VALIDATION OF A LOCALISED LEARNING MANAGEMENT SYSTEM FOR NIGERIAN POST-BASIC EDUCATION: A DEVELOPMENT IN THE FACE OF COVID-19 PANDEMIC

SHITTU, A.J.K[1].; YUSUF, M.O.[2].; ADEDOKUN-SHITTU, N. A.[2].; AJANI A. H.[2].; & LAWAL, S.A.[2]
[1]Department of Mathematical and Computer Sciences, Fountain University Osogbo
[2]Department of Educational Technology, University of Ilorin, Ilorin, Nigeria
E-mail: omomeji@gmail.com

Abstract

The COVID-19 pandemic has forced Nigerian educational system to remain on locks in order to keep citizens safe from the spread of the virus. Since Nigeria was not prepared for a situation like this, impromptu measures such as Radio/TV, Newspaper and WhatsApp-based learning have been deployed for engaging students at home, though semi-structured. This prompted this developmental research in developing a structured localised learning management system (LLMS) for post-basic education in Nigeria. The need for developing a LLMS for this period and beyond emanated from the fact that, despite the vast availability of some existing LMSs, their structural complexity, not-too-friendly functional operationality, and non-contextual and localised contents for users, especially regarding teachers' and students' inability to access localised resources via the platforms need to be considered quintessential in the current situation. Thereby, bridging the gap between instructional contents and knowledge acquisition. A research and developmental approach was employed, while adopting the generic ADDIE model. Purposively, 9 experts were sampled: 3 each from Computer Science; Educational Technology, and School Administration to serve as the participants. Two validated researchers-structured instruments were used and both narrative and descriptive statistics were employed to analyse the data collected. The findings of the study indicated that the developed LLMS "Schoolgit" can be developed and experts unanimously agreed that the LLMS has the capability of achieving the goals of its development. This study concluded that in the face of this COVID-19 pandemic, LLMS could provide interactive learning, localised instructional contents, easy-to-use continuous schooling activity for students, and equally provide effective school and instructional management for both school administrators and teachers. Hence, the study recommended that post-basic education administrators, teachers and government should adopt the LLMS in order to actively engage the students, while staying at home when pandemics or situations that require schools to remain locked occur.

Keyword: Localised Learning; Learning Management System; Corona Virus; COVID-19; Nigerian Post-Basic Education

Introduction

The evolution of human existence from creation till date is made possible due to human exploration of the environment, that is: "local learning". This exploration created avenue for human to employ different reasoning for survival. Till date, this exploration has led to the emergence of several tools to make human existence easier. Critical in the human exploration is the emergence of technology. Etymologically, the word technology is coined from two Greek words: "tekhne" and "logia"; "tekhne" means an art, a skill, a craft, way, manner, or means by which a thing is gained; and "logia" means word, a saying, a discourse or an expression (Tulley, 2008). Thus, literally, technology means an expression of craftsmanship.

Today, the proper description of technology would be the totality of application and use of knowledge, skills, tools and materials to enhance human existence. Encyclopaedia Britannica

(2020) described technology as the application of scientific knowledge to the practical aims of human life. Researchers such as Oladosu, Adedokun-Shittu, Sanni, and Ajani (2020) claimed that evidently, the integration of technology in several human endeavours has potentially altered the operational mode and social structure, and this social alteration has diametrically forced different walks of life to react and change as well, and education is not exempted in this evolutionary trend. Yusuf and Balogun (2011) posited that undoubtedly, technology has impacted on the quality and quantity of education, most especially in traditional and distance education, as well as, in research across several spheres. In concrete terms, technology has enhanced classroom instruction through its dynamic, interactive, and engaging content; as well as providing real opportunities for individualised instruction. As regards technology application in education, technology could function in two different perspectives, while achieving similar goals: technology in education; and technology of education (Laleye, 2015).

In a simple description, technology in education is the application of technological products to enhance education, while technology of education is the application of technological theories and principles in achieving educational goals. Both technology in education and technology of education is targeted towards achieving immediate teaching and learning objectives, and ultimately achieving the educational targets. With the ubiquitous nature of technology, quality education for all can easily be achieved (Ndongfack, 2015; Adedokun-Shittu, Ajani, Nuhu, & Shittu, 2020). Adedokun-Shittu, Shittu, Imam-AbdulKabir, and Ahmed (2017) and Al-Qahtani and Higgins (2013) believed that the expansion of technology across a wide range of educational activities came with the intention of increasing the pace of achieving educational goals. Specifically, Adedokun-Shittu et al., (2020) emphasized that technology integration is aimed at transforming learning from the traditional teacher-centredness to learner-centred approach. Thereby, emphasizing learners' active participation in the instructional system.

