



# Students' Perception of Online Learning Quality and Preference for the Online Learning Model

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## Authors' contributions

*This work was carried out in collaboration among all authors. Authors SAK, FBKT and MTQ designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. All authors managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.*

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## ABSTRACT

**Aims:** As a result of the novel coronavirus (COVID-19) pandemic, the traditional face-to-face learning approach at tertiary institutions was replaced by an online learning model. This has a significant impact on tertiary students, teachers, and administrators, particularly in Ghana, where online learning has not been widely used in the past. The current study looked at how students' perceptions of the quality of their online learning experiences affected their acceptance of the paradigm before and after the COVID-19 prevalence.

**Study Design:** The study adds to the body of knowledge by assessing how well the modified DeLone and McLean information systems success model applies to online learning.

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**Place and Duration of Study:** Technical Universities in Ghana between September 2021 and May 2022.

**Methodology:** Structured questionnaires were used to obtain primary data from 1386 students at Ghana's technical universities. The study employed the multiple linear regression model to examine the effects of class and gender on students' opinions of the quality and preferences for the online learning model.

**Results:** The study's findings revealed that the online learning system provided quality service to students, with a mean response value (MRV) ranging from 3.74 to 4.52.

It was also discovered that 72% of students preferred online learning because of the system quality, information quality, and service quality provided.

**Conclusion:** Students must be encouraged to pursue online education that is appropriate, cutting-edge, and useful if they are to succeed and remain relevant in the digital age. Tertiary institution administrators are being encouraged to improve the quality of the online learning environment for both students and teachers.

*Keywords: Learning preference; online learning model; information quality; service quality; systems quality.*

## 1. INTRODUCTION

COVID-19, which originated in China, was so rapid and severe that it forced several countries around the world to close schools, including academic institutions. As a result, school closures affected approximately a billion students worldwide [1, 2]. Because of the COVID-19 pandemic, colleges and universities were under pressure to suspend in-person instruction and send students home. Universities had no choice but to develop online courses as a replacement to continue teaching and learning. To enhance online learning globally, educational institutions have started implementing teaching and learning technologies, such as digital video conferencing platforms (Zoom, Microsoft Platform, Moddle, Webex, Blackboard, and Google Classroom) [2, 3, 4]. Ghana was compelled to switch to online education as a temporary replacement to finish the school year, similar to many other countries affected by the COVID-19 pandemic. Web-based technologies and electronic learning have emerged as well-known resources to address any learning loss because it is impossible to use traditional face-to-face learning techniques. Numerous universities around the world have embraced online education as a result of the COVID-19 epidemic [4, 5].

Education authorities had no choice but to implement online learning if only as a stop-gap to ensure that tertiary education did not cease, as it makes traditional classroom learning nearly impossible due to its health effects. Tertiary education administrators accepted and developed online learning as a substitute for traditional classroom instruction to suit the needs and expectations of students. The institutions

primarily intended to implement this new computer-mediated teaching and learning technique during the coronavirus pandemic [4]. However, as the pandemic worsens, it has become important to take into account online education as a long-term replacement for conventional classroom instruction at the nation's postsecondary institutions. However, using online learning is common in many regions of the world, particularly when providing distance learning [3]. Numerous studies have compared the efficacy of in-person and online learning in this context [6]. According to some research, students do better online than in person since the former is more likely to guarantee course completion, a higher rate of information acquisition, and happiness [7]. Other research has confirmed the efficiency of online learning as a teaching and learning strategy that provides a superior learning outcome to face-to-face learning [4, 8,9].

Despite the incentives cited for online learning, other research contends that it has numerous drawbacks that make face-to-face instruction preferable. According to a study by [10] that looked at students' motivation, contentment, and involvement, online learning was less effective academically for students than face-to-face instruction. Similar research comparing how well students performed in face-to-face and online learning revealed that online learners generally received worse grades [11]. Additionally, research has identified several factors that influence students' preferences for online learning systems in institutions [10]. They include a lack of qualified lecturers; sluggish internet speeds; Wi-Fi availability; infrastructure; the design of the interface; the caliber of the

materials; system usage; and student adoption. In this context, Ghana's sudden shift to online education raises concerns about the caliber of instruction and students' choice of it over in-person instruction. This is so because there is disagreement among academics as to whether online learning limits quality learning or ensures it [4, 8, 10]. There is a knowledge vacuum in the existing literature as a result of the disagreement on the effectiveness of online learning as a substitute for face-to-face instruction. As a result, the current article focuses on the investigation of students' perceptions of the quality of online learning and how that affects their acceptance of the online learning model as a substitute for traditional classroom instruction in Ghanaian tertiary education, particularly since the practice is not yet widely used in the nation. This should contribute to the ongoing discussion on the quality of online education from the viewpoint of the student, who is the end user.

