Gender Differences in E-Learning Success in a Developing Country Context: A Multi-Group Analysis

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ABSTRACT

The purpose of this study was to evaluate gender differences in the variables that influence the adoption of e-learning in an academic environment. Literature on gender differences in e-learning adoption and usage seems to be very limited and hazy. Hence, the need for this research study. The study was based on the hypothesis that factors such as system quality, information quality, and service quality influence the behavioural intention to use an e-learning platform (Moodle LMS), which in turn influences actual Moodle usage. The study made use of the SmartPLS application. The Structural Equation Model (SEM) technique was used to analyse the interactions between the components of the proposed model from the viewpoint of 540 responses. Both males’ and females’ LMS usage intentions were shown to be significantly influenced by system quality and service quality. In addition to this finding, information quality showed a statistically significant influence on males’ LMS use intentions while having no effect on the LMS use intentions of females. This study contributes to the dearth of research that exists on gender differences in the adoption of e-learning in developing nations that have placed a strong emphasis on the use of e-learning technologies. E-learning adoption theory is bolstered by this study, which empirically confirms that the DeLone and McLean model is applicable in a new setting.

Keywords: Developing Country, E-learning, Gender Difference, Multi-Group Analysis, Moodle.

I. INTRODUCTION

E-learning has emerged as a dominant force in the context of modern society (Jia et al., 2011). With the emergence of Covid-19, e-learning and telecommuting have become part of the normal activities of the modern employee in developed countries and several underdeveloped ones. In a typical e-learning classroom or e-learning setting, lecturers and students who find themselves in an online environment encounter distinct challenges than in a conventional classroom setting (Tirziu & Vrabie, 2015). To maintain learning continuity and a stronger teacher-student bond, it is necessary to use any means of communication. For instance, on an online portal or a Learning Management System (LMS) like Moodle which is being used by the University of Education, Winneba (UEW), face-to-face resources can be uploaded by Lecturers on the online learning portal and user interface for students. A number of these LMS are equipped with features that allow for asynchronous and synchronous student-teacher interactions in a variety of formats, hence enabling the use of several approaches. There are successful strategies for delivering face-to-face information in an online setting that will increase the student's learning, pleasure, and cognitive comprehension of course content. In some developing countries, the emergence of the Covid-19 pandemic prompted several educational institutions (especially tertiary schools), corporate bodies, and governmental institutions to adopt e-learning systems to ensure the continued education of their students/the continuation of the school's educational calendar and increased employee productivity. A study by Baki et al. (2018) found that e-learning systems would not reach their full potential if they are not properly employed by end-users. They further added that e-learning systems are modern technological innovation that is on the increase in terms of acceptance and usage by businesses and people. Therefore, the authors advise that considerable research be conducted to provide significant insight into the many elements impacting user adoption in e-learning systems. This justifies the need for conducting this study.

