iSEA: A Mobile Based Learning Application for History and Culture Knowledge Enhancement for the ASEAN Region

Maria Visitacion N. Gumabay, Byron Joseph A. Hallar, Annjeannette Alain D. Galang

Abstract—This study was intended to provide a more efficient and convenient way for mobile users to enhance their knowledge about ASEAN countries. The researchers evaluated the utility of the developed crossword puzzle application and assessed the general usability of its user interface for its intended purpose and audience of users. The descriptive qualitative research method for the research design and the Mobile-D methodology was employed for the development of the software application output. With a generally favorable reception from its users, the researchers concluded that the iSEA Mobile Based Learning Application can be considered ready for general deployment and use. It was also concluded that additional studies can also be done to make a more complete assessment of the knowledge gained by its users before and after using the application.

Keywords—Mobile learning, e-learning, crossword, ASEAN, iSEA.

I. INTRODUCTION

THE increased ubiquity of smartphones and tablets has provided new tools to enhance the teaching and learning processes. In the 21st century academic environment, it has become important to utilize information and computer technology in order to reach out to students who are growing up as "digital natives". The increasing affordability and utility of these devices virtually ensures that they will find their way into more hands, especially those of young people [1], [2].

The "iSEA Mobile Based Learning Application" is a software application researched and developed for the Android platform that was intended to provide learners equipped with mobile devices an alternative means of enhancing their knowledge about the history and culture of the ASEAN family of nations [3]-[6].

II. OBJECTIVES

The general objective of this study is to provide a more efficient and convenient way for mobile users to enhance their knowledge about ASEAN countries.

It aimed to determine whether the use of an electronic crossword puzzle significantly improve users' knowledge with

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regards to the history and culture of the member nations of the ASEAN; to determine the users' responses toward the use of crossword puzzle in improving their knowledge regarding the ASEAN countries; and to identify the features of the crossword puzzle mobile application in terms of ease of use, user satisfaction, learnability, and attractiveness.

III. THEORETICAL FRAMEWORK

The rapid and widespread adoption of mobile technologies has brought about opportunities for the increased accessibility and democratization of learning. The greater affordability and accessibility of mobile devices when has given them the potential to complement or even in some instances completely replace conventional computer technologies such a traditional desktop PC or even the laptop [7].

Mobile technologies feature outstanding communication and collaboration capabilities that are now being harnessed within the context of ICT-aided learning. These mobile technologies have the potential to increase social inclusion and participation through mobile learning outside the traditional education system [8], [9].

In this paper, a theoretical framework for mobile e-learning has been developed for mobile learners. This framework is draws upon three existing theories that are used as the foundation for utilizing mobile technology with language learners, [10]-[13].

IV. CONCEPTUAL FRAMEWORK

According to standards set by ISO/IEC-9126-1; application usability includes the characteristics of understandability, learnability, operability, attractiveness, and usability compliance sub-characteristics [14].

Usability is known as a qualitative attribute that determines how easy the user interface can be used. It measures the quality of user's interaction to the system environment [15]-[17].

In general, mobile applications should be simple, and the input should be easy to insert, simplified by using location aware functions. In order for mobile users to focus on using the application, mobile applications must have a reasonably well-designed interface with appropriate color and font sizes [18]-[20].

The prototype application was tested and evaluated by real users of the mobile application.

An appropriate questionnaire was floated to these users and statistical analysis was conducted in order to objectively evaluate the quality of the user interface.
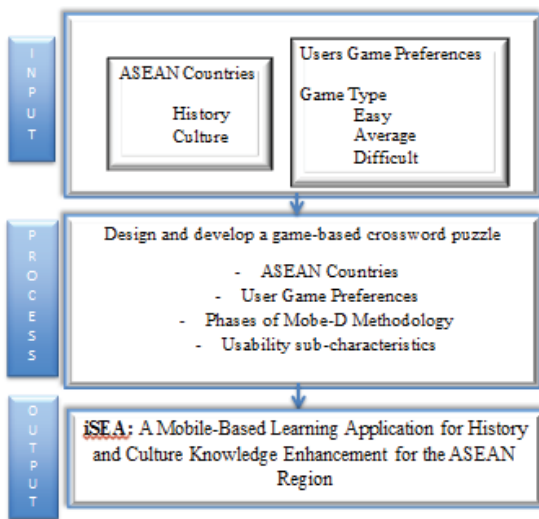

Fig. 1 Research Paradigm

Fig 1 illustrates the research paradigm utilized by the study. The IPO model was derived [21], identifies unmet needs and unused opportunities and diagnoses the problems that prevent needs from being met and opportunities from being used.