The understanding of the critical importance of technology integration for education in Nigeria led to the establishment of educational resource centres (ERCs) in all Nigerian States (Federal Republic of Nigeria, FRN, 2014); the integration of technological resources to drive tertiary education. This is evident in the enactment of National ICT Policy in 2012 (NICTP, 2012) and collaboration among private organisations to provide technological resources to secondary schools, such as, Multichoice Resource Centre, SchoolNet, and a host of others.

All these were done to enhance easy achievement of Nigerian educational goals; reposition Nigeria to retain its Giant of Africa country tag; and increase Nigeria's pace in belonging to the comity of developed nations across the globe.

It is important to note that, these policies were majorly implemented for tertiary education, neglecting the fact that basic and post-basic education serve as the foundation to achieving educational goals. Also, as novel as the policies and establishments are, the Nigerian post-basic educational system is only prepared for a conventional education system. This is evident in the 2020 education lockdown due to the coronavirus pandemic (COVID-19), thereby, Nigerian Government suspending all educational activities for more than 100 days, commencing from 23rd of March, 2020 to prevent the spread of the virus. Emphatically, the Director General of the World Health Organization (WHO) declared the outbreak of the COVID-19 on 30th of January, 2020. Subsequently in Nigeria, the Federal Ministry of Health (FMH) announced the confirmation of the first case of COVID-19 on 27th of February, 2020 (Education in Emergency Working Group, EiEWG, 2020).
Importantly, not only has the closure of schools affect close to 46 million students throughout the country, all the planned activities for the first and second terms of 2020 will

not be completed as scheduled. Majority of post-basic school students tend to stay at home doing nothing, instead of using the time to engage and continue with the school academic calendar. To salvage the situation at the interim, various stakeholders ranging from government and private school proprietors adopted impromptu measures such as Radio/TV, Newspaper and WhatsApp-based learning to engage students at home. It is important to note that these measures were deployed as emergency learning means and they are largely semi-structured.

In providing a structural instructional management system in the post-basic education sector, this study developed and validated a localised learning management system (LLMS) for post-basic education in Nigeria. This was done to bridge the gap between the school and the students during the COVID-19 period. Fundamentally, LMS has undeniably made an important contribution to education (Cigdem & Topcu, 2015). It provides opportunity to seamlessly create a virtual schooling system, from course planning, to conducting classes, and to providing assessment (Ashrafzadeh & Sayadian, 2015). In a general term, LMS is an educational integrated management system designed to manage, monitor, and customise schooling activities. Popular among several existing LMS are: Moodle, Coursera, Blackboard, eFront, Canvas and a host of others. With LMS, learning process can be continuous, without a pause on schooling activities, as well as, monitoring and evaluating education activities (Zhang, de-Pablos, & Zhou, 2013).

As popular and good as the existing LMSs are, they have their deficiencies. These include: structural complexity, not-too-friendly functional operationality, and non-contextual and localised contents for users, especially regarding teachers' and students' inability to access localised resources via the platforms (Lawal, 2019). Structural complexities for users in terms of school administrators, teachers and students not being able to easily navigate around the existing LMSs. Non-contextual and localised contents in terms of teachers and students not having access to contextual and localised environmental resource bank, and consequently not being able to provide contextual examples to better students' understanding of concepts. These deficiencies prompted this study.

Generally, instructional packages require careful planning, especially those that are targeted at optimising existing learning practices, be developed based on the use of instructional design models, and be designed in ways that would best optimize the best conditions for the learners for learning to take place (Amosa, 2013). In developing the LLMS, different design-based model came into consideration. These included: Dick and Carey's systems approach model; ADDIE; Gerlach-Ely Model; Kemp Design Model; ASSURE instructional model; Kirkpatrick's evaluation model; and a host of others. Every model has its' own attributes and what makes it perfect to be employed in developing and evaluating instructions.

In the case of this current study, ADDIE instructional model having a peculiar and generalised feature that focused on planning and conducting instruction that incorporates media in a method that is capable of producing the desired learning outcomes was found appropriate to be employed. Also, this model was found appropriate because it does not require high complexity, deep design knowledge, low time integration and easy revision of designs (Gustafson & Branch, 2002), that is, it provides opportunity for new or inexperienced instructors to generate a general roadmap to follow and help them think more like expert teachers.
In line with the identified gaps as discussed above, the purpose of this study was to develop and validate a LLMS for Nigerian post-basic education in the face of the COVID-19 pandemic. Two major research questions were raised:

(i)   What are the processes involved in developing the LLMS for Nigerian post-basic education?

(ii)   What is the validation of experts on the developed LLMS for Nigerian post-basic education?