II. GENDER DIFFERENCES IN E-LEARNING ACCEPTANCE

The problem of gender difference has led to greater awareness in the study and practice of education-related fields in the modern world. Although gender inequalities have been the subject of a number of studies, very little attention...
has been paid to the influence these variations have had on the implementation of e-learning in higher education. According to Yoo et al. (2015), the distinguishing feature of e-learning is the combination of human-human contact (which occurs between students, other students, and instructors) and human-machine interaction (which occurs between students and e-learning software). The use of e-learning tools, for example, makes the learning process more comfortable. When using various types of technology, men tend to approach these technologies differently compared to their female counterparts who also use similar technologies. The findings of several of research lend credence to this assumption (e.g. Adamus et al., 2009; Kayany & Yelsma, 2000). Women have shown, over time, limited degrees of proficiency while utilizing computers. They probably use computers for a variety of activities that are associated with communication and they subscribe to several social media platforms as opposed to other computer programs. On the other hand, men are more likely than women to use virtual media, and the concept of computers, wireless technology, and the internet is closely associated with men. The results of the many studies that have been conducted on the gender difference in the adoption of e-learning are varied. According to research conducted by Cuadrado-Garcia et al. (2010), there are distinguishing characteristics in how male and female students utilize e-learning systems. The degrees of motivation and pleasure that male and female students experience throughout their academic careers are also distinct. As per Azhar and Abd (2020), the behavioural intention of users of e-learning systems has a direct beneficial impact on gender. The authors base their argument on research that they conducted. Kaushik and Agrawal (2020) conducted a study to determine the elements that influence students and either encourage or discourage them from making use of online learning platforms. They concluded that the proliferation of e-learning platforms fills pupils with a sense of hope and inventiveness. These students felt uneasy or awkward when utilizing the recently implemented e-learning platforms since they were unfamiliar with them. On the other hand, there were not any discernible differences among the various demographics that were found. The authors’ study was carried out on Indian students. As a result, comparison research is necessary to determine the influence that cultural biases have on the preparation of pupils for digital learning. Studies have shown that women will adopt and use new technology or choose a career in information and communications technology because of this confidence gap (Michie & Nelson, 2006; Wood & Li, 2005). On the other hand, several studies have found that an increasing number of men and women are exposed to and are using computers and computer applications in their work and personal lives (Rainer et al., 2003). This has resulted in a reduction of gender gaps in the adoption and usage of Information and Communications Technology (ICT) applications and systems. On the heels of the conflicting outcomes of the role of gender in technology adoption and usage, Li et al. (2008) suggest that future studies are carried out to make clear the role that gender plays when it comes to the adoption and use of new technology. Within the context of developing nations, gender differences in the adoption of e-learning have received very little amount of research attention. There have been suggestions in the academic literature for greater study to be conducted from the viewpoint of developing countries. This research investigates the factors responsible for students’ acceptance of e-learning at a Ghanaian University to close the knowledge gap that currently exists on gender differences in adoption.

III. THE D&M ISS MODEL

The DeLone and McLean (2002) Information System Success model (D&M ISS model) is a comprehensive framework for measuring an information system's success (DeLone & McLean, 2002). The model has six major antecedents: system quality, information quality, use, user satisfaction, individual impact, and organizational impact (DeLone & McLean, 2002). System and information quality both have a major impact on information system usage and user satisfaction. Use and user satisfaction influence one another, and both affect individual impact, which has an impact on organizational impact. DeLone and McLean (2003) modified the original model in response to the benefits and drawbacks highlighted by other researchers. Individual and organizational impact variables were classified as Net Benefits, and the variable Service Quality was established. Quality is preceded by system quality, information quality, and service quality (Yakubu & Dasuki, 2018). The quality antecedents influence use and user satisfaction. Furthermore, the amount of Use may impact the degree of user satisfaction, and the level of User satisfaction may influence the amount of Use. Net Benefits are mostly influenced by use and user satisfaction (Delone & Maclean, 2002). Several researchers have used the notion in several contexts. For instance, Yakubu and Dasuki (2018) used the approach to evaluate E-learning adoption among Nigerian university students. Hsu et al. (2014) introduced a variable measuring trust to investigate E-commerce adoption. Jagannathan et al. (2018) also investigated online banking acceptability using the model. By analyzing eGovernment systems, Wang and Liao (2008) also verified the concept. Opoku et al. (2020) and Mohammadi (2015) explored e-learning studies by combining TAM and D&M ISS model components. With the inclusion of system success in their study of students' perceptions, Freeze et al. (2010) studied IS Success Model for E-Learning Context-Based in E-Learning. This model was also evaluated by Lee-Post (2009) from an information systems approach. Student satisfaction with the University of Dar es Salaam's e-learning system was evaluated by Mtebe and Raphael (2018) by incorporating teacher quality and perceived usefulness as essential components. A conceptual model created from the revised D&M ISS model was used by Ajoye and Nwagwu (2014) to study the impact of quality antecedents on user satisfaction of the postgraduate school site for the University of Ibadan. The D&M ISS model was utilized in light of the previous evaluations. As a result of several e-learning studies, this model is effective (e.g. Opoku et al., 2020; Subaek et al., 2019; Cui et al., 2019; Yakubu & Dasuki, 2018; Seta et al., 2018; Lin, 2017; Mohammadi, 2015).

IV. RESEARCH FRAMEWORK

To explain the gender difference in e-learning success among Ghanaian university students, this research made use of an upgraded version of the Information System Success Model, which is known as the D&M ISS model. The model was adjusted so that it would be compatible with the students’ e-learning environment at the University of Education,
Winneba, in Ghana. Using a modified D&M ISS model, we looked at how students' actual usage of the Moodle LMS was impacted by the system's characteristics. Information, systems, and services all have quality antecedents. As shown in Figure 1, the model implies that a favourable impact on behavioural intention will be achieved by improving the system, information, and service quality. This, in turn, will improve actual usage.

