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EVALUATION OF USER SATISFACTION WITH THE E-LEARNING CROSS-PLATFORM APPLICATION FOR BOTSWANA SECONDARY SCHOOLS

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Abstract

This manuscript presents an analysis of user contentment with a newly developed e-learning cross-platform tool tailored for Secondary Schools in Botswana. We utilized a detailed questionnaire to craft a descriptive survey aiming to gauge the satisfaction levels of users with this e-learning tool. There is a noticeable resistance to adopting online educational methods in Botswana's secondary education sector, with most institutions clinging to conventional in-person teaching methodologies, where instructors directly impart educational content. However, this traditional approach to learning is riddled with challenges, including a significant rate of student failures in final assessments. The investigative survey engaged both students and educators from Botswana's secondary schools. We put forward and examined various hypotheses—System Quality, Information Quality, Service Quality, Intention to Use/Usage, and Net Benefits—via correlation analysis. The empirical findings validated most of the proposed relationships among these constructs, demonstrating a direct and positive linkage between Information Quality, System Quality, Service Quality, Net Benefits, Intention to Use/Usage, and User Satisfaction. The paper concludes by affirming the model’s efficacy in appraising e-learning cross-platform tools, paving the way for enhanced online education adoption in Botswana's secondary schools.

Keywords: User Satisfaction, Information Systems, E-Learning, M-Learning, Cross-Platform Applications, Secondary Schools, Botswana, African Countries.

I. INTRODUCTION

The utilization of an information system plays a crucial role in determining its success, along with other elements [1]. Lyytinen emphasizes that if a system remains unused, it is deemed to have encountered a failure in terms of interaction [2]. While frequent or extensive use of a system doesn't necessarily equate to its success, the absence of use does unequivocally signal its failure [2]. Information and Communications Technologies (ICT) have changed the end-user experience in e-learning delivery. In today's age of technological progression, the swift escalation in reliance on mobile applications across an array of novel devices, ranging from smartphones to tablets, is introducing unprecedented challenges in the educational development sector [1].

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There are different mobile platforms available, for example, Windows and Android phones, and they all have unique characteristics. As a result, the market requires the development of applications that can run on all platforms to reach more users. Students in secondary schools in Botswana specifically use mobile devices with a variety of operating systems, including Windows and Android.

E-learning cross-platform applications are the learning systems which deliver the learning contents through both computers and mobile devices [3]. Due to m-learning integration into e-learning, it is no longer a replacement of e-learning, but its enhancement.

The use of e-learning applications offers universities opportunities for introduction of new services and encourages advanced methods development of both qualitative and quantitative ways of delivering information and services [4].

Assessing an e-learning system is imperative to determine its usability and user satisfaction, especially when the design concept is novel. Contemporary users seek beyond mere functionality; they desire an experience that is both enjoyable and captivating [5]

This research aimed to explore the impact of Information System (IS) metrics, including Information Quality, System Quality, Service Quality, User Intention to Use/Actual Use, and Net Benefits, on the satisfaction of teachers and students in Botswana secondary schools using an e-learning cross-platform application.

II. A BRIEF OVERVIEW OF THE EXISTING IS SUCCESS MODELS OF E-LEARNING

This section reviews the literature on e-learning IS success models to build theoretical and empirical framework of the study. For each models, model constructs were investigated in order to establish whether it could be used to evaluate user satisfaction with the e-learning application.

a) Demand-Driven Learning Model(MacDonald-2001)

A learning framework, driven by demand and constructed through a joint initiative between scholars and professionals from both the private and public sectors, has been established [6]. This framework encompasses discussions on the learning management system, its associated content, and the services it provides.

In this context, technology serves as a pivotal instrument to achieve the desired educational outcomes efficiently [6]. The central objective of this model is to motivate educators to engage proactively in integrating and applying technology within the classroom setting [7].

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Figure 1 shows the components of the Demand-Driven Learning Model.