Methodology

This study employed a developmental approach while adapting the ADDIE model as a Service-based architecture in developing the LLMS. The study also employed a survey method to derive experts' validation on the developed LLMS. The target population included educational technology and computer science experts, as well as, post-basic school administrators across Nigeria. But due to the lockdown declared by the Federal Government of Nigeria, nine experts and administrators on the proportion of 3:3:3 were purposively sampled: three Computer Science Experts; three Educational Technology Experts; and three School Administrators. The research instruments comprised two validated researchers-structured instruments: Computer Science and Educational Technology Experts' Rating Guides (CSETERG) designed to gather experts' rating on the interactivity, functionality and instructional conformity of the developed LLMS; and School Administrators' Content Validation Questionnaire (SACVQ) structured to elicit school administrators' opinion on the administrative and managerial functions of the developed LLMS. Both instruments were structured on a 5-point Likert scale with scores ranging from 5 through 1. Both instruments CSETERG and SACVQ revealed a reliability value of 0.84 and 0.79 respectively. The developmental process was narratively described, while descriptive statistics of mean and range was employed in analysing the survey data collected for the validation procedure.

Results

Due to the nature of this study, the narrative approach was employed to describe how the localised LMS was developed, while, descriptive statistics of range was used in describing the validation process, and this is elucidated in Tables.

Research Question One: What are the processes involved in developing the localised LMS for Nigerian post-basic education?

This study conceptualised ADDIE instructional design model as the development procedure in developing the LLMS. ADDIE been an acronym of five iterative steps explaining a set of tasks fundamental to the selection, designing and evaluation of instructional technology. The ADDIE acronym stands for: Analysis; Design; Development; Implementation; and Evaluation (Branch, 2009). However, for the appropriate understanding of the context of this study, ADDIE model was adapted to illustrate the developmental procedure for this study.

Analyse Existing LMS and Users

At this stage, the researchers did carefully examine the existing LMSs that are mostly adopted among Nigerian schools, and mostly used by school administrators, teachers and students for instruction. The widely known and used LMS include Moodle, Blackboard and Google Classroom. The researchers also investigated the characteristics of the users such as their technological exposure rate, technology application capability, socio-economic characteristics, perceived usefulness and ease of use of technological products, social background, and learning style. In analysing the existing LMSs, the researchers identified three factors that are important in developing the LLMS as regards interactivity: Firstly, the researchers realised that the existing LMSs are lacking in the context of instructional content interactivity and experiencing structural complexity. Most LMSs do not provide interactive feature for instructional contents flipping for users. Users will need to log back to the homepage to have access to other instructional contents, instead of linking current

instructional practice to related content(s). This non-interactive feature discourages students to utilise existing LMSs.

Secondly, while existing LMSs lacks interactive content features, another identified issue included the not-too-friendly functional operationality of the existing LMSs. Just as a real-world classroom experience, an LMS ought to be capable to make assignment(s) submission or grading a seamless activity. Majority of the existing LMS only provide avenue for tutors to download, grade, and reupload. This simple activity consumes more time dedicated to assessment, compare to the conventional practice. Another aspect included collaboration, though, most LMSs integrate social media such as Facebook and Twitter into their platforms.

This is not enough to cater for collaboration, as most times users almost always get distracted from learning and managing their academic affairs.

Lastly, non-contextual and localised contents for users, especially regarding teachers and students' inability to access localised resources via the existing LMSs was a matter of concern. Majority of the LMSs are developed to only cater for contents that are "English." These LMSs are designed with limited capability to generate instructional contents that are rigid to redesign. The Nigerian culture and tradition that could serve as excellent examples to majority of the available online contents are largely unavailable on the existing LMSs.

Teachers have to sources for localised instructional contents such as audio-visual materials outside the LMS platform, even when contents were gotten, another aspect is the integrative capability of the LMS to capture localised contents.

Designing Objectives
At this point, researchers stated the objectives of developing a LLMS. These include: the three major objectives of the LLMS shall be to: (i) design a LLMS that identifies and bridges the gap between content, context, and local resources in order to aid post-basic school students learning; (ii) create a platform where school administration can be seamlessly done; and (iii) present a virtual learning communities to facilitate student-student and student-content engagement for in-school and off-school periods.

