeh).

Table 4.6c: Regression results for the a-path from Social Influence to Behaviour Intention and for the c'-path from Social Influence to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
SocInflx	-.44	0.34	> .05	-.96	0.31	< .01
Gender	-3.20	1.35	< .05	-4.54	1.25	< .01
SocInflx*Gender 1	0.85	0.38	< .05			
SocInflx*Gender 2				1.36	0.35	< .001
Index of MM		b	SE	LLCI		ULCI
		0.63	0.23	0.249		1.139

Source: Field Data, 2024

Note: N = 65. Model for the a-path $R^2 = .15$, $F(3.52)$, $p < .05$, Model for c'-path $R^2 = .58$, $F(21.09)$, $p < .001$, SocInflx = Social Influence, Index of MM= Index of Moderated Mediation

The results from the table 4.6c presents the moderation analysis on the a-path, from social influence to behaviour intention showing the effect size and the significance level of interaction between social influence and gender on behaviour intention. Social influence had a negative and non-significant influence behaviour intention ($b = -.44$, $p > .05$) depicting that social influence negatively influences behaviour intention but not significant in the presence of the moderating variable (gender). It again shows that

gender had a negative but significant influence on behaviour intention ($b = -3.20$, $p < .05$). The interaction term of social influence and gender on behaviour intention was also strong and significant ($b = 0.85$, $p < .05$) suggesting that the relationship between social influence and behaviour intention towards LMS is influenced by gender and this was found to be significant only for males ($b=0.42$, $p < .05$).

The index of moderated mediation was found to be significant ($b = 0.63$, CI [0.249, 1.139]), providing evidence for a moderated mediation on the relationship between social influence and use behaviour. This shows that the indirect effect of social influence on use behaviour through behaviour intention and with the presence of gender, overall is moderate and significantly change the strength and direction of the effect of social influence on the use behaviour. This conditional indirect effect was significant for both males ($b = 0.307$, CI [0.010, 0.615]) and females ($b = -.323$, CI [-.760, -.079]) as there is no zero between the lower and upper bounds of the confidence intervals for both genders.

The table 4.6c further show the result on the c' -path, from social influence directly to use behaviour, and this reveal a strong negative and significant direct effect ($b = -.96$, $p < .01$), suggesting that social influence directly influence use behaviour of participants with the presence of a moderating variable (gender). Gender was also found to directly influence use behaviour however in a negative direction ($b = -4.54$, $p < .01$). The interaction effect observed on social influence and gender on use behaviour revealed a significant moderation of gender on the relationship between social influence and use behaviour ($b = 1.36$, $p < .001$). This designate that the direct effect of social influence on use behaviour is strengthened by gender of the user and this influence is significant for both males ($b = 0.40$, CI [0.096, 0.709]) and female ($b = -.96$, CI [-1.573, -.349]).

4.5.2d: The moderating effect of gender on facilitating condition to behaviour intention and actual system usage

This analysis examined the effects of facilitating condition (FacCond) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of gender. The result of the model for a-path and c'-path is presented in table 4.6d showing the effect and the significance level of the input variable (FacCond), moderating variable (Gender), and the interaction term (FacCond * Gender) on the outcome variables (BehInt and UseBeh).

Table 4.6d: Regression results for the a-path from Facilitating Condition to Behaviour Intention and for the c'-path from Facilitating Condition to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
FacCond	0.46	0.25	> .05	0.48	0.27	> .05
Gender	-1.00	1.05	> .05	0.07	1.11	> .05
FacCond*Gender 1	0.23	0.28	> .05			
FacCond*Gender 2				0.06	0.30	> .05
		b	SE	LLCI	ULCI	
Index of MM		0.14	0.19	-.238	0.498	

Source: Field Data, 2024

Note: N = 65. Model for the a-path $R^2 = .36$, $F(11.31)$, $p < .001$, Model for c'-path $R^2 = .56$, $F(19.24)$, $p < .001$, FacCond = Facilitating Condition, Index of MM= Index of Moderated Mediation

The results from the table 4.6d presents the analysis on the a-path which is from facilitating condition to behaviour intention showing the influence and the significance level of interaction between facilitating condition and gender on behaviour intention.

There is a weak positive but non-significant influence of facilitating condition on behaviour intention ($b = 0.46, p > .05$) demonstrating that facilitating condition does not influence behaviour intention in the presence of the moderating variable (gender). It also shows negative and non-significant direct influence of gender on behaviour intention ($b = -1.00, p > .05$). The relationship between facilitating condition and behaviour intention towards LMS adoption was not influenced by gender as the interaction of facilitating condition and gender on behaviour intention is found to be weak and non-significant ($b = 0.23, p > .05$) depicting that the relationship between facilitating condition and behaviour intention towards LMS does not vary based on gender of participants.

The index of moderated mediation was found to be non-significant ($b = 0.14, CI [-.238, 0.498]$), providing evidence for no moderated mediation on the relationship between facilitating condition and use behaviour. This shows that the indirect influence of facilitating condition on use behaviour through behaviour intention and with the presence of gender, overall is weak and do not significantly change the strength and direction of the influence in the relationship. However, this conditional indirect effect was significant for males ($b = 0.43, CI [0.212, 0.757]$), but for females it was non-significant ($b = 0.28, CI [-0.001, 0.638]$) as there is zero between the lower and upper limits of the confidence intervals.

The table 4.6d also present the result on the c' -path from facilitating condition to use behaviour, and shows a weak positive and non-significant direct effect ($b = 0.48, p > .05$), suggesting that facilitating condition does not directly influence use behaviour of participants with the presence of a moderating variable (gender). Gender was also found not to directly influence use behaviour directly ($b = 0.07, p > .05$). The result further revealed an overall non-significant moderating influence of gender on the

relationship between facilitating condition and use behaviour ($b = 0.06$, $p > .05$). This designate that the direct influence of facilitating condition on use behaviour is not affected by gender of the user.

4.5.2e: The moderating effect of gender on instructional assessment quality to behaviour intention and actual system usage

This analysis examined the effects of instructional assessment quality (InstAQty) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of gender. The result of the model for a-path and c'-path is presented in table 4.6e showing the influence and the significance level of the input variable (InstAQty), moderating variable (Gender), and the interaction term (InstAQty * Gender) on the outcome variables (BehInt and UseBeh).

Table 4.6e: Regression results for the a-path from Instructional Assessment Quality to Behaviour Intention and for the c'-path from Instructional Assessment Quality to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
InstAQty	0.18	0.21	> .05	0.35	0.21	> .05
Gender	-1.55	1.03	> .05	0.80	1.03	> .05
InstAQty * Gender 1	0.36	0.27	> .05			
InstAQty * Gender 2				-.13	0.27	> .05
		b	SE	LLCI		ULCI
Index of MM		0.29	0.21	-.198		0.642

Source: Field Data, 2024

Note: N = 65. Model for the a-path $R^2 = .18$, $F(4.57)$, $p < .01$, Model for c'-path $R^2 = .51$, $F(15.54)$, $p < .001$, InstAQty = Instructional Assessment Quality, Index of MM= Index of Moderated Mediation

The results from the table 4.6e presents the analysis on the a-path, the relationship from instructional assessment quality to behaviour intention showing the

influence and the significance level of interaction between instructional assessment quality and gender on behaviour intention. There is a weak and non-significant influence of instructional assessment quality on behaviour intention ($b = 0.18, p > .05$) demonstrating that instructional assessment quality does not influence behaviour intention in the presence of the moderating variable (gender). It also shows negative and non-significant direct influence of gender on behaviour intention ($b = -1.55, p > .05$). The relationship between instructional assessment quality and behaviour intention towards LMS adoption was not influenced by gender as the interaction of instructional assessment quality and gender on behaviour intention is found to be weak and non-significant ($b = 0.36, p > .05$) depicting that the relationship between instructional assessment quality and behaviour intention towards LMS does not vary based on gender of participants.