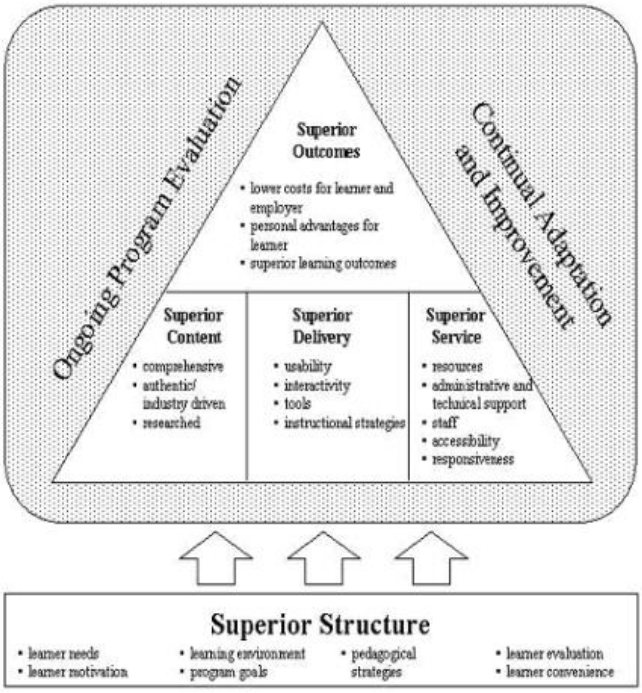

Fig 1: The Demand-Driven Model [6]

This approach demonstrates how important it is to adapt content and services to meet the changing demands of students and teachers as well as pedagogical developments [6].

The model consists of five dimensions (structure, content, delivery, service, and outcomes), all of which must collaborate to deliver a high-quality online course [7]. Key themes include involving learners requirements, connections sought, interactions valued, social building of content, and integration of delivery partners.

b) The Strategic e-Learning Model

The Strategic E-learning Model focuses on students as engaged, independent learners who absorb information and build knowledge [7]. This model explores the issues and the necessity for e-learning among students which they may have never encountered before in traditional learning for example, how to solve online technological problems by themselves [8].

The learner is at the center of the model, and three interaction elements-skill, volition, and self-regulation circle this central idea to explain successful learning[8]. Figure 2 shows the Metacognitive perspective of the Strategic e-Learning Model.

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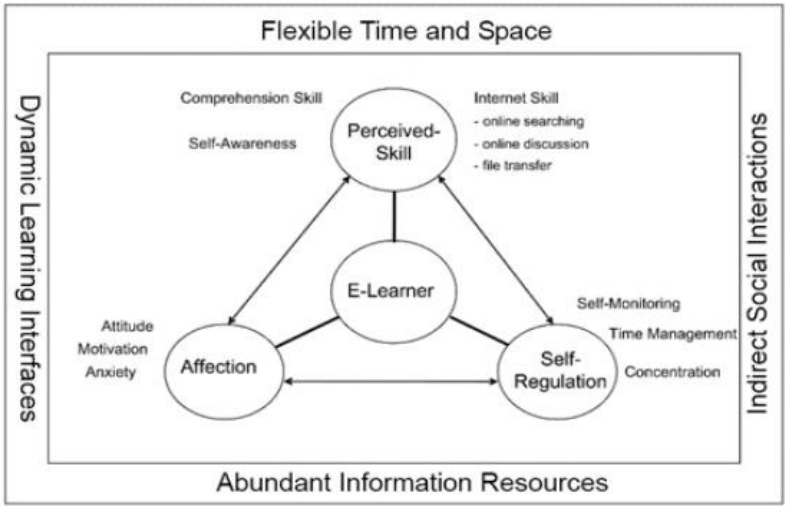

Fig 2: The Strategic E-learning Model [8]

The Strategic E-learning Model adopts a metacognitive approach for the delineation and evaluation of e-learning processes. It encompasses three crucial domains related to student e-learning strategies: perceived skill, emotional response, and self-regulation, alongside four key facets of e-learning environmental characteristics [8]. This model serves as a diagnostic instrument for e-learning researchers, system architects, curriculum creators, and educators, aiding them in evaluating student approaches towards e-learning throughout various stages of experimentation, design, and development [7].