Developing Resources
Structural Design and Developmental Stage: The initial design is based on an admin template for enterprise development. Each Schoolgit's portal design layout is then further edited to sooth the activities on the platform. The structure is mocked up using HTML, CSS and JavaScript for interactivity. AJAX feature is heavily used in all Schoolgit's internal working system since the application is a Single Page Application and relies heavily on communication directly with the server, using the JavaScript XMLHttpRequest object.
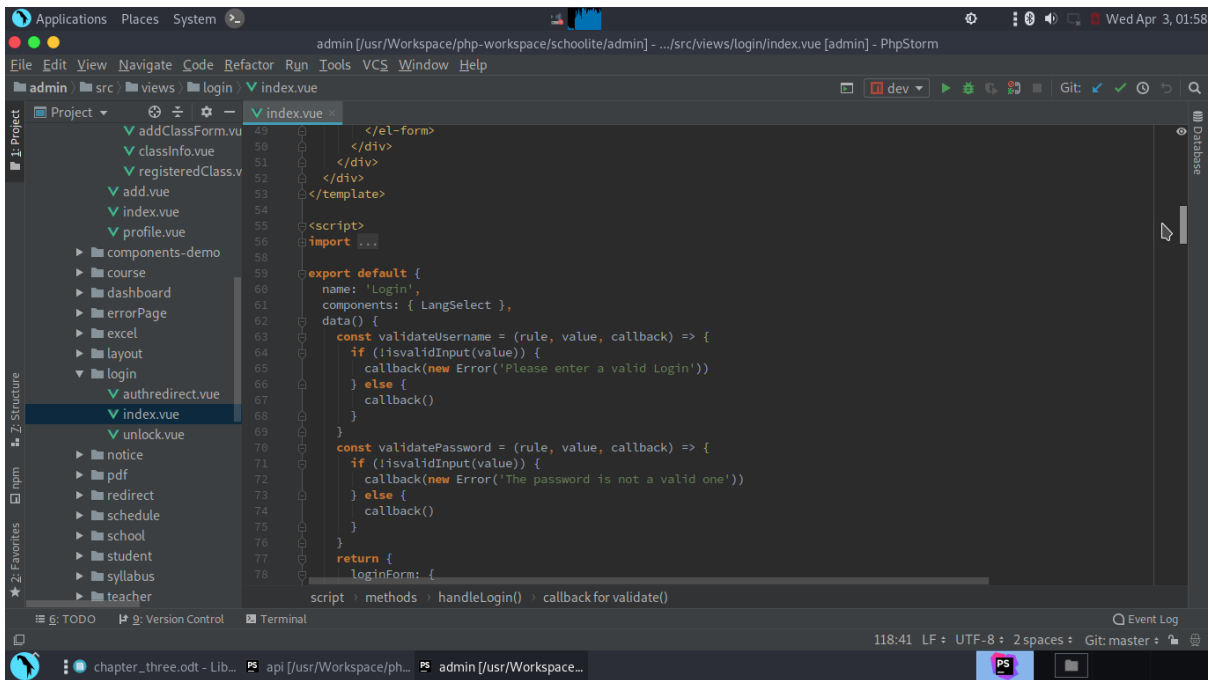
Figure 1: Structural Layout

Schoolgit is developed under four different platforms based on users and activities on those platforms. They included: Schoolgit Admin (https://admin.schoolgit.com): This is the platform for school administrator activities; Schoolgit Teach (https://teach.schoolgit.com): This is the platform for teaching activities; Schoolgit Learn (https://learn.schoolgit.com): This is the platform for students and learners activities; and Schoolgit Gap (https://gap.schoolgit.com): This is the platform for Parents and Guardian to monitor their ward's activities and their ward's school activities.

Database Design and Development Stage: In this stage, every possible data which will be stored and served by the application is considered carefully, such data types, size and availability rate are the factors to consider. This phase relates to all other modules. In this stage, Google SQL Server for MySQL 5.7 was majorly considered as the central data storage server after accessing critically the factors involved.
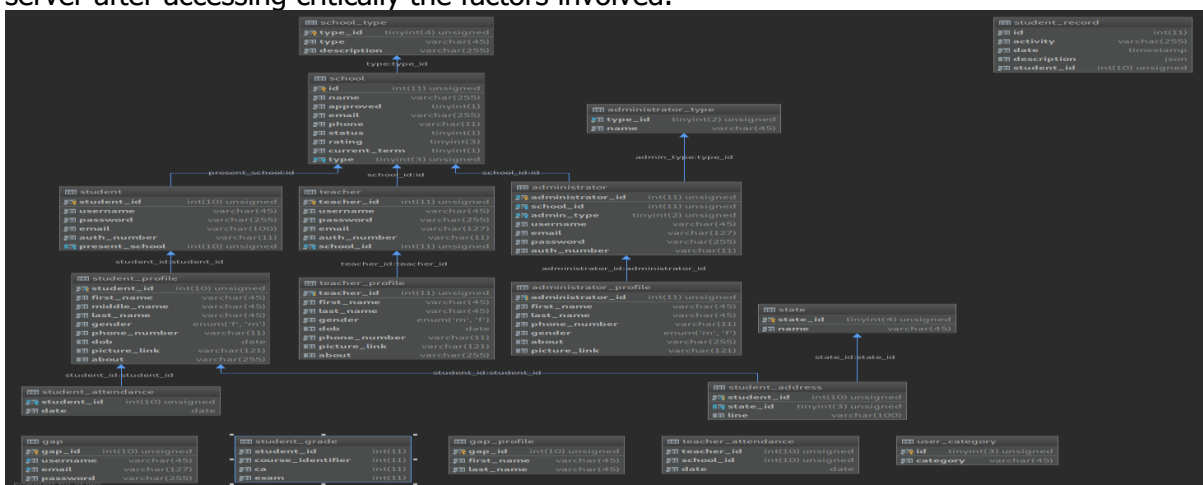

