An Implementation of Mobile Shareable Content Object Reference Model for Online Assessment Using Virtual Learning Environment

C. S. Nithya and K. Nirmala

Abstract At present, mobile applications play a vital role in the learning environment. Kids play, learn, and develop their knowledge through the mobile applications. This paper proposed the implementation of a mobile application that would be used to access the online assessment for students. The students can access the assessment and develop their technical skills. This paper is mainly focused on two sections. In the first section, the steps involved in designing a mobile application for online assessment of students mainly focused on MSCORM using a virtual learning environment. The second section is used to evaluate the mobile application based on the mobile shareable object reference model for online assessment to improve the technical skills of the student. This paper implements M-SCORM for online assessment using virtual learning environments.

Keywords M-SCORM · Virtual learning environments · Analyze · Design · Development · Evaluation

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1 Introduction

SCORM defines a selected means of constructing Learning Management Systems (LMSs) and coaching content [1] in order that they work well with different SCORM conformant systems. SCORM stands for "Shareable Content Object Reference Model." The sharable content object model represents the online content which is in the form of audio, video, and multimedia. SCORM defines a way to produce "shareable content objects" or "SCOs" that may be reused in numerous systems and contexts. It will contain its own marker, score, and completion standing [2]. As there may be no physical storage of data, every bit of data is accessed online in the cloud environment. It reduces the access time. The online material content will be fast in accessing the data in the virtual learning environment.

2 Literature Survey

Wibowo and Astriawati [3] used e-learning to investigate the following: (1) the difference in learning outcomes between cadets who were taught by using Edmodo-based e-learning and those who were taught by using face-to-face conventional instruction; and (2) the viability of using Edmodo-based e-learning in terms of cadet learning outcomes [4]. The appraisal was picked up from the instructive results of the cadets before the treatment (pre-test) and after the treatment (post-test). The data was then broken down utilizing a t-test to determine differences in the cadets' learning results and an n-gain investigation to determine the effectiveness of e-learning in general. The results were contrasted with the use of conventional face-to-face instruction [5].

El Borji and Khaldi [6] proposed devices to watch and help the advancement of students/players. The biggest arrangement is to deal with the blending perspectives and, furthermore, the readiness of extraordinary games to accommodate e-learning frameworks upheld by the mechanized bundle and, furthermore, the fate of incredible games as reusable learning objects (LO). The methodology intends to fulfill the exact wants of SGs as far as data all together that they will be spoken to, listed, and promoted. This can be a new application profile of the IEEE LOM standard entitled "SGLOM" integrating fields to clarify SGs not exclusively in an extremely specialized sense anyway conjointly by looking at the training and rules. The creators spend significant time in the blending partner extraction parts of SGs in an LMS, by using the ADL SCORM 2004 data model that characterizes how content is regularly prepacked as a SCORM PIF.

3 Proposed Architecture

This proposed work consists of five stages, as shown in Fig. 1. People have started using mobile phones in their day-to-day lives. Mobile phones play an important role in their lives. Mobile phones act as inevitable devices in the current scenario. Most of the students were practicing based on assessments and developing their careers online [7]. This paper mainly focused on shareable content based on mobile devices. This mobile shareable content object reference model consists of five stages [8].

Analyze: The first stage of the M-SCORM is termed the analysis stage. During this stage, the developer needs to think and analyze the student mentality, age, social factors of the particular place, and also the economic status of the students in terms of customers. The analysis mainly focused on the customer side, such as the presentation layer, back-end layer, navigation process of the student's mentality, and the objective of the assessment to improve the student's technical skills.

Design: The designing stage includes the mentality of student behavior, objectives of technical knowledge, and strategic planning that follows to improve student performance.

Development: In the development stage, a blue print technology must be developed into a mobile application to improve the technical knowledge of the student in terms of assessment. Assessment must be designed and developed in the mobile application using the mobile shareable content object reference model.

Implementation: A mobile Application for online assessment is developed by the shareable content object through the mobile devices. This mobile application is designed and developed for the online assessments that are being implemented [9].

Evaluation: The final stage of the methodologies is the evaluation process, which is used to evaluate the students' technical skills via the assessment.

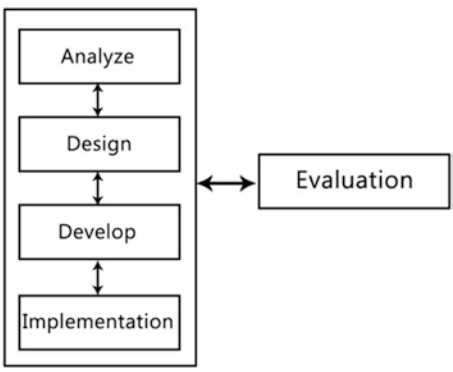

Fig. 1 Proposed architecture

4 Methodology

This paper includes various methodologies involving six stages of a process, as shown in Fig. 2.

