

# Students' Use Behaviors of E-Learning Management Systems in Ghanaian Public Universities: What do the demographics say?

Daniel Amadiok,<sup>1</sup> Winston Kwame Abroampa,<sup>2</sup> & Eric Opoku Osei<sup>3</sup>

## Abstract

It is crucial to identify and offer intense training to groups of students who underutilize e-learning management systems. This study used a quantitative research methodology to evaluate demographic differences in students' use of e-LMS in Ghanaian public universities. A questionnaire was used to collect data from 531 students. The techniques for data analysis included independent t-tests, mean computation, percentage estimation, and standard deviation estimation. Based on age and educational level, the results showed that there were no statistically significant variations in how students used e-LMSs. Nevertheless, a statistically significant variation in their use behavior with regard to gender and academic major was established. Particularly, social science majors and female students in Ghana's public universities showed low use behavior of e-LMS. Therefore, it is recommended that students majoring in social sciences and those who are female undergo enhanced training on using the e-LMS platform.

**Keywords:** *Demographic characteristics, e-Learning management systems, Use behavior*

## Introduction

It is impossible to overestimate the importance of technology in education, particularly in higher education, where it has become an absolute necessity rather than an option. Technology integration has become crucial for every educational organization in the twenty-first century (Alshehri, 2020). When compared to conventional classroom approaches, technology has a number of benefits for education that greatly speed up the teaching and learning processes (Aldowah, Ghazal, Umar, & Muniandy, 2017). With the use of digital tools, educators may more quickly and effectively impart knowledge, look for answers to students' learning problems, and offer assistance. Technology also gives teachers the tools to interact with students who may be dispersed across various geographical regions. Additionally, technology helps students study more efficiently and gives them the tools they need to take charge of their own education. Through digital tools, students have access to a wide range of educational resources, enabling them to customize their learning to meet their unique needs. Due to the crucial role that digital tools

play in the administration and delivery of higher education, numerous educational institutions throughout the world have made significant investments in digital technologies to assist teaching and learning. The e-learning management system is one such piece of technology that is essential to many academic endeavors (Kasim & Khalid, 2016; Wichadee, 2015).

E-learning management systems are comprehensive software solutions created for the creation, management, and dissemination of educational information to students (Lang & Pirani, 2014). These systems are referred to by a variety of titles in the academic community, including virtual learning environments, course management systems, and learning content management systems (Ghilay, 2019). The varied names associated with these platforms naturally reflect their main objectives, which center on course management and learning facilitation. Numerous studies also offer various viewpoints on e-learning management systems. They are frequently portrayed as self-contained online learning platforms with storage capabilities that enable instructors to create and distribute educational content while also keeping track of student involvement (Tseng, 2020). They also function as centralized hubs for uni-

Full listing of authors and contacts can be found at the end of this article.



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versities, enabling academic institutions to efficiently plan and manage online teaching and learning (Nicholas-Omoregbe, Azeta, Chiazor, & Omoregbe, 2017). As Sharma, Gaur, Saddikuti, and Rastogi (2017) suggested, these systems can also distribute instructional information through the Internet, enabling flexible lesson planning to accommodate students who are spread out geographically. E-learning management systems are web-based solutions that encourage teacher-student interaction and collaboration, foster the dissemination of knowledge, and strengthen the learning process. Colleges use these systems to perform both synchronous and asynchronous e-learning activities, as well as hybridized deliveries, giving online education a flexible and all-encompassing approach.

The variety of e-LMSs used in higher education institutions is expanding because of the development of information and communication technologies. Because there are so many alternatives, different institutions choose particular systems (Xhaferi, Bahiti, & Imeri, 2015). Notable e-learning management systems include Moodle, eCollege, Canvas, Sakai, and WebCT (Annamalai, Ramayah, Kumar, & Osman, 2021; Matarirano, Jere, Sibanda, & Panicker, 2020). These e-LMSs provide a wide range of functionality, such as discussion forums, gradebooks, announcement tools, and file management capabilities, to help students and educators navigate virtual learning environments (Biney, 2020). Additionally, some of the applications might include extra functionality, including content creation, delivery, management, assessment, email, chat, list servers, instant messaging, and discussion forums (Akay & Gumusoglu, 2020).

