

# Measuring Usability Compliance of a Stand-alone Educational Tablet: The Users' Perspective, Nigeria

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## ABSTRACT

This study assessed usability compliance of Opón-Ìmò Technology Enhanced Learning System (OTELS), Nigeria. Specifically, the study investigated: students' satisfaction with the OTELS; its efficiency; retentiveness; learnability and capacity to reduce errors. Being a survey study, samples were drawn from six secondary schools across the three Senatorial districts of Osun state, Nigeria. 701 students were purposively selected as sampled for the study. A researcher-constructed questionnaire: Usability Compliant Questionnaire was used for data collection. The instrument was administered on 40 selected students outside the sample location through test-retest strategy; it yielded reliability value of 0.87 through Pearsons Product Moment Correlation statistics. Data were analysed with frequency counts and percentages to answer research questions one to five. Results revealed that 70% of respondents expressed satisfaction with the OTELS; 73% found the OTELS efficient; 68% found it retentive; 76% found the OTELS learnable; and 59% agreed that the OTELS is capable of reducing errors when in use. The study concluded that the OTELS is usable for learning among secondary school students in the state. It was recommended among others that Osun state government may constantly update the learning system to sustain its use among secondary school students.

**Keywords:** *Education, Information Communication Technology, E-learning, Usability assessment, Opón-Ìmò Technology Enhanced Learning System (OTELS).*

## INTRODUCTION

Education remains the bedrock of every national development (Abiogu, 2014; Ezeani & Urama, 2014). It is the singular index of measuring national prosperity and human development. Without a functional system of education, most national aspirations whether in science, art or economics would forever remain a pipedream. A functional education in this study is defined from the point of access and quality (Abraham, 2011; Ladan, 2015). The numbers of willing students seeking formal education in Nigeria is on the increase while employers of products from the country's educational system are in doubt as per the quality of such products to be able to deliver when it matters. These reasons among others necessitated the embrace of ICT for instructional delivery to expand access to education and make students learn more in less time without reducing qualities (Andersson & Grönlund, 2009). ICT has been judge one of the best things to happen to education in this century in that it facilitates quality education and expand access for hitherto denied persons (Adeyemi & Olaleye, 2010; Adesote & Fatoki 2013; Ololube, Ubogu & Ossai, n. d.). ICT is a family of technological products and process used for the collection, processing and transmission of information from one person to the other (Olaore, 2014). Embracing ICT for education will enthrone an efficient way of managing educational administrative processes. Specifically, ICT facilitates effective education administration in the area of curriculum development and circulation, instructional delivery, school business operations, re-energising procedures for evaluating school programme among others (Adeyemi & Olaleye, 2010). On the other hand, ICT when appropriately used can facilitate improved students achievements. According to Adesote and Fatoki (2013), embracing ICT increases learners'

engagement and motivation in learning activities and assists them in acquiring basic skills. The romance between technology and education birthed the concept of E-learning.

Although its origin remains uncertain, E-learning has become a veritable strategy to meeting the educational needs of the future in a more efficient way through contemporary teaching aids. It has the potential to redefine the way teaching and learning businesses are conducted world over (Moore, Dickson-Deane & Galyen, 2011). E-learning are all learning activities facilitated through electronic means such as the internet, the intranet, satellite broadcast, audio/video tape, interactive TV, CD-ROM, computers (desktops, laptops, tablet) and computer accessories (Kakoty, Lal & Sarma, 2011; Birzina, 2013). However in this study, E-learning refers to all learning activities through electronic means including the tablet computers. Some of the benefits derivable from E-learning include its cost effectiveness; it also assures flexibility of time and space, gives learners the latitude to choose from wide range of available courses and creates access and collapse walls of social inequity among learners (Song, 2010; Kakoty, Lal & Sarma, 2011). The authors stated further that once student-centeredness is given priority when designing e-learning, it encourages self-paced learning and ensures active participation of the learners in the process of learning.

