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Survey of Learning Management System Efficacy in Ogun State Tertiary Institutions

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ABSTRACT

The outcome of learning is mostly revealed in the students' retention strength, academic performance, and achievement. Learning Management System is designed to enhance this through the promotion of the students' cognitive, affective and psychomotor skills. This study examined the perception of students in Ogun State tertiary institutions on the efficacy of Learning Management System used in their respective institutions. The study adopted descriptive survey research design with 3, 670 participants. The instrument used was self-developed, titled *Learning Management System Efficacy questionnaire LeMSeQ*. Three research questions and one hypothesis were used to guide the conduct of the study. The data collected were analyzed with descriptive statistics of frequency counts, simple percentages, mean and standard deviation, and inferential statistics of t-test. The result shows a significant outcome (t = 23.528, $p < 0.05$) with the private students mean score of 53.85 (S.D = 3.55) higher than the public students mean score of 35.25 (S.D = 2.89), and the difference is statistically significant. The findings reveal factors that promote and hinder the efficacy of *Learning Management System* in Ogun State tertiary institutions to include among others, the availability of internet services, personal technology facilities, poor internet connection, partially user friendly, limited time of adjustment, poor individualized feedback, and academic weblog and podcast.

Keywords: *dashboard, educational dashboard, learning management system, perception, student*

INTRODUCTION

Tertiary institutions in developing countries face strain in switching from traditional to online learning. This strain is majorly on students, lecturers, and university management; and Nigerian institutions are not totally free from the strain (Olugbade & Olurinola, 2021) because of the shortage experience in digital conversion, basic statistics, or habitual traditional paper

management. Learning Management System is an automated learning process with a metric design and analysis delivery through an online platform (Arta, Dewan, & Fuhua, 2020; Beheshitha, et al, 2016; Fischer et al., 2020; Munguia, et al, 2020). It is a single display that aggregates different indicators about learner(s), learning process(es) and/or learning context(s) into one or multiple visualizations (Buelow, Barry, & Rich, 2018; Chigozie-Okwum, et al, 2018; Schwendimann, et al., 2016). For educational dashboard to boost students' learning process, the information should be displayed one time in an accurate manner with the coherence of learning design. It aims at improving decision-making by directing cognition and capitalizing on human perceptual capacities (Sedrakyan, Mannens, & Verbert, 2019; Damyanov, & Tsankov, 2019).

Dashboard evolved to mean a control panel in front of the driver in automobiles, showing information to help driving (Munguia et al., 2020; Olalde & Larrañaga, 2019). It is a recognized emerging performance management system to monitor productivity, analyze cost-effectiveness and improve customer satisfaction in the business community. It is a visual display of the most important information needed to achieve one or more objectives that have been consolidated on a single computer screen so it can be monitored at a glance (Teo, & Zhou, 2016; Xhakaj, Aleven, & McLaren, 2016). The information is usually graphically represented and mostly includes the indicators involved in achieving the educational objectives. It is adopted by all organizations, enabling communication of key strategies, objectives and decision making (Eckerson 2010). It monitors critical educational processes and activities using metrics of performance, analyzes the root cause of problems by exploring relevant and timely information from multiple perspectives, manages learning and learning processes to improve decisions, optimizes performance, and steers institutions in the right direction, (Sedrakyan, Mannens, & Verbert, 2019;. Sujaritha, & Kavitha, 2020).

It presents learning patterns to learners, helping them modify their learning strategies and motivating learning. It stimulates learners' psychological changes through the improvement of self-knowledge and social awareness, self-reflection, and self-assessment (Rhode et al., 2017; Sarikaya, et al., 2018; Sclater, Peasgood, & Mullan, 2016). The formative feedback from educational dashboards gives learners the opportunity for greater awareness and reflection on their learning, using the insights gained to modify their perceptions and behaviours. The quality of learners' comments positively associated with the use of quality-related dashboard visualizations but negatively associated with the use of class average dashboard visualizations for learners high on self-avoidance goals (Beheshitha et al., 2016; Schwendimann et al., 2017).

Educational dashboard is mostly designed with learners as target users to increase means of providing personalized feedback for each online learner (Lim et al., 2019). The current content management systems used in educational institutions collect a vast array of information about students' activities, including discussion in board posts, access to reading material, and completion of course quizzes and other assessments, which can generate thousands of transactions per student (every activity performed by a student will be considered

as a transaction) (Arta, Ali, & Fuhua, 2020).