c) The Technology Acceptance model

The Technology Acceptance Model is a model used to guide on the mechanisms underlying technology acceptance to forecast behavior as well as give a theoretical explanation for effective e-learning technology implementation. Its practical goal is to inform the users about actions they might take prior to adopting e-learning technology. The model is based on how students' perceptions of using e-learning and how their perceptions of its utility impact users' intentions [7]. Based on the model, technology is a three-stage process whereby system design characteristics trigger a certain response or reaction which in turn generates an emotive response or attitude towards utilizing technology, impacting the usage behavior. The Technology Acceptance Model (TAM) can be utilized to ascertain the potential satisfaction levels of students regarding e-learning. However, it is important to note that this model does not incorporate the pedagogical aspects of e-learning or the strategic implementation of an e-learning system. Instead, its primary focus lies in examining the adoption of e-learning technology specifically for content management purposes [9]. In Figure 3, the Technology Acceptance Model is visually represented.

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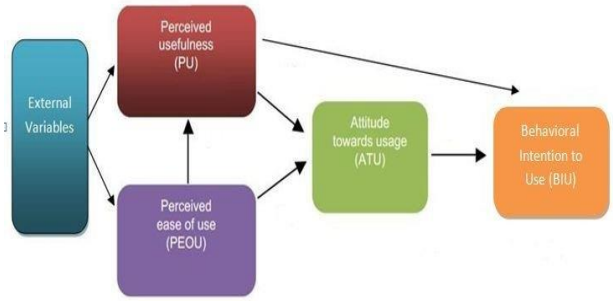

Fig 3: The Technology Acceptance Model [9]

The TAM Model is structured around three interrelated components. Initially, it considers user interface and technical usability. This is followed by an assessment of the e-learning system's value and ultimately, the user's behavioral intentions [9]. Within the TAM Model framework, the Perceived Ease of Use has a direct impact on the Perceived Usefulness of the e-learning system, while the Behavioral Intention to Use influences students' actual use of the e-learning system [7].

Despite its extensive efforts to address the deficiencies of the Theory-Based Model, the TAM Model overlooks critical facets of an e-learning system such as pedagogy, administration, and curriculum design. These elements serve as the bedrock of a comprehensive e-learning system [8]. The TAM Model, therefore, remains somewhat incomplete, as it confines its focus to user interface and technology usability, neglecting the fact that technology serves merely as a supplementary component in the establishment of a robust e-learning system [9].

d) The E-learning Life-cycle Model

The E-learning Lifecycle Model encapsulates the entire spectrum of the e-learning process, with its primary aim being the identification of crucial criteria for the evaluation of e-learning [10]. From the analysis of existing models, two prevalent shortcomings have been identified. The first issue is that many e-learning methodologies commence at the stage of course development, neglecting the imperative phases of institutional planning and resource allocation. Some models even entirely omit these preliminary steps [7]. Secondly, there is a scarcity of models that accentuate the vital elements required for effective evaluation. Figure 4 illustrates the E-learning processes as delineated in the Lifecycle Model.

Diverging from the traditional focus on individuals, tasks, or roles, this model centers on the processes integral to the creation and implementation of e-learning [10]. Acknowledging the e-learning lifecycle is indispensable, as it enables a clear determination of the most opportune moments for evaluation, as well as setting clear objectives for such assessments [7]. The model divides the e-learning lifecycle into six phases, grouped into three categories: Review and Planning (encompassing review and planning), Curriculum Development (including course design and course development), and Delivery (covering teaching and student learning). It is crucial to note that these

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phases are interlinked, with complex dependencies and feedback loops present throughout the real development process.