The evolution of ICT and in particular of mobile technologies has revolutionized the world as we know it, and devices, such as tablets, have gained popularity so quickly in the general public and in various age groups that it is impossible not to try to imagine what such devices can lead to when used in education. Mobile technologies, and in particular tablets and smartphones, with their innate versatility are becoming increasingly indispensable in today's learning environment (Kakoty et al., 2011). According to MacFarlane, Sim and Horton (2005), to determine whether software is suitable for use in education depend on usability. Usability determines the quality of interaction between a user and a variety of technological products and processes which include software application, mobile application among others (Hasan, 2014). According to Ali, Alrasheedi, Ouda and Capretz (2014) quoting ISO 9241-11, usability is defined as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. The inference from this is that, unless a technological system can be accessed, used by a specific user to achieve established objective with ease, such system cannot be said to be usable. As submitted by Costabile, De Marsico, Lanzilotti, Plantamura and Roselli (2005), it is more beneficial to a learner of technological system when his or her concentration is on the learning contents rather than how to access such contents. According to the authors, rigidity, slowness and unpleasant user experience usually account for high dropout rate from e-learning. Nielsen (2012) however increased the usability parameters to five upon which the present study was based: efficiency, retentiveness, learnability, error prevention and user satisfaction.

According to Hasan (2014), usability evaluation when properly formulated and implemented, could engender positive attitude towards a given software, ensure accuracy thereby reducing errors and boost students' confidence thereby helping to sustain patronage of the system among the users. Two major usability evaluation methods stand out: Usability evaluation and usability testing (Joshi, Arora, Dai, Price, Vizer & Sears, 2009). While usability evaluation involves usability experts interacting with a system of interest in order to detect usability problems, usability testing on the other hand involves actual system users using the system to perform a specific task with a few to finding out its usability or otherwise (Mathew, 2012). This study employed the later usability method.

*Opón-ìmò*, a Yoruba word which literarily means "tablet of knowledge" is an E-learning system deployed in 2013 by the government of Osun state in Nigeria to assist Senior Secondary School (SSS) teachers and students in teaching-learning situations. The learning system tagged Osun Technology Enhanced Learning System (OTELS) which does not require any form of connectivity for optimisation has three distinctive learning environments: the e-book library, virtual environment and integrated tests zone. The e-book library contains electronic copies of approved textbooks while the test zones housed practice questions. Similarly, the virtual classroom has audio-visual materials meant to serve students who might not be comfortable learning through texts alone (Osun.gov.ng, 2013; Tijani, 2016). Learning with this system finds relevance in M-learning which evolves from E-learning (Kakoty, Lal & Sarma, 2015).



Figure 1: *Opón-Ìmò* showing the OTELs at the centre Figure 2: OTELs zones

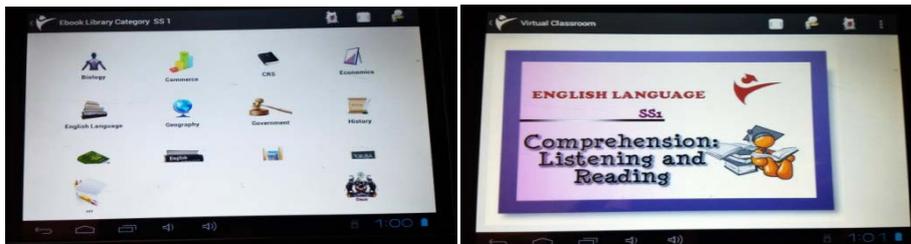


Figure3: The E-book zones Figure4: The virtual environment

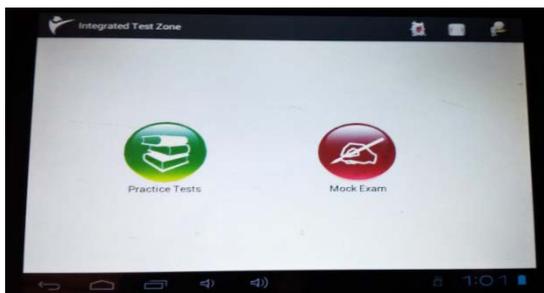


Figure 5: The test zone (Tijani, 2015)