This study is anchored on a theoretical framework for design of tasks and learning dashboard, the Technology Acceptance Model (TAM), and the Learning Analytics Process Model. TAM was used to explain the behaviour and readiness of learner to effectively use educational dashboard. Learning Analytics Process Model was used to explain how educational dashboard and its indicators would impact learners' alertness towards performance, achievement, and retention.

The theoretical framework for design of tasks and learning dashboard of Van der Gijp et al. (2017) was used to come to a decision on type of tasks to design and information to present in the educational dashboard. The framework initially distinguishes three components of the knowledge and skills involved in interpreting radiologic images which are perception, analysis, and synthesis. However, building on this framework, cognitive, affective and psychomotor domains were used. First, cognitive domain is the knowledge and comprehension domain which is the basis of analysis, synthesis, and application. Therefore, educational dashboard should be designed to activate this domain of learning through integrating findings, differential analysis, and decision making skills for further actions. Educational dashboard should be designed to apply to the affective domain of the learners, which is rooted in feelings of learners towards learning. Psychomotor domain, the pliable psych of the learners, includes perception. The educational dashboard should cater to this domain through the inclusion of components that would activate it. Discriminating skills and recognition skills should be embedded in dashboard especially for practical disciplines.

The Technology Acceptance Model (TAM), founded on the Theory of Planned Behaviour (Ajzen, 1991), states that human behaviour is directly preceded by the intention to perform this behaviour. Personal beliefs about one's behaviour, norms, and the (perceived) amount of behavioural control one has are three factors that influence intentions. TAM builds on this theory to state that the intention to use education dashboards effectively by learners is predisposed by two main factors: perceived usefulness and perceived ease of use. The influence of both factors has been consistently shown and affirmed that they were key determinants of learners' attitudes towards computer usage (Rienties et al., 2016). Individual technology experience and discipline factors also influence the learners' effective usage of technology and innovative practice to boost their performance, retention, and achievement in learning sphere (Teo & Zhou, 2016).

Learning Analytics Process Model was described by Verbert et al. (2013) to have four phases. Phase 1 indicates that educational dashboard should provide awareness to students of how their activity compares to that of their peers while Phase 2 provides that this information should charge students to reflect on their behaviour. Phase 3 should make learners to engage in sense making learning activities that boost their understanding and the retention of the learning experience. In Phase 4, the learners' behaviour changes in line with the expected outcomes. The education dashboard indicators depicted as simple column charts and pie charts

have been used by experts and require their recommendation that simple visuals without a lot of graphical adornment and the use of color to convey information impact the learners learning behaviour. The colored bars should represent individual learner with gray bars for the rest learner in the cohort. Green, blue, and red should be used to respectively indicate whether the learner is above average, average, or below average. To uphold alertness of individual learner's in line with performance, achievement and retention comparism of learner online activities with their peers is important, while the educational dashboard indicators for grades should be green for grade A, blue for grade B, yellow for grade C, orange for grade D, and red for grade F (Park & Jo, 2015).

The objectives of this study were the following: (1) to identify the factors promoting Learning Management System effective usage in Ogun State tertiary institutions, (b) to identify the factors hindering the effective use of Learning Management System in delivering teaching-learning activities in Ogun State tertiary institutions, and (3) to assess the students' perception of the effectiveness of educational dashboard in Ogun State tertiary institutions. The researchers hypothesized that there is no significant difference in the perception of private and public tertiary institutions students on Learning Management System effectiveness in Ogun State.

METHOD

The researchers adopted descriptive survey research design, chosen because they did not manipulate any of the variables under investigation, and instead, presented the data as generated via the research instrument for data analysis and interpretation. There were 3, 670 students in Ogun State tertiary institutions selected to be the respondents.

A self-developed questionnaire titled *Learning Management System Efficacy Questionnaire LeMSeQ* was used to collect data for this study. The instrument was developed after reviewing previously conducted research. It has two sections: Section A consists of the respondents' demographic data and Section B elicits information focusing on the goals of this study. There are 15 items measured using a five-point Likert scale (-2 = strongly disagree, -1 = disagree, 0 = neutral, 1 = agree, 2 = strongly agree).