A. System Quality

It is generally agreed that quality is one of the essential features that must be included in every information system. These features include things like responsiveness, an easy-to-use or usable interface, reliable operation, and flexibility of the system (Yakubu & Dasuki, 2018). Because there are certain differences between how male and female students use e-learning, these features may have some bearing on gender. On the other hand, how women and men understand a system could not be the same. According to Delone and McLean (2003), system quality was defined as the level of correctness of the information that was generated by a system. Because of a system's inaccuracies, the quantity of pleasure it delivers to its customers may decrease. (Seddon & Kiew, 1996). (Mtebe & Raphael, 2018). E-learning study has shown that the quality of a system has a significant and positive influence on a person's motivation to use e-learning (Wang & Chiu, 2011; Cheng, 2012; Li et al., 2012). Teachers are more inclined to use a system if it is easy to use, hence this might have a positive effect on teachers' utilization. However, this may not be the case if the system is difficult to use. This might influence how users perceive its efficacy if it is easy to use and can help them perform better at their jobs (Cheng et al., 2012).

Therefore, we hypothesize that;

- $H_{1w}$: System quality will have a positive influence on males' behavioural intention to use Moodle LMS
- $H_{1f}$: System quality will have a positive influence on females' behavioural intention to use Moodle LMS

B. Information Quality

The term "information quality" refers to the essential characteristics of e-learning output (Petter et al., 2008). This relates to how effective the e-learning material is for the user. However, the system must be timely, simple to understand, accessible, relevant, comprehensive, and secure. These features impact the acceptance of a system. If a system contains irrelevant information and is difficult to comprehend, it will not be adopted. Prior research has shown that information quality positively affects e-learning adoption intent (Wang & Chiu, 2011; Cheng, 2012). Women are seen to devote more time to a system if they comprehend its operation. They often accept a system and use it as a productivity tool, while males employ it for amusement (Narasimhamurthy, 2014). If a system generates excellent information, its adoption rate will grow. Following this, the study hypothesizes that;

- $H_{2w}$: Information quality will have a positive influence on males' behavioural intention to use Moodle LMS
- $H_{2f}$: Information quality will have a positive influence on females' behavioural intention to use Moodle LMS

C. Service Quality

According to Delone and McLean (2003), service quality is "the quality of support services that users get from the IT department". To put it another way, service quality in the context of online learning relates to the critical support offered to online learning users. There are a variety of services available, including network support, help with system upgrades, and hardware support (Yakubu & Dasuki, 2018). Service quality, as defined by Petter et al. (2008), is the degree to which information systems (IS) assist and support e-learning system users. It's also worth checking to see whether the system has any faults. Studies have shown that service quality has a significant impact on e-learning behavioural intention (Ramayah et al., 2010; Hassanzadeh et al., 2012; Li et al., 2012; Mtebe & Raphael, 2018). According to the results of this research, it can be concluded that women place a larger emphasis on quality than men, as they spend more time analyzing every aspect of the products and services they buy. Therefore, we hypothesize that;

- $H_{3w}$: Service quality will have a positive influence on males' behavioural intention to use Moodle LMS
- $H_{3f}$: Service quality will have a positive influence on females' behavioural intention to use Moodle LMS

D. Behavioural Intention to Use Moodle LMS and Actual Usage

Individual behavioural intention is an important indicator of whether or not a person will utilize a certain technological system (Schierz et al., 2010). In the new D&M IS success model, all components (factors) impacting the willingness to utilize an e-learning system were addressed. Some studies within the context of e-learning have shown a correlation between intent to use and actual utilization (Alkhalaf et al., 2012; Chow et al., 2012; Hassanzadeh et al., 2012). Intention and anticipated use of e-learning are covered in the intention dimension. Actual usage or system utilization monitors a user's behaviour or behaviours while employing a particular technology, such as an e-learning system.
According to Venkatesh et al. (2003), a person's behavioural intention determines his or her actual behaviour or system use. The modified ISS model of DeLone and McLean (1992) posits that a person's behavioural intention will result in real use. This was validated by Mohammadi's (2015) study on e-Learning systems. In some instances, other investigations, like those by Chong et al. (2012) and Suki (2011), have validated this. Therefore, a user's intention to use a system is likely to impact his or her actual usage.