The index of moderated mediation was found to be non-significant ($b = 0.29, CI [-.198, 0.642]$), providing evidence for no moderated mediation on the relationship between instructional assessment quality and use behaviour. This shows that the indirect influence of instructional assessment quality on use behaviour through behaviour intention and with the presence of gender, overall is weak and do not significantly change the strength and direction of the relationship.

The table 4.6e also present the result on the c' -path, the direct relationship from instructional assessment quality to use behaviour, and shows a weak positive and non-significant direct effect ($b = 0.35, p > .05$), suggesting that instructional assessment quality does not directly influence use behaviour of participants with the presence of a moderating variable (gender). Gender was also found not to directly influence use behaviour directly ($b = 0.80, p > .05$). The result further revealed an overall negative and non-significant moderating influence of gender on the relationship between

instructional assessment quality and use behaviour ($b = -.13, p > .05$). This designate that the direct influence of instructional assessment quality on use behaviour is not affected by gender of the user.

4.5.2f: The moderating effect of gender on information quality to behaviour intention and actual system usage

This analysis examined the effects of information quality (InfoQty) on behaviour intention (BehInt) and use behaviour (UseBeh), considering the moderating role of gender. The result of the model for a-path and c'-path is presented in table 4.6f showing the effect and the significance level of the input variable (InfoQty), moderating variable (Gender), and the interaction term (InfoQty * Gender) on the outcome variables (BehInt and UseBeh).

Table 4.6f: Regression results for the a-path from Information Quality to Behaviour Intention and for the c'-path from Information Quality to Use behaviour

Variable	Model a-path			Model c'-path		
	b	SE	p	b	SE	p
InfoQty	-.03	0.26	> .05	-.10	0.28	> .05
Gender	-2.25	1.05	< .05	-1.00	1.15	> .05
InfoQty * Gender 1	0.59	0.29	< .05			
InfoQty * Gender 2				0.36	0.32	> .05
		b	SE	LLCI	ULCI	
Index of MM		0.45	0.21	0.051	0.841	

Source: Field Data, 2024

Note: N = 65. Model for the a-path $R^2 = .27, F (7.49), p < .001$, Model for c'-path $R^2 = .50, F (14.86), p < .001$, InfoQty = Information Quality, Index of MM= Index of Moderated Mediation

The results from the table 4.6f presents the moderation analysis on the a-path which is from information quality to behaviour intention showing the influence and the significance level of interaction between information quality and gender on behaviour intention. Information quality had a negative and non-significant influence behaviour intention ($b = -.03, p > .05$) depicting that information quality negatively influences behaviour intention but this influence is not significant. However, it shows that gender had a negative but significant influence on behaviour intention ($b = -2.25, p < .05$). The interaction effect of information quality and gender on behaviour intention is found to be positive and significant ($b = 0.59, p < .05$) suggesting that the relationship between information quality and behaviour intention towards LMS is influenced by gender and this was found to be significant only for males ($b=0.56, p < .001$) but non-significant for females ($b= -.03, p > .915$).

The index of moderated mediation was found to be significant ($b = 0.45, CI [0.051, 0.841]$), providing evidence for a moderated mediation on the relationship between information quality and use behaviour. This shows that the indirect effect of information quality on use behaviour through behaviour intention and with the presence of gender, overall is weak but significant, and change the strength and direction of the influence of information quality on the use behaviour. This conditional indirect effect was significant for only males ($b = 0.43, CI [0.221, 0.677]$) but non-significant for females ($b = -.02, CI [-.357, .322]$) as there is zero between the lower and upper limits of the confidence intervals for female gender.

The table 4.6f again present the result on the c'-path, the direct relationship from information quality to use behaviour, this shows a weak negative and non-significant direct influence ($b = -.10, p > .05$), suggesting that information quality do not directly influence use behaviour of participants with the presence of gender as a moderator.

Gender was also found to have strong negative and non-significant influence on use behaviour ($b = -1.00$, $p > .05$). The interaction effect observed on information quality and gender on use behaviour revealed a non-significant moderation of gender on the relationship between information quality and use behaviour ($b = 0.36$, $p < .05$). This designate that the direct effect of information quality on use behaviour is not affected by gender of the user and this influence is non-significant for both females ($b = -.10$, CI $[-.652, 0.448]$) and males ($b = 0.26$, CI $[-.051, .561]$).



PART II: DISCUSSION OF RESULTS

This section of the chapter 4 discussed the results, providing possible justifications for occurrence and compared the findings with the existing literature regarding LMS adoption. The discussion was done based on the research objectives. The first objective discussed the pattern of usage (activities and frequency). The second objective discussed the factors that informed the adoption of the LMS. Finally, the effect of the moderators (gender and age) on the relationship between the independent, mediating, and dependent variables was explained.

4.6.1 Research Objective 1: Deaf students' LMS usage activities and frequency

This research objective explored the deaf students' engagement with the LMS, focusing on various activities and their frequency of use. The findings revealed a diverse pattern of LMS utilization among the participants, highlighting both areas of strength and potential underutilization. The overall usage by 61.5% suggests a moderate regular level of LMS engagement, falling between "Once a month" and "Daily". This indicates that while students are utilizing the LMS, their engagement is not consistently high across all activities. This aligns with literature indicating that LMS use can be variable and dependent on a multitude of factors, including the course design, instructor support, student motivation, and perceived value of its usage (Bates, 2019; Salmon, 2011). The moderate level of engagement observed in this study underscores the importance of understanding these contributing factors to maximize the effectiveness of LMS platforms and this finding corroborate that of Dampson (2021) who found that the usage level of LMS by students at UEW was at the moderate level.

A notable observation was the relatively low frequency of interaction with colleagues on the LMS. This suggests a potential underutilization of the LMS as a

platform for collaborative learning and peer-to-peer interaction. One possible reason for such level of usage could be the challenges deaf students face in communication with limited to no supports such as the use of sign language interpreters or captions. Another possible reason could be that even though the LMS may offer tools for communication and collaboration, such as discussion forums, group workspaces, and messaging systems, however, deaf students found it difficult to use such features but not necessarily that students did not want to fully leveraging on the interactive features in the LMS. Again, a possible explanation could be a preference for other communication channels (e.g., social media, messaging apps, in-person) (Junco, 2015; Ellison et al., 2007), a lack of awareness of the LMS's collaborative features, perceived limitations in the platform's functionality for social interaction, or a lack of incentive to engage in online collaboration (Bonk & Kim, 2010). This echoes findings of several studies (Aljedanni et al., 2021; Kim et al., 2019; Kumar et al., 2023; Suryanto et al., 2024) who all found that students less use the collaborative and interactive features of the LMS for collaborative learning and peer-to-peer interactions and this was attributed to the reason that when students do not perceive value in the collaborative features of the LMS or find them difficult to use, they are less likely to engage with them. Furthermore, the design of the learning environment and the instructor's role in fostering online interaction can also significantly impact student's participation in collaborative activities (Palloff & Pratt, 2013). However, in contrast, Gracia and Rivera (2020) found that student regularly using the collaborative and interactive features of the LMS to communicate and share ideas and resources while also engaging in collaborative project through the LMS. Hence, this warrants for further investigation to understand the reasons behind this trend.

Conversely, the activity with the highest engagement was the use of the LMS for submitting assignments. This was unsurprising, as assignment submission is often a mandatory component of coursework, making consistent use of the LMS for this purpose essential. The high frequency of assignment submission suggests that students are primarily using the LMS as a tool for task completion rather than for broader engagement with the platform's resources and features. This instrumental use of LMS platforms is a common finding (Patel et al., 2022; Singh et al., 2023; Wang et al., 2009). Students may be primarily focused on fulfilling course requirements, such as submitting assignments and accessing grades, rather than actively participating in online discussions or utilizing other available resources. This highlights the need for educators to design learning activities that encourage more active and meaningful engagement with the LMS beyond basic task completion.