## 2. LITERATURE REVIEW

The traditional face-to-face learning model had to give way to online learning in tertiary institutions. In this regard, the institutions were required to develop measures to guarantee the level of service quality of their online instruction. It was crucial to research the effectiveness of the online service from the standpoint of the pupils. Studies of student acceptance of the online learning system and student views of online learning are important indicators of the quality of the learning experience and quality research service is essential to install an online learning system that students choose.

According to earlier research, the idea of quality in the online learning model predicts several well-known quality outcomes, including system quality, information quality, service quality, and learning and continuance intention [12-16]. Online learning is a recognized and accepted practice around the world, even though it is not a common component of the Ghanaian educational paradigm and several higher education regulatory authorities in Ghana have questioned online diplomas [14,16]. When a teacher and student engagement with one another using the internet, it is referred to as "online learning" because the contact takes place online [17]. The rise of online education in the computer-based industry cannot be emphasized enough. Researchers have discovered that it has not always been easy to engage students online, maintain their interest throughout the course, and

attempt to reduce their attention rate [16,18]. The elements that draw and impact learners' desire for online learning as a viable option have been the subject of research [15,18]. This research has verified a direct link between the success of online learning and the perceived quality of the service by the learners. This study cannot overlook how learning is delivered via the internet while the COVID-19 pandemic continues into the new school year. This necessitates that educational institutions evaluate the online learning model to look at learning quality and how it can affect students' perceptions of the online learning service's service quality and learners' preference for using the online learning platform.

Ghana must concur with the rest of the world that technological advancements are fundamentally altering how individuals learn and the connection between students and teachers. The online learning revolution is particularly notable for the rising use of Internet technology to create and deliver learning [19]. The model for online learning systems is an interactive network system made up of different features that support a virtual classroom to improve the quality of teaching and learning. The use of Internet technology in educational institutions offers an efficient learning model that addresses the problem of time and space and also produces many associated benefits, such as being learner-centred and self-paced, being economical for learners, and providing the archival capability to facilitate knowledge reuse and sharing [6,20,14,17,18]. Tertiary institutions in Ghana made significant investments in online learning systems during the move to online learning during the COVID-19 epidemic. The benefits of such systems can only be realized if students think the instruction is of high quality and choose to use them instead of face-to-face instruction [19,21,22]. To help academic institutions and course designers create systems that are more likely to support the online learning model, it makes academic sense to evaluate the quality of the online learning system from the perspective of the students.

Evaluating the effectiveness of online learning by highlighting some key characteristics of high-quality online education service delivery. They consist of the context's quality, the online program's structure, and the online learning model. Other factors include the course's content and communication methods, the nature of the interactions and relationships between educators

and learners, and the degree to which students master the subject matter. Other studies have identified flexibility, responsiveness, student support, self-reported interaction, perceived technology utility and simplicity of use, technical help, and student happiness as qualities of great online learning [23,24]. Student reflection was identified by Means [25], as a crucial success component in an online learning approach [25, 26] identified pedagogies, resources, and delivery strategies as essential for quality in online education. The research found a link between students' reflective behaviour and the success of their online learning. This indicates that to ascertain students' preferences for online learning, it is important to include perceived quality, a psychological construct that shapes experience and reflection.

Moore [27] discovered that an executive committee, technology infrastructure, student services, and teacher services were among the criteria for quality in online learning. As crucial aspects of high-quality online education, [27, 28] included institutional support; course development; teaching and learning; course structure; student support; faculty support; and evaluation and assessment. According to [29] the instructor's attitude, enthusiasm, and real dedication toward instruction delivery via online education courses determine much of the quality of instruction. [29,30] highlighted timely feedback, consistency in information delivery, relevance, learning objectives, and technical assistance as factors that contribute to the quality of online education. This claim was made in collaboration with [30], who said that administrative, teaching and learning support are all useful indicators of the quality of online learning. According to the relevant literature, improving student expectations and experience is necessary to improve the quality of online learning service delivery and make it more student-centred [27,31]. To make students content with the online learning model, institutions must see students as consumers and do their utmost to provide the greatest online educational services that satisfy their quality expectations [30,31]. To put it another way, the quality of online learning may refer to the discrepancy between the student's service expectations and his or her learning expectations [32,33].