H4_m: Males’ intention to use Moodle LMS will have a positive influence on their actual usage of LMS

H4_f: Females’ intention to use Moodle LMS will have a positive influence on their actual usage of LMS

V. DATA ANALYSIS AND RESULTS

The data were analyzed using SmartPLS, a widely used statistical program for Structural Equation Modeling. With SEM, you may use observational data to find structures and their relationships. The model's applicability was first examined by assessing the data's normality, internal consistency, and convergent and discriminant validity. The structural model's predictive power, accuracy, and links to the other components were explored further. A total of 552 university students took part in the study. Moodle is an e-learning platform used by the University of education teachers and students. For some years, the university has used the Moodle learning management system (LMS) to assist teaching and learning, and it is critical to explore gender differences in its use. A total of 540 data points were obtained out of 552 questionnaires distributed to undergraduate students. Males made up more than half of the sample (59.1 %), with females accounting for the remaining 40.9 %.

A. Normality and Collinearity Test

The data were subjected to a normality test to assess whether they merited further investigation. The data were checked to see whether they were normally distributed using the skewness-Kurtosis method (Byrne, 2013). The results were found to fall within the projected ranges. As indicated in Table I, all skewness values between 2 and +2 and kurtosis values between -7 and 7 were consistent with the normality of the data (Byrne, 2013). However, when data are collected from several sources, there may be a substantial correlation between items or indicators, leading to the issue of multicollinearity. Variance Inflation Factor (VIF) values must be less than 5 (VIF 5) to prevent this (Kim, 2019). According to the study, all VIF values were less than 5, suggesting that multicollinearity was not a problem.

Fig. 1. Research Model

B. Evaluation of the Measurement Model

Confirmatory Factor Analysis was employed in this work to confirm the correctness of the measurement model. Factor loadings, Cronbach's Alpha, composite reliability (CR), average variance extracted (AVE), and discriminant validity were estimated (Henseler et al., 2015). Three items (SYQ1, SEQ1, and ACTU4) were eliminated from the LMS usage constructs owing to factor loadings below the recommended value of 0.70. (Gefen & Straub, 2005). The model was then re-evaluated to determine the parameters (Fig. 2). Internal consistency of the models was measured using Cronbach's alpha, with values greater than 0.5 considered acceptable as indicated by the study of Hair et al. (2010), Hu and Bentler (1998), and Hasan and Boa (2020). Furthermore, the composite reliability of the constructs was found to be above the necessary threshold of 0.70, showing a great level of construct dependability (Fornell & Larcker, 1981). To establish convergent validity, the AVE was also utilized, which assumes that each item measures what it was intended to measure. More than 0.50 is required for the AVE criteria, which indicates a lower measurement error than the observed structural variation, to be met. Overall, the convergent validity was good, since all AVEs were higher than 0.5 (see Table II).

An additional factor that was evaluated was discriminant validity, which indicates how one notion varies from the others. As a result of this, the Fornell-Larcker criteria were used (Henseler et al., 2015). As long as the square root of AVE exceeds the correlation between the constructs, discriminant validity has been achieved. Discriminant validity across components may be shown in Table III, where the square root of AVE (in bold) is larger than its inner correlation values.
TABLE I: FACTOR LOADING AND NORMALITY OF MEASUREMENT