Figure 2: Entity Relationship

Web Services Design and Development Stage: In this stage a lot of development, especially regarding optimization at both the frontend of the development and the backend

of the development. A system as complex as Schoolgit requires about some weeks of straight development at this stage to get the system and services up and running with minimal security protocols and quite a handful of bugs. At the backend, a PHP framework called Snorth was used for this project which was also developed by the researchers.

Conclusions from this stage further splits the development into various components. Web services was used as references in most database actions. The data manipulation is done through web services (API).

Figure 3: API Structural Backend Layout

Generally, several core features were integrated into the LLMS, this include the ability of teacher to use the Schoolgit Teach Platform to design localised lesson contents, source for related contextual and localised instructional resources and share it/them with the students with just a generated lesson code. As illustrated in Figure 4, it shows part of the driving functionalities for lesson design page. This is the page where authorised teachers in the Schoolgit Teach platform can design lessons for their students. Learners can access the designed contents via the Schoolgit Learn Platform or the Schoolgit's Learn application for mobile phones. These designed contents can also be viewed from any mobile application which can consume the developed API for such purpose.
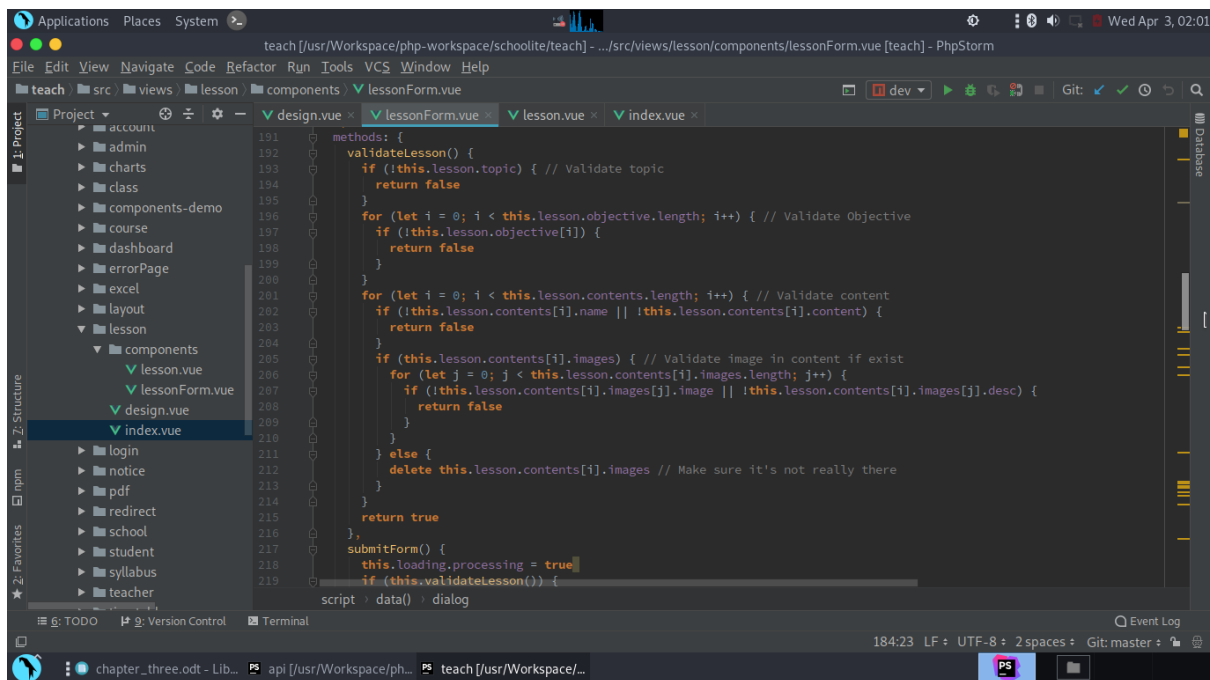
Figure 4: Schoolgit Frontend Structure