The researchers selected the IPO model as the basis for describing the general process of developing the ASEAN Countries Crossword Puzzle mobile application. This three-stage model consists of stages appropriately named: INPUT, PROCESS and OUTPUT.

The gathering of the necessary input data and the determination of application requirements were performed at the INPUT stage. Once this was done, the researchers proceeded to the PROCESS stage with the actual design and development of the application. After the completion of this process, the OUTPUT was the completed iSEA mobile application that was considered ready for deployment and use.

V. METHODS

A. Research Design

This employed the descriptive qualitative research method for the data gathering and evaluation. The samples were identified by selecting first year to fourth year students taking up BS Sociology at the MMSU College of Arts and Sciences and a random sampling of students from other courses taking up history subjects. The data was gathered by means of a questionnaire.

B. Data Analysis

Descriptive statistics was used such as frequency, percentage, and mean to analyze the data for the descriptive research questions. The following scale was used to interpret the weighted mean obtained from questionnaire.

To identify the features of this study and the effectiveness of crossword puzzle mobile application, the following mean ranges and descriptive interpretations are presented.

TABLE I
STATISTICAL TOOL (LIKERT SCALE) FOR THE INTERPRETATION OF THE ISEA RESULT

Scale	Weighted Mean	Interpretation
5	4.20 – 5.00	Strongly Agree (SA)
4	3.40 – 4.19	Agree (A)
3	2.60 – 3.39	Moderately Agree (MA)
2	1.80 – 2.59	Disagree (D)
1	1.00 – 1.79	Strongly Disagree (SD)

Table I is the statistical tool that were employed in the data analysis are the frequency distribution and mean. Mean was utilized to identify features of the mobile application that usually encountered and the level of effectiveness of the mobile-based application.

For the software development side, the Mobile-D methodology [22] was utilized. This methodology is an agile development approach for mobile devices. By using this methodology, the researchers were able to deliver a fully functional mobile application because of its rapid application development features [23].

The design of the mobile learning application was based on the different inputs generated by this study [24]. The workflow is divided in different phases. These are exploring, initialize, productionize, stabilize and system fix as shown in Fig. 2.

Fig. 2 Phases of MOBILE-D

- **Explore** – In the Explore phase, the developers planned and established the incipient project. The Explore phase is an important phase to set the ground for controlled implementation of the software development product.
- **Initialize** – The purpose of the Initialize phase pattern is to enable the success of forthcoming project phases by preparing and verifying all critical development issues so that they all are in full readiness in the end of the phase for implementing requirements selected by the customer.
- **Productionize** – In the Productionize phase the developers implemented the required functionality into the product by applying iterative and incremental development cycles.
- **Stabilize** –The Stabilize phase ensured the quality of the final application.
- **System Test and Fix** – The purpose of System Test & Fix is to see if the produced system implemented the customer-defined functionality correctly, provide the project team feedback on the systems functionality and fix the found defects.

VI. RESULTS

TABLE II
SUMMARY ON THE EVALUATION (USER ACCEPTANCE) OF THE ISEA USERS ON
ITS FEATURES WITH RESPECT TO THE FEATURES OF THE CROSSWORD PUZZLE
MOBILE-BASED APPLICATION

Criteria	Mean	Description
1. Ease of use	4.49	Strongly Agree
2. User Satisfaction	4.20	Strongly Agree
3. Learnability	4.22	Strongly Agree
4. Attractiveness	4.20	Strongly Agree
Overall Mean	**4.27**	**Strongly Agree**

Table II shows the results of the evaluation of the mobile application by the users with regards to the criterion of ease of use, user satisfaction, learnability and attractiveness. The respondents could give a score from 1 to 5, with 1 as the lowest score and 5 as the highest. The respondents gave mean scores that ranged from 4.20 to 4.49, which generated an overall mean score of 4.27. Higher scores indicate a more positive evaluation.

VII. DISCUSSIONS

A. Project Description

The project is a mobile application that was designed to operate on smartphones or tablets running at least Android OS 2.3 "Gingerbread" or higher. It was developed using the Android Software Development Kit (SDK) and Android Developer Tools (ADT). It uses a MySQL database for its information storage needs.

The mobile application supports the following:

- Dynamic positioning of puzzle choices. Each choice in the question and answer is randomly arranged so that the users cannot memorize the position of the answers;
- One size fits all learning, just in time, just enough and just for fun;
- Access to the content and topics of the existing history and culture of the ASEAN Region though a smartphone;
- The puzzle game is based on the unit that the history and culture of the ASEAN region.
- Every unit has a topic to be learned;
- a user-friendly interface for the learner. This will boost their imagination and easily attract their attention.
- Display the solution to the puzzle.