First Stage – Analyze: This stage involves two processes such as need assessment and task analysis. Assessment will be planned in a way that should improve the students' technical skills. Assessment mainly focused on a shareable content object through mobile devices can be optimized. The next process is termed as task analysis. It is still unclear how the content should be shared with the specific student via mobile devices.

Second Stage – Design: This stage involves the design stage, which mainly focuses on the strategy for displaying the shareable content of the assessment to train the students' technical skills through mobile apps. A mobile application should be designed in order to make the student comfortable in using the student assessment through mobile applications.

Third Stage – Development: This stage involves two processes. One is a prototype. The prototype of online assessment is a development with effective strategies. The second process involves creation of instruction to access the assessment focused on the shareable content object reference model through mobile concepts.

Fig. 2 Methodology

Fourth Stage – Implementation: This stage involves the combination of the first three stages. Initially, the analyzing phase should be done for the shareable content for the reference model, design, and development at this stage.

Final Stage – Evaluation: This is the final stage of evaluation for an online assessment using a virtual learning environment. This virtual learning environment helps students improve their technical skills, and the content is also shared with a particular group of people through SCORM.

5 Implementation

The online assessment mobile application has been designed and developed in order to improve the technical skills of these mobile applications; and are designed with the following criteria: (a) The Flutter packages were used to create the online assessment applications. These Flutter packages function as one of the Open Source services in Microsoft Visual Studio. These Flutters are used to design a mobile application either for Android or iOS. Figure 3 shows the online assessment based on M-SCORM. (b) The student is logging through their private authentication in order to access the online assessment for the particular courses. (c) This online assessment improves the technical skills of the student through the mobile shareable content object.

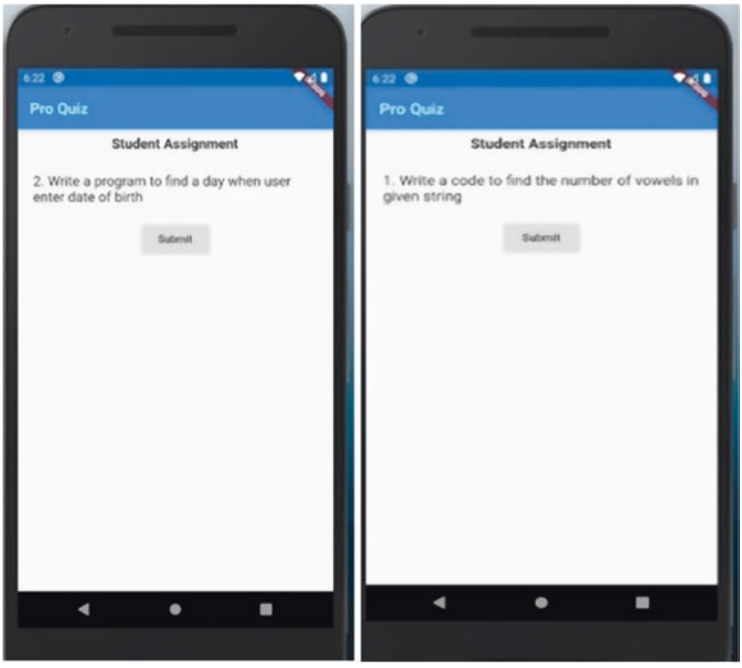

Fig. 3 Implementation of M-SCORM – assessment

6 Experimental Result

The experimental result is categorized into three cases, such as (a) by subject experts, (b) by the students, and (c) a test case based on the user.

Case 1: By the Subject Experts: Validating tests by the subject experts are done with a sample of 100 members. These mobile applications were tested with subject experts regarding the application, shareable content, and flexibility of the mobile application. The percentage of each category is displayed in Table 1 and in Fig. 4.

From Table 1, the graphs are generated based on subject experts using shareable content object using mobile.

Case 2: By the Student: Validating tests by the student were done with a sample of 1000 members. These mobile applications were tested with students on the application, shareable content, and flexibility of the mobile application. The percentage of each category is displayed in Table 2 and in Fig. 5.

From Table 2, the graphs are generated based on student using shareable content object using mobile.

Case 3: Test Case by the User: Test case of an assessment is conducted by a student who is performing their assessment through M-SCORM. The test case was done with satisfaction, ease of use, and ease of learning with a sample of 1000 students. Table 3 and Fig. 6 display the reports of the test cases.