Theoretically, this study finds relevance in Constructivism. Constructivism being one of the three most popular learning theories in a way explains the embrace of technologies in today's classrooms especially at the secondary school levels (Ford & Lott, 2009; Ebert, 2009). According to Jones and Brader-Araje (2002), different explanations for constructivism exist; however, a common thread that connects all is the emphasis on active learner's participation in teaching-learning situations if qualitative learning is the focus of such engagement. This position promotes knowledge as a process rather than a product; and such process entails individual learner playing a greater role in terms of meaning construction rather than fact memorisation (Kharade & Thakkar, 2012). Therefore, the OTELs which requires maximum participation of individual user in order to achieve positive learning experience rest on constructivism theory which emphasises active learners' participation in every learning situation.

### Statement of problem

Technological inventions are numerous in education, however, the rate at which users abandon such systems due to poor usability calls for concern. Usability is a basic parameter for the evaluation of technological innovations; it ensures the quality of e-learning devices and put the users and their needs at the center of technological development (Zaharias, 2004). Any system which is difficult to use will attract less number of users to itself. The OTELs like other learning systems used by a large group of students with no pre-deployment training or post-deployment supports must be tested for its usability as a matter of duty to promote positive user experience (Ali, 2013). Also, a widely accepted heuristics and evaluation

methodologies for measuring usability of e-learning is still being developed by usability researchers, this study therefore provides an empirical usability report of a standalone learning system as an addition to the growing body of usability evaluation literature (Costabile et al., 2005; Granića, & Ćukušić, 2011).

### Research questions

1. To what degree are students satisfied with the OTELS?
2. To what degree do students find the OTELS efficient?
3. To what degree do students find the OTELS retentive?
4. To what degree do students find the OTELS learnable?
5. To what degree do students found the OTELS capable of reducing error rate?

## METHODOLOGY

The study was a descriptive research of the survey type. Study population was all Senior Secondary School 3 students in government-owned secondary schools across Osun state, Nigeria. These set of students were the beneficiaries of the learning system as at the time of conducting this study. Politically, the state is divided into three Senatorial districts; Osun Central, Osun East and Osun West. Purposive sampling method was used to select two Local Governments Areas from each of the senatorial districts; one school each from the selected LGAs; and 1,100 students who had received their learning systems from the six selected schools. Nevertheless, only 701 students out of the 1,100 selected were available as at the time of visit by the researcher to the selected schools. A researcher-constructed Usability Compliant Questionnaire (UCQ) was used for data collection. The questionnaire, using the 4-point Likert scale of Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1, was constructed based on selected usability parameters as stated by Nielsen (2012). The parameters include: efficiency; retentiveness; learnability; error prevention and user satisfaction. The questionnaire was divided into sections A and B. Section A contains questions on respondents' demographic information while section B which was further subdivided into six: B1, B2, B3, B4, and B5 contained questions which bother on students' assessment of the OTELS as a learning system based on the selected usability parameters.

The UCQ was given to six experts for validation; two English language teachers from Osogbo high school, three lecturers (two Educational technology and one Information and communication) from the University of Ilorin, Ilorin, Nigeria. To ensure the reliability of the instrument for the study, a test-retest reliability method was adopted. The instrument was re-administered to 40 Senior Secondary School three (SS3) students of Osogbo High School, Osogbo three weeks after the first date of administration on the same group. Data collected from this exercise was analysed with Pearson Product Moment Correlation and it yielded a reliability coefficient value of 0.87 which indicated the suitability of the instrument for the study. The researcher obtained necessary pass from the school authorities and thereafter administered the instruments on the respondents with the help of his assistant. 701 copies of the questionnaire were administered to the respondents, however 668 (95.3) were retrieved and found usable. The remaining 33 copies were not properly completed or more than one response options were selected. Data gathered from the UCQ were analysed with percentages and frequency counts.