School management might need to create customer service techniques that offer students the finest online service quality as students

become more complicated and online learning becomes a standard component of university education [34,33]. The DeLone and McLean information systems success model may hold the key to comprehending and putting those tactics into practice. This study concentrated on the updated DeLone and McLean information systems success model in the context of online learning and proposed a research model to examine how three quality dimensions (system quality, information quality, and service quality) affect learners' perceptions of the quality of online learning and preferences to use the online learning service based on the learners' expectations and experiences [35,36]. This study's purpose was to provide a theoretical basis and empirical evidence for predicting and explaining antecedents of online learning service usage and to provide important guidelines for academic institutions in their designing and implementing online learning systems. The following research queries need to be resolved, to accomplish this: (1) How do students in Ghana's tertiary institutions feel about the quality of the country's online learning system? (2) How does the choice of using the online learning model depend on how well students perceive the quality of the online learning environment? (3) Do gender and class affect students' opinions on the quality of their education and their preferred online learning model? (4) What is the overall impact of students' preferences for online learning models on their perception of the quality of online learning? To what extent may students who learn online use the updated DeLone and McLean information systems success, model?

The updated DeLone and McLean information systems success model's relevance to the online learning model was examined in this study [36]. The research model assumes that system, information, and service quality all have an impact on how well students perceive the value of online learning, which in turn has an impact on how much students choose to utilize online learning platforms. These justifications result in students' perceptions of the system's quality, information quality, service quality, and the impact of quality (system, information, and service) on students' preferences.

### 3. METHODS

One thousand nine hundred and eighty questionnaires were distributed to study participants, and 70% (1386) of them were completed and returned for further data analysis.

Due to the lack of a sampling frame, a convenience sampling technique was used for this study. This enables the researchers to collect data that would not otherwise be possible. The measurement scale constructs were adapted from the updated DeLone and McLean information systems success model, which included perceived information quality, perceived service quality, and perceived system quality as independent variables and online learning preference as a dependent variable. The questionnaires were created with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (strongly agree). This study sought to investigate the impact of students' perceived quality of online learning on their preference for the online learning model, and data were gathered through an online survey of 1386 students from all ten Technical Universities in Ghana.

### 3.1 Multiple Regression

The study considered a multiple linear regression model as the study variable  $y$  depends on more than one explanatory or independent variable. This model is a generalization of the simple linear regression model which allows the mean function  $E(y)$  to depend on more than one explanatory variable [37,38]. It is assumed that; the study model would take the form  $y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \dots + \alpha_k X_k + \varepsilon$  and the  $n$  observations will also follow the same model satisfying the equations below:

$$\begin{aligned} y_1 &= \alpha_0 + \alpha_1 X_{11} + \alpha_2 X_{12} + \dots + \alpha_k X_{1k} + \varepsilon_1 \\ y_2 &= \alpha_0 + \alpha_1 X_{21} + \alpha_2 X_{22} + \dots + \alpha_k X_{2k} + \varepsilon_2 \\ &\vdots \\ &\vdots \\ y_n &= \alpha_0 + \alpha_1 X_{n1} + \alpha_2 X_{n2} + \dots + \alpha_k X_{nk} + \varepsilon_n \end{aligned}$$

These equations can also be written as

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} = \begin{bmatrix} 1 & x_{11} & x_{12} & x_{13} & \dots & x_{1k} \\ 1 & x_{21} & x_{22} & x_{23} & \dots & x_{2k} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & x_{n1} & x_{n2} & \dots & \dots & x_{nk} \end{bmatrix} \begin{bmatrix} \alpha_0 \\ \alpha_1 \\ \alpha_2 \\ \vdots \\ \alpha_k \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{bmatrix}$$

or  $y = X\alpha + \varepsilon$  where  $y = (y_1, y_2, \dots, y_n)'$  is a  $n \times 1$  vector of  $n$  observation on the study variable

$$X = \begin{bmatrix} 1 & x_{11} & x_{12} & x_{13} & \dots & x_{1k} \\ 1 & x_{21} & x_{22} & x_{23} & \dots & x_{2k} \\ 1 & x_{31} & x_{32} & x_{33} & \dots & x_{3k} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & x_{n1} & x_{n2} & \dots & \dots & x_{nk} \end{bmatrix}$$

is a  $n \times k$  matrix of the  $n$  observations of each of the  $k$  explanatory variables. The first column of  $X$  is taken to be  $(1, 1, \dots, 1)$  if the intercept is considered in the model.  $\alpha = (\alpha_1, \alpha_2, \dots, \alpha_k)$  is  $k \times 1$  vector of the regression coefficients and  $\varepsilon = (\varepsilon_1, \varepsilon_2, \dots, \varepsilon_n)$  is a  $n \times 1$  vector of the random error component of the model. Thus,  $C$  is said to be the set of all possible vectors  $(\alpha)$ , where  $C$  is a  $k$ -dimensional real Euclidean space. The aim was to find a vector  $C' = (c_1, c_2, \dots, c_k)$  from  $C$  that minimises the sum of squares deviation of the  $\varepsilon_i$ 's. That is:

$$S(\alpha) = \sum_{i=1}^n \varepsilon_i^2 = \varepsilon' \varepsilon = (y - X\alpha)'(y - X\alpha) \text{ for any given } X \text{ and } y$$

