Evaluating Usability of Academic Web Portals for Social-Academic Learning

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ABSTRACT

The importance of an institution's web portal for alternative learning outside physical classrooms or lecture halls has been spotlighted by the impact of the coronavirus pandemic. In this paper, the usability of a social-academic platform has been evaluated as one of the vital services that foster collaborative learning and increase the usage of academic web portals. The evaluation adopted a standard post-system usability assessment tool – System Usability Scale, to examine the platform's usability and validate the construct of perceived social learning by random evaluators. The outcome of the post-system evaluation noted empirically that, the system is perceived with a 70.9% learnability and 83.9% usability scale score with excellent usability in the 90th-95th percentile range. Consequently, the study shows that the social academic web portal platform in such a pandemic era is adaptable, usable, and can be beneficial in fostering social academic interactions between lecturers and students in learning institutions, and therefore increase the web portal's usage.

(Keywords: collaborative learning, web portal usability, social academic platform, academic web portals).

INTRODUCTION

The outbreak of the novel and deadly Corona Virus (COVID-19) has plagued all aspects of daily activities. Over time, several social activities have partially resumed in most sectors with measures in place to avoid physical contact between individuals. Learning institutions are finding it difficult to resume normal operations, even on a partial note. The mode of learning has been partially halted with the pandemic, as learning in the physical classroom or lecture theatres without proper preventive measures may increase the transmission outcome. An alternative mode of learning has been long emphasized in studies – online, virtual, or distance learning, but their modalities are yet to gain grounds in most academic web portals in Nigerian universities (Adeoye, et al., 2020; Adeyeye, et al., 2014; Anene, et al., 2014; Kyari, et al., 2018). These web portals on a national perspective, are usually managerial or administrative in nature and do not facilitate educational interactions or foster a social construct of learning between its users (Oliha, 2014). While developed countries are accustomed to this trend already, many universities within developing countries like Nigeria are not.

Online or distance learning has exposed that learning can occur without the physical classroom, between any two or more parties, irrespective of their locations. Academies offering these services have demonstrated that there is more to the potentials of web technologies in learning institutions than the normal student record management services they offer. There are services academic web portals should offer, but the core of them must include the social and academic construct alongside administrative functions (Farooq and Mir, 2010; Kandler, 2010; Oluwatobi, et al., 2014). However, learning opportunities are reduced as a result of defects in either the social or academic aspects. Both constructs engage users with informative discussions and may involve social forums with interactions between instructors and students via the web portal. This aids collaborative interactions and promotes platform usage.

The construct of learning has not been fostered in most learning institutions' web portals except for information and management of student records – i.e., mostly for managerial services in some Nigerian universities (Abdulhamid, et al., 2010; Alam, et al., 2017; Azeta, et al., 2008; Ofoegbu, et al., 2014; Oliha, 2014; Oluwatobi, et al., 2014). This limits the possibilities of fully utilizing and maximizing the impact of web technologies in learning institutions. Consequently, most sites experience low usage resulting from usability challenges and the absence of the technology's core services –

subjecting the portal usage to payment of fees and registration purposes which happen infrequently. With the dawn of the COVID-19 pandemic, learning over the web is now more vital in academic institutions than ever, and in the context of Nigerian universities, this work proposes a social-academic learning platform to cushion interactivity defects in learning aspects of academic web portals following the research design in Figure 1.

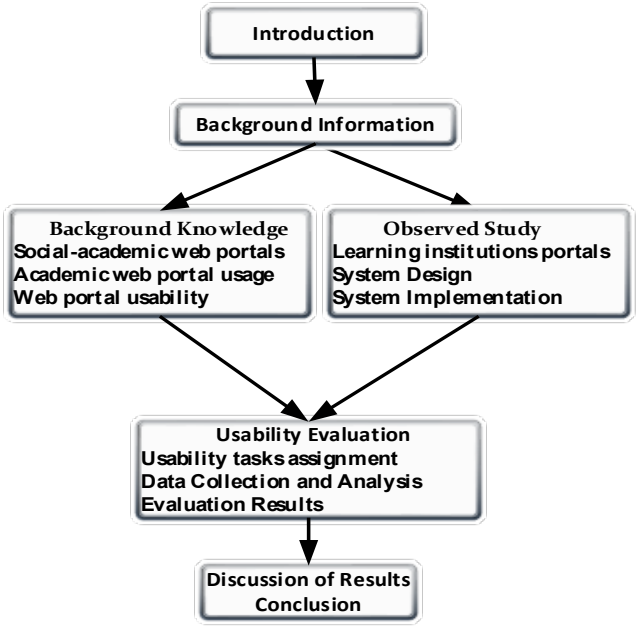

Figure 1: Research Design.