**RESULTS**

**Table 1. Demographic data of students based on gender**

Variables	A	Total	Percentage	B	Total	Percentage	Total
Stdts' Gender	Male	362	54.2	Female	306	45.8	668

**Table 2. Distribution of students by school location**

Variables	Frequency	Percentage
Rural	238	35.6
Urban	223	33.4
Sub-Urban	207	31.0
<b>Total</b>	<b>668</b>	<b>100.0</b>

Table 2 shows respondents' school locations, out of 668 respondents that were sampled, 223 (33.4%) were based in the urban areas (Osogbo & Ile-Ife), 207 (31.0%) were based in the sub-urban areas (Ire & Ede) while the remaining 238 (35.6%) were based in the rural areas (Ile-Ogbo & Osu).

**Research Question 1:** To what degree are students satisfied with the OTELS?

**Table 3. Students' satisfaction with the OTELS**

	Statement	SD		SA	
		F	%	F	%
1	The OTELS has all the features I need for my learning	210	31.4	458	68.6
2	The OTELS provides suggestions I need for correct usage	163	24.4	505	75.6
3	The OTELS is rigid to interact with	228	43.1	288	47.9
4	I am satisfied with the functions offered by the OTELS	323	48.4	345	51.6
5	The terminologies that have been used in the OTELS are familiar to me e.g. bookmark	176	26.3	492	73.7
6	The arrangement of subjects on the OTELS is perfect and should not be changed	199	29.8	469	70.2

Note: Agree and strongly agree were merged into strongly agree while disagree and strongly disagree were merged into strongly disagree.

Table 3 revealed that 68.6% of the respondents strongly agreed that the OTELS had all the features they needed for their learning while 31.4% strongly disagreed. 75.6% of the respondents strongly agreed that the OTELS provided suggestions they needed for correct usage while 24.4% also strongly disagreed. A total of 56.9% of the respondents strongly agreed that the OTELS was rigid to interact with while 43.1% strongly disagreed. Also, 51.6% of the respondents strongly agreed that they were satisfied with the functions offered by the OTELS while 48.4% strongly disagreed. Similarly, a total of 73.7% of the respondents also strongly agreed that the terminologies that were used in the OTELS were familiar to them e.g. bookmark while 26.3% strongly disagreed. More so, 70.2% of the respondents strongly agreed that the arrangement of subjects on the OTELS was perfect and should not be changed while 29.8% strongly disagreed. The inference from this is that, the students were satisfied with the OTELS as a learning tool as

demonstrated by 70% of the total respondents.

**Research Question 2:** To what degree do students find the OTELS efficient?

**Table 4. Efficiency of the OTELS**

	Statement	SD		SA	
		F	%	F	%
7	I find navigating around the OTELS very easy	95	14.2	573	85.8
8	It is easy to switch from one zone to the other on the OTELS	110	16.5	558	83.5
9	I can effectively complete my work using the OTELS	145	21.7	523	78.3
10	It takes little time to bookmark learning contents on the OTELS	249	37.3	419	62.7
11	I can efficiently complete my work using the OTELS	138	20.7	530	79.3
12	I can navigate within the OTELS using available short codes	326	48.8	342	51.2

Note: Agree and strongly agree were merged into strongly agree while disagree and strongly disagree were merged into strongly disagree.