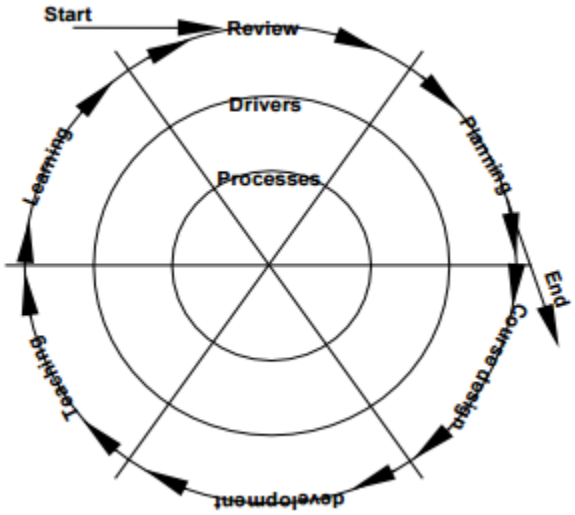

Fig 4: The E-learning Lifecycle Model [7]

Evaluation of User Satisfaction with the E-learning Cross-Platform Application

The study evaluated user satisfaction with the e-learning cross-platform application using the following constructs:

1) System Quality
2) Information Quality
3) Service Quality
4) Intention to Use/Use
5) Net Benefits
6) User Satisfaction

These characteristics had been derived from the DeLone and McLean Updated Information System Success Model [8].

III. METHODOLOGY

The secondary school students and teachers were surveyed using a descriptive survey technique to assess how satisfied they were with the cross-platform e-learning program. The data collection tool was administered using questionnaires based on the modified model. 52 students, teachers, and IT experts made up the sample size. They were exposed to the e-learning cross-platform application. Inferential and descriptive statistics was used to analyze the collected data. The sample size was considered being valid because we used random sampling of probability sampling. In this sampling method, every individual in the population was provided an equal opportunity to be selected for

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participation. The entire sampling procedure was conducted such that each participant was chosen completely independently of the other members in the population.

a) Justification of choice of the DeLone and McLean Updated Information System Success model

The DeLone and McLean Updated Information System Success Model is considered separately from other models. This is since the DeLone and McLean Updated Information System Success Model address a number of factors that are taken into account when creating and assessing e-learning applications. These structures are very advantageous for the African setting. Secondly, other models are not chosen because they are rarely designed to highlight the critical points for effective evaluation. When creating and assessing e-learning systems and tracking variables for implementation and impacts, this model is one of the most often utilized models.

Researchers investigated the associations among the measures identified in DeLone and McLean Updated Information System Success Model [11],[13],[5]. The various success characteristics and their connections, as well as the links between system use, system quality, and information quality, as well as individual impacts, extensions, and recommendations [12]**.** The model includes all the criteria needed to assess an e-learning system. The DeLone and McLean Updated Information System Success Model shown in Figure 5 below shows that evaluation is carried out by using assessment factors classified into six categories.

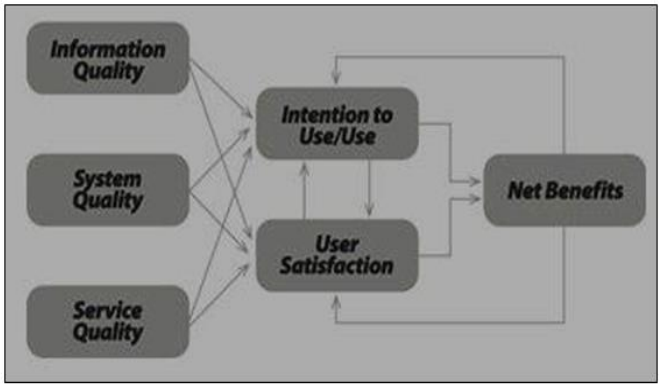

Fig 5: The DeLone and McLean Updated Information System Success Model [12]

Figure 5 illustrates the evaluation methodology, which employs various assessment criteria categorized into six main groups: Information Quality, System Quality, Service Quality, Intention to Use/Use, User Satisfaction, and Net Benefits [12]. The initial three constructs of the model are utilized to evaluate the quality of system design. System Quality is concerned with appraising the attributes and effectiveness of the chosen platform in the e-learning context. It leverages success metrics such as flexibility, stability, reliability, security, responsiveness, and user-friendliness to carry out this assessment [5].