The data also reveal a considerable proportion of students less engaged with certain LMS activities. For instance, the substantial portion of respondents reported less usage of the LMS for accessing or using learning materials, and similar percentages rarely attended live lectures and also rarely took test and quizzes on the LMS. These findings raise concerns about the effectiveness of the LMS in delivering learning content, facilitating live instruction and ensuring effective assessment among deaf students. It is crucial to understand the factors contributing to the lack of engagement for these activities on the LMS. Possible reasons include technical difficulties in using the LMS for such activities, a preference for traditional learning methods, a lack of perceived value in the online resources and live lectures, time constraints, or a mismatch between the design of online content and students' learning styles (Ally, 2006; Clark & Mayer, 2016). These factors are frequently cited as barriers to effective online learning especially for deaf students (Noble, 2010). Furthermore, the quality of online

instruction and the level of instructor presence and support can significantly influence student engagement with online resources and live sessions (Brown et al., 2020; Noble, 2010).

4.6.2 Research Objective 2: Determinants of LMS adoption by deaf students

The research objective 2 of the study aimed to examine the determinants of learning management system adoption by deaf students in the university.

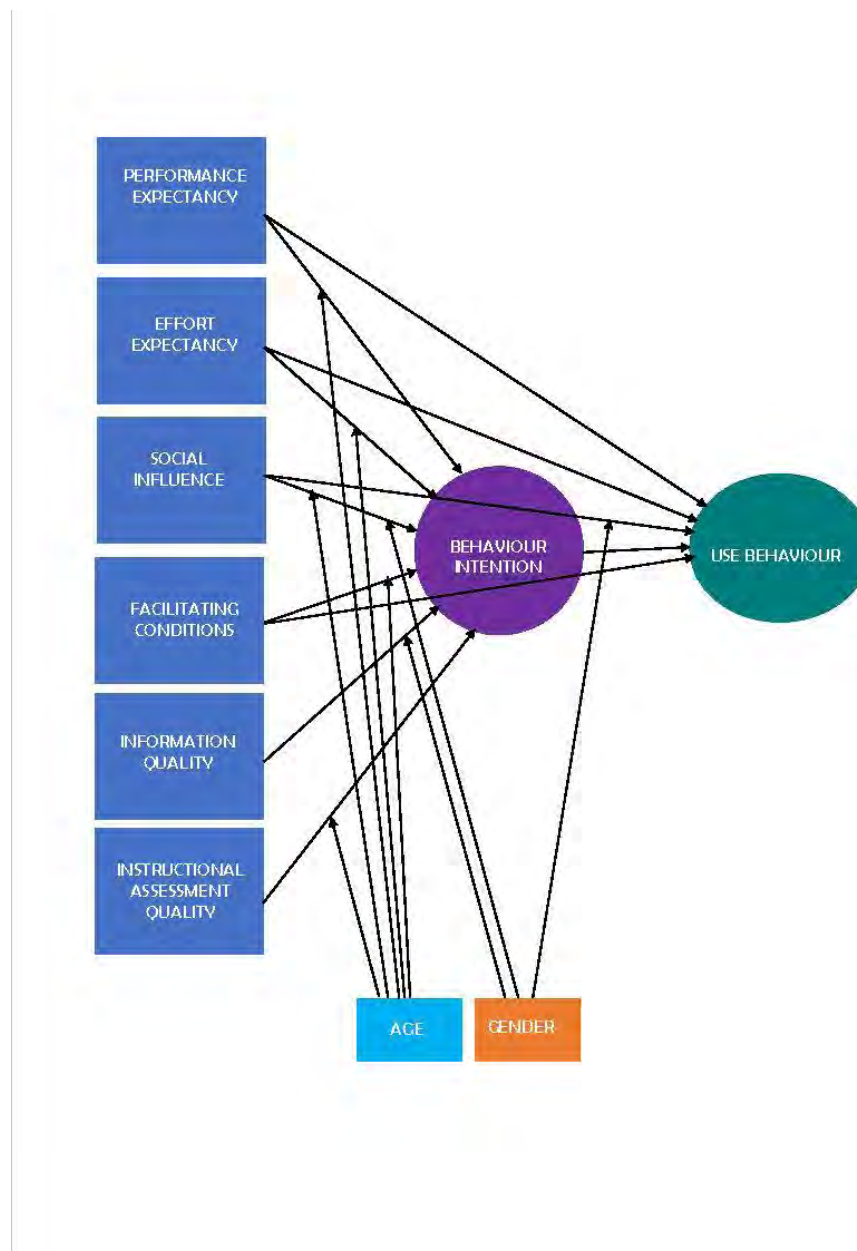


Figure 4.6.2: Final Conceptual Model

Performance Expectancy

The findings indicate that performance expectancy significantly influences use behaviour indirectly through behaviour intention among deaf students in using the university's learning management system (LMS). Performance expectancy, defined as the degree to which deaf students perceive that the LMS facilitates task completion and improves their academic performance, was positively associated with behaviour intention, which in turn predicted their actual use behaviour towards the LMS. This mediation effect suggests that deaf students who believe the LMS enhances their learning outcomes are more likely to form positive intentions to engage with the system, subsequently leading to better use behaviour. This aligns with prior research on LMS adoption in higher education, where performance expectancy consistently emerges as a crucial antecedent to behaviour intention and system usage (Venkatesh et al., 2003; Sun & Chen, 2016; Tarhini, Alalwan, & Al-Qirim, 2017). For instance, deaf students' belief in the usefulness of the LMS fosters motivation to integrate it into their academic routines, reflecting the broader technology acceptance frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Moreover, interventions that enhance perceptions of LMS effectiveness such as demonstrating successful use cases or providing hands-on experience can strengthen the behaviour intention, thereby facilitating an increased in use behaviour. Hence, targeting performance expectancy through showing evidence of benefits and relevant improvements may effectively increase LMS engagement among deaf students by shaping their intention to use the system.

Beyond the indirect pathway, performance expectancy also exhibited a significant direct effect on LMS use behaviour. This direct influence suggests that deaf students' perceptions of the LMS's utility rendering into actual usage even without fully

formed behaviour intentions, indicating other psychological or contextual mechanisms at play. Supporting literature suggests factors such as habit formation, self-efficacy, and facilitating conditions contribute to direct effects of performance expectancy on technology use (Liaw, 2008; Sun & Rueda, 2012; Venkatesh et al., 2012). For example, deaf students confident in the LMS's ability to improve their academic tasks may develop habitual engagement or feel empowered to use the platform, thereby bypassing the traditional intention-behaviour pathway. Furthermore, adequate institutional support and accessible LMS features tailored for deaf students could enhance this direct relationship by reducing barriers to use. These findings underscore the multifaceted role of performance expectancy in LMS adoption, highlighting that fostering positive performance beliefs not only encourages intention formation but also promotes actual system use through additional cognitive and environmental facilitators. Consequently, university strategies to improve LMS adoption among deaf students should simultaneously address performance expectancy and the broader contextual factors enabling sustained use.

Effort Expectancy

The results revealed a significant indirect effect of effort expectancy on LMS use behaviour through behaviour intention, indicating that deaf students' behaviour intention partially contributes to this relationship. Effort expectancy, defined as the degree to which deaf students perceive the LMS to be easy to use and requiring minimal effort, influences their intention to engage with the platform. This aligns with the Unified Theory of Acceptance and Use of Technology (UTAUT), which identifies effort expectancy as a key determinant of behaviour intention (Venkatesh et al., 2003). Previous research in university contexts supports this finding, showing that perceived ease of use positively influences students' intention to use LMS platforms (Alharbi &

Drew, 2014; Park, 2009). From a cognitive perspective, ease of use reduces cognitive load, enabling users to apportion mental resources to learning tasks rather than struggling with system navigation (Sweller, 2010). Therefore, when deaf students perceive the LMS as user-friendly, they develop stronger intentions to use it, which fosters their actual system engagement and use. Practical strategies to boost effort expectancy include the provision of intuitive interface design, clear instructions, and accessible tutorials tailored for deaf users, which can lower perceived barriers and improve adoption rates.