Through e-learning management systems, educators have access to a variety of big data like never before. To incorporate learning analytics into the teaching and learning process, these systems automatically generate enormous amounts of data, which are subsequently examined using statistical tools (Ismail, Hamid, & Chiroma, 2019; Matsebula & Mnkandla, 2017; Lenar, Jamila, Ego, & Rustem, 2019). Predictive algorithms and forecasting tools that draw on data from educational institutions are used in e-learning management systems. Institutions can better understand students' learning patterns and forecast their chances of success by carefully evaluating the data kept in log files within these systems (Yu & Jo, 2014). Importantly, in these learning environments, several elements, including study time, peer relationships, adherence to study schedules, and frequency of downloads, have a significant impact on

students' academic development. Dashboards in e-learning management systems track and assess students' academic progress over time, producing important metrics including completion rates, involvement in the e-LMS, attendance data, and the likelihood of academic success. These indicators give educational authorities the ability to glean important insights into the growth and achievement of their students. Institutions use the data collected from teacher and student actions inside these systems to improve and hone their pedagogical strategies.

The broad adoption and effective implementation of e-learning systems in educational institutions depend on their acceptance by three crucial stakeholders: educational institutions themselves, teachers, and students (Edumadze et al., 2014). However, it is crucial to acknowledge the notable discrepancies in students', instructors', and administrators' readiness to use e-LMSs (Ansong, Boateng, & Boateng, 2016). The level of e-learning system use in higher education institutions is determined by elements like the educational content's quality and the accessibility of necessary resources like chat platforms, forums, and collaborative features. Several studies (Ayouni, Menzli, Hajjej, Maddeh & Al-Otaibi, 2021; Kuadey et al., 2022; Mtebe, 2015; Juhanak, Zounek & Rohlikova, 2019) have confirmed the widespread adoption of e-LMSs at institutions of education and universities around the world. They also highlighted the growing adoption tendency in both well-resourced and under-resourced institutions. The high adoption of e-LMSs has failed to transfer into proportionate students' use behavior of the platforms in sub-Saharan Africa (Dampson, 2021; Mtebe, 2015). While studies (Dampson, 2021; Tagoe & Cole, 2020; Asamoah, 2020; Sahoo, Odame, Reddy & Khan, 2020) acknowledge the general underutilization of e-LMSs in public universities in Ghana, there is a dearth of knowledge and empirical findings on the influence of demographic factors on the overall non-use of e-LMSs by students. Therefore, it is necessary to thoroughly examine various demographic groups to determine those contributing to the underutilization of e-LMSs within Ghana's public universities. In fact, analyzing student usage behavior based on demographic categories can give university administrators insightful information that will help them customize support programs to meet the specific requirements of these groups. Furthermore, a thorough comprehension of the variations in students' use of e-LMSs has enormous promise for developing applicable regulations and enhancing training meth-



ods in higher education. Thus, the research questions this paper sought to answer are:

1. *What are students' use behaviors of e-learning management systems?*
2. *What statistically significant differences exist in students' use behaviors of e-learning management systems based on their demographic characteristics?*

To add contextual knowledge to the research questions, the ensuing section presents a review of studies related to the themes extracted from the research questions.

### **Students' use behavior of e-LMS**

The words “use behavior,” “actual use,” or “actual usage” are widely used interchangeably in numerous studies in the field of information systems. These phrases jointly express the idea of a firm commitment to using a certain technology or information system (Black, 1982). Students' usage behavior of e-learning management systems in the specific context of education serves as a visible indication of their persistent dedication to utilizing these educational platforms (Yakubu & Dasuki, 2018). The importance of behavioral intentions and perceived behavioral control in determining the actual use of information systems is stressed by theoretical frameworks like the Technology Acceptance Model (Davis, 1986), the Theory of Planned Behavior (Ajzen, 1991), and the Unified Theory of Acceptance and Use of Technology (Vankesh, Thong, & Xu, 2016). These theories stress that people's intentions and perceptions of their level of control over their behavior are the primary forces behind their actual interactions with technology. Assessment of students' use behavior of the teaching and learning platform is a crucial component of this study. Such an assessment not only clarifies the degree of their contact with the systems but also provides priceless information about the platform's overall influence on their academic endeavors. As a result, a thorough examination of students' actual use behavior serves as a vital benchmark for determining the usefulness and efficacy of the platform in improving the educational experience of students. Numerous studies have acknowledged students' actual use behaviors of e-LMSs in advanced countries as extremely high. However, these same studies have pronounced that the application is underutilized in the sub-Saharan African context (Dampson, 2021; Tagoe & Cole, 2020; Asamoah, 2020; Mtebe, 2015). Some groups of students are the cause of the underutilization and must be identified.