To ascertain the validity of the instrument, a draft of the questionnaire was given to experts in educational technology for correction, modification, and approval before administering it to the participants. Its reliability coefficients were determined and computed using the data obtained after trial testing with few tertiary students in Oyo state. The Cronbach Alpha coefficient (α) used to estimate the internal consistency of the instrument yielded 0.76. Data collection was done by the researchers and research assistants. The instrument was administered to the respondents and after filling in their opinions; it was collected immediately to ensure high rate of return of the instrument.

Two sets of samples were used in the study. Ownership was used to group the respondents into private and public tertiary institution students. Each of the first and the second samples consists of 1,850 individuals to compose the 3700 participants. After sorting, the valid instrument returned was at 3670 with 99.2% return. 48.0% male and 52.0% female with the same respective percentage of old and fresh students were used for this study with 43.0% Sciences, 32.0% Commercial, and 25.0% Social Sciences students, while 24.9% students were from institution with well-equipped facilities (Well Available), 25.5% from institution with equipped facilities (Available), 28.0% from institution with partially equipped facilities (Partially Available), and 21.6% from institution with little or no facilities (Not Available).

RESULTS AND DISCUSSION

The results of this study were analyzed and presented based on the outcome of descriptive and inferential statistics used. Table 1 shows the descriptive report of the respondents based on their perception on retention, performance and achievement through the Learning Management System used in Ogun State tertiary institutions.

Table 1
Frequency Percentage Reports of the Students` Perception on Retention, Performance and Achievement

Perception on RePA	Public		Private		Full Sample	
	n	%	n	%	N	%
Retention						
Good	1641	89.0	1553	85.0	3194	87.0
Poor	147	7.9	201	11.0	348	9.5
No	55	3.0	73	4.0	128	3.5
Performance						
Excellent	1382	75.0	1352	74.0	2734	74.5
Good	387	20.9	383	21.0	770	20.9
Poor	74	4.0	132	4.0	206	4.6
Achievement (Grade)						
Grade A	165	9.0	750	41.0	915	24.9
Grade B	756	41.0	622	34.0	1378	37.5
Grade C	627	34.0	165	9.0	792	21.6
Grade D	147	8.0	147	8.0	294	8.0
Grade E	92	5.0	92	5.0	184	5.0
Grade F	56	3.0	51	3.0	107	2.9

Table 1 reveals 41 % Sciences, 32 % Commercial and 25 % Social Sciences students in respective disciplines perceived the efficacy of educational dashboard. The perception of Science students is higher than the perception of other students. Also, 89 % public and 85 % private students perceived that they have good retention, with poor retention 7.9% public and

11 % private while no retention as perceived is 3% public and 4% private. This implies that the retentive strength of the private students is slightly lower compare with their counterpart in the public despite their early exposure to e-learning. This may be due to their social life, digital life management, and interpersonal factors.

Moreover, 75% excellent performance is due to the interactive educational dashboard as perceived by the public students, while 74 % private students perceived same. 20.9% of the public students perceived good performance as against the 21% of the private students, while both public and private students have equal perception on poor performance due to educational dashboard. The educational efficacy perception on achievement indicates that 9% Grade A achievement perceived by public students while 41% private counterparts have same perception; 41% public and 34% private perceived Grade B. Meanwhile, 34% public against 9% private perceived Grade C, while their perceptions on Grade D, Grade E, and Grade F are the same.

Factors that Promote the Efficacy of LMS in Ogun State Tertiary Institutions as Perceived by the Students

Table 2

Mean and Standard Deviation Reports of the Factors Promoting the Learning Management System Effectiveness

Factors Promoting the Learning Management System Effectiveness	N	Mean	SD	Remark
Availability of internet services in the university		30.80	.744	Significant
Web-based learning software		30.00	.679	Significant
Personal tech facilities	3670	31.30	.783	Significant
Document management system		31.20	.605	Significant
Availability of on-line library		30.80	.758	Significant
Academic weblog and podcast		33.00	.641	Significant

Table 2 specifies the mean response of factors that promote the efficacy of educational dashboard in Ogun State tertiary institutions, as perceived by the students, indicating it significant with the mean value greater than 2.50. This shows that availability of internet services, web-based learning software and personal laptop, online library, weblog, podcast and document management system are the factors that promote the efficacy of educational dashboard in as perceived by the students in Ogun State tertiary institutions.