A minimum is obtained as  $S(\alpha)$  is a real-valued and a differentiable function. Thus;

$$S(\alpha) = y'y + \alpha'X'X\alpha - 2\alpha'X'y$$

Differentiating  $S(\alpha)$  with respect to  $\alpha$

$$\frac{dS(\alpha)}{d(\alpha)} = 2X'X\alpha - 2X'y$$

$$\frac{d^2S(\alpha)}{d\alpha^2} = 2X'X$$

This gives the normal equation given by

$$\frac{dS(\alpha)}{d(\alpha)} = 0 \Rightarrow 2X'X\alpha - 2X'y = 0 \Rightarrow X'XC = X'y$$

It is assumed that the rank  $(X) = k$ , then  $X'X$  is a positive definite and the unique solution of the normal equation is:

$$C = (X'X)^{-1}X'y$$

Since  $\frac{d^2S(\alpha)}{d\alpha^2} = 2X'X$  is at least a non-negative definite,  $C$  minimize  $S(\alpha)$ . Therefore,  $C = (X'X)^{-1}X'y$  is known as Ordinary Least Square Estimator of  $\alpha$ .

The goodness-of-fit for an Ordinary Least Square regression can be measured as:

$$R^2 = 1 - \frac{SSR}{SST} = \frac{SSE}{SST}$$

Where,

$$SST = \sum_{i=1}^n (y_i - \bar{y})^2$$

SST is the total sum of square deviation and is a measure of the variations of  $y_i$ 's around the mean  $\bar{y}$

$$SSE = \sum_{i=1}^n (y_i - \hat{y}_i)^2 = \sum_{i=1}^n \varepsilon_i^2$$

SSE is the residual or error sum of squares and measures the lack of the regression model.

$$SSR = \sum_{i=1}^n (\hat{y}_i - \bar{y})^2$$

SSR is the sum of squares due to the regression. This measures the variations in  $y$  that can be explained by the regression model. The  $R^2$  is called the coefficient of determination and measures the percentage of variation of  $Y$  around  $\bar{Y}$  that is explained by the regression equation. The closer the observed points are to the estimated regression line, the better the fit, the higher the  $R^2$ .  $R^2$  lies between 0 and 1.

The test for the significance of the regression model in the case of multiple linear regression analysis is carried out using the analysis of variance. The test is used to check if a linear statistical relationship exists between the response variable and at least one of the predictor variables. It tests for the overall adequacy of the model.

Hypothesis

$$H_0: \alpha_1 = \alpha_2 = \dots = \alpha_k = 0$$

$$H_a: \text{at least one of the } \alpha_i \neq 0$$

Test Statistics

$$F = \frac{MSR}{MSE} = \frac{\frac{SSR}{k}}{\frac{MSE}{n-k-1}}$$

The test has  $F(k, n - k - 1)$  distribution. Thus, we reject  $H_0$  if  $F_{cal} > F_{\theta, (k, n-k-1)}$ ,  $\theta$  is the level of significance of the test.

#### 4. RESULTS AND DISCUSSION

A reliability/validity test was performed on all 20 test items (variables) used in the study, yielding a reliability/validity coefficient of 0.928, which is greater than the recommended minimum of 0.7 [39, 40]. (See Table 1).

It can be inferred from Table 1 that the variables assigned for the study were about 93% reliable

to be used for descripto-exploratory analysis [40]. The study achieved a response rate of 73%.

#### 4.1 Respondents Profile

This section of the study provides information about the respondents' gender, year of study, and communication device use (Table 2 refers).

Table 2 demonstrates the skewed gender distribution of respondents (students). 785 (57%) of the total respondents came from this group. 559 (40%), of the respondents were women. Of the total respondents, 42 (3%) chose not to indicate or declined to declare their sex. 616 (45%) of the students were in their first year of study (level 100), 463 (22%) were in their second year (level 200), and 242 (18%) were in their third year (level 300), while 65 of the students, or 5% of the total, indicated that they were in their final year (level 400). The respondents had a misinformed opinion of using mobile phones as a communication tool for online learning. This accounted for 1301 (94%) of all respondents. 50 (4% of students) said they practised on a laptop computer, 17 (1%) said they practised on a tablet, and the remaining 14 (1%) indicated they practised on a desktop computer.