### **Gender segregation in e-LMS use**

In several studies examining students' uses of technology, the influence of gender as a demographic element has been examined. According to Cai, Fan, and Du's (2017) research, the gender gap in technology use has only minimally closed, indicating that there is still a significant gap between males and females. In a similar vein, Mumporeze and Prieler's (2017) study indicated that women utilize technology on average less than men do, and Qazi et al. (2021) discovered that men are more likely to use ICTs than women. Additionally, Alshorman and Bawaneh (2018) found that men tend to have more positive sentiments toward their use of technology than do women. Men utilize learning management systems more actively than women, according to Borokhovski, Tamim, Pickup, Rabah, and Obukhova (2019). In addition, Lim et al. (2020) used factorial invariance analysis to distinguish between how men and women use e-learning management systems. Dahlstrom & Bichsel (2014) reported that men and women use technology equally, which is in opposition to these findings. They asserted that inequalities in attitude are to blame for the disparities in technology use. Dahlstrom and Bichsel's (2014) assertion is supported by the studies (Alshorman & Bawaneh, 2018; Yalman, Basaran, & Gonen, 2016). There are few studies that prove the distinctions between male and female students' uses of e-learning management systems in Ghana's public universities. Thus, this current study proposes the hypothesis:

$H_{01}$ : *There is no statistically significant difference in students' use behaviors of e-learning management systems based on their gender.*

### **Age segregation in e-LMS use**

Numerous studies have shown that age can have a variety of effects on how people use technology. Researchers (Scherer, Siddiq, & Teo, 2015; John, 2015; Guillén-Gámez, Lugonesb, & Mayorga-Fernándezh, 2019) have noted that age influences how people utilize technology. According to Cabero and Barroso's (2016) research, younger males tend to excel at technology and utilize it more frequently than their older counterparts. This assertion was supported by a similar study by Gudmundsdottir and Hatlevik (2018), which emphasized that younger students have better technology usage abilities than older people. Guillén-Gámez, Lugonesb, and Mayorga-Fernándezh (2019) backed up the conclusions made by the studies (Cabero



& Barroso, 2016; Gudmundsdottir & Hatlevik, 2018) by emphasizing that younger students use technology more frequently than their older peers. Furthermore, Onyeaka, Romero, Healy, and Celano (2020) discovered that younger students engage with a larger variety of technologies than their older counterparts and have more expertise in using technology. In contrast, John (2015) found that those over the age of 30 had more favorable opinions about their usage of technology than people under that age. Despite these diverse findings, only a small number of studies have looked at how age affects how students use e-learning management systems. Particularly, there has not been much coverage of the higher education scene in Ghana. Consequently, to investigate this assertion, the following hypothesis has been formulated:

*H<sub>02</sub>: There is no statistically significant difference in students' use behaviors of e-learning management systems based on their age.*

#### **Educational level segregation in e-LMS use**

Students are normally divided into two groups in universities all around the world: undergraduates and postgraduates. There are differences between how these two groups of students use technology. Several studies have examined these student groups' perspectives on how they use e-learning management systems. For instance, postgraduate students exhibit a high level of proficiency when utilizing e-learning management systems, according to Buthelezi and Wyk's (2020) research. Postgraduate students, on the other hand, exhibit little involvement with e-learning management systems (Kite et al., 2020). According to Dahlstrom and Bichsel's (2014) research, undergraduates did not show a lot of enthusiasm for using e-learning management systems in practice. In contrast to Sahoo, Odame, Reddy, and Khan's (2020) finding that undergraduates are skilled at using these systems, Firat's (2016) study emphasized distinct usage habits with regard to undergraduates' use of e-learning management systems. It is clear from reading these studies that we still don't fully grasp the differences between undergraduates and postgraduates in terms of how they use e-learning management systems. To address this gap, the following hypothesis has been formulated:

*H<sub>03</sub>: There is no statistically significant difference in students' use behavior of e-learning management systems based on their educational level.*

#### **Academic major segregation in e-LMS use**

Academic majors are split into two groups in Binyamin's (2019) taxonomy of university courses: science and social science. According to Binyamin, science students concentrate on fields like medicine, applied sciences (like computer science and engineering), and natural sciences (like biology, physics, and chemistry). In contrast, social science students focus on the humanities (such as history, religion, education, languages, and management). Ngah et al.'s (2022) study pointed out that there are variances in how students use technology. Students studying pure science outperformed those studying social science in terms of technology use. This occurrence was explained by the fact that students studying pure science are engaged in practical activities and want to employ technology. Despite this categorization, a limited number of studies have explored the variations in technology usage based on these divisions. Consequently, this study aimed to investigate the disparities in students' use behavior of e-LMSs based on their academic major. To examine this assertion, the hypothesis below has been formulated:

*H<sub>04</sub>: there is no statistically significant difference in students use behavior of e-learning management systems based on their academic major.*

#### **Methodology**

All students enrolled in Ghanaian public universities who had used their institution's e-Learning Management System (e-LMS) for at least a year comprised the study's target population. The accessible population involved three public universities in Ghana because of their use of structures that enable students to collect data for academic purposes. However, Saunders, Lewis, and Thornhill (2019) advise using a multistage random sample strategy, which the researchers did because of the geographically scattered distribution of students within the universities. The faculties, along with their corresponding departments, made up the study's natural clusters. The sampling procedure was conducted in stages, with the first stage involving the selection of one faculty (within a specific division in a college) from each of the three universities using the lottery method. The second stage involved choosing one department from each of the three faculties selected using the lottery technique once more, without replacement. In the final stage, student participants were selected using simple random sampling with the randomizer software as suggested by Creswell and Creswell (2018).



The accessible population, which included 4,002 students, consisted of those from the three universities that were selected during the initial sampling phase. Using a chart created by Krejcie and Morgan in 1970, a sample size of 825 was determined. After a thorough assessment of the literature, a paper-based questionnaire was created and given to the respondents. This decision was because, as Binyamin (2019) suggests, print versions have a higher response rate than online distribution. A five-point Likert-type scale was used to rate the adapted questionnaire items. Three ICT lecturers reviewed the questionnaire items to make sure they were valid. The questionnaire's pre-testing produced a reliability index for Cronbach's alpha of 0.957. The respondents were given a total of 825 questionnaires; however, only 598 of these were filled out and returned. Sixty-seven questionnaires were declared unsuitable for further analysis after a preliminary evaluation because of missing values and suspicious patterns. Consequently, 531 questionnaires, accounting for 64.4% of the total, were included in the final analysis. Research question 1, which was descriptive, involved looking at frequencies, percentages, averages, and standard deviations. Contrarily, an independent t-test was used to analyze research question 2, which was inferential in nature.

## Data analysis

### Demographic data

The study elicited students' gender, age, educational level, and academic major as demographic data. Table 1 presents the demographic data of the respondents.

Data in Table 1 show that males and females made up 54.4% and 45.6%, respectively, of the total number of respondents. The mean age of the respondents was 23.82. Students below the mean age and students above the mean age were (302) 56.9% and (229) 43.1%, respectively, of the total respondents. Undergraduates were 449 (84.6%), whereas postgraduates were 82 (15.4%). Students who had science as their academic major were 197 (37.1%), whereas those with social science as their academic major were 334 (62.9%).

In summary, the analysis of Table 1 suggests that, firstly, there were more male respondents than female respondents. Secondly, the number of students below the mean age exceeded those above the mean age. Thirdly, undergraduates outnumbered postgraduates. Lastly, there were more respondents with a background in the social sciences compared to those with a pure science background in this study.

### Students' use behavior of e-LMS

Frequency, percentage, mean, and standard deviation were computed from the data on students' use behavior of e-LMS. Table 2 depicts the results.