B. Interfaces

Fig. 3 The Main Interface of the iSEA application

Fig. 4 Country selection screen

Fig. 5 Category confirmation dialog

Fig. 7 Topic Selection

Fig. 6 Category Selection

Fig. 8 Setting Screen

Fig. 9 Difficulty Level

Fig. 11Crossword solution

Fig. 10 Crossword puzzle proper

Fig. 12 Preferences

Fig. 13 Feedback

Fig. 14 About the Application
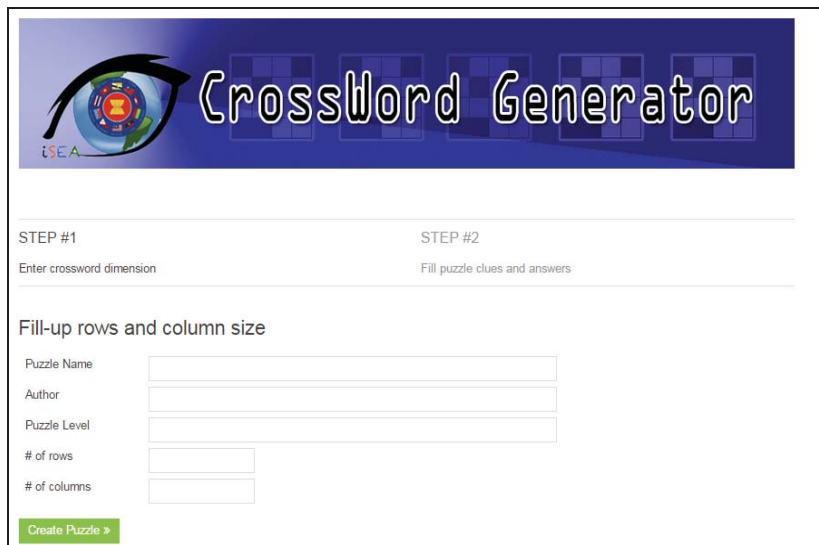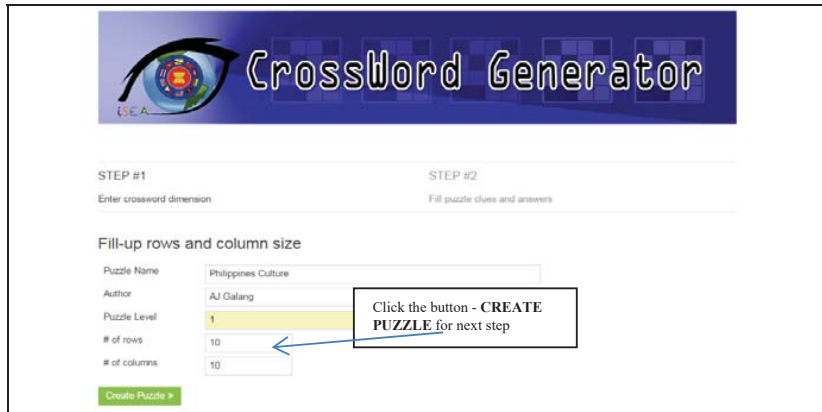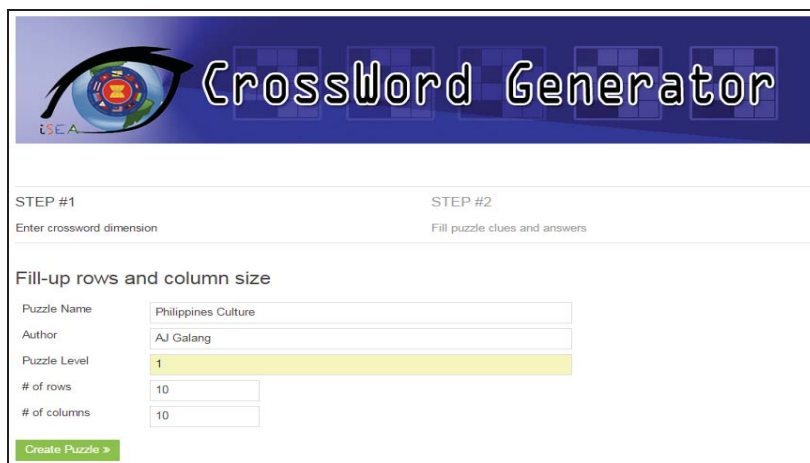
C. Windows Based