It is clear that the majority of students (94%) only have a cell phone, which is not the ideal tool for online learning.

#### 4.2 Perceived System Quality

This section of the study sought to ascertain respondents' perceptions of the quality of the online learning system as implemented in their respective institutions (Table 3 refers).

The statement "operation of an online learning system is reliable" had the majority of respondents (357) remaining neutral, 329 (24%) and 198 (14%), respectively, of the students agree/strongly agree, while 301(22%) and 201 (15%) of the students indicated disagree/strongly disagree to same (see Table 3). This means that approximately 859 (63%) respondents (students) do not believe the online learning system is reliable. The statement; "online learning system allows information to be readily accessible to me" was agreed upon by 470 (33.9%) and strongly agreed upon by 230 (16.6%). 261 (18.8%) and 129 (9.3%) also indicated that disagree/strongly disagree to the statement, while 296 (21.4%)

could not agree or disagree. As a result, the majority of respondents (700), or approximately 51% of the students, attest to the fact that the online learning system makes information easily accessible to them. The statement "it takes too long for using online learning system to respond to my requests" elicited a range of responses, with 335 (24%) remaining neutral. 453 (32.7%) and 141 (10.2%) said they agreed/strongly agreed, while 304 (21.9%) and 153 (11.0%) said they disagreed/strongly disagreed. Because 50% of the students disagreed with the statement, it suggests that responding to their requests using an online learning system does not take too long.

In addition, 579 (41.8%) of the students agree and strongly agree with the statement "I find online learning system easy to use," while 537 (38.7%) disagree and strongly disagree with the statement. However, 270 (19.5%) were unable to decide on the statement. The majority of students find the online learning system difficult to use, as at least half of the students did not agree with the statement. According to the findings in Table 3, respondents were generally satisfied with the online learning system, and thus students have a positive perception of the online learning model's system quality (Table 3 refers).

**Table 1. Reliability/Validity test**

N	%	Cronbach's Alpha	Number of Items
1386	100	0.928	20

**Table 2. Respondents profile**

Attributes	N	Frequency	Percentage
<b>Gender</b>	<b>1386</b>		
Male		785	57.0
Female		559	40.0
Prefer not to say		42	3.0
<b>Year of study</b>	<b>1386</b>		
Year one		616	45.0
Year two		463	22.0
Year three		242	18.0
Year four		65	5.0
<b>Device use</b>	<b>1386</b>		
Mobile Phone		1301	93.8
Tablet		17	1.2
Laptop Computer		50	4.0
Desktop Computer		14	1.0

**Table 3. Perception of system quality**

S/N	Statement/Item	Rating				
		SD	D	N	A	SA
1	Operation of an online learning system is reliable.	201 (14.5%)	301 (21.7%)	357 (25.8%)	329 (23.7%)	198 (14.3%)
2	Online learning system allows information to be readily accessible to me.	129 (9.3)	261 (18.8%)	296 (21.4%)	470 (33.9%)	230 (16.6%)
3	It takes too long for using online learning system to respond to my requests.	153 (11.0%)	304 (21.9%)	335 (24.2%)	453 (32.7%)	141 (10.2%)
4	I find online learning system easy to use	226 (16.3%)	311 (22.4%)	270 (19.5%)	409 (29.5%)	170 (12.3%)

SD = Strongly Disagree, D = Disagree, N = Neutral; A = Agree; SA = Strongly agree

### 4.3 Perceived Information Quality

The purpose of this section was to determine how respondents (students) perceived the quality of information on the online learning system (see Table 4).

Table 4 shows that 612 (44.2%) and 212 (15.3%) agree/strongly agree with the statement: "the information provided by the online learning system is accurate," while 349 (25.2%) remained neutral, and 62 (4.5%) and 151 (10.9%) disagree/strongly disagree. It can be deduced that the majority of students (60%) believe the information provided by the online learning system is correct. The statement "the information from the online learning system is up to date enough for my purpose" was met with disagreement/strong disagreement from 91 (6.6%) and 293 (21.1%) respondents, respectively. However, 485 (35.0%) and 169 (12.2%) of the students agree/strongly agree with the statement (the information from the online learning system is up to date enough for my purpose), respectively, while 384 (25%) remained neutral. Because only 47% (less than 50%) agree/strongly agree with the statement. It cannot be determined whether the information provided by the online learning system is current enough for its intended purpose. Less than half