**Table 1:** Demographic data

Gender	Frequency	Percentage
Male	289	54.4
Female	242	45.6
<b>Total</b>	<b>531</b>	<b>100</b>
Age	Frequency	Percentage
Below-mean age	302	56.9
Above-mean age	229	43.1
<b>Total</b>	<b>531</b>	<b>100</b>
Educational level	Frequency	Percentage
Undergraduate	449	84.6
Postgraduate	82	15.4
<b>Total</b>	<b>531</b>	<b>100</b>
Academic major	Frequency	Percentage
Science	197	37.1
Social science	334	62.9
<b>Total</b>	<b>531</b>	<b>100</b>

**Table 2:** Students' use behavior of e-learning management systems

Statement	Strongly Disagree No. (%)	Disagree No. (%)	Unsure No. (%)	Agree No. (%)	Strongly Agree No. (%)	Mean	SD
I use the university's e-LMS frequently.	25 (4.7)	111 (20.9)	104 (19.6)	192 (36.2)	99 (18.6)	3.43	1.149
I depend on the university's e-LMS for my studies.	36 (6.8)	125 (23.5)	108 (20.3)	180 (33.9)	82 (15.4)	3.28	1.179
I tend to use the university's e-LMS for as long as is necessary.	21 (4.0)	53 (10.0)	104 (19.6)	236 (44.4)	117 (22.0)	3.71	1.043
I use many features of e-LMS.	22 (4.1)	86 (16.2)	144 (27.1)	198 (37.3)	81 (15.3)	3.43	1.061
<b>Total Mean (Std. Dev.)</b>	<b>104 (4.9)</b>	<b>375 (17.7)</b>	<b>460 (21.7)</b>	<b>806 (37.9)</b>	<b>379 (17.8)</b>	<b>13.85</b>	<b>4.43</b>
<b>Mean of Means</b>						<b>3.46</b>	<b>1.11</b>

Mean ranges: 0-1.49 (strongly disagree); 1.5-2.49 (disagree); 2.5-3.49 (unsure); 3.5-4.49 (agree); 4.5-5.0 (strongly agree)



The data in Table 2 show that students agree ( $M = 3.43$ ;  $SD = 1.149$ ) that they use their university's e-LMS frequently. Again, the data in Table 2 show that students were unsure ( $M = 3.28$ ;  $SD = 1.179$ ) that they depend on the university's e-LMS for their studies. Moreover, from the table, students agreed ( $M = 3.71$ ;  $SD = 1.043$ ) that they tend to use their university's e-LMS for as long as is necessary. Finally, the data in Table 2 show that students were unsure ( $M = 3.43$ ;  $SD = 1.061$ ) of the fact that they tend to use many features of their university's e-LMS.

Summarily, Table 2 shows that students were unsure ( $M = 3.46$ ;  $SD = 1.11$ ) of their use behavior of their university's e-LMS. It is, thus, deduced that in public universities in Ghana, students are unsure of their usage behavior of e-LMSs.

### Students' use behavior of e-LMS in terms of their demographic characteristics

The results of the analysis of students' use behavior of e-LMSs based on their demographic characteristics are presented in this section. The demographic characteristics are gender, age, academic level, and academic major. The results are shown in Table 3.

Table 3 reveals a statistically significant difference ( $p = 0.004$ ;  $\alpha = 0.05$ ) between males and females in their use behavior of e-LMS. The table indicates that the mean of males ( $M = 3.567$ ;  $SD = 0.9309$ ) is higher than the mean of females ( $M = 3.336$ ;  $SD = 0.9257$ ). Thus,  $H_{01}$  was rejected. It is, therefore, imperative that males have a higher use behavior of e-LMS than females.

Also, there was no statistically significant difference ( $p = 0.690$ ;  $\alpha = 0.05$ ) between below-mean age and above-mean age in terms of their use behavior of e-LMS. Thus,  $H_{02}$  was accepted. A look at the mean scores in Table 3 shows that the mean score of students below the mean age ( $M = 3.476$ ;  $SD = 0.9326$ ) is similar to the mean score of students above the mean age ( $M = 3.443$ ;  $SD = 0.9395$ ). It can, thus, be deduced that students with their ages below the mean age have use behavior of e-LMS similar to that of students with their ages above the mean age in Ghanaian public universities.

Table 3 further shows that there was no statistically significant difference ( $p = 0.312$ ;  $\alpha = 0.05$ ) between undergraduate and postgraduate students in terms of their e-LMS use behavior. Thus,  $H_{03}$  was accepted.