Again, aside the indirect effect, effort expectancy also showed a significant direct influence on LMS use behaviour. This suggests that deaf students' ease to use the LMS fostered not only their intentional use but also positive actual system use behaviour. Research indicates that ease of use strengthens self-efficacy and promotes habit formation, both of which contribute directly to sustained technology use (Liaw, 2008; Sun & Rueda, 2012). For deaf students, an LMS perceived as straightforward, encourages routine interaction and reduces anxiety associated with technology use which leads to higher actual usage regardless of their conscious intention towards using it. This finding underscores the importance of usability improvements that enhance user experience to facilitate both deliberate and automatic LMS use. Consequently, universities aiming to increase LMS adoption among deaf students should prioritize interface accessibility, streamlined navigation, and ongoing technical support to reinforce these direct pathways of use behaviour.

Social Influence

The result showed that behaviour intention did not significantly mediate the relationship between social influence and LMS use behaviour among deaf students. Although social influence showed a positive but non-significant total effect on use

behaviour, the indirect effect through behaviour intention was also non-significant. This indicates that perceived social pressure or normative beliefs from peers, instructors, or significant others do not strongly shape deaf students' intentions to use the LMS, nor their actual usage. This finding diverges from the Unified Theory of Acceptance and Use of Technology (UTAUT), which identifies social influence as a key determinant of behaviour intention and technology adoption (Venkatesh et al., 2003). However, prior research in higher education contexts suggests that LMS use is often mandatory, limiting the impact of social influence on behaviour intention (Alenezi, 2018; Ifinedo, 2016). Consequently, deaf students' intentions to use the LMS may be less dependent on social norms and more influenced by institutional requirements or individual factors.

Consistent with the indirect effect, social influence did not significantly predict use behaviour directly. This suggests that social pressure alone is insufficient to drive LMS engagement among deaf students. Other factors such as habit formation, perceived usefulness, or self-efficacy may more directly influence use behaviour in this context (Liaw, 2008; Sun & Rueda, 2012). The minimal effect of social influence may also reflect the nature of LMS adoption in university settings where use is compulsory rather than voluntary, reducing the relevance of peer or instructor approval. These results imply that interventions aiming to increase LMS adoption by deaf students should focus less on social normative messaging and more on enhancing individual motivations and system usability.

Facilitating Conditions

The mediation analysis revealed a significant indirect effect of facilitating conditions on LMS use behaviour through behaviour intention, indicating partial mediation. Facilitating conditions defined as deaf students' perceptions of available resources, technical support, and infrastructural assistance positively influenced their

intention to use the LMS, which subsequently predicted actual usage. This finding corroborates prior studies in higher education technology adoption, where facilitating conditions enhance behaviour intention by increasing users' perceived control and confidence in their ability to use the system (Ifinedo, 2016; Liaw, 2008). The availability of adequate training, technical support, and user-friendly interfaces are critical in fostering positive intentions, which drive consistent LMS engagement (Sun & Rueda, 2012). Thus, improving facilitating conditions strengthens deaf students' motivation to utilize LMS resources effectively.

Beyond the mediated pathway, facilitating conditions also exerted a significant direct effect on LMS use behaviour. This indicates that access to resources and support independently promotes use behaviour, beyond its influence on behaviour intention. This aligns with theoretical models such as the Unified Theory of Acceptance and Use of Technology (UTAUT), which identifies facilitating conditions as a determinant of actual technology use through mechanisms like habit formation and perceived behaviour control (Venkatesh et al., 2003). Deaf students with reliable access to necessary tools and assistance may integrate LMS use into their academic routines more effortlessly, leading to habitual or automatic engagement. Therefore, institutional efforts to enhance facilitating conditions not only foster intention but also directly promote sustained LMS use among deaf students.

Instructional Assessment Quality

The mediation analysis demonstrated that behaviour intention fully mediated the relationship between instructional assessment quality and use behaviour among deaf students. Instructional assessment quality had a significant indirect effect on LMS use behaviour through behaviour intention. This indicates that deaf students' perceptions of the clarity, fairness, alignment, and feedback quality of assessments on the learning

platform influence their intention to engage with LMS-based learning activities, which in turn drives their actual use behaviour. This finding aligns with established research emphasizing the role of assessment quality in fostering student motivation and engagement (Al-Busaidi & Al-Shihi, 2012; Park et al., 2012) and a high-quality assessments signals relevance and meaningfulness, thereby strengthening students' commitment to learning tasks and promoting deeper interaction with the LMS (Binyamin, 2019, Pintrich & Schunk, 2002; Sun et al., 2008). The results underscore that improving assessment design and feedback mechanisms within LMS platforms can effectively enhance students' behaviour intentions, ultimately increasing their usage of LMS resources.

While the total effect of instructional assessment quality on LMS use behaviour was significant, the direct effect controlling for behaviour intention was positive but non-significant. This suggests that the influence of perceived assessment quality on LMS use behaviour is primarily transmitted through behaviour intention rather than exerting a direct influence. These findings highlight behaviour intention as a crucial mechanism by which instructional assessment quality shapes use behaviour. The lack of a significant direct effect suggests that other pathways, such as immediate engagement or habit, play a lesser role in this context. This pattern is consistent with LMS adoption studies emphasizing that students' behaviour intentions mediate the relationship between educational design elements and the LMS use behaviour (Liaw, 2008; Sun & Rueda, 2012). Therefore, enhancing the perceived quality of instructional assessments remains a key strategy for promoting LMS engagement among deaf students by positively influencing their behaviour intentions.

Information Quality

This result on the influence of information quality on use behaviour reveal a significant total effect, suggesting a positive relationship between users' perceptions of the quality of information provided by the learning system or resource and their subsequent use behaviour. This implies that when users perceive the information as accurate, up-to date, and relevant to their learning, they are more likely to engage with the system. This aligns with research on information seeking behaviour, which suggests that individuals are more likely to use information sources that they perceive as credible, accurate, and relevant to their needs (Binyamin, 2019; DeLone & McLean, 2003; Wilson, 2000). High-quality information can increase the perceived value and usefulness of the system or resource, thereby motivating users to engage more actively.

However, it was also made evident a non-significant direct effect of information quality on Use behaviour. While the direction of the effect is positive, suggesting that even when controlling for behavioural intention, perceived information quality might have some direct influence on use, the effect is not statistically significant at the conventional $p < .05$ level. This suggests that the relationship between deaf students' perception of the quality of information provided by the LMS and use behaviour might be fully explained by the mediating role of their behaviour intention. This is a crucial distinction, as it highlights the importance of understanding the mechanisms through which information quality influences user behaviour.

Remarkably, the result corroborated a significant indirect effect of Information quality on Use behaviour through behaviour intention providing a strong evidence for full mediation. Users' perceptions of the quality of the information provided influence their behaviour intentions, leading to their actual use behaviour. This suggests that improving the perceived quality of information can lead to increased use of resources

from the system by strengthening users' intentions to engage with it. This result is consistent with that the impact of information quality on use behaviour is primarily driven by its influence on user intentions. When users perceive the information as accurate, relevant, timely, and complete, they are more likely to develop positive intentions toward the related system or resource, which ultimately leads to increased use.

4.6.3 Research Objective 3: Effect of demographics (age and gender) in moderating the deaf students' LMS adoption factors

The third research objective of the study aimed to examine the moderating role of demographic characteristics (age and gender) on the relationship that exist between the various factors of learning management system adoption deaf students in the university.