In Table 4, 85.8% of the respondents strongly agreed with the fact that they found navigating round the OTELS very easy while 14.2% strongly disagreed. Similarly, 83.5% of the students strongly agreed that it was easy to switch from one zone of the OTELS to the other while 16.5% thought otherwise. In like manner, 78.3% of the total respondents strongly agreed that they could effectively complete their work using the OTELS while 21.7% strongly disagreed. A total of 37.3% of the respondents strongly disagreed with the fact that it took little time to bookmark learning contents on the OTELS while 62.7% strongly agreed. Also, 79.3% of the students strongly agreed that they could efficiently complete their work using the OTELS while 20.7% strongly disagreed. The respondents' opinions about the availability of shortcodes on the OTELS were sharply divided; while 51.2% strongly agreed, 48.8% of the respondents strongly disagreed. From the analysis presented, it can be inferred that the students found the OTELS efficient as a learning tool as demonstrated by 73% of the total respondents.

**Research Question 3:** To what degree do students find the OTELS retentive?

**Table 5. Retentiveness of the OTELS**

	Statement	SD		SA	
		F	%	F	%
13	I don't need any expert's help to use the OTELS the second time	243	36.4	425	63.6
14	I can easily locate the E-book library, Test-zone and Virtual classroom on the OTELS	80	12	588	88
15	I usually mistaken the Mock exam for the Practice test on the OTELS	363	54.3	305	45.7
16	I can mention the basic zones of the OTELS without seeing them	196	29.3	472	70.7
17	Remembering how to navigate within the OTELS is very simple	138	20.7	530	79.3
18	I need to read my user's guide each time I want to use the OTELS	279	41.8	389	58.2

Note: Agree and strongly agree were merged into strongly agree while disagree and strongly disagree were merged into strongly disagree.

Table 5 presents the students responses as regards their opinions concerning the retentiveness of the OTELS as a learning tool. Whereas 63.6% of the total respondents strongly agreed that they did not need any expert's help to use the OTELS the second time, 36.4% of them strongly disagreed. In the same vein, 88% of the students strongly agreed that it was easy to locate the three zones of the OTELS while 12% strongly disagreed. Also, 54.3% of the total respondents strongly disagreed with the fact that they usually mistaken the mock exam on the OTELS for practice test while 45.7% strongly agreed. Similarly, 29.3% of the respondents strongly disagreed with the fact that they could mention the basic zones of the OTELS without seeing them while 70.7% strongly agreed. Meanwhile, 79.3% of the total respondents strongly agreed that remembering how to navigate within the OTELS was very simple while 20.7% strongly disagreed. Furthermore, 58.2% of the respondents strongly agreed that they needed to read their user's guide each time they want to use the OTELS while 41.8% strongly disagreed. It can be deduced from the presented analysis that the students found the OTELS retentive as a learning tool as demonstrated by 68% of the total respondents.

**Research Question 4:** To what degree do students find the OTELS learnable?

**Table 6. Learnability of the OTELS**

	Statement	SD		SA	
		F	%	F	%
19	Opening the OTELS is very easy	86	12.9	582	87.1
20	It is easy to locate the contents of the virtual classroom	86	12.9	582	87.1
21	In the OTELS, remembering icons and their functions is very difficult for me	424	63.5	244	36.5
22	Understanding the different categories in the OTELS is easy for me	138	20.7	530	79.3
23	I can easily take test while reading my e-books	121	18.1	547	81.9
24	While listening to the Virtual classroom, I can pause and continue later	111	16.6	557	83.4

Note: Agree and strongly agree were merged into strongly agree while disagree and strongly disagree were merged into strongly disagree.

In Table 6, the analysed data showed that majority (i.e. 76%) of the respondents found the OTELS learnable as a learning tool. For instance, 87.1% of the respondents strongly agreed that opening the OTELS was very easy, while 12.9% strongly disagreed. Also, 87.1% of the respondents strongly agreed that it was easy to locate the contents of the virtual classroom while 12.9% strongly disagreed. In the same vein, 63.5% strongly disagreed with the position that remembering different icons and their functions was very difficult for them while 36.5% thought otherwise. 79.3% of the respondents also strongly agreed that it was easier for them to understand different categories in the OTELS while 20.7% strongly disagreed. Similarly, 81.9% of the respondents strongly agreed that they could take a test easily while reading the e-books while 18.1% strongly disagreed. Following the same trend, 83.4% of the total respondents strongly agreed that while listening to the virtual classroom, they could pause and continue later while 16.6% strongly disagreed.