of the respondents (42.2%) agree/strongly agree with the statement: "the information contained in the online learning system meets my needs," 430 (30.5%) disagree/strongly disagree with the statement, and 370 (26.7%) remain neutral. As a result, it is difficult to say definitively that the information contained in the online learning system meets the needs of the respondents. Only about 603 (33.8%) of the respondents agreed/strongly agreed with the statement, "online learning system provides me with a complete set of information," while 326 (23.5%) were neutral. Together, 453 (32.7%) of respondents disagree/strongly disagree with the statement (online learning system provides me with a complete set of information). Thus, Table 4 indicates that the information and content of the information provided by the online learning system are out of date, incomplete, and do not meet the needs of students, but the little information it does provide is very accurate.

### 4.4 Perceived Service Quality

An evaluation of respondents' perceptions of the quality of service provided by the online learning system was carried out. It is expected that if students receive high-quality service, they will continue to use the online learning system. The results are shown in Table 5 below.

**Table 4. Perceived information quality**

S/N	Statement/Item	Rating				
		SD	D	N	A	SA
1	The information provided by online learning system is accurate	62 (4.5%)	151 (10.9%)	349 (25.2%)	612 (44.2%)	212 (15.3%)
2	The information from online learning system is up-to-date enough for my purpose.	91 (6.6%)	293 (21.1%)	348 (25.1%)	485 (35.0%)	169 (12.2%)
3	The information content in online learning system meets my needs.	130 (9.4%)	300 (21.6%)	370 (26.7%)	426 (30.7%)	160 (11.5%)
4	Online learning system provides me with a complete set of information.	146 (10.5%)	307 (22.2%)	326 (23.5%)	436 (31.5%)	171 (12.3%)

*SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree*

**Table 5. Perceived service quality**

Statement/Item	MRV	SD
Grading in the course was fair and consistent.	4.10	0.260
Assignments were distributed fairly throughout the semester.	3.74	0.050
Graded assignments, test, etc., were returned promptly	4.00	0.209
The instructor could be contacted for consultation	4.52	0.105
The instructor satisfactorily answered questions.	3.70	0.188

*MRV = Mean response value; SD = Standard deviation*



The mean response values and standard deviation were used to assess how respondents perceived the online learning system's service quality. A high mean response value (MRV) of 3.70 to 4.52 indicates a high level of agreement with the statement (see Table 5). Furthermore, the low standard deviation (SD) values recorded indicate that the responses concerning the quality of service are not widely spread from the average response. According to the MRV and SD, the statements/items (see Table 5) received positive responses from the respondents (students). As a result, it is possible to conclude that the online learning system provides quality service to students.

#### 4.5 Perceived Quality of Online Learning and Students Preference of the Online Learning Model

A regression model was used to determine the impact of students' perceptions of the quality of the online learning system on their preference for the programme. The quality of online learning was perceived in terms of system quality, information quality, and service quality. In our regression analysis, these were the independent variables (see Table 6).

The regression coefficient (see Table 6) indicates that the independent variables (System Quality, Information Quality, and Service quality) have a positive linear relationship with the dependent variable (preference of students toward online learning). A one-unit increase in System Quality, Information Quality, and Service quality would

increase students' preference for online learning by 0.461, 0.151, and 0.213, respectively.

The regression equation is as follows

$$\text{Preference of online learning} = 0.466 + 0.461 \text{ system quality} + 0.151 \text{ information quality} + 0.213 \text{ service quality.}$$

As evidenced by their respective p-values of 0.000, 0.001 and 0.000, the results also show that all three independent variables (System quality, Information quality, and Service quality) are statistically significant at a 5% level of significance in determining the preference of students for online learning.

Analysis of variance (ANOVA) test revealed an F-value of 11.6006 and a P-value of 0.000. As observed, the P-value is far less than the alpha level ( $\alpha_{0.05}$ ) indicating that the differences in the dependent variables were significantly influenced by the independent factors. That is the statistical significance of the total model. At a 5% level of significance, it can be concluded that system quality, information quality, and service quality all have an impact on students' preferences for online learning. (Note: Table 7)

According to Table 8; system quality, information quality, and service quality accounted for 72% (R Square, 0.723) of the total variation in student preference for online learning. As a result, system quality, information quality, and service quality all have a significant impact on students' preference for online learning.