An example of application which consumed the API for such purpose is the 'Learn Biology' application developed by the Researchers. A simple get request as shown in Figure 5 will return a customised response containing all lesson contents which was designed in the Schoolgit Teach web platform. (See Figure 5). Summarily, a LLMS for Nigerian post-basic education can be developed.
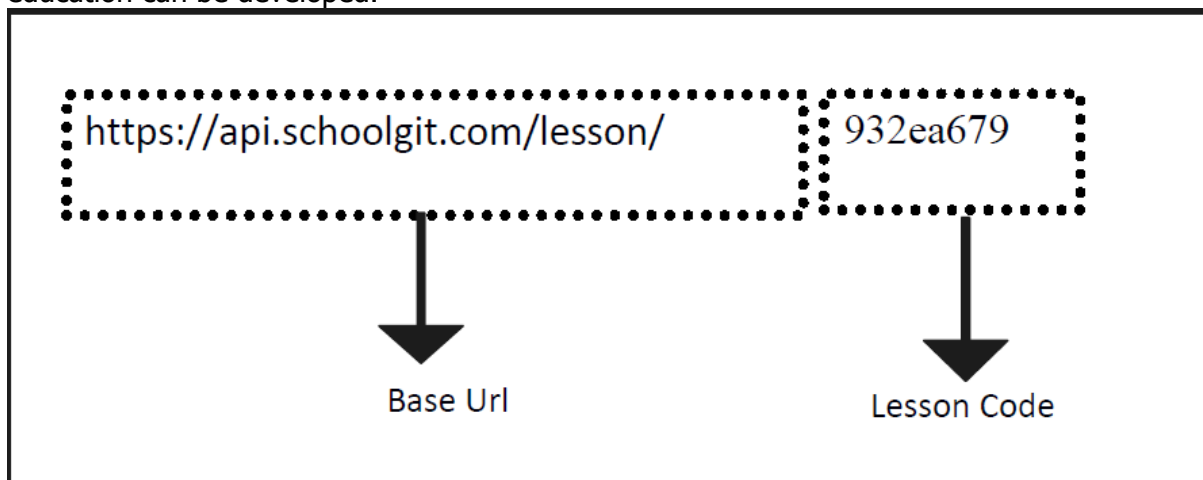
Figure 5:Illustration of API Usage

Implementing the Developed LLMS

In implementing the developed LLMS, a pilot study was conducted to ascertain the likely bugs and efficiency of the developed LLMS. The LLMS was shown to a computer scientist to assess the design; an educational technologist to assess the instructional features; and a school administrator to assess the school management and administrative features of the LLMS. Generally, some items were highlighted for review, especially regarding the data security, fonts, colour, and bugs. These corrections were made and specific bug modifications were made to further strengthen the efficiency of the LLMS.

Evaluating the Developed LLMS

The evaluation process of the developed LLMS was continuous from the analysis stage to the implementation. This was due to the iterative nature of ADDIE framework. The researchers constantly assessed the LMS and identified where gaps existed, and determined what issues still needed to be addressed. In order to ascertain the formative evaluation status of the LLMS, 9 computer scientist, educational technologist and school administrators were given the weblinks of the LLMS to ascertain their ratings and validation. Further explanation was made while answering research question two.

Research Question Two: What is the validation of experts on the developed LLMS for Nigerian post-basic education?

The CSETERG and SACVQ was structured on a 5-point Likert scale with range scores from 5 to 1. The data collected was analysed with simple and cumulative average, while range was used to determine the overall rating of the developed LLMS. A benchmark of 0-39, 40-49, 50-59, 60-69 and 70-100 to represent poor, fair, good, very good and excellent. Results of the analysis is shown on Table 1 for Computer Science and Educational Technology Experts rating, while Table 2 revealed the School Administrators validation:

Table 1: Computer Science and Educational Technology Experts' Rating of the Developed LLMS

S/N	Item	Computer Science Experts Average Score	Educational Technology Experts Average Score
1.	The administrator platform of the package can be found at https://admin.schoolgit.com and it is accessible in the world wide web	4.33	5.00
2.	The teacher platform of the package can be found at hhttp://teach.schoolgit.com and it is accessible in the world wide web	4.33	5.00
3.	The package has a good web interface	4.00	4.67
4.	The structure allows navigation freely in different unit	4.67	4.33
5.	The structure of the package allows administrators to easily review, add, remove, view students, administrators and teachers profile	4.33	4.33
6.	The package login/authentication page is secure	3.67	4.33
7.	The package is easy to use and navigate freely	5.00	4.67
8.	The package is secured and relevant	4.00	5.00
9.	The package is easy to use and self-explanatory	4.33	5.00
10	The application is reliable	4.00	4.00
11	The package is easy to use for both administrators, teachers and learners	4.67	4.33
12	The application is easily available for anyone with decent internet speed	4.33	4.00
	LLMS Integrative Nature		
13	The package has a nice dashboard to overview total school asset	4.33	4.67
14	Enrolling new students, teachers, and administrators is easy for schools	5.00	4.33