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Information Quality, on the other hand, focuses on evaluating the quality of the course content. The success metrics used for this purpose include clarity, organization, presentation, and the up-to-dateness of course materials [12]. Service Quality is responsible for assessing the quality of interactions between students and instructors, utilizing success metrics like promptness, availability, helpfulness, and clarity of lectures to gauge its effectiveness [13].

1) Reliability of Instruments

The Cronbach's Alpha was designed as a measure of internal coherence of the survey's items. It fluctuates between zero and one [14], [15]. The stronger the internal consistency of the questionnaire items, the closer Cronbach's Alpha is to one. The items should measure many substantive areas within a single construct when using the Cronbach's Alpha scale. [14]. The Cronbach's scale was used to conduct a reliability test on the variables for each of the study's constructs. The resulting Cronbach's Alpha coefficient values were higher than the 0.8 threshold, with the total User Satisfaction construct being the highest. This high Cronbach's Alpha coefficient values indicated the good reliability of the developed questionnaires.

2) User Satisfaction Presentation Analysis

The role of information system measures in evaluating User Satisfaction was shown with different variables on each of the constructs of the DeLone and McLean Information System Success Model [16]. For each construct of the model mean and standard deviation were calculated. Moreover, the Cronbach's Alpha values were computed for each construct to assess internal consistency. The study utilized exploratory methods for factor analysis, a technique aiming to uncover underlying dimensions that explain observed variables [14]. Factor analysis serves as a method for data reduction, assisting in identifying structural relationships between variables and highlighting key factors responsible for the majority of variation observed [17].

Factor analysis simplifies the complexity of data with numerous variables by distilling it down to a smaller set of manageable factors. Hair et al. advocate for the importance of this technique, emphasizing that a factor loading greater than 0.5 is indicative of the validity and reliability of the indicators [17]. In the context of our study, all the targets exhibited a factor loading surpassing the 0.5 threshold. This ensures that both the construction and structural indicators of the factors are valid and reliable. Through the analysis of correlation between responses, factor analysis facilitated the establishment of a structured understanding of the links between them. This method allows for the determination of the extent to which each variable is explained by its respective sample size [15]. With these insights, data processing can be streamlined, leading to a reduction in data complexity.

3) Findings of Cronbach's Values for Constructs

In order to verify the accuracy of the target structure and confirm that the measurements scale used in the question design was understood, each construct was observed using Cronbach's Alpha.

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The results are shown in Table 1.

Table 1: Cronbach's Alpha values for constructs

	Cronbach's values for constructs (variables)	
S/N	**Construct (variable)**	**Cronbach's Alpha value**
1	System Quality	0.9910
2	Information Quality	0.9021
3	Service Quality	0.8780
4	Net Benefits	0.8571
5	Intention to Use/Use	0.3295

All values of Cronbach's Alpha were above the threshold point of 0.7, except for Intention to Use/Use which was 0.3295. It implies that constructing six average builds from the 23 original items was acceptable [13]. All items in each group could be shown as measuring the same construct, and the structure was highly reliable.

IV. RESULTS OF EVALUATION OF USER SATISFACTION WITH THE E-LEARNING CROSS-PLATFORM APPLICATION

Descriptive statistical methods were applied to establish criteria for evaluating system quality, resulting in the generation of measurement items. The influence of the System Quality component on User Satisfaction was found to be considerably substantial, as evidenced by average scores ranging from 2.95 to 3.35 on a 4-point Likert scale. The observed standard deviations, falling within a range of 1.0990 to 0.9234, were deemed to be within acceptable limits. Concurrently, the criteria set for assessing Information Quality revealed average scores fluctuating between 3.05 to 3.30 on the 4-point Likert scale. This score range is indicative of a relatively satisfactory user experience. The standard deviation for this component ranged from 0.8335 to 0.9787, with the highest recorded value being 0.960. This data demonstrates a consistent level of user satisfaction concerning the Information Quality of the system.

The criteria for assessing Service Quality had also shown the lowest standard deviation of 3.15 on 4-point Likert scale. This demonstrated that people were usually content with the quality of the service. The acceptable difference was shown by the standard deviations of the variables, which ranged from 1.0053 to 0.9881.