The moderating effect of age on LMS adoption by deaf students

Performance Expectancy

This findings of non-significantly effect of performance expectancy on behaviour intention with the introduction of moderating effect of gender and its interaction with performance expectancy in the model, suggests that the perceived usefulness of the LMS does not differentially influence the behaviour intentions across male and female deaf students and rather indicates that the relationship between performance expectancy and behaviour intention is relatively uniform across genders within this population. This result diverges from prior studies in higher education LMS adoption where performance expectancy consistently emerged as a robust predictor of behaviour intention in technology adoption (Venkatesh et al., 2003).

Additionally, with gender alone nor the interaction between gender and performance expectancy not significantly predicting use behaviour directly and the coupled non-significant index of moderated mediation, confirms that gender does not meaningfully moderate the direct and indirect effect of performance expectancy on use behaviour through behaviour intention. These findings imply that gender may not be a moderating factor influencing LMS adoption among deaf university students, suggesting an equal pattern in perceptions of LMS usefulness and usage intention. This aligns with emerging evidence indicating the diminishing gender differences in technology acceptance within educational settings, which could be possibly due to increased digital literacy and equal access to technology (AlAwadhi & Morris, 2009).

Effort Expectancy

It was evident that deaf students' perception about the ease with using the LMS did not exert significant effect on their behaviour intention of towards the use of the LMS when gender and the interaction term are included. The negative and non-significant effect of gender and the non-significant interaction term of effort expectancy and gender on the a-path suggests that the strength and direction of the relationship between effort expectancy and behaviour intention does not significantly differ between genders. This result contrasts with some previous studies and the established UTAUT model (Venkatesh et al., 2003), which often posit effort expectancy as a significant predictor of behaviour intention of a particular system users and it is more significant in females than males (Ahmad et al., 2023; Alshahrani et al., 2019). However, these results could be attributed to several factors, including the influence of other variables in the model, such as gender, the possibility of a suppression effect, or the specific characteristics of the sample. Moreover, the positive but non-significant Index of Moderated Mediation indicates that while there's a suggestion of gender moderating the

indirect effect of effort expectancy on use behaviour through behaviour intention, this evidence is weak not conclusive (Hayes, 2018).

Noticeably, there was a significant direct effect of effort expectancy on use behaviour and this observation indicates that, even after controlling for behaviour intention and gender, effort expectancy has a direct influence on use behaviour. This suggests that deaf students who find the LMS easy to use were more likely to use it, regardless of their intentions. Users might develop a habit of using a platform they perceive as easy, or they might experience positive feelings associated with ease of use, which directly influence their use behaviour.

Social Influence

The findings revealed that social influence did not significantly predict behavioural intention among deaf students. However, both gender and the interaction between social influence and gender significantly influenced behavioural intention. This indicates that while perceived social influence from hearing or deaf peers, instructors, or university community may not directly impact the behaviour intention of deaf students uniformly across, gender differences substantially shaped how social influence relates to behaviour intention which in this study it was more significant for male deaf students than female deaf students. These findings contrast with prior research highlighting gender disparities in educational technology adoption, where females often experience different socio-cultural expectations that affect their engagement with digital learning tools (Al-Emran, Elsherif, & Shaalan, 2016; Wang & Newlin, 2002). Deaf male students may be influenced more by their peers, increasing their intention to use the LMS platforms compared to females, and this to some extent is not consistent with literatures emphasizing the complex role of gender in shaping the behaviour outcomes of an individual or group (Alshahrani et al., 2019; Smith, O'Day,

& Forness, 2012). The significant positive index of moderated mediation confirms that the indirect effect of social influence on LMS use behaviour through their behaviour intention is contingent upon gender, supporting intersectional moderation frameworks in technology acceptance (Else-Quest & Hyde, 2016).

Regarding direct effects, social influence and gender negatively predicted LMS use behaviour, while their interaction was also significant. This suggests that greater perceived social influence is associated with reduced LMS use, and this relationship differs markedly for male deaf students than female deaf students which contradicts findings from Alshahrani et al (2019), which revealed that female students were more affected by social influences. These findings highlight the need for gender-sensitive strategies in promoting LMS adoption, recognizing that females and males may respond differently to social contexts and external pressures.

Facilitating conditions

The findings indicated that facilitating conditions defined as the availability of technical infrastructure, institutional support, and resources had a positive but non-significant influence on behaviour intention. Gender neither significantly predicted behaviour intention nor moderated the relationship between facilitating conditions and behaviour intention. These findings suggest that both male and female deaf students perceive facilitating conditions as equally accessible and relevant in their decision to adopt LMS platforms. This is consistent with previous research indicating that equitable access to digital infrastructure and support services may diminish gender disparities in technology adoption within higher education (Park, 2009; Liu, Chen, Sun, Wible, & Kuo, 2010). However, the lack of moderation by gender contrasts with prior study that suggested gendered socialization patterns influence responses to environmental support

(Eagly & Wood, 2012), indicating that contemporary educational contexts may have shifted toward more gender-neutral perceptions of facilitating conditions.

Similarly, facilitating conditions did not significantly predict LMS use behaviour directly, nor did gender or their interaction. This diverges from the expectations of the UTAUT model, which identifies facilitating conditions as critical determinants of technology use (Venkatesh et al., 2003). The absence of significant direct or moderated effects suggests that other factors such as personal motivation, perceived usefulness, or task relevance may exert stronger influence on LMS use among deaf students. Additionally, the non-significant moderated mediation indicates that gender does not condition the indirect relationship between facilitating conditions on use behaviour through their behaviour intention. This may reflect a context characterized by widespread access to digital resources and evolving gender norms related to technology engagement in higher education (Anderson & Perrin, 2017) which somehow appears to be case of UEW where equal support are provided for both male and female deaf students when it comes to academic tasks.

Instructional Assessment Quality

The role of gender in moderating the relationship between instructional assessment quality and behaviour intention to use a learning management system (LMS) among deaf university students revealed a non-significant main effect for instructional assessment quality, gender, or their interaction term on behavioural intention (Sun et al., 2008). Furthermore, with the index of moderated mediation not significant, suggesting that the indirect effect of instructional assessment quality on LMS use behaviour through behaviour intention does not differ across gender groups. These findings suggest that the perceived quality of LMS-based assessments may not meaningfully shaped the behaviour intention of both male and female deaf students at

the university. The lack of gender moderation aligns with recent research suggesting narrowing gender gaps in technology-related engagement, particularly within structured academic environments where digital access is standardized (Tselios et al., 2011).

In the direct effects model, instructional assessment quality, gender, and their interaction did not significantly predict LMS use behaviour. While this trend suggests gender not exerting significant influence on the relationship between instructional assessment quality and LMS use behaviour by deaf students, it could be possibly be due to both male and female deaf students having impartial perception of the quality of using LMS as a medium of being assessed for academic tasks. While research on LMS usage in higher education indicates that usability, feedback clarity, and system reliability often drive actual usage more than content quality with gender moderation effect (Alrasheedi et al., 2015) that was not the case in this study. Thus, the absence of strong effects by gender and its interaction with instructional assessment quality, may reflect a need to focus on broader aspects of system design and individual learner context for other related factors, rather than assessment quality.

Information Quality

Findings revealed that information quality did not significantly predict behaviour intention indicating that the perceived quality of information available on the LMS did not directly influence students' intention to use the platform. This aligns with prior studies noting that information overload or low relevance can undermine user engagement, even in the presence of abundant information (Navimipour & Soltani, 2016).

However, with the significant effects of gender and the interaction between information quality and gender on behaviour intention, indicates that gender moderates

the influence of information quality on behaviour intention, suggesting a meaningful difference in how male and female deaf students form intentions to use LMS as result of the quality of information provided by LMS for their use. This implies that gender influences the strength and direction of the relationship between information quality and behaviour intention of university deaf students. This is consistent with research that reports gender-based variation in information processing and technology evaluation in digital learning environments (Islam, 2014; Sánchez & Hueros, 2010) where females may be more sensitive to aspects such as information clarity and contextual richness, while males may respond more to structured, goal-oriented content. Unsurprisingly, with the significant index of moderated mediation, suggesting that gender moderates the indirect path from information quality to use behaviour through behaviour intention underscoring the role gender as a moderating factor in LMS adoption research. These highlight the relevance of providing appropriate content to increase user's behaviour intention as it can influence their use behaviour indirectly even if direct path is non-significant.