15	Curriculum system of the package is relevant	4.33	3.33
16	The package mode separates different sub-platforms in multiple domains to make navigation easier	4.67	4.67
17	Notification system of the package is fast and reliable	4.33	3.33
18	The package makes communication with all students, teachers, and administrators easy	4.67	4.00
19	The package makes management of school activities easier	5.00	4.67
20	I recommend this package for post-basic schools	4.67	4.67
	Cumulative Average	**88.7**	**88.3**

Table 1 revealed the validation rating of experts on the developed LLMS. Based on the range benchmark 0-39, 40-49, 50-59, 60-69 and 70-100 to represent poor, fair, good, very good, and excellent. The cumulative average score of 88.7 and 88.3 for both the Computer science and Educational technology experts respectively indicated that the developed LLMS was rated excellent.

Table 2: School Administrators Validation of the Developed LLMS

S/N	Validation Items	Average Score
1.	The administrator platform of the package can be found at https://admin.schoolgit.com and it is accessible in the world wide web	4.67
2.	Content and structure of the package is effective and easy to navigate	4.33
3.	The structure of the package permits administrators to advance freely to all part of the package	4.33
4.	The package has a good web interface	4.00
5.	Administrators can easily interact with the package without any form of technological expertise	4.33
6.	The structure of the package allows administrators to easily review, add, remove, view students, administrators and teachers profile	4.00
7.	The package login/authentication page is secure	4.00
8.	Interface of the application is accessible always	4.67
9.	The package responds well with descent internet speed	4.33
10.	The package has a nice dashboard to overview total school asset	4.33
11.	Enrolling new students, teachers, and administrators is easy for schools	3.33
12.	Curriculum system and course system of the package is relevant	3.67
13.	Timetable management, course allocations and day-to-day school management activities is made easy by the package	4.00
14.	The package makes communication with all students, teachers, and administrators easy	4.67
15.	The package makes overall management of school activities easier	5.00
16.	I recommend this package for post-basic schools	4.67
	Cumulative Average	**67.7**

Table 2 revealed the validation rating of school administrators on the developed LLMS for school administrative task effectiveness. Based on the range benchmark 0-29, 30-39, 40-49,

50-59 and 60-80 to represent poor, fair, good, very good, and excellent. The cumulative average score of 67.7 indicated that the developed learning management is effective for school administrative task effectiveness. Summarily, all the experts: Computer science experts; Educational technology experts; and school administrators rated the developed LLMS as excellent; and effective for school administrative task.

Discussion
The development and validation of a LLMS for post-basic education in the face of CONVID-19 pandemic was successful. A research and development research approach was employed. This was targeted towards qualitatively and quantitatively identifying the possibilities and potentials of designing such LLMS in the face of the ravaging CONVID-19.

This study emanated from the current situation across the world, especially Nigeria: Nigerian schools been under locks and keys, and students not been actively engaged academically in their various homes; and lack of localised learning and complexities in the use of LMS.

Generally, this study found out that it is possible to develop a LLMS for post-basic schools to use during moments like this. This possibility has contributed to the achievement of one of the objectives of the National ICT Policy (NICTP, 2012), which is to integrate ICT into Nigeria education curriculum and to promote and adopt virtual learning spaces for Nigeria schools. The outcome of this study equally supports the study of Ashrafzadeh and Sayadian (2015) who claimed that the contribution of LMS to revolutionise school activities is evident, and LMS has provided opportunity to seamlessly create a virtual schooling system. In line with this, the strong conviction has expressed by Lawal (2019) that virtual learning spaces such as the developed LLMS are just as real as the physical and conventional four-wall classroom, and learners could be given resources that are available to them while in their convenience to further concretise contents abstraction and naturalise their learning.

The validation of experts indicated that the developed LLMS is OK for Nigerian post-basic education. This is owed to the localised generative ability contents, simplicity, interactive, and contextual form of the LLMS Indicatively, this outcome is concretised by the position of Abanikannda and Ajani (2019) who posited that the migration of subject contents to newer climes, such as the transition of classroom activity from teacher-centred information delivery to leaner-centred context and collaborative acquisition is the newer future and stakeholders are recognising it as the next phase to Nigerian education.

Conclusion and Recommendation
This study concluded that in the face of this COVID-19 pandemic, LLMS could provide interactive learning, localised instructional contents, easy-to-use learning platform, continuous schooling activity for students, and equally provide effective school and instructional management for both school administrators and teachers. It is hoped that the adoption of the LLMS for post-basic Nigerian education will afford opportunity to teachers to practically explore contextualised resources to enhance their teaching; provide real-time assessment; generate dynamic lesson notes; and afford the opportunity for collaboration between/among students and teachers. As students stayed at home during the COVID-19 pandemic, many of them have access to a digital device owned by parent or other family members or friends, and they spend a lot of time playing with these devices. This play could be regenerated into active learning and redistribution of playful time into learning time. This study therefore recommended that post-basic education administrators, teachers, and government should adopt the developed LLMS in order to actively engage the students while staying at home when pandemics or emergencies that require schools to remain locked occur, and further adopt a paradigm shift into newer learning technologies that would

provide a continuous and hitch-free educational system for Nigeria. Hopefully, this will aid in easily achieving Nigeria's educational goals; reposition Nigeria to retain its Giant of Africa country tag; and increase Nigeria's pace in belonging to the comity of developed nations across the globe.