The first research question showed that all the factors promoting the efficacy of educational dashboard in Ogun State tertiary institutions as perceived by the students were significant. Therefore, internet service availability, web-based learning software, personal laptop, online library, weblog, podcast promote the effective usage of educational dashboard in Ogun State tertiary institutions, as perceived by the students. This finding corroborates the

findings of Olugbade and Olurinola (2021) that the aforementioned factors must be in place for effective usage of educational dashboard; unavailability of these factors especially internet debars the usage of educational dashboard because both the server and the end users must have a good internet connection to enable effective e-learning activities.

Factors Hindering the Use of LMS for Effective Delivery of Teaching-Learning Activities in Ogun State Tertiary Institutions as Perceived by Students

Table 3
Mean and Standard Deviation Reports of the Factors Hindering Effective Usage of Learning Management System

Factors Hindering the Effective Usage of Learning Management System	N	Mean	SD	Remark
Poor internet connection		27.90	1.014	Significant
Erratic power supply		28.10	0.869	Significant
Limited time of adjustment		27.60	0.929	Significant
Poor individualized feedback on learning habits		28.00	0.884	Significant
Lack of instructor guidance	3670	28.60	0.928	Significant
phone or gadget Access is problematic		27.00	0.996	Significant
Economy		29.30	0.804	Significant
User partial friendliness		32.70	0.581	Significant
Poor computer skills		29.30	0.804	Significant

Table 3 reveals the mean of the factors that hinder the effective usage of educational dashboard in Ogun State tertiary institutions, as perceived by the students, that are significant with the minimum mean value of 27.60 which is greater than the significant value of 2.50 cut off. Table 3 also shows the respective mean of the perceived hindering factors of effective usage of educational dashboard in Ogun State tertiary institutions: poor internet connection at 27.90 (1.014), erratic power supply at 28.10 (0.869), limited time of adjustment at 27.60(0.929), poor individualized feedback on learning habits at 28.00 (0.884), lack of instructor guidance at 28.60 (0.928), phone or gadget access is problematic at 27.00 (0.996), economy at 29.30 (0.804), user partial friendliness at 32.70 (0.581), and poor computer skills at 29.30 (0.804). These all imply that all the perceived hindering factors are significant.

Martin and Bolliger (2018) and Olugbade and Olurinola (2021) affirm that the urge to embark on e-learning is high in Nigeria, but it is still a dream because of weak ICT infrastructure, unsensitized populace, and technophobia workforce. This is wrecked further by economy which includes money for subscription, high cost of personal computer, laptop, software, internet, and the technical support and un-connectedness in rural areas (Todd, 2020; Xhakaj, Aleven, & McLaren, 2016; Xhakaj, Aleven, & McLaren, 2017). Poor internet connection has been identified as one of the major problems hindering the use of educational dashboard because the dashboard is network-dependent of both the server and the end users,

a breakdown in network connection from any of the two debar the effective usage of educational dashboard. Problem with phone or gadget, limited access to computer and modems are identified (Sujaritha & Kavitha, 2020) to post detrimental effect on the success of e-learning. Todd (2020) maintained that there is high cost to be met by the learners. Teo and Zhou (2016) also affirmed that unreliable internet connection or slow and limited network frustrates expected learning outcome, while the access to course materials in time to support efficient e-learning is paralyzed.

It was found that the educational dashboard is not user-friendly to students who are not ICT inclined; this is supported by Xhakaj, Aleven, and McLaren (2016), who posed that computer illiteracy among students is a factor of hindrance to the effective usage of educational dashboard. Further, Sareen and Nangia (2020) argued that students have a favorable and positive attitude towards e-learning; but they are debarred from dashboard effective usage by several factors such as technical problems, inexperience, paucity of appropriate materials, technophobia, and strife to follow up in learning.

Students' Perception on the LMS Effectiveness in Improving Retention, Performance, and Achievement Significance in Ogun State Tertiary Institution

Table 4

Mean and Standard Deviation Reports of Students' Perception on the Effectiveness of Learning Management System in Improving Retention, Performance, and Achievement

Students' Perception on RePA	N	Mean	SD	Remark
Retention		30.40	0.748	Significant
Performance	3670	29.80	0.813	Significant
Achievement		30.80	0.674	Significant

Table 4 reveals the mean of students' perceptions on educational dashboard effectiveness in improving retention, performance, and achievement (RePA) in Ogun State tertiary institutions are significant with the minimum mean value of 30.40, which is greater than the value of 2.50. Table 4 shows the respective mean for the perceptions on RePA improvement: retention at 30.40 (0.748), performance at 29.80 (0.813), and achievement at 30.80 (0.674). This implies that educational dashboard effectiveness improve retention, performance and achievement in Ogun State tertiary institutions, as perceived by the students.