| Code | Items                                                                 | Factor Loading(α) | VIF   | Standard Deviation | Excess Kurtosis | Skewness |
|------|------------------------------------------------------------------------|-------------------|-------|--------------------|-----------------|----------|
| SYQ2 | The Moodle is user friendly                                           | 0.803             | 1.777 | 1.334              | -1.038          | 0.127    |
| SYQ3 | The Moodle is easy to learn                                           | 0.843             | 2.098 | 1.335              | -1.046          | 0.224    |
| SYQ4 | The response time of Moodle is very good                              | 0.810             | 1.735 | 1.307              | -0.89           | 0.451    |
| SYQ5 | Overall Moodle is highly reliable with minimal downtime               | 0.866             | 2.264 | 1.317              | -0.985          | 0.327    |
| INQ1 | The course content in Moodle is accurate                              | 0.836             | 2.244 | 1.209              | -0.288          | 0.663    |
| INQ2 | The course content in Moodle is up-to-date                            | 0.831             | 2.180 | 1.261              | -0.738          | 0.472    |
| INQ3 | The courses have sufficient content required for me to complete the learning process | 0.866             | 3.026 | 1.218              | -0.645          | 0.47     |
| INQ4 | The information I get from Moodle is easy to understand               | 0.853             | 2.880 | 1.156              | -0.313          | 0.618    |
| INQ5 | The information within Moodle is secure                               | 0.831             | 2.165 | 1.181              | -0.528          | 0.493    |
| SEQ2 | The staff in charge of Moodle responds to my request quickly          | 0.811             | 1.581 | 1.297              | -0.651          | 0.646    |
| SEQ3 | The staff in charge of Moodle has the technical ability to solve my problems | 0.902             | 2.085 | 1.221              | -0.412          | 0.708    |
| SEQ4 | Moodle shows concern and empathy I intend to use                      | 0.807             | 1.688 | 1.201              | 0.364           | 1.112    |
| BIN1 | Moodle frequently this semester I am willing to encourage other people to use Moodle | 0.762             | 1.777 | 1.293              | -0.967          | 0.222    |
| BIN2 | I predict I will use Moodle frequently in the coming semesters        | 0.837             | 2.391 | 1.215              | -0.61           | 0.516    |
| BIN3 | It is a good idea to use Moodle I will recommend Moodle to my friends | 0.836             | 2.317 | 1.377              | -1.185          | 0.12     |
| BIN4 | I will recommend Moodle to my friends I use Moodle to help me to interact with my lecturer (s) | 0.808             | 2.301 | 1.164              | -0.334          | 0.56     |
| BIN5 | I use Moodle to access learning resources I use Moodle to communicate and share knowledge with my colleagues | 0.869             | 2.105 | 1.378              | -1.189          | 0.127    |
| ACTU1| Use Moodle to help me to interact with my lecturer (s)                | 0.798             | 1.556 | 1.293              | -0.967          | 0.225    |
| ACTU2| Use Moodle to access learning resources                               | 0.869             | 2.384 | 1.349              | -0.977          | 0.381    |
| ACTU3| Use Moodle to communicate and share knowledge with my colleagues      | 0.904             | 2.384 | 1.349              | -0.977          | 0.381    |

α: Cronbach’s Alpha > 0.700, SYQ = System Quality, INQ = Information Quality, SEQ = Service Quality, BIN = Behavioral Intention to use Moodle, ACTU = Actual Usage

TABLE II: CONSTRUCTS RELIABILITY

| Constructs                  | Cronbach’s Alpha (α) | Composite Reliability | Average Variance Extracted (AVE) |
|-----------------------------|----------------------|-----------------------|----------------------------------|
| System Quality (SYQ)        | 0.850                | 0.899                 | 0.690                            |
| Information Quality (INQ)   | 0.899                | 0.925                 | 0.711                            |
| Service Quality (SEQ)       | 0.793                | 0.879                 | 0.708                            |
| Behavioural Intention to use Moodle (BIN) | 0.883 | 0.914 | 0.682 |
| Actual Usage (ACTU)         | 0.820                | 0.893                 | 0.736                            |
general model tuning. Larger than zero (0) indicates a high possibility to determine how accurate a model's prediction accuracy (Henseler et al., 2015). A coefficient value larger than zero (0) indicates a high-quality forecast (Henseler et al., 2015). Q2 values in table V demonstrate that the model is accurate and that the constructs are necessary for general model tuning.

C. Evaluation of Structural Model

This study proved that the measuring model was accurate and valid. The next stage was to evaluate the model's structure. This involved looking at the relationships between the variables, calculating the coefficient of determination, and evaluating the model's ability to predict the future. The structural model's model predictive capability or power is often measured using the coefficient of determination (R²).

D. Gender Differences in the Study Constructs

To evaluate gender differences in the adoption factors, the data were split into two groups, namely, male and female using a multi-grouped Analysis in Partial Least Square. A construct relationship was established between the two groups as seen in Table VI and Table VII.