**Table 6. Regression Coefficient**

Model 1	Un standardized Coefficients		Standardized Coefficients	T-value	P-value
	B	Std. Error	Beta		
Constant	0.466	0.337		1.383	0.051
1. System quality	0.461	0.098	0.401	4.704	0.000
2. Information quality	0.151	0.078	0.228	1.936	0.001
4. Service quality	0.213	0.033	0.218	6.455	0.000

a. Dependent variable: Preference of online learning

**Table 7. Analysis of Variance of Students' Perception and Preference**

Model	Source	Sum of Squares	D.F	Mean square	F	Sig.
1	Regression	42.875	3	14.292	11.6006	0.000
	Residual	8.621	7	1.232		
	Total	51.496	10			

a. Predictors: (Constant), system quality, information quality and service quality; b. Dependent variable: Preference of online learning

**Table 8. Summary of regression model of students' perception and preference**

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	0.717 (a)	0.723	0.701	0.1214

Predictors: (Constant), system quality, information quality and service quality

## 5. CONCLUSION AND RECOMMENDATION

According to the study's findings, the majority of students use only their mobile phones for online learning. Even though the online learning system makes information easily accessible, its operation is not very reliable. According to the study, students were generally satisfied with the online learning system, and as a result, students have a positive perception of the system quality of the online learning model. It was also found that the information and content of the information provided by the online learning system were out of date, incomplete, and do not meet the needs of students, but the little information it does provide were very accurate. The study also reveals that the online learning system provides students with high-quality services.

It is recommended that, because students' perceived quality influences their preference for online learning, tertiary institution administrators do everything possible to improve the quality of online education. Students' use of online learning models as an alternative or supplement to face-to-face learning can be encouraged during and after the Covid-19 pandemic. Regulators of tertiary education in Ghana must incorporate an online learning policy into Ghana's education policy.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

- Azzi-Huck K, Shmis T. Managing the impact of COVID-19 on education systems around the world: how countries are preparing, coping, and planning for recovery; 2020.
- Adams D, Sumintono B, Mohamed A, Mohamad Noor NSM. E-learning readiness among students of diverse backgrounds in a leading Malaysian higher education institution. *Malays J Learn Instruction*. 2018;15(2):227-56. DOI: 10.32890/mjli2018.15.2.9.
- Abdulkareem TA, Eidan SM. Online learning for higher education continuity (During Covid-19 pandemic). *Int J Youth Eco*. 2020;4(2):125-31. DOI: 10.18576/ijye/040206.
- Coutts CE, Buheji M, Ahmed D, Abdulkareem TA, Buheji B, Eidan SM et al. Emergency remote education in Bahrain, Iraq, and Russia during COVID-19 pandemic: A comparative case study. *Hum Syst Manag*. 2020;39:473-93. DOI: 10.3233/HSM-201097.
- Azhari FA, Ming LC. Review of e-learning practice at the tertiary education level in Malaysia. *Indian J Pharm Educ Res*. 2015;49(4):248-57.
- González-Gómez D, Cañada-Cañada F, Jeong JS, Gallego-Picó A. La enseñanza de contenidos científicos a través de un modelo "flipped": propuesta de instrucción para estudiantes del Grado de Educación Primaria. *Enseñanza Cienc*. 2017;35:71-87.
- Bernard RM, Borokhovski E, Schmid RF, Tamim RM, Abrami PC. A meta-analysis of blended learning and technology use in higher education: from the general to the applied. *J Comput Higher Educ*. 2014; 26(1):87-122.
- Lockman AS, Schirmer BR. Online instruction in higher education: promising, research-based, and evidence-based practices. *Journal of Education and e-Learning Research*. 2020;7(2):130-52.
- Ryan S, Kaufman J, Greenhouse J, She R, Shi J. The effectiveness of blended online learning courses at the community college level. *Community Coll J Res Pract*. 2016; 40(4):285-98.
- Adams AE, Randall S, Traustadóttir T. A tale of two sections: an experiment to compare the effectiveness of a hybrid versus a traditional lecture format in introductory microbiology. *CBE Life Sci Educ*. 2015;14(1):ar6-ar6.
- Powers KL, Brooks PJ, Galazyn M, Donnelly S. Testing the efficacy of MyPsychLab to replace traditional instruction in a hybrid course. *Psychol Learn Teach*. 2016;15(1):6-30.