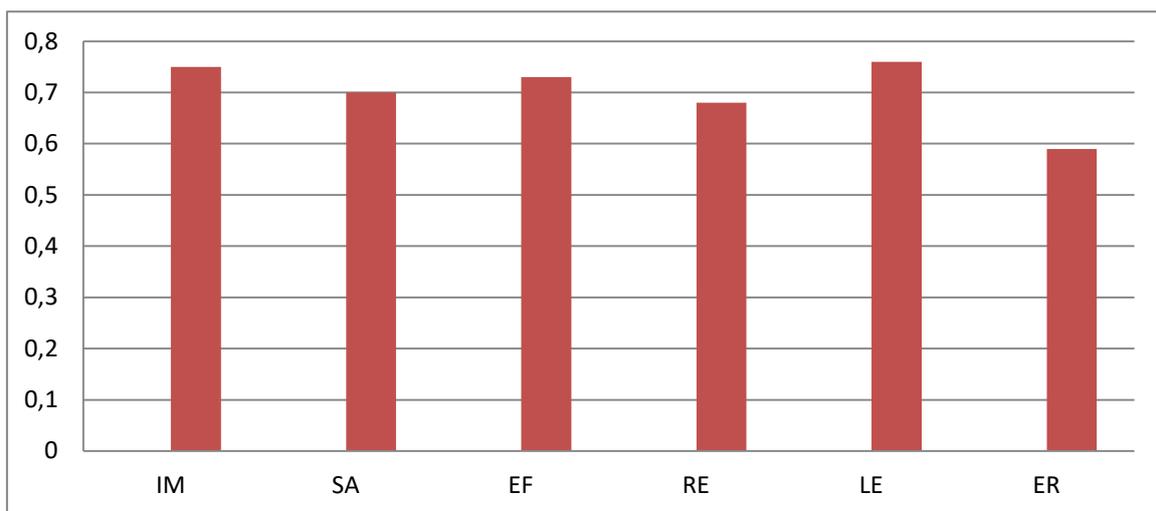
**Research Question 5:** To what degree do students found the OTELS capable of reducing error rate?

**Table 7.**Reduction of error rate when OTELS is in use

	Statement	SD		SA	
		F	%	F	%
31	When using the OTELS, I can reverse any error(s) I commit	233	34.9	435	65.1
32	There is a user guide on the OTELS to prevent me from committing errors	281	42.1	387	57.9
33	When am using the OTELS,I cannot commit any error	325	48.7	343	51.3
34	Any error I commit while using the OTELS is always reversible	261	39.1	407	60.9
35	It is not possible to commit error while using the OTELS	374	56	294	44
36	I cannot commit any error because all icons on the OTELS are properly labeled	185	27.7	483	72.3

Note: Agree and strongly agree were merged into strongly agree while disagree and strongly disagree were merged into strongly disagree.

Presented in Table 7, is the analysis of students responses to questions bothering on the OTELS capacity to minimise errors while in use. Whereas 65.1% of the respondents strongly agreed that they could reverse any error committed when using the OTELS, 34.9% of them strongly disagreed. Also, 57.9% of the respondents strongly agreed that there was a user guide on the OTELS to prevent them from committing errors while 42.1% strongly disagreed. Similarly, 51.3% of the respondents strongly agreed that they could not commit any error when using the OTELS while 48.7% strongly disagreed. In the same vein, 60.9% of the respondents strongly agreed that they could reverse any error they committed when using the OTELS while 39.1% strongly disagreed. Also, 44% of the respondents strongly agreed that it was not possible for them to commit any error while using the OTELS while 56% thought otherwise. Similarly, 72.3% of the total respondents also strongly agreed that they could not commit any error while using the OTELS because all icons were properly labelled while 27.7% strongly disagreed. From the foregoing, it can be concluded that the respondents strongly agreed that the OTELS was capable of reducing error rate when they used it for learning purposes. This was demonstrated by 59% of the total respondents.