From Table 3, the graphs are generated which are tested by the user for the online assessment based on M-SCORM.

Table 1 Case 1: By the subject experts

Aspect	Percentage
Application	3.7
Shareable content	3.2
Flexibility	3.1

Table 2 Case 2: By the student

Aspect	Percentage
Application	3.4
Shareable content	3.6
Flexibility	3

Table 3 Case 3: Test case by the user

Aspect	Percentage
Satisfaction	5
Ease of use	2.7
Ease of learning	2.3

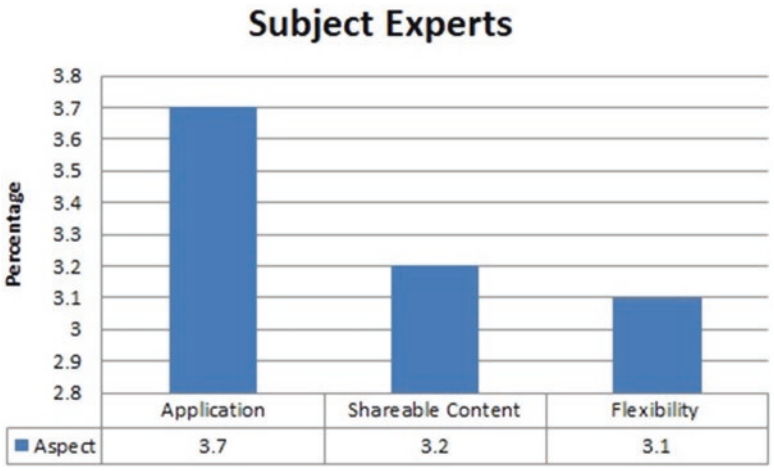

Fig. 4 Case 1: By the subject experts

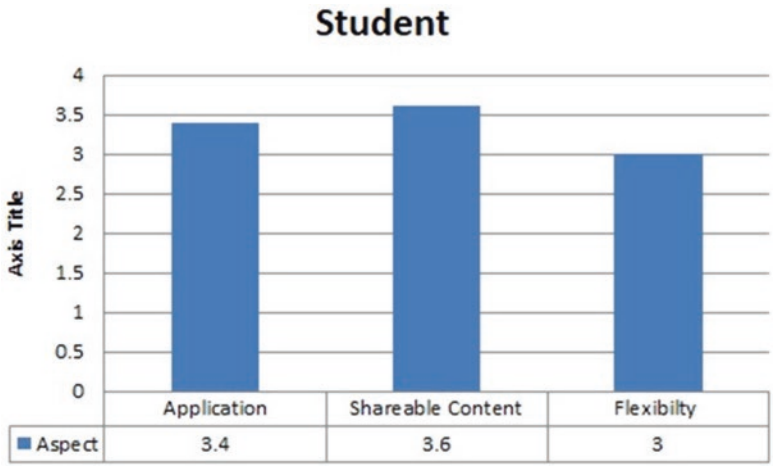

Fig. 5 Case 2: By the student

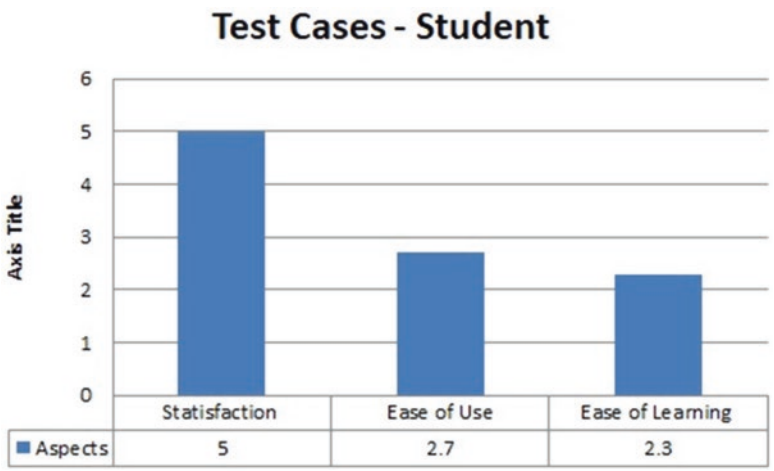

Fig. 6 Case 3: Test cases by the student

7 Conclusion

In conclusion, the mobile-based shareable content object for online assessment was analyzed with appropriate strategies and task analysis. This mobile-based shareable content object was designed with online assessments and developed using Flutter with Microsoft Visual Studio, which is open source. The mobile application was developed to improve the technical skills of students through a shareable content object reference model. This paper concludes that M-SCORM-based online assessment through a visual learning environment leads to being effective and efficient.

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