12. Cole MT, Shelley DJ, Swartz LB. Online instruction, e-learning, and student satisfaction: A three-year study. *IRRODL*. 2014;15(6):111-31.
13. Lee-Post A. Success factors in developing and delivering online courses at the University of Kentucky. KIKM Research Paper #175A. KY: Lexington Book Company: Decision Science and Information Systems Area. Gatton College of Business and Economics, University of Kentucky; 2003.
14. Lee-Post A. Exploring the Receptiveness of Web-based distance learning at the University of Kentucky. KIKM Research Paper #169A. KY: Lexington Book Company: Decision Science and Information Systems Area. Gatton College of Business and Economics, University of Kentucky; 2002.
15. Bulić M, Blažević I. The impact of online learning on student motivation in science and biology classes. *J Elem*. 2020;13(1):73-87.
16. Chen K-C, Jang S-J. Motivation in online learning: testing a model of self-determination theory. *Comput Hum Behav*. 2010;26(4):741-52.
17. Saghafi MR, Franz J, Crowther P. An integrated blended model for the contemporary learning environments. *J Interact Learn Res*. 2014;25(4):531-49.
18. Sebastianelli R, Swift C, Tamimi N. Factors affecting perceived learning, satisfaction, and quality in the online MBA: A structural equation modeling approach. *J Educ Bus*. 2015;90(6):296-305.
19. Rahman MHA, Uddin MS, Dey A. Investigating the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh. *J Comput Assist Learn*. 2021;37(6):1513-27. doi: 10.1111/jcal.12535
20. Azhari FA, Ming LC. Review of e-learning practice at the tertiary education level in Malaysia. *Indian J Pharm Educ Res*. 2014;49(4):248-57.
21. Raija H, Heli T, Elisa L. DeLone & McLean IS success model in evaluating knowledge transfer in a virtual learning environment. *Int J Inform Syst Soc Change*. 2010;1:36-48. DOI: 10.4018/jissc.2010040103.
22. Marks RB, Sibley SD, Arbaugh JB. A structural equation model of predictors for effective online learning. *J Manag Educ*. 2005;29(4):531-63.
23. Martin F, Wang C, Sadaf A. Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses. *Internet Higher Educ*. 2018;37:52-65.
24. McGorry SY. Measuring quality in online programs. *Internet Higher Educ*. 2003;6(2):159-77.
25. Zhu X, Chen B, Avadhanam RM, Shui H, Zhang RZ. Reading and connecting: using social annotation in online classes. *Information and learning sciences*. 2020;121(5/6):261-71.
26. Michael FM, Maithya R, Cheloti SK. Influence of teacher competency on integration of ICT in teaching and learning in public secondary schools in Machakos. *Journal of Education and e-Learning Research*. 2016;3(4):143-9.
27. Moore MG. Editorial, what does research say about the learners using computer-mediated communication in distance learning? *Am J Distance Educ*. 2002 [editorial];16(2):61-4.
28. Sebastianelli R, Swift C, Tamimi N. Factors affecting perceived learning, satisfaction, and quality in the online MBA: A structural equation modeling approach. *J Educ Bus*. 2015;90(6):296-305.
29. Yee RCS. Perceptions of online learning in an Australian University: Malaysian students' perspectives usability of the online learning tools. *Int J Asian Soc Sci*. 2013;3(9):1973-81.
30. Moore J. Effects of online interaction and instructor presence on students' satisfaction and success with online undergraduate public relations courses. *Journalism Mass Commun Educ*. 2014;69(3):271-88.
31. Stacey E, Wiesenbergs F. A study of face-to-face and online teaching philosophies in Canada and Australia. *Distance Educ [Rev Educ Distance]*. 2007;22:19-40.
32. Barbour MK, Reeves TC. The reality of virtual schools: a review of the literature. *Comput Educ*. 2009;52(2):402-16.
33. Gray JA, DiLoreto M. The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *Int J Educ Leadersh Preparation*. 2016;11(1):n1.
34. Martínez-Argüelles M, Batalla-Busquets J. Perceived service quality and student loyalty in an online university. *IRRODL*. 2016;17(4):264-79.

35. DeLone WH, McLean ER. Information systems success: the quest for the dependent variable. *Inf Syst Res.* 1992;3(1):60-95.
36. Delone W, McLean E. The DeLone and McLean model of information systems success: A ten-year update. *J Manag Inf Syst.* 2003;19(4):9-30.
37. Ramachandran KM, Tsokos CP. *Mathematical Statistics with application.* Tampa, FL: Department of Mathematics and Statistics, University of South Florida; 2009.
38. Schneeweiss H. Consistent estimation of a regression with errors in the variables. *Metrika.* 2016;23:101-15.
39. Santos A, Reynolds J. Cronbach's alpha. A tool for Assessing Reliability of Scale. *J Extension.* 1999;2:37.
40. Twenefour FBK. The influence of family background on students' academic performance. *Acad. J Educ Res.* 2017; 5(8):216-32.

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