The criteria for assessing Intention to Use/Use had shown the average score from 2.90 to 3.30 on the 4-point Likert scale which demonstrated the level of satisfaction. Standard deviation values varied from 0.8645 to 1.0208. This indicates that the greatest value for the difference between the highest point and the lowest point among survey respondents was 1.0208. The standards for evaluating Net Benefits were defined. The average scores on the 4-point Likert scale for the Net Benefits component's user satisfaction ranged from 3.30 to 3.45, which indicate that it was generally high. This implied that Net Benefits played a significant role in e-learning software. It was acceptable that the standard deviation was between the ranges of 0.6416 to 0.9504.

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V. TESTING RESULTS OF HYPOTHESES BY REGRESSION ANALYSIS

Regression analysis was performed on each construct of DeLone and McLean Updated Information System Success Model against User Satisfaction, to measure whether the construct was needed to make an application satisfactory to users. The following hypotheses were tested.

1) Hypothesis H1: Evaluating System Quality of the e-learning cross-platform application to test User Satisfaction.
2) Hypothesis H2: Evaluating Information Quality of the e-learning cross-platform application to test User Satisfaction.
3) Hypothesis H3: Evaluating Service Quality of the e-learning cross-platform application to test User Satisfaction.
4) Hypothesis H4: Evaluating Intension to Use/Use of the e-learning cross-platform application to test User Satisfaction.
5) Hypothesis H5: Evaluating Net Benefits of the e-learning cross-platform application to test User Satisfaction.

Linear regression analysis was used to test User Satisfaction against all constructs asserted by DeLone and McLean updated information system success model. Linear regression analysis was used to test System Quality, where user Satisfaction was the dependent variable and System Quality was the independent variable. We observed a significant relationship between System Quality and User Satisfaction with the e-learning cross-platform application. The results showed that system quality had a significantly higher t value, which meant that System Quality had impact on User Satisfaction in comparison to other measures. At $p<0.05$, we accepted the hypothesis and concluded that System Quality significantly influenced User Satisfaction.

In the linear regression analysis to test Information Quality, User Satisfaction was the dependent variable, and Information Quality was the independent variable. There was a significant relationship between Information Quality and User Satisfaction. Since the path coefficient p was less than 0.05, we accepted the null hypothesis.

In the linear regression analysis to test hypothesis H3 of research, User Satisfaction was the dependent variable, and Service Quality was the independent variable. There was a significant relationship between System Quality and User Satisfaction. The interaction between Service Quality and User Satisfaction showed a high positive correlation. We accepted the null hypothesis and stated that Service Quality significantly influenced User Satisfaction.

In the linear regression to test Hypothesis H4, User Satisfaction was the dependent variable and Intention to Use/Use was the independent variable. There was significant relationship between Intention to Use/Use and User Satisfaction. The results of the interaction between Intention to Use/Use and User Satisfaction revealed a significant negative correlation between these items. At $p<0.05$, we accepted the null hypothesis.

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In linear regression to test Hypothesis H5, User Satisfaction was the dependent variable and Net Benefits was the independent variable. There was significant relationship between Net Benefits and User Satisfaction. At $p<0.05$, we accepted the null hypothesis and concluded that Net Benefits significantly influenced User Satisfaction.

With the significance level under 0.05, the hypotheses H1, H2, H3, H4 and H5 were accepted, and all factors, namely System Quality, Information Quality, Service Quality, Intention to Use/Use and Net Benefits, were considered as having positive impact on User Satisfaction.

VI. IMPLICATION OF MEASURING USER SATISFACTION WITH THE E-LEARNING CROSS-PLATFORM APPLICATION

This study looked at how satisfied users were with the cross-platform e-learning program used by secondary school teachers and students. As shown in Figure 7, the results revealed that each of the factors—System Quality, Information Quality, Service Quality, Intention to Use/Use, and Net Benefits—had a favorable impact on User Satisfaction.