Concerning the construct relationship for males, all four hypotheses were tested (Table VI). The study depicts that the males' intention to use Moodle LMS was affected by how good the system was, with (P < 0.000). Hence, H1m is supported. The men's intention to use Moodle LMS was also affected by how good the service was, with (P < 0.000). Hence, H2m is supported. Lastly, men's intentions to use Moodle LMS have a positive and significant effect on how much they actually use it, with (P < 0.000). So, H4m is supported. With respect to the females' hypotheses (Table VII). System quality showed a substantial influence on the female behavioural intention to use Moodle LMS, with (P < 0.000). as measured by the female construct relationship.

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\text{Actual Usage (R}^2_{\text{ACTU}}\text{) = 0.926, (Q}^2\text{) = 0.678}
\]

The Heterotrait-Monotrait Ratio (HTMT) is an additional criterion supporting discriminant validity. For HTMT to be attained, all correlation values must fall below the 0.900 thresholds. Table IV indicated that the discriminant validity was flawless.

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\text{TABLE III: Fornell-Larcker Criterion (Discriminant Validity)}
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| ACTU | BIN | INQ | SEQ | SYQ |
|------|-----|-----|-----|-----|
| ACTU | 0.858 | - | - | - |
| BIN  | 0.963 | 0.826 | - | - |
| INQ  | 0.515 | 0.533 | 0.843 | - |
| SEQ  | 0.626 | 0.653 | 0.492 | 0.841 |
| SYQ  | 0.593 | 0.592 | 0.460 | 0.509 | 0.831 |

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\text{TABLE IV: Heterotrait-Monotrait Ratio (HTMT)}
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| ACTU | BIN | INQ | SEQ | SYQ |
|------|-----|-----|-----|-----|
| ACTU | - | - | - | - |
| BIN  | 0.524 | - | - | - |
| INQ  | 0.600 | 0.597 | - | - |
| SEQ  | 0.769 | 0.773 | 0.579 | - |
| SYQ  | 0.710 | 0.680 | 0.524 | 0.615 | - |

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\text{TABLE V: The Model Predictive Strength}
\]

| Construct | (R}^2\text{) | (Q}^2\text{) |
|-----------|----------|----------|
| Actual Usage | 0.926 | 0.678 |
| Behavioural Intention to use Moodle | 0.545 | 0.367 |
As a result, H1f is supported. Information quality had no impact on the behavioural intention of females to use Moodle LMS. H2f is thus not supported. Nonetheless, Service quality showed a substantial influence on female behavioural intention to use Moodle LMS, with \( p < 0.000 \). Hence, H3f is supported. The females' behavioural intention to use Moodle LMS had a substantial impact on actual utilization to use it \( (p < 0.000) \).

VI. DISCUSSION OF FINDINGS

This is one of the first studies of its kind to use Multi-Group analysis to examine gender variations in e-learning achievement in a developing country. In an attempt to explain why students accepted the Moodle Learning Management System, five variables were selected (LMS). The study revealed that system quality had a significant impact on both men's and women's intent to utilize Moodle LMS. This research implies that if an e-learning platform is dependable, user-friendly, secure, rapid, and responsive, both men and women are likely to have a favourable image of it and consider it valuable. This conclusion gives validity to the findings of Cheng et al. (2012), Opoku et al. (2020), Yakubu and Dasuki (2018), and Kim and Lee (2014), who demonstrated that the quality of an e-learning system reliably predicts an individual's desire to utilize the system. It was shown that information quality had a statistically significant impact on men's behavioural intention to utilize Moodle LMS. This indicates that male students at the university are satisfied with the feedback generated by the e-learning platform. This outcome is consistent with prior research findings (Ramayah et al., 2010; Wang & Chiu, 2011; Cheng, 2012). The non-significance of the relationship between information quality and females' desire to use Moodle LMS may be because the system developers may not have provided information that is simple to comprehend and presented clearly and concisely. Since women depend on a system as a productivity tool, they dedicate adequate effort to comprehending how the system operates. Probably, they will not find the system advantageous if they have difficulty understanding the system's feedback. This contradicts the conclusions of prior research (Hassanzadeh et al., 2012; Yakubu & Dasuki, 2018). Males and females both exhibited a statistically significant correlation between service quality and behavioural intent. This finding may suggest that an increase in the number of different types of services that users need from an e-learning system would boost their willingness to utilize the system. This is consistent with prior study results (Opoku et al., 2020; Cheng, 2012; Li et al., 2012). In conclusion, behavioral intention to use Moodle LMS was statistically significant in actual utilization across both genders. This shows that the quality of the system and the quality of the service will have a beneficial impact on the behavioural intentions of both males and females, which will influence Actual usage. The legitimacy of the study conducted by Chow et al. (2012), Opoku et al. (2020), and Hassanzadeh et al. (2012) is enhanced by this finding.