BACKGROUND KNOWLEDGE

Social-Academic Learning and Web Portals

Social learning involves the use of academic web portals for the social construct of knowledge in an academic context. With the social web of learning, the way we interact affects our learning ability in a social context in terms of collaboration, negotiation, debate, peer review, and mentoring. The common notion about this platform is that it is a virtual learning environment that stimulates interactions and the sharing of ideas (Aichner and Jacob, 2015; Kietzmann, et al., 2011; Premagowrie, et al., 2014; Vonderwell, 2003), which plays an important part in the learning process and can have a significant impact on learning outcomes.

Academic web portals over time have been effective in the management of student information regarding their records within a stipulated time of the study (Abdulhamid, et al., 2010; Alam, et al., 2017; Oliha, 2014). From a Nigerian context, some of these web portals do not provide the construct for lecturers to engage students in learning opportunities with an online presence. Learning is established when instructors and learners collaboratively construct knowledge that emphasizes interactions between one or more interactors in a learning environment that is either social (forums) or academic (virtual classrooms). It can occur from a social or an academic interaction, within a learning environment with any technological device.

Collaboratively, mobile devices and interconnected networks are providing capabilities to learn from anywhere and have been emphasized as ways to steer interactions between lecturers and students as reported in recent studies (Gan and Balakrishnan, 2017; Tita and Moki, 2017). Steering social interactions in an academic context exceed the value of just merely increasing student engagement by fostering critical analysis, reflection, and the social construction of knowledge. The construct of learning also involves academic activities where a task by a lecturer can effectively be completed by a student while using an institution's web portal and refers to the academic aspect of a web portal's core services.

Both the social and academic constructs are vital to the creation and sharing of knowledge between learners and instructors, but some factors stand as limitations towards realizing the full utilization of institutional web portals.

Factors Affecting Lecturer/Students' Usage of Academic Web Portals

A study carried out by Alatawi, et al. (2018) to investigate factors that help to encourage students to use university web portals revealed that interactions, efficiency, and accessibility were some of the critical factors that influence the end users' satisfaction level. El-Said (2018) opined that web portals are expensive to build and maintain, but if done without considering users or usability preferences, it is bound to have poor interactivity either with humans or other computing entities which raises usability concerns. Other studies on the factors influencing students' interactions or use of academic web portals revealed that: usefulness of contents (Yanga, et al., 2005), focus groups (Large, et al.,

2006; Blas, et al., 2014), social and academic contents (Farooq and Mir, 2010; Kandler, 2010), information content (Bringular, et al. (2011), poor interactivity between lecturers and students (Oluwatobi, et al., 2014), and usability construct are the most important factors (Munaiseche and Liando, 2016). These factors account for the quality of learner/instructor usage of academic web portals. Theoretical efforts to manage challenges have, in the past, been made by some other studies.

In a related effort, Adeyeye, et al. (2014), proposed virtual learning in Nigerian universities as a panacea for enhanced academic standards. Their approach was centered on an intranet-based networked environment for learning with connected nodes or users. However, the usability of such a networked platform was unascertained.

In similar efforts, e-learning in tertiary education in Nigeria was considered in the works of Kyari, et al. (2018). Their approach was statutory thereby determining the state of learning alternatively in Nigerian universities and thus exposed challenges belittling the potentials of web portals for learning in universities.

In the efforts of Adeoye, et al. (2020), the Nigerian tertiary education system experience was checked against COVID-19 and e-learning. They focused on the necessity of e-learning by identifying and discussing challenges with viable opportunities applicable to the use of e-learning. Their approach, however, was theoretical and usability was not considered. Thus, usability remains a means to validate how easy it is to learn and use a web portal with expected benefits.