**Table 3:** Independent sample t-test of students' use behavior of e-LMS based on their background characteristics

Gender	No.	Mean	SD	t	df	Sig (2-tailed)
Male	289	3.567	0.9309	2.864	529	0.004*
Female	242	3.336	0.9257			
Age groups	No.	Mean	SD	t	df	Sig (2-tailed)
Below-mean age	302	3.476	0.9326	0.400	529	0.690
Above-mean age	229	3.443	0.9395			
Educational level	No.	Mean	SD	t	df	Sig (2-tailed)
Undergraduates	449	3.444	0.9431	1.012	529	0.312
Postgraduates	82	3.558	0.8874			
Academic major	No.	Mean	SD	t	df	Sig (2-tailed)
Science	197	3.643	0.942	3.472	529	0.01*
Social Science	334	3.355	0.915			

\* = Significant at  $\alpha = 0.05$

A look at the mean scores in Table 3 shows that the mean score of undergraduate students ( $M = 3.444$ ;  $SD = 0.9431$ ) is similar to the mean score of postgraduate students ( $M = 3.558$ ;  $SD = 0.8874$ ). Thus, it indicates that undergraduate and postgraduate students have similar use behaviors of e-LMS in Ghanaian public universities.

Finally, Table 3 indicates that there was a statistically significant difference ( $p = 0.01$ ;  $\alpha = 0.05$ ) between students in the sciences and social sciences in terms of their use behavior of e-LMS, so  $H_{04}$  was rejected. Table 3 shows that the mean score of students with an academic major in science ( $M = 3.643$ ;  $SD = 0.942$ ) is higher than the mean score of students with an academic major in social science ( $M = 3.355$ ;  $SD = 0.915$ ). Thus, it implies that students in the sciences have a higher use behavior of e-LMSs than those in the social sciences in Ghanaian public universities.

### Discussion

The study revealed that students were unsure ( $M = 3.46$ ;  $SD = 1.11$ ) of their use behaviors of their university's e-LMS. This result corroborates the studies of Dampson (2021), Tagoe and Cole (2020), Asamoah (2020), and Mtebe (2015), which revealed that students underutilize e-LMSs in universities in the sub-Saharan context. These findings are attributable to a specific subset of students who either demonstrate a limited level of engagement with e-LMSs or, in some,



cases, do not engage with them at all.

It also became known that there was a statistically significant difference ( $p = 0.004$ ;  $\alpha = 0.05$ ) in students' use behavior of e-LMSs based on their gender. This result aligns with studies that claim that there is a gender imbalance in the use of e-learning systems and that males use e-LMSs more frequently than females. The study by Li, Wang, and Campbell (2015) found that male students use e-LMS more regularly than females. Moreover, Alshorman and Bawaneh's (2018) study found that males have higher attitudes toward technology than females. Contrary to this study, Alblassi's (2016) study revealed that e-LMS use among males and females was the same. Likewise, Dahlstrom and Bichsel's (2014) study found that males and females have the same abilities for utilizing information technologies. Moreover, the study by Cai, Fan, and Du (2017) found a reduction in the gap between men and women in terms of technology utilization. This finding of the study is in congruent with most studies regarding information technology utilization. The result indicates that female students in Ghanaian public universities need more training on e-LMSs to build optimal utilization behavior. This result might have occurred because males are more tech-savvy than females and would want to use more technology in their activities (Dahlstrom & Bichsel, 2014).

The study also found that there was no statistically significant difference ( $p = 0.690$ ;  $\alpha = 0.05$ ) in students' use behavior of e-LMS based on their age. This result is inconsistent with most of the studies (Cabero & Barroso, 2016; Gudmundsdottir & Hatlevik, 2018; Guillén-Gámez, Lugonesb, & Mayorga-Fernándezh, 2019) in this research area. These studies found that younger students tend to use e-LMSs more than older students. The findings of this current study seem to have occurred because the age differences among respondents was small. All ages in the 21st century have equal access to various kinds of technologies and skill development, which may be influencing their use behaviors of e-LMS, hence this result.