This is supported by Park and Kim (2020) who note that the use of educational dashboard promotes student-to-student engagements, and instructors' feedback helps learners engage more in learning, promoting learner retentive ability which is the basis of academic performance and achievement (Martin & Bolliger, 2018). This is also corroborated with the assertion of Olalde and Larrañaga, (2019) that the use of discussion forums fosters collaborative learning among the learners, and regular communication with the course instructors promotes retention, academic performance, and achievement. The discussions are

beneficial when structured with prompts or questions that deepen students understanding, (Arta, Dewan, & Fuhua, 2020).

Hypothesis

There is no significant difference in the perception of private and public students on Learning Management System effectiveness in Ogun State tertiary institutions.

Table 5
The Difference between the Students' Perception of Educational Dashboard Effectiveness

	N	Mean	S.D.	df	*R*	*T*	Sig. of *t*
Public	1843	35.25	2.89	24	0.11	23.528	.000*
Private	1827	53.85	3.55				

* indicates significant *t* at $p < 0.05$

Table 5 shows the result of the paired-samples *t*-test of difference between the students' perception on the educational dashboard effectiveness in Ogun State tertiary institutions based on ownership. The result shows a significant outcome ($t = 23.528$, $p < 0.05$). This outcome implies that there is a significant difference between the public and private students' perception on the educational dashboard effectiveness. It also shows that the mean score of 53.85 (S.D.= 3.55) recorded by the private students is not just higher than the mean score of 35.25 (S.D.= 2.89) recorded by the public students. The difference between the mean scores is statistically significant. As a result, the null hypothesis was rejected.

It was found that the students' perception on the educational dashboard effectiveness in Ogun State tertiary institutions based on ownership is different. The differences based on ownership is due to availability of technological facilities needed to drive e-learning. This is supported by Park and Kim (2020) that interactive communication method used in e-learning facilitates strong relationships between student and instructor, wires the teachers' and students involvement, and ultimately, increases student participation in learning activities when steadily available. The unavailability of this post differ experience on students, and this also influences their perception on the effectiveness of educational dashboard (Olugbade & Olurinola, 2021). The difference based on Janson, Söllner, and Leimeister (2017) and Yoo et al. (2015) is anchored on the students' perception on e-assignment and grading, less teacher-student interaction, classroom organization, and disruption of e-teaching activities due to limited network or poor connection.

CONCLUSION AND RECOMMENDATIONS

The novelty of this research is that Learning Management System effectively appeals to the cognitive, affective, and psychomotor domains of the learners. This in turn influences student retention, academic performance, and achievement.

Data from the descriptive results show that the perception of Science students is higher than the perception of other students. The retentive strength of the private students is slightly lower compared with their counterpart in the public, despite their early exposure to e-learning, which may due to their social life, digital life management, and interpersonal factors.

The brilliant performance of the students is due to interactive educational dashboard used in e-learning activities. The effectiveness of educational dashboard in promoting retention, academic performance and achievement is contextual, depending on different factors including availability of internet services in the university, web-based learning software, personal tech facilities, document management system, availability of online library, academic weblog and podcast, economy, user-partial friendliness, and poor individualized feedback on learning activities.

The implication of this is that tertiary institutions should design and upgrade their educational dashboard to encourage interactive e-learning. Broadband facilities should be readily available in the tertiary institutions to enhance the use of educational dashboard tools for effective teaching and learning. Workshops, trainings, and refresher courses on the use of educational dashboard tools should be made available to both fresh and old students, while institutions should provide access to high-quality remote education resources with effective monitoring of the quality of e-learning activities. Secondary schools should be enforced to go on e-learning in preparation for tertiary education.

For future work, the following are the recommendations: (1) improve the app by creating a cross-platform application that can be installed both on Android and iOS mobile devices; (2) use dynamic personalized recommendation algorithm to improve accuracy and efficiency of the recommender system further; and (3) include real-time chat feature, single-page functionality, and automatic suggestion or detection of the user's location while submitting a pet cruelty report.

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