Academic Web Portal Usability

Usability is a veritable construct in the development process of web portals – particularly for learning institutions. It serves as a yardstick to examine at the core, the effectiveness of the portal in fulfilling its objectives and to also measure that planned improvements on the portal have their desired impacts (Aziz, 2015). Usability is the key to the interactivity of any academic web portal between its entities – lecturers and students in this case. It ensures that facilitating interactions between lecturers and students will foster web portal usefulness and continuous usage in the context of how easy the user interfaces are to learn and use. One way to evaluate these web portal interfaces is via usability testing (Munaiseche and Liando, 2016). A deployed web portal usability evaluation can be achieved using standard post-task level measurement tools like: Software Usability Measurement Inventory (SUMI), Post-Study System Usability Questionnaire (PSSUQ), System Usability Scale (SUS), Questionnaire for User Interaction Satisfaction (QUIS) and the Computer System Usability Questionnaire (CSUQ) (Adrain, 2013; Mifsud, 2015).

In an observed study involving three learning institutions: University of Benin (www.waeup.uniben.org), Ambrose Ali University (www.aaue.waeup.org), and Benson Idahosa University (www.biu.edu.ng), the academic construct of learning was sadly deficient and social interactions were not fostered by these portals. Thus, a motivation for a social-academic web portal system – a learning platform that integrates both social and academic activities and its development is discussed in the section hereafter.

MATERIALS AND METHODS

The Approach - Data Gathering

The data gathering process for this study involved the investigation of important usability factors that will foster learning interactions. Interactive views and consents were obtained via interviews from participants who were lecturers and students of three learning institutions (Federal – University of Benin, State – Ambrose Ali University, and Private – Benson Idahosa University). These views were considered as constructs for the development of the social learning platform. The Federal institution's web portal was the observed study of choice for platform integration. Findings from the investigation were documented as vital inputs for the design.

Platform Design

For conciseness and focus, the notations for instructors and learners were only considered towards exposing interactions that collaborate instructors and learners. Using an object-oriented design tool – Unified Modeling Language, the interactive component of the social learning platform was modeled in the form of activities

between the learner and the instructor depicted in Figure 2 and Figure 3.

Figure 2 depicts the diagram for the instructor's activities exposing his engagement in a social academic learning system. This activity diagram depicts the graphical representations of workflows of stepwise activities and actions with support for choice, iteration, and concurrency. In a similar representation, Figure 3 depicts activities that engage students in the process of learning on the platform.

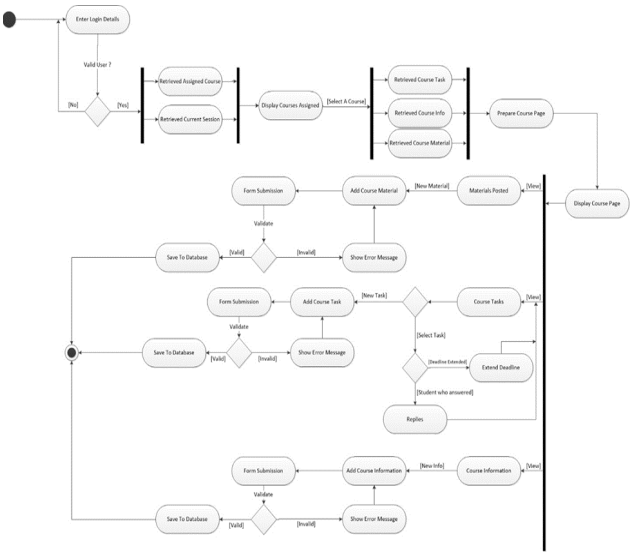

Figure 2: Instructor's (Lecturer's) Activity Diagram.

The social construct where knowledge is shared via the forum module increases students' online presence with the academic web portal. The course-related activities involving course tasks and discussions with the feedback channel for replies and posts, foster collaborative learning in a social context.