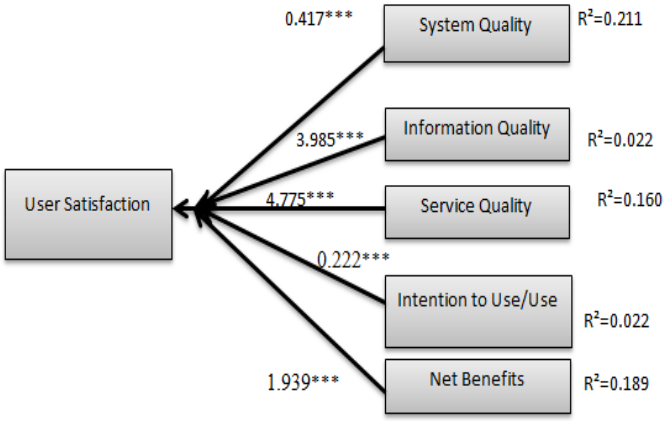

Fig 7: The conceptual model depicting the results of measuring User Satisfaction

Figure 7 illustrates the relationship between the independent factors (Net Benefits, Intention to Use/Use, System Quality, Information Quality, Service Quality, and User Satisfaction) and the dependent variable, User Satisfaction.

VII. DISCUSSION OF RESULTS OF MEASURING USER SATISFACTION WITH THE E-LEARNING CROSS-PLATFORM APPLICATION

The purpose of this study was to evaluate the level of user satisfaction with the cross-platform e-learning application that secondary school students and teachers use to access educational content. Teachers and students were given questionnaires to fill out as part of the DeLone and McLean Updated Information Systems Success Model's user satisfaction survey. The findings demonstrated the comprehensive importance of information system interactions for user pleasure. The impact of System Quality on User Satisfaction further supports the significance of this construct for information system

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evaluation. The quality of an information system, including its hardware, software, and data components, is represented by system quality. It is a gauge of how technically sounds the system is.

Information systems must meet user expectations for flexibility and ease of use, even for beginners. Information systems with high ratings are intended to be dependable, easy to use, and to have superior functionality over rival systems. User satisfaction with a management information system was found by Gelderman to be significantly correlated with System Quality [13]. System Quality was also discovered to be closely connected to User Satisfaction in a knowledge management system [14]. Thus, the correlation between System Quality and User Satisfaction is well supported [13].

In our research, the e-learning cross-platform application was considered as an information system. The cross-platform e-learning application capability and technical support were taken into account when assessing System Quality. The cross-platform e-learning program was seen as operating "almost without reproach" by teachers and students (as it was put by one of the respondents), which could be interpreted as stability and good availability of the system. Most of the respondents stated that there was enough online support concerning the cross-platform application. .

According to the study, Information Quality affected User Satisfaction. Four characteristics of information quality are defined by Huh et al. as follows: (1) correctness, (2) completeness, (3) consistency, and (4) currency [12]. These qualities influence users' perceptions and serve as standards for evaluating the effectiveness of the system. In the beginning, finding the information that they needed had been challenging for students and teachers, but as usage expanded, it had gotten simpler for them. Morris discovered that Information Quality and User Satisfaction at System User Experience are Consistently Correlated 12]. Gein specifically looked at the Information Quality components of websites, like the content and style, and discovered strong connections between these elements and user satisfaction [14].

This study found Service Quality to be a significant attribute in measuring User Satisfaction. The degree of difference between a customer's impression of the execution of a service and their normative expectations for that service is known as service quality [14]. Service quality is assessed by how well service representatives handle complaints and problems brought on by system irregularities. Complexities related to system properties are handled by the support staff of the system [16]. The correlation between service quality and User Satisfaction has been studied extensively; however the results of these studies provide conflicting evidence in favor of this association. Multiple approaches used by researchers to measure this construct may be to blame for the conflicting results. The contradictory results could be the result of different measurement techniques used by the researchers.