VII. CONCLUSION

The DeLone and McClean quality antecedents' criteria were heavily weighted in this study since they were utilized to evaluate gender inequalities in the adoption of e-learning by students at a university in Ghana. In the end, this research found that system quality and service quality had a positive and significant influence on the behavioural intention of both men and women to use Moodle LMS. A positive effect of information quality on the behavioural intention of men to use Moodle LMS was also found, whereas a negative effect on the behavioural intention of females was found. In addition, the behavioural intention of both males and females to utilize Moodle LMS had a substantial influence on the extent to which they used the platform. This research is one of the first of its type to employ multi-grouped analysis to investigate gender differences in e-learning uptake, and it's one of the first of its sort overall.

VIII. RESEARCH LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The sample size of Ghanaian university students is the primary constraint of this study. Future studies may investigate the gender differences in the levels of teachers. Second, it is uncertain whether the model and its analysis apply to the tertiary education of other emerging nations. The study of Moodle LMS adoption in other developing nations will be useful. Students in a developing nation like Ghana may not be computer literate enough to utilize educational software, thus future research should examine students' computer literacy levels as a precondition for utilizing educational software to increase learning in the future. Understanding what factors impact the acceptance of e-learning programs is critical because of cultural differences between developed and poor countries. It is acknowledged

**TABLE VI: RESULTS OF STRUCTURAL MODEL (MALE RESPONSE)**

| Structural Relationship | Research Hypotheses | Beta Values (\( \beta \)) | T-Statistics \((t-Value > 1.99)\) | P Values | Results |
|-------------------------|---------------------|--------------------------|-----------------------------|---------|---------|
| SYQ \(\rightarrow\) BIN | H2m                 | 0.313                    | 5.577                       | 0.000   | Supported |
| INQ \(\rightarrow\) BIN | H2n                 | 0.304                    | 6.440                       | 0.000   | Supported |
| SEQ \(\rightarrow\) BIN | H3n                 | 0.322                    | 5.648                       | 0.000   | Supported |
| BIN \(\rightarrow\) ACTU | H4m                 | 0.970                    | 289.046                     | 0.000   | Supported |

**TABLE VII: RESULTS OF STRUCTURAL MODEL (FEMALE RESPONSE)**

| Structural Relationship | Research Hypotheses | Beta Values (\( \beta \)) | T-Statistics \((t-Value > 1.99)\) | P Values | Results |
|-------------------------|---------------------|--------------------------|-----------------------------|---------|---------|
| SYQ \(\rightarrow\) BIN | H3f                 | 0.265                    | 4.987                       | 0.000   | Supported |
| INQ \(\rightarrow\) BIN | H2f                 | 0.060                    | 0.842                       | 0.400   | Not Supported |
| SEQ \(\rightarrow\) BIN | H3f                 | 0.533                    | 8.465                       | 0.000   | Supported |
| BIN \(\rightarrow\) ACTU | H4f                 | 0.956                    | 186.916                     | 0.000   | Supported |

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that the rate of technological adoption in developed nations may not be identical to that in underdeveloped nations. As noted by Opoku et al. (2020) and Yakubu and Dasuki (2001), there is a need for further academic study to investigate the various adoption rates (2018).

IX. STUDY IMPLICATION

The findings of this research have significant implications for the adoption of eLearning in developing countries, particularly in Ghana. When implementing e-learning in a university, administrators, academics, and system developers must consider gender. Users' willingness to accept new technologies is strongly influenced by the quality of the systems, services, and information provided. E-learning system designers should pay close attention to these aspects if they want to boost user adoption. It is also important that system interfaces be simple and need just basic IT skills to utilize. To boost their rate of adoption, students and instructors must also get enough training and guidance. It seems there are currently no studies in developing countries that focus on the gender difference in the use of eLearning technology, and this study fills that need. This study contributes to the current body of knowledge on e-learning adoption by testing the DeLone and McLean ISS model quality antecedent variable in sub-Saharan Africa.

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CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

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