Design Implementation, System Deployment and Testing

The platform designs were implemented as modules and interfaces to foster a usable platform for interactions. Platform interfaces were created using a cross-platform python-based text and source code editor – Sublime Text. Files and scripts were created for each module interface using the server-side scripting language – PHP, and library of style sheets and cascading – bootstrap for creating interface looks and layouts. At the back end, schema objects were created in the database as tables to store users' data using

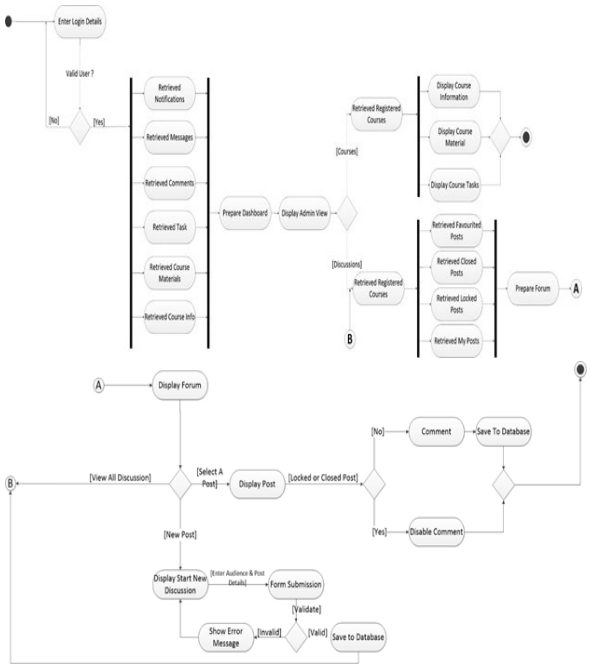

Figure 3: Learner's (Student's) Activity Diagram.

MySQL as a custom storage engine. The database was fully accessed using PHP connection from the Application Programming Interface (API) to the backend provided by the phpMyadmin component of MySQL Server. XAMPP a cross-platform server technology was used as a local server to deploy the system's services across several nodes connected.

Testing was conducted to evaluate the system's compliance with its specified requirements and functionalities. Access was granted for the set of correct input data. Errors were flagged in the case of wrong inputs and missing links and were debugged. Specific modules were those of the lecturer and student, tested with live data exposing their interactivity links and charts shown in Figures 4, 5, and 6.

This module is a submodule under the instructors' dashboard representing and reflecting the academic exhibition of tasks or duties on the portal. Owing to the academic aspect of academic web portals, Figure 4 highlighted academic constructs such as: course tasks, information, materials and the ability to upload course materials, assignments, and sets deadline for submission amongst many other services for different course levels and academic sessions. It provides fluid management of tasks and duties as well as the opportunity to monitor them. This module is a submodule under the instructors'

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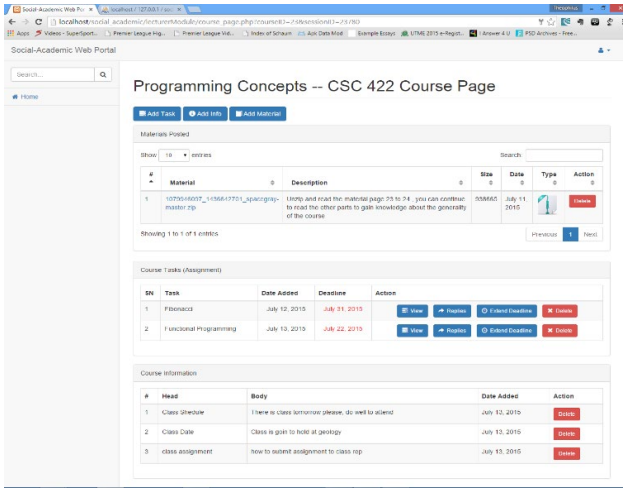

Figure 4: Lecturer's Academic Dashboard.

Figures 5 and 6 depict the platform features that project the student's dashboard for both the social and academic constructs involving: *Live Feeds* (forum, tasks deadline, information, and material) for students; a *Notification Centre*, where any updates from lecturers regarding students' course work/materials can be viewed; and a *Forum* which charts activity and involvement on student's academic/activity progress rate for usage of the portal across intended activities.