**Figure 6:** Graphical illustration of the students' responses (strongly agreed) to the SUEQ

IM = Impression, SA = satisfaction, EF = efficiency, RE = retentiveness, LE = learnability and ER = error rate

## CONCLUSION

### *Discussions of findings*

This discussion centered on findings on how effective the students found the OTELS, its efficiency, its learnability, retentiveness, students' level of satisfactory and their opinion about the capability of the OTELS to reduce error rate when using it. Findings revealed that majority of the students wished they could take notes with their OTELS during classroom work; this might be as a result of their awareness of similar mobile technologies which could perform similar function. It might also be that the introduction of OTELS has not brought any significant change to the prevailing teaching methodology in the schools; students were still made to copy notes on paper books even though they already exist on the OTELS.

The result of the analysis on students' satisfaction with the OTELS indicated that students were satisfied with the learning system. Although, many of the respondents felt dissatisfied with the OTELS as it is and would like to see some changes, most of them still agreed that they were satisfied with the system as it is. This result can be linked to another where most respondents agreed that the OTELS is rigid and therefore not easy to interact with it. Another explanation for this finding might be due to limited freedom allowed an OTELS user in terms of contents manipulation, personalisation of icons and some other features. It should be noted that many of the respondents might have personal computer systems which allows greater manipulation than the OTELS presently does.

The terminologies used on the OTELS also received respondents supports as majority agreed they could easily identify with them. This is so because the OTELS kept in focus the industry standards as confirmed by the usability experts' rating in terms of match between OTELS and the real world. Majority of the respondents agreed that current style of subjects arrangements on the OTELS should be left unchanged. The explanation for this might be that the students enjoy having access to learning contents on subjects other than the ones they offer at their different arms. For example, an Art student can access contents on science subjects such as physics and chemistry and vice-versa.

Similarly, findings revealed the efficiency of the OTELS in learning situations. Majority of the respondents claimed they could move from one zone of the system to another with ease within short period of time. Interactivity is important if the system is to be used optimally. There are three zones on the OTELS which are interconnected and interrelated, for the system to achieve its objectives; users must be able to navigate seamlessly from one zone to the other. Similarly, a very high percentage of the respondents confirmed that they could complete their academic work within short period of time. This result is in line with the expectation that the introduction of the OTELS will allow users to have unrestricted access to enormous learning contents.

Also, some of the respondents agreed that they spent more time to perform actions such as bookmark while majority thought otherwise. Again, this might not be unconnected with the respondents' computer skills. Except an OTELS user possess some kinds of computer skills, bookmarking and retrieving bookmarked contents might pose some challenges to him/her. It is worthy of note that, no accelerators was available on the system for an expert user. With the absence of an accelerator, navigating round the OTELS requires more time than necessary which may constitute a major source of frustration.

The result on retentiveness of the OTELS as a learning system indicated that respondents found the OTELS retentive. As shown in the result, about two-third of the students affirmed they do not need expert's guidance on how to use the OTELS after the initial training. Even though this number is good, about one-third of the students still wished they could receive more experts' guidance while using the system. This could be due to inadequacy of initial training given to the users. Following-up from this were the opinions of close to half of the total respondents who claimed they usually mistaken different zones on the OTELS for another. This might also be connected to the initial training and the design of the different icons. Although, usability experts rated the icons well in terms of colour and design, many of the students still found them hard to memorise.

Similarly, result also indicated that more than one-third of the total respondents prefer to read the user's guide anytime they want to use the OTELS. Although higher number of the respondents thought otherwise, many of them still displayed low retention of the OTELS. This could be tied to inadequate training, icon design and colour coding. Findings in relation to the learnability of the OTELS indicated that respondents found the system learnable. For instance, a larger percentage of the respondents agreed they could easily launch the software and access the contents. Also, the result showed that majority of the respondents does not think the OTELS is difficult to operate; this can be linked with earlier result on satisfaction where majority of them claimed the system is easier to use. It might also be connected to the initial training received and the prevalence of other mobile devices within their environments. Another important result is that almost all the respondents supported the fact that they could perform two or more operations on the OTELS simultaneously.