In an e-learning environment, Chiu looked at the impact of support on user satisfaction and discovered a non-significant link [12]. Choe investigated the impact of education and training on User Satisfaction with an information system but discovered no connection at any level of IS implementation [15]. In our study, we evaluated student-teacher

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interactions as a way of measuring service quality. The pupils' response was that they were generally happy with the engagement. The required help and direction had been given to the students, and their inquiries had been addressed. These findings demonstrated that respondents were content with the advice they received.

Service Quality is extremely important because a bad service could lead to losing Users [22]. From the perspective of e-learning, poor interaction in the e-learning environment may discourage students from studying. [12]. Our measures showed that Service Quality was valid. Using the DeLone and McLean Updated Information System Success Model which examined the expectations and perceptions that users had on service quality, we found that Service Quality was positively and significantly related to User Satisfaction. This study showed that Intention to Use had a substantial impact on User Satisfaction. The measures of satisfaction included density of use, timetables, study material, exercises and instructions to accomplish a give task [7]. Intention to Use/Use is when the user start using the application in terms of browsing, searching, or any other types of interactivity [16].

Sambasian *et al*. used the Updated Information System Success Model of DeLone and McLean to investigate the variables that affected the Malaysian government's various ministries' intention to adopt and actual use of the electronic procurement system [13]. They expanded the original DeLone and McLean model to include variables like trust, conducive circumstances, and high-quality web design and discovered that these variables were closely related to Intention to Use. This measurement was often self-reported by the user at the individual level of analysis. In the case of measuring user satisfaction with the application, this type of information could be easily captured through the application access logs 12].

This study demonstrated how significantly Net Benefits have an impact on User Satisfaction. The importance of this construct in assessing user satisfaction in secondary school settings might be partially attributed to the inadequate deployment of infrastructure and poor maintenance [12]. It is crucial to assess the satisfaction of students, teachers, and IT technicians as the major users of an e-learning cross-platform application because the success of a system is tied to User Satisfaction. The students' perception of the advantages of the cross-platform e-learning application when completing a task, like accessing course materials on several devices, was the most significant result.

VIII. CONCLUSION

Users' assessments of the application's system quality, information quality, service quality, intention to use/use, and net benefits were used to assess how satisfied users were with the cross-platform e-learning application. According to this study, each information system attribute had a big impact on User Satisfaction. User satisfaction was most impacted by System Quality, whereas Net Benefits had the least impact.

These six attributes offer opportunities to explore and describe the environment from several points of view. Students and teachers were given two weeks to work with the cross-platform e-learning program and were asked to rate perceived system usability. A

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successful implementation influences the likelihood of system acceptance by users and its success. The results of this study may indicate that the Ministry of Education and secondary schools need to take proactive measures through implementation of the technology and ICT infrastructure impediments suggested in the study.

A center of excellence for ICT in education that promotes research and the development of ICT pedagogy should be established by the Ministry of Education in order to spread high-quality information to educational areas. It is advised that IT professionals arrange workshops in schools to assist and support teachers with the integration of ICT into the curriculum by offering resource assistance to enable service quality. Additionally, IT experts ought to motivate teachers to use computers and internet to teach pupils across all subjects' areas. ICT professionals must be knowledgeable in cutting-edge e-learning system configurations, including maintain databases, system administration, and support, in order to identify any issues that might develop with online applications and resolve them to enable acceptance in Botswana secondary facilities. In order for the implementation of e-learning in Botswana's secondary schools, particularly for topics, to be effective, CT experts in secondary schools must have a thorough understanding of ICT technologies in order to be able to provide training or support to teachers and students on a variety of ICT technologies.

The Ministry of Education needs to establish standards and provide e-learning materials for secondary, open, and remote schools. The e-learning material should then be the same at all levels and across all disciplines to ensure information quality. It should increase the availability of e-learning resources across all academic disciplines. By launching training sessions for school teachers on the use of ICT to enhance their teaching methods and take an inventory of the teachers' skills and credentials, capacity development for the technological domain should be carried out. Schools should implement e-learning programmes to supplement the traditional classroom environment for learning. It is suggested that the Ministry of Education develop an ICT pedagogical framework that can be used in higher education at different levels as well as special education in order to increase the service quality of e-learning implementation.

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