The direct relationship between information quality and LMS use behaviour of deaf students, effect of gender nor was its interaction term with information quality was significant. This finding suggests that gender does not moderate the direct relationship between information quality and use behaviour of the LMS by deaf students in the university.

The moderating effect of gender on LMS adoption by deaf students

Performance Expectancy

The findings on age moderating the relationship between performance expectancy and LMS use behaviour, both directly and indirectly through behavioural

intention. Findings indicated that performance expectancy, age, and the interaction between age and performance expectancy all significantly predicted behaviour intention, suggesting that when deaf students perceive that the LMS will enhance their academic performance, their intention to use the system increases and this diminishes with increasing age. This effect was more significant for younger deaf students than older deaf students, suggesting that younger deaf students may be more motivated by the performance gains, while older students may rely on different evaluative criteria such as experience or ease of use, a finding echoed in LMS adoption research (Tarhini et al., 2017) and also is consistent with other prior studies emphasizing the importance of performance-related beliefs in shaping technology acceptance in higher education settings (Almarashdeh, 2016; Park, 2009).

However, in the direct effect model, neither performance expectancy, age, nor their interaction significantly predicted actual LMS use behaviour, indicating that the direct relationship between performance expectancy to use behaviour of the LMS by deaf students is not contingent on age and this aligns with findings from several prior studies (Alshahrani et al., 2019; Binyamin, 2019; Chu & Chen, 2016; Tarhini et al., 2015) who all found that age did not moderate the relationship between performance expectancy and use behaviour. Nonetheless, a significant index of moderated mediation confirmed that the indirect effect of performance expectancy on use behaviour via behavioural intention varies by age.

Effort Expectancy

The role of age moderating the indirect effect of effort expectancy on LMS use behaviour through behavioural intention among deaf university students revealed a support of moderated mediation, demonstrating that the relationship between effort expectancy and behaviour intention was not uniform across age groups. The significant

effects from effort expectancy, age, and the interaction suggests that the positive impact of ease of use on behaviour intention diminishes with increasing age and this was more significant for younger deaf students, indicating that when students perceive the LMS as easy to use, they were more likely to form a positive intention to use it. This is consistent with prior findings on LMS adoption in university settings, where ease of use has been a key determinant of intention to adopt educational technologies such as the LMS (Roca et al., 2006; Sánchez & Hueros, 2010) and also confirms previous LMS studies indicating that younger users are more responsive to usability features than older users, who may prioritize other factors such as relevance or necessity (Tarhini, Hone, Liu, & Tarhini., 2017; Tarhini et al., 2015;) and facilitating conditions (Alshahrani et al., 2019).

In the direct effect model, effort expectancy, age, and their interaction did not significantly predict LMS use behaviour of deaf students. However, the significant index of moderated mediation indicated that the indirect effect of effort expectancy on use behaviour through behavioural intention is contingent on age which was more for younger deaf students than older deaf students which is in line with the findings of Chu and Chen (2016), who postulated that younger students are more likely to find LMS more ease to use than their older colleagues. As age increases, this indirect effect weakens, suggesting that younger users are more influenced by effort expectancy in forming intentions that lead to actual system use. These findings emphasize the importance of tailoring LMS implementation strategies to different age groups and reinforce the relevance of behaviour intention as a critical pathway in technology adoption models.

Social Influence

This study examined the moderating role of age in the relationship between social influence and LMS use behaviour, operating through behavioural intention. Employing a moderated mediation, the results revealed that social influence, age, and their interaction term was significant. This indicates that age determines the strength and direction of the influence of social influence on behaviour intention. This implies that deaf university students who perceive stronger influence from peers, instructors, to perform a task using the LMS are more likely to intend to use the LMS. This aligns with existing research demonstrating the positive role of social influences in informing technology acceptance in university settings (Venkatesh et al., 2012; Al-Harbi, 2011). These findings support literature suggesting that younger students are more susceptible to peer and institutional influence in forming technology adoption intentions (Chu & Chen, 2016; Teo, 2010), while older students may be more internally motivated or support from technical team.

In contrast, within the direct effect model, social influence, age, and their interaction did not significantly predict use behaviour of deaf students on the LMS. This is consistent with Venkatesh et al (2003), whose findings suggested that age does not moderate the effect of social influence on use behaviour of an information system, especially if it is an educational institution, since mostly the use of such information are done on compulsory basis. However, the index of moderated mediation was statistically significant, confirming that the indirect effect of social influence on use behaviour via behavioural intention depends on age. As age increases, the indirect effect weakens, suggesting that the pathway from social influence to actual LMS use is stronger for younger students. These findings highlight the critical role of age in shaping the social-cognitive processes underlying LMS adoption. They suggest that

interventions to promote LMS usage among deaf students may benefit from age-specific strategies, with younger learners being more responsive to peer and institutional encouragement.

Facilitating Conditions

On the role of age moderating the relationship between facilitating conditions and LMS use behaviour and the mediator of behaviour intention, among deaf students in the university, the findings reveal that facilitating conditions significantly informed behaviour intention in engaging with the LMS, indicating that when students perceive greater access to technical infrastructure, institutional support, and training, they are more likely to develop strong intentions to use the LMS. This was evident as both age and the interaction between facilitating conditions and age significantly conditioned the extent to which facilitating conditions influence the behaviour intention in LMS adoption and this was significant for younger deaf students than older deaf students. This suggests that the strength of this relationship diminishes with increasing age. These results align with existing literature in higher education which shows that younger students are more reliant on environmental supports in technology adoption (Park, 2009; Al-Azawei et al., 2017), but contradict the findings by Alshahrani et al. (2019), which juxtapose that the moderating role of age on the effect of facilitating conditions on LMS adoption was more realized by older students.

In the direct effects model, facilitating conditions, age, and their interaction were not significant predictors of LMS use behaviour, implying that the direct influence of facilitating conditions on use behaviour is fully mediated by deaf students' behaviour intention as confirmed by the significant index of moderated mediation which was contingent upon age, with the effect weakening as age increases. This findings suggests that younger deaf students benefit more from institutional supports when forming

intentions to use LMS platforms, while older students may rely more on intrinsic factors or prior experience. These findings underscore the importance of age-sensitive strategies in LMS implementation, particularly ensuring that institutional support systems are tailored to the unique needs of diverse age groups.

Instructional Assessment Quality

The moderating role of age on the effect of instructional assessment quality on LMS behaviour intention among deaf students in a university setting, the results underscore the importance of age in shaping how instructional assessment quality influences technology adoption processes as the findings revealed that age and the interaction between instructional assessment quality and age significantly conditioned the extent of influence from instructional assessment quality encompassing the clarity, accessibility, and pedagogical relevance of assessments to deaf students' behaviour intention to use the LMS with younger students reporting stronger intentions, indicating that the effect of instructional quality on behaviour intention diminishes as age increases. This suggests that when students perceive assessments as well-structured and supportive, they are more inclined to form strong intentions to use the LMS. This is consistent with research suggesting that younger university students, particularly those with limited academic independence, rely more on instructional structure in digital learning environments (Al-Azawei et al., 2017).

In contrast, the direct effects of instructional assessment quality, age, and their interaction on LMS use behaviour were non-significant, supporting an indirect-only mediation through deaf students' behaviour intention. The significant index of moderated mediation confirms this as age conditions the strength of the indirect effect. As age increases, the influence of instructional assessment quality on LMS use behaviour through behaviour intention weakens and these findings align with previous

studies indicating that older deaf students often draw on accumulated experiences, making them less dependent on instructional assessment quality (Ifinedo, 2017; Lee, 2010). Thus, instructional assessment quality in LMS environments should be tailored to support older students.