It was realized that there was no statistically significant difference ( $p = 0.312$ ;  $\alpha = 0.05$ ) in students' use behavior of e-LMS based on their educational level. This result indicates that undergraduates and postgraduates have the same use behavior for e-LMS. Several studies (Sahoo, Odame, Reddy, & Khan, 2020; Buthelezi & Wyk, 2020; Firat, 2016) in this research area have considered students use of e-LMSs based on either undergraduates or postgraduates. However, this

study compared both groups use of e-LMSs. The result might have occurred because both undergraduate and postgraduate students are subjected to e-LMS use in the same way.

The study further found that there was a statistically significant difference ( $p = 0.01$ ;  $\alpha = 0.05$ ) in students' use behavior of e-LMS based on their academic major. This finding indicates that students with an academic major in science have a higher use behavior of e-LMS than students with an academic major in social science. This corroborates the study of Ngah et al. (2022), which revealed that there was a statistically significant difference between pure science and social science students in terms of their usage of technologies. Pure science students utilize technologies that offer them more firsthand practical activities than social science students. This finding is not surprising in the Ghanaian higher education context because science students tend to be more practice-oriented and prefer to use technologies in their studies than social science students. Science students have specialized ICT tools for modeling, data analysis, and simulations in their course areas.

In summary, there was no difference in students' use behaviors of e-LMSs in terms of age and educational level. However, there was a difference in students use behaviors of e-LMS based on their gender and academic majors. Female and social science students underutilize e-LMSs; therefore, enough training on e-LMS usage should be offered to them. The management of public universities in Ghana should give special attention to females and social science students when strategies and policies on e-LMS are being applied to them. It is imperative that the capacity of all students, irrespective of their background, be developed to enable them to conveniently use LMS.

The potential limitation of this study is that it relied on a self-reported survey. However, respondents were informed of the ethical conditions under which the study was being conducted, to encourage genuine responses to the questionnaire.

## Conclusion

The purpose of this study was to examine the demographic differences in students' e-LMS usage behavior. According to the study's findings, neither students' age nor educational level significantly affected how they used an e-LMS. However, there were noticeable differences in how students used the e-LMS based on their academic major and gender. As a result,



we suggest that e-LMS usage regulations and procedures be applied consistently to all students. However, special attention should be given to female students and students majoring in social science areas. It is significant to emphasize that the generalizability of this study is constrained to Ghana's traditional public universities. Further research involving technical and private universities is advised in order to have a more thorough picture of e-LMS usage patterns across all universities in Ghana. This increased research effort would provide a more comprehensive viewpoint on e-LMS use behavior within the Ghanaian higher education sector.

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## Authors

<sup>1</sup> Daniel Amadiok (danieladmadiok@gmail.com) is a Doctoral Candidate in the Department of Teacher Education at Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

<sup>2</sup> Winston Kwame Abroampa (wynxtin@yahoo.com) is an Associate Professor in the Department of Teacher Education at Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

<sup>3</sup> Eric Opoku Osei (eoosei@gmail.com) is a Senior Lecturer in the Department of Computer Science at Kwame Nkrumah University of Science and Technology, Kumasi, Ghana



## Appendix

### Questionnaire for Students

The researcher is conducting a study on the topic “*Students’ Use Behaviors of E-Learning Management Systems in Ghanaian Public Universities: What do the demographics say?*”

You have been selected to participate in the study. The information gathered from you is for academic purposes only and would be treated with the highest confidentiality. Please read through the items as carefully as possible and offer your correct opinion. Thank you for your cooperation.

Please tick (√) where applicable.

#### Section 1: Demographic Characteristics

1. Gender: Male [  ]      Female [  ]
2. Age: Below 18 [  ] 18-22 [  ] 23-27 [  ] 28-32 [  ] 33-37 [  ] 38-42 [  ] 43-47 [  ] above 47 [  ]
3. Education: Undergraduate [  ]      Postgraduate [  ]
4. Academic major: Sciences [  ]      Social Science [  ]

Please show how you agree or disagree with the following statements.

Section 2: *the following questions seek to ascertain respondents’ perspectives about their e-learning management systems use behavior in their university.*

Please show how you agree or disagree with the following statements.

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

Students’ use behavior of e-learning management	1	2	3	4	5
5   I use the university’s e-LMS frequently.					
6   I depend on the university’s e-LMS for my studies.					
7   I tend to use the university’s e-LMS for as long as is necessary.					
8   I use many features of e-LMS.					