Findings on capability of the OTELS to reduce error rate while the system is being used indicated that it does reduce error rate. For instance, about two-third of the respondents were of the opinion that errors committed while using the system are reversible, while the remaining one-third thought otherwise. The one-third is particularly of interest, the implication of this is that one out of every three users of the system gets stuck one way or the other while using the system and without a user guide and help menu installed on the system for proper guidance.

Although, slightly above half of the total respondents believe they can not commit any error when using the system, close to half of total respondents thought otherwise. With this number being afraid of committing errors while using the system, optimal system usage might be difficult to achieve. This lends credence to the submissions of many of the respondents interviewed who for fear of damaging the systems had refused to use them completely. This again re-echoed the importance of help menu and user's guide on the system.

### ***Summary of findings***

The conclusion resulting from the findings of this study is mostly positive across the areas covered in the study. Areas such as users' satisfaction with the system, its learnability, efficiency, retentiveness and error reduction. It was discovered that students found the OTELS learnable, efficient, retentive and capable of reducing error rate. It was also discovered that the students were satisfied with the OTELS and have positive impressions about learning system.

### ***Implication of findings***

The following implications were drawn based on the findings of this study: Majority of the students expressed satisfaction with the functionality of the OTELS as indicated by the result of this study. This means that the chance of students abandoning the system is slim. This momentum should however be sustained by extending technology to other areas of the students' academic activities and also through quick response to challenges that might come up in the course of using it.

Furthermore, positive results were recorded in terms of efficiency of the OTELS when students use it in learning situations. The implication of this is that with further upgrade to the system, students could benefit more from it which might in turn leads to improved academic achievements. It was also discovered that students found the OTELS retentive. The implication of this is that terminologies and concepts used in the system were easily understood by the students. It could also be of immense benefit if this is further built on in subsequent versions of the system.

Respondents also found the system learnable, although those who thought otherwise were substantial. This implied that many users were underutilising their systems; therefore, efforts should be made towards implementing structured training that would ensure that all users mastered the act of using the OTELS as expected. Also, findings that the OTELS reduce error rate when in used was positive. Many of the respondents also expressed negative opinions about the error prevention capability of the system. What this implied is that, whereas majority of the users might be able to navigate the system effortlessly,

slightly above one-third of them would be struggling to cope. Efforts should be intensified to make available help menu and user guide on the system to cater for this category of users.

### **Recommendations**

1. Since it was discovered that majority of the respondents were satisfied with the learning system, government may wish to put in place strategies that will ensure periodic review of the system to keep abreast of the development in mobile learning application to ensure its contemporariness in order to sustain students' satisfaction with the system.
2. Majority of the respondents attested to the efficiency of the OTELS in learning context, however, there is need to embark on certain review to ensure greater efficiency. The system could also be made internet ready, other accelerators such as short codes, calculator, subject/language dictionaries (English and Yoruba) may also be provided on the system.
3. Effort could also be made by the government to ensure that current icons (e.g. icons representing SS1 to SS3 in the E-book library) on the system are redesigned and terminologies and concepts which are familiar to the students are given priority. That is, the OTELS could be indigenised to further aid its retentiveness.
4. Obviously, many students might be under utilising their OTELS due to poor learnability. Efforts could be geared towards scaling up the user-training process so as to ensure that majority of students properly have a grasp of how to use the OTELS efficiently.
5. The findings of this study also revealed that there were no help menu and user guide on the OTELS, this is very important since these two remain majorly the source of information and support to the user especially those in the rural areas. Government may see to it that these are promptly provided to reduce errors and provide supports to the students.

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