Information Quality

The moderating effect of age on the indirect relationship between information quality and LMS use behaviour, mediated by behavioural intention, among deaf university students indicated that information quality significantly predicted behaviour intention, demonstrating that students who perceive information provided in the LMS as accurate, clear, accessible, and timely are more likely to intend to use the system. This aligns with existing research in higher education technology adoption, which highlights that as the information provided in the LMS is of high-quality, it enhances user engagement and decision-making related to the LMS utilization (Al-Fraihat, et al., 2020; Koufaris & Hampton-Sosa, 2004). However, this effect was not moderated by age nor their interaction term as both exerted non-significant effect on the relationship between information quality and behaviour intention of deaf students. This suggests that age does not differentially influence how information quality affects behaviour intention among deaf students.

Similarly, with the non-significant direct effects of information quality, age, and their interaction on LMS use behaviour coupled with the non-significant index of moderated mediation implicates that information quality's impact primarily occurs indirectly through behaviour intentions of deaf students and confirms the absence of age as a contextual moderator in this pathway. These findings suggest that deaf students' perception about the information quality exerts an unchangeable, positive effect on LMS adoption intentions regardless of age. This may reflect a levelling effect

of digital familiarity and information-rich environments across age groups of deaf students within university environment (Anderson & Perrin, 2017). The results highlight that enhancing information quality is a universally effective strategy for promoting LMS adoption by deaf students across diverse age groups at the university.



CHAPTER FIVE

SUMMARY, CONCLUSION, IMPLICATIONS, AND RECOMMENDATIONS

5.1 Overview

This chapter presents summary of findings, conclusion, recommendations, implications of the study, and suggested areas for further research.

5.2 Summary of Findings

Three major findings emerged from the study;

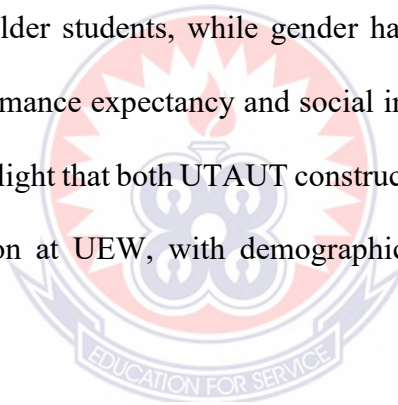
1. The findings reveal that deaf students at the University of Education, Winneba engagement level with the LMS was at a moderate level. Among LMS activities, assignment submission was the most common activity deaf student engaged in using the LMS, while peer interaction and discussion forums saw the lowest usage. Specifically, nearly half of the deaf students regularly submitted assignments via the LMS, whereas only about a quarter frequently used it to interact and collaborate with course mates.
2. Notably, mediation analyses indicated that behaviour intention was key in mediating the effects of the LMS determinants such as performance and effort expectancy, facilitating conditions, and quality factors on actual use behaviour. For instance, higher information quality (clear, relevant LMS content) significantly increased students' intent to use the LMS, and this intent in turn led to actual usage, but no significant direct effect of information quality on use was found. A similar full mediation was evident for instructional assessment quality. This implies that improving LMS quality shapes use behaviour primarily by changing deaf students' intentions to use the LMS.
3. Similarly, regarding demographic moderators, age played a notable role.

Younger students' intention to use the LMS was more strongly driven by performance expectancy than older students': the positive impact of expected performance gains on intention diminished significantly with increasing age. In other words, younger deaf students were especially motivated by beliefs in the LMS's usefulness, whereas older students' intentions were less tied to performance expectations. By contrast, gender did not significantly moderate any of the key relationships; male and female deaf students showed similar patterns of how expectancy and quality factors led to intention and use. In summary, age but not gender influenced the strength of the adoption pathways, indicating that LMS engagement strategies may need slight age-related adjustments.

5.3 Conclusion

This study focused on investigating the activities deaf students engaged in using the learning management system and factors that informed their adoption of this system in the university. The study was guided by three research objectives (see page 8), and a quantitative approach was utilized. Using a questionnaire, a survey involving 65 deaf students from level 200 to level 400 in the University of Education, Winneba formed the study participants and source of data for analysis. Descriptive data analysis techniques (frequency counts and percentages) and a regression-based path analysis were employed to analyse the collected responses. First, deaf students' LMS usage was moderate and they most often used the LMS for individual coursework (assignments, accessing materials, taking quizzes) and was less used for interaction and collaborative learning. Second, the determinants among adoption factors align with core technology acceptance theories like the UTAUT model where Performance Expectancy emerged

as a key predictor of intention and use (both directly and indirectly via intention), confirming that when deaf students perceive the LMS as useful for their learning, they form stronger intentions to use it, which in turn leads to higher actual use. Effort Expectancy (ease of use) and facilitating conditions also positively influenced to use behaviour of deaf students, though their effects were partly mediated by their intentions. Notably, information quality and instructional quality influenced LMS use only through intention, indicating that improving content and assessment quality features in the LMS enhances actual usage as results from students' intent to engage. The third objective revealed that age moderates the LMS adoption processes with younger students' intentions being more sensitive to performance expectancy, effort expectancy, and social influence than older students, while gender had a non-significant moderation effect expect for performance expectancy and social influence for male deaf students. These conclusions highlight that both UTAUT constructs and quality factors urged deaf students' LMS adoption at UEW, with demographics playing a subtle role in the adoption process.



5.4 Recommendations

1. To improve LMS engagement among deaf students, instructors, lecturers, and administrators in the university should promote interactive and inclusive learning by encouraging peer communication and collaboration. This includes providing targeted training, using accessible communication tools, designing interactive activities, and establishing peer support systems. These steps will enhance both academic outcomes and social integration.
2. To increase LMS adoption among deaf students, lecturers, instructors, and LMS service providers should focus on strengthening students' intention to use the LMS

by improving the quality of content and assessments. This includes making materials more accessible (e.g., using captions and visual aids), enhancing the clarity and relevance of instructional content, and training faculty to create inclusive learning experiences. Since actual LMS use is driven by students' intention shaped by their perceptions of quality targeted improvements in these areas will effectively boost engagement and usage.

3. To improve LMS adoption among deaf students, lecturers, instructors, and LMS service providers should tailor engagement strategies by age. Younger students respond more to the perceived learning benefits of the LMS, so efforts should highlight academic performance gains. Older students may benefit more from practical support and user-friendly training to build confidence. Since gender showed no significant effect, strategies can be applied equally to male and female students.

5.5 Implications of Study

Theoretical Implications

This study contributes to technology acceptance research by extending the UTAUT model for a special-needs context. The findings reaffirm the central role of Performance Expectancy and Effort Expectancy in LMS adoption, consistent with UTAUT, but highlight that their effects are often partially mediated by behaviour intention in the case of deaf students. The strong interplay among factors (e.g. high correlation between performance and effort expectancy) suggests that in the deaf student population, technology beliefs form an interconnected belief system. Importantly, the full mediation of information and instructional quality by intention underscores that UTAUT's "outcome expectation" dimension can be enriched with

quality perceptions when studying educational technologies. The lack of gender moderation also aligns with recent calls to refine UTAUT's moderators. Overall, these results suggest that UTAUT remains a valid framework for testing LMS acceptance among deaf students, but future models should incorporate factors like content quality and explicitly test mediating mechanisms.

Practical Implications

Practically, the study informs universities and educators on how to increase LMS adoption in inclusive education settings at the tertiary level. The demonstrated importance of performance expectancy and quality factors means that institutions should market the LMS by emphasizing its learning benefits and high-quality content. Policies could include actively monitoring LMS usage data and surveying deaf users to continually improve system content and usability. Faculty development programs might train instructors in designing LMS-based tasks that align with deaf students' learning needs. At the administrative level, allocating resources to ensure accessible LMS platforms (e.g. universal design, sign-language content) can operationalize these findings. By applying these evidence-based insights (e.g. targeted training, content enhancement), universities can create more inclusive e-learning environments that support deaf students' engagement and academic success.