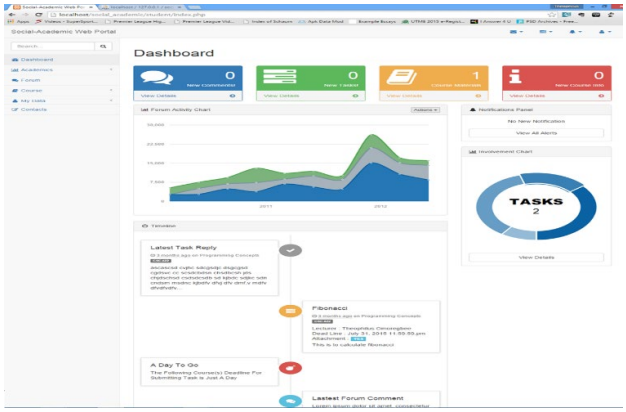

Figure 5: Student's Dashboard

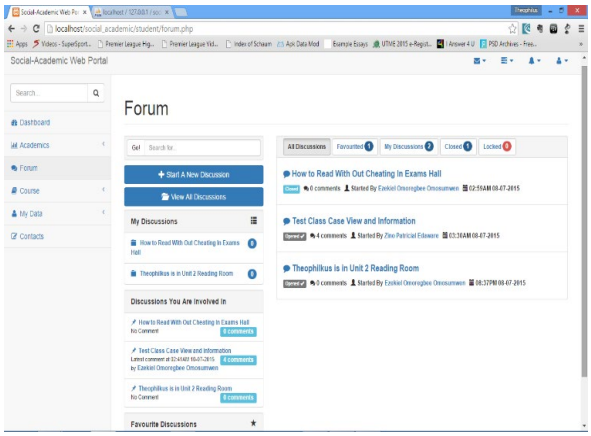

Figure 6: A Social Academic Learning Forum

Figure 6 highlighted the social learning construct for collaboration between the learners and instructors on the web portal. It allows students also to socially create, read, and comment on their favorite topics or related posts – a collaborative construction of knowledge.

EVALUATION, RESULTS, AND DISCUSSIONS

Usability Evaluation

Usability evaluation was conducted to evaluate the ease at which the developed social academic web portal can be used in the context of interaction with designated participants.

Participants and Tasks

The evaluation experiment consisted of three lecturers and five students from each learning institution, making a total of 24 participants. The goal was to examine the system's usability and the number of participants (evaluators) was quite adequate in range with regards to software usability evaluation (Macfield, 2009; Six and Macfield, 2016).

Participants were briefed with the goal of the study and introduced to the social learning platform with guidelines on how to use it to complete a specific task. Thereafter, usernames and passwords were generated for access and registration of courses for participation in the usability exercise. Academic tasks were assigned by lecturers to be completed by students within a time frame. Students were able to understand the platform and participated in tasks assigned to them by their lecturers. Thereafter, they were

meant to participate in a group discussion via the forum to validate the construct of social learning and sharing of knowledge via the developed platform.

Usability Assessment Metric

SUS, a standard post-task level measurement tool was adapted. It is a survey-based usability assessment metric scaling from 1 – 5 representing "Strongly Disagree" to "Strongly Agree" to capture usability experiment outcomes. It consisted of 10 usability questions where the 4th and 10th items measured the dimension of perceived learnability. Each of the participants was given the SUS post system usability questionnaire presented in Figure 7 and they were timely attended to and returned.

Results

The assessment data were gathered, and the results of the evaluation are represented in Figures 8 and 9 using the grading in Table 1 for each scored item. Values from each participant's responses were captured for all 10 questions and computed with SUS scores.

These scores were required to compute the SUS score for each participant as seen in Figure 9.

SN	SUS Questions	Strongly Disagree				Strongly Agree
1	I think that I would like to use this learning protal frequently.	☐	☐	☐	☐	☐
2	I found the social learning portal unnecessarily complex.	☐	☐	☐	☐	☐
3	I thought the social academic system was easy to use.	☐	☐	☐	☐	☐
4	I think that I would need the support of a technical person to be able to use the developed learning portal	☐	☐	☐	☐	☐
5	I found the various modules in this system to be well integrated.	☐	☐	☐	☐	☐
6	I thought there was too much inconsistency in this system.	☐	☐	☐	☐	☐
7	I would imagine that most people would learn to use this socila academic web portal very quickly.	☐	☐	☐	☐	☐
8	I found the system very cumbersome to use.	☐	☐	☐	☐	☐
9	I felt very confident using the system.	☐	☐	☐	☐	☐
10	I needed to learn a lot of things before I could get going with this system.	☐	☐	☐	☐	☐

Figure 7: SUS Usability Assessment Questionnaire (Sauro, 2018).