References

Abanikannda M. O., & Ajani, A. H. (2019). Mobile learning technology for national development: enhancing blended learning among engaged pre-service teachers in Osun State. *African Research Journal of Education and Social Sciences,* 6(1). 48-60.

Adedokun-Shittu, N. A., Ajani, A. H., Nuhu K. M., & Shittu, A. J. K. (2020). Augmented reality instructional tool in enhancing geography learners' academic performance and retention in Osun state, Nigeria. *Education and Information Technologies*. ISSN 1360-2357. Pp. 1-12. https://doi.org/10.1007/s10639-020-10099-2

Adedokun-Shittu, N. A., Shittu, A. J. K., Imam-AbdulKabir, A., & Ahmed, M. A. (2017). A global online perspective of students' assessment experience: An inquiry on academic social networking sites. *International Journal for Innovative Technology Integration in Education*. 1(2): Published by Association for Innovative Technology Integration in Education (AITIE). Available online at https://ijitie.aitie.org.ng/index.php/ijitie/article/view/45/28

Al-Qahtani, A. A. Y., & Higgins, S. E. (2013). Effects of traditional, blended and e-learning on students' achievement in higher education. *Journal of Computer Assisted Learning*, 29: 220–234.

Amosa, A. A. (2013). Effect of community resources on junior secondary schools' performance in basic technology in Ilorin, Kwara State, Nigeria. *Journal of Education in Developing Areas (JEDA),* 21(1), 214-221.

Ashrafzadeh, A., & Sayadian, S. (2015). University instructors' concerns and perceptions of technology integration. *Computers in Human Behavior*, 49, 62–73. https://doi.org/10.1016/j.chb.2015.01.071

Cigdem, H., & Topcu, A. (2015). Predictors of instructors' behavioral intention to use learning management system: A Turkish vocational college example. *Computers in Human Behavior,* 52, 22–28. https://doi.org/10.1016/j.chb.2015.05.049

Education in Emergency Working Group (EiEWG) (2020). *Nigeria education sector COVID19 response strategy in North East.* UNICEF. Nigeria.

Encyclopaedia Britannica (2020). *Definition of technology*, (8th Edition). Retrieved from https://www.britannica.com/technology/technology

Federal Republic of Nigeria. FRN, (2014). *National policy on education*. 6th Lagos: NERDC.
Laleye A. M. (2015). Educational technology for effective service delivery in educational training and research in Nigeria. *Procedia- Social and Behavioral Sciences.* 176.398 – 404. doi: 10.1016/j.sbspro.2015.01.488

Lawal, S. A. (2019). *Design and validation of learning management system for post-basic education in Nigeria.* An unpublished B.Sc. dissertation submitted to the Department of Educational Technology, University of Ilorin.

National ICT Policy, (NICTP, 2012). *National information communication technology policy.* A draft by ministerial committee on ICT harmonization. Published by Federal Government of Nigeria.

Ndongfack, M. (2015). Mastery of active and shared learning processes for technopedagogy (MASLEPT): A model for teacher professional development on technology integration. *Creative Education*, 6, 32-45.

Oladosu, K. K., Adedokun-Shittu, N. A., Sanni, T. A., & Ajani, A. H. (2020). Arabic students' perceived usefulness and ease of use of ICT resources in universities in Kwara State. *The Festschrift in Honour of Professor AGAS, Oladosu*. 1(1). 212-219. Department of Arts Education, University of Ilorin.

Tulley, R. (2008). Is there techne in my logos? on the origins and evolution of the ideographic term—technology. *International Journal of Technology, Knowledge and Society*. (4). 93-104. 10.18848/1832-3669/CGP/v04i01/55813.

Yusuf, M., & Balogun, R. M. (2011). Student-teachers' competence and attitude towards information and communication technology: case study in a Nigerian university. *Contemporary Educational Technology*, 2(1).18-27.

Zhang, X., de Pablos, P. O., & Zhou, Z. (2013). Effect of knowledge sharing visibility on incentive-based relationship in electronic knowledge management systems: An empirical investigation. *Computers in Human Behavior*, 29(2), 307–313. https://doi.org/10.1016/j.chb.2012.01.029