5.6 Suggestions for further research

While this research provides valuable insights, several limitations suggest directions for future work. First, the study was conducted at a single university with a cross-sectional survey; future research could use longitudinal to capture how LMS adoption evolves over time for deaf students. Second, qualitative investigations (e.g.

focus groups or interviews) or mixed-method designs could explore in-depth unique barriers (communication difficulties, interface accessibility) which are not captured by the current study. Third, since only age and gender were examined, other demographics like educational level, experience, or degree program might moderate LMS adoption and should be tested. Fourth, expanding the sample to include deaf students from other institutions or regions would improve generalizability.



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APPENDICES

APPENDIX A: QUESTIONNAIRE

CONSENT FORM DEPARTMENT OF SPECIAL EDUCATION

Dear Respondent,

The bearer of this questionnaire is a student of the University of Education, Winneba, Department of Special Education pursuing **MPhil in Special Education**. He is conducting a survey on “**Adoption of learning management system by Deaf students in the University of Education, Winneba.**” Please kindly respond to the following questions for the student. Your responses will be duly appreciated and treated with utmost confidentiality

Your involvement in this project will be kept as confidential as legally possible. All data will be reported in the aggregate. I will not ask any information that should lead back to your identity as a participant. Your participation is completely voluntary. You may skip any question that you do not wish to answer, and you may discontinue at any time. There are no personal risks or benefits to you as a participant. University's Board approval of this project is on file.

I hope that you will participate in this research project, as it will be beneficial in understanding the adoption of learning management system used in the university by deaf students in the changing trend of deaf education. Thank you very much for your time. Should you have any questions about this research project, please feel free to contact Clement Otsiabah at (055) 939-6614.

By ticking the ‘I Agree’ box on this form, you are consenting to the study.

I agree to partake in this study.

Department..... Code.....

Part 1: Demographic data

1. Gender: Male [] Female []
2. Please write your age here:
3. Current Level: Level 200 [] Level 300 [] Level 400 []
4. How long have you been using computer or smartphone?
 Less than 1 year [] 1-2 years [] 2-3 years [] 3-4years [] More than 4 years []
5. How many times have you received training on how to use UEW-LMS/VClass?
 Never [] 1-2 times [] 3-4 times [] 5 times [] More than 5 times []

PART 2: LMS Usage Activities and Frequency Level

The following questions seek to gather respondent’s usage frequency of the learning management system by deaf students in the University of Education, Winneba.

Please show the extent you use the LMS with the following statements by ticking in the box which best describe your view. Never, Rarely, Once a month, Once a week or two weeks, and Daily.

SN	ITEMS	Never	Rarely	Once a month	Once a week or two weeks	Daily
1	I access and download lecture notes and materials using the UEW-LMS					
2	I attend live lectures/classes on the UEW-LMS					

3	I use the UEW-LMS to submit assignments					
4	I take test and quizzes on the UEW-LMS					
5	Interact with colleague students on the UEW-LMS					
6	Overall, I use UEW-LMS/VClass for learning and assessment					

PART 3: Factors that inform the adoption of UEW-LMS by Deaf students

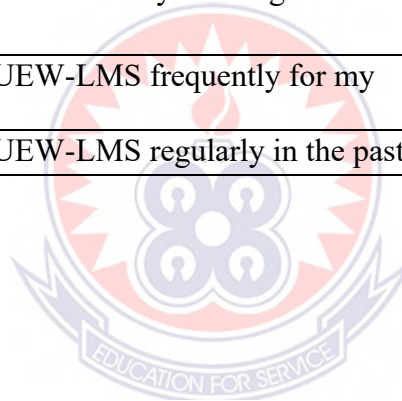
The following questions seek to ascertain respondent's view about the factors that inform the learning management system adoption behaviour of deaf students in the University of Education, Winneba.

Please show how extent you agree or disagree with the following statements by ticking in the box which best describe your view. SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, and SA = Strongly Agree

	SA	A	N	D	SD
Performance Expectancy (PEX)					
1. If I use UEW-LMS useful in my learning activities					
2. Using the UEW-LMS enables me to accomplish my learning and assessment activities more quickly					
3. Using the UEW-LMS increases my academic productivity.					
4. Using the UEW-LMS enhances my effectiveness in my learning activities					
Effort Expectancy (EEX)					
5. Learning to operate the UEW-LMS is easy for me					

6. My interaction on the UEW-LMS is clear, understandable and easier					
7. It would be easy for me to become skilful at using the UEW-LMS					
8. I find the UEW-LMS easy to use for learning and assessment					
Social influence (SI)					
9. People who influence my behaviour think I should use the UEW-LMS					
10. People who are important (classmates and friends) to me think that I should use the UEW-LMS					
11. The course instructor has been helpful in the use of the UEW-LMS					
12. In my class, students who use the UEW-LMS enjoy more prestige than those who do not.					
13. Using the UEW-LMS is academically status-enhancing for students					
Facilitating conditions (FC)					
14. I have the resources necessary to use the UEW-LMS					
15. I have the knowledge necessary to use the UEW-LMS					
16. The online learning support staffs are available when I face any problem with UEW-LMS					
17. Training and manuals for using UEW-LMS is available					
18. The management would provide the necessary help for using UEW-LMS					
Instructional Assessment Quality (IA)					
19. UEW-LMS contains self-assessment tools (i.e. exams, quiz, assignments...etc) that advance my academic achievement					
20. Assessment features in UEW-LMS are effective to help understand learning materials					
21. The self-assessment tools in UEW-LMS measure my achievement of learning objectives.					
22. UEW-LMS provides learners with opportunities to access extended feedback from instructors, experts, and peers					
23. UEW-LMS provides informative feedback to online assessments					
Information Quality (IFQ)					
24. Information I get from the UEW-LMS is accurate, free from error, and up-to-date for my study					

25. It is easy to understand information presented on the UEW-LMS for my study.					
26. The information on UEW-LMS is complete, sufficient and presented in a format that is useful to my study					
27. I can retrieve the information I need easily from UEW-LMS.					
Behaviour Intention Using UEW-LMS (BIULMS)					
28. I intend to continue use the UEW-LMS in the future					
29. In would prefer my instructor use UEW-LMS more frequently					
30. I would like to use UEW-LMS in all future courses					
31. I would recommend using UEW-LMS to others					
Actual Use of UEW-LMS (AULMS)					
32. I use UEW-LMS more than one time in a semester					
33. I usually use UEW-LMS for my learning and assessment tasks					
34. I have been using UEW-LMS frequently for my studies					
35. I have been using UEW-LMS regularly in the past					



APPENDIX B

INTRODUCTORY LETTER

 **UNIVERSITY OF EDUCATION, WINNEBA**
FACULTY OF APPLIED BEHAVIOURAL SCIENCES IN EDUCATION
DEPARTMENT OF SPECIAL EDUCATION
P.O. Box 25, Winneba, Ghana sped@uew.edu.gh
+830 (030) 2241069

12th June, 2024

TO WHOM IT MAY CONCERN

Dear Sir/Madam

LETTER OF INTRODUCTION: MR. CLEMENT OTSIABAH

I write to introduce to you, **Mr. Clement Otsiabah** an M.Phil student of the Department of Special Education with index number 220029901.

He is currently working on his thesis on the topic: **"Adoption of Learning Management System by deaf Students at the University of Education, Winneba."**

He will administer questionnaire in your Institution.

I would be grateful if you could give him the needed assistance.

Thank you for the consideration and assistance.

Yours faithfully,


MRS. FLORENCE AKUA MENSAH
(Ag. Head of Department)

 ir.uew.edu.gh