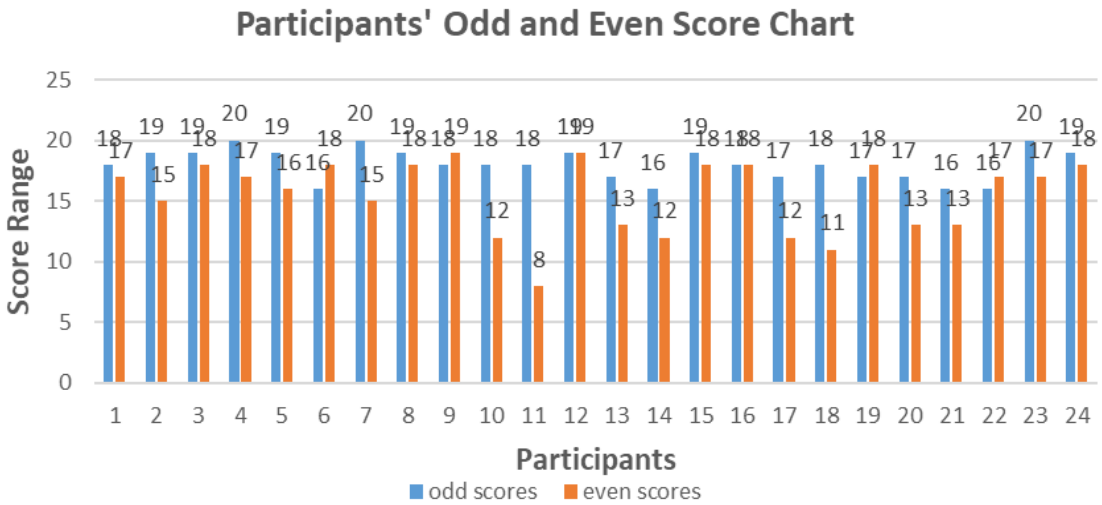

Figure 8: Participants Score Chart.

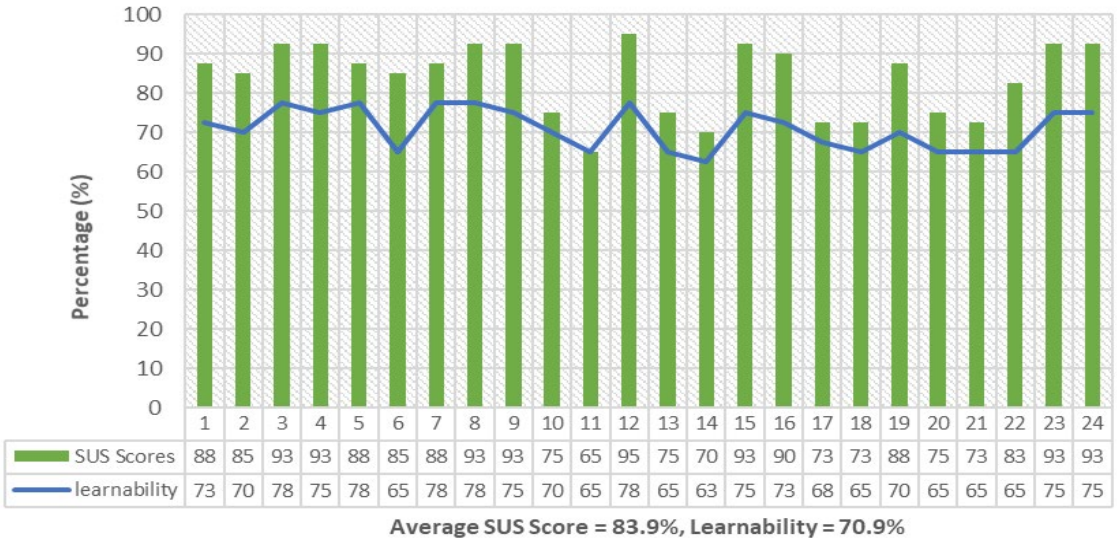

Figure 9: SUS Score Chart.

From Figure 9, the average SUS scores for participants 11 and 14 was 70% while the majority had above 80%. On average, the perceived SUS score was evaluated as 83.9% and learnability was 70.9%. The category of the grade ranking is presented in Table 1.

Table 1: SUS and Grade Ranking (Sauro, 2018)

Grade	SUS	Percentile Range	Adjective	Acceptable
A+	84.1 – 100	96 – 100	Best Imagined	Acceptable
A	80.8 – 84.0	90 – 95	Excellent	Acceptable
A-	78.9 – 80.7	85 – 89		Acceptable
B+	77.2 – 78.8	80 – 84		Acceptable
B	74.1 – 77.1	70 – 79		Acceptable
B-	72.6 – 74.0	65 – 69		Acceptable
C+	71.1 – 72.5	60 – 64	Good	Acceptable
C	65.0 – 71.0	41 – 59		Marginal
C-	62.7 – 64.9	35 – 40		Marginal
D	51.7 – 62.6	15 – 34	OK	Marginal
F	25.1 – 51.6	2 – 14	Poor	Not Acceptable

Discussion

Several factors limiting the usage of academic web portals for social learning construct have been discussed in this study noting also, that such construct has not been fostered by the observed objects of study. Deploying a learning platform that integrates collaborative interactions on both social and academic services mandated the designs of activity diagrams in Figures 2 and 3, modelling the interactions between two or more participants and implemented dashboards that supported interactivity and social construct of learning that were noted in Figures 4, 5, and 6. Developed with usability features, the designs and implementations were able to accommodate some of the challenges in the notion of Kyari, et al. (2018), and in addendum to Adeoye, et al. (2020) explored the potentials of universities web portals for increased learning usage.

In related efforts (Adeoye, et al., 2020; Kyari, et al., 2018; Adeyeye, et al., 2014), alternative modes of learning in Nigerian universities have been purported as a panacea to enhance academic standards and cushion the pandemic effect. However, the usability factor is critical in evaluating the full usage potential of academic web portals for social academic services and thus, usability as against design in Abdulhamid, et al. (2010) has been evaluated, as it remains a means to validate how easy it is to learn and use a web portal with expected benefits.

The evaluation involved evaluators designated with social academic tasks to determine the efficiency and perceived satisfaction of the deployed platform via a post-task SUS assessment questionnaire. The SUS scores were documented and presented in a table with graphical analysis to enable informative insights and meanings.

On the construct of usability, the resultant average SUS score calculated from the odd and even score computations in Figure 9 was 83.9% with an "*Excellent*" percentile range of 90 – 95. According to Sauro (2018), a system with a SUS

score of above 68 is good and acceptable which is at the 50th percentile. Respectively, the construct of learnability was perceived with an average SUS score of 70.9% with a "*Good*" percentile range of 85 – 89. Learnability with an SUS score of 70.9% on the other hand does not reflect an excellent category of ranking – a factor that may be considered to have limited the deployed platform from attaining the best-imagined category. Remarkably, with the SUS score slightly above the acceptable range, it thus indicates that the social academic platform can easily be learned and improved on. Summarily, the platform is with well-integrated modules that foster social academic-related tasks with swift and effective usage. Contributorily, the evaluation signposted an acceptable learnability feature and excellent perceived usability with high support for interactions with and among users to increase academic web portals usage beyond admission and managerial services.

CONCLUSION

A key emphasis of this study is noteworthy on the utilization of web technologies in fostering a platform for social-academic interactions in such a pandemic era. Usability has been evaluated to validate the social academic aspects of academic web portals which relatively were deficient in the observed learning institutions. The evaluation demonstrated an acceptable learnability quality and excellent system usability with increased interactivity via the deployed platform.

The outcome of this study serves as an insight to alternatively foster two-way learning via web portals for Nigerian universities. Usage increase is also observable with proper integration of the platform into existing learning institutions portals. Adaptation by appropriate managing authorities and stakeholders for integration is paramount to gauge its usability and targeted expectations.

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