1. Crossword Generator Interfaces

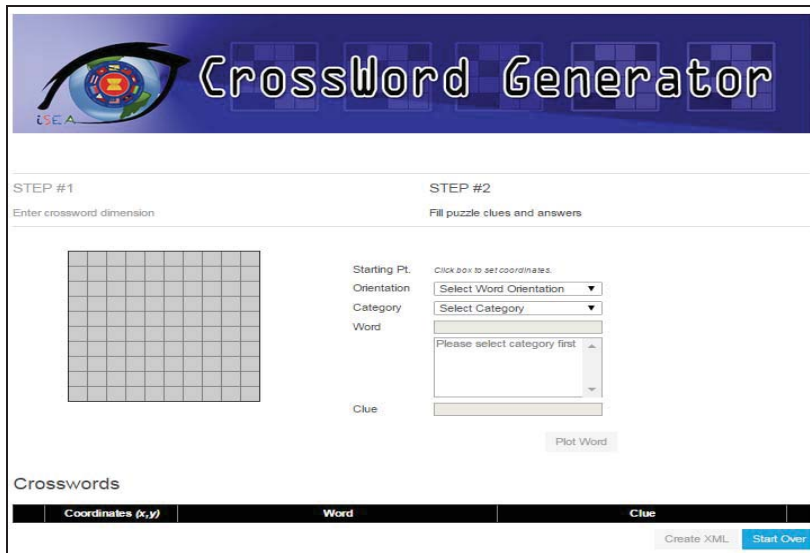Fig. 15 Opening Screen (Web Cross Word Puzzle Generator)

Fig. 16 Step #1 – Enter of the basic information of the Cross Word Puzzle like Puzzle Name, Author, Puzzle Level, Number of Row and Number of Columns

Fig. 17 Move to next step – Generating crossword grid and fill answers

Fig. 18 Fill up Cross Word Puzzle

Fig. 19 Step #2: Generate Crossword Grid and Fill answers

Fig. 20 Step #3: Generate XML File for the Android File

```xml
<?xml version="1.0"?>
<grid>
  <name>Philippines Culture</name>
  <date>1212/1111/2014</date>
  <author>AJ Galang</author>
  <level>1</level>
  <width>10</width>
  <height>10</height>
  <horizontal>
    <word y="0" x="0" description="display (clothes) by wearing them.">Model</word>
    <word y="2" x="2" description="an opening in the wall or roof of a building">Window</word>
  </horizontal>
  <vertical>
    <word y="0" x="2" description="directed or moving toward a lower place or position.">Down</word>
  </vertical>
</grid>
```
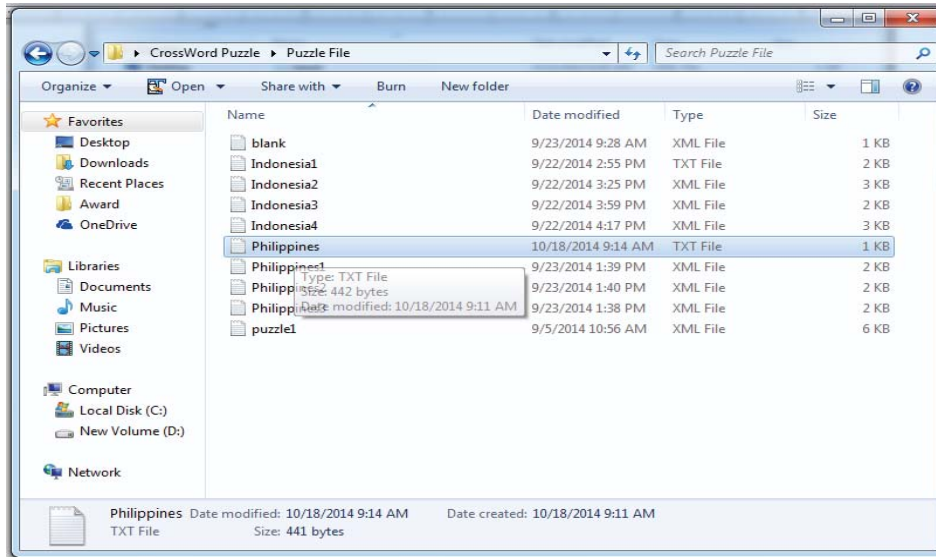
Fig. 21 Step #3: Sample Generated Clues and Word

Fig. 22 Saved File using .xml file, this will be uploaded at the android crossword puzzle

VIII. FINDINGS

Based on the gathered data through interviews, observations and questionnaires, the following findings are hereby presented.

In determining the use of an electronic crossword puzzle and the user responses towards the use of crossword puzzle as perceived by the respondents, there is a significant improvement by the users' knowledge with regards to the history and culture of the member nations of the ASEAN.

Based on the features of the application through the usability sub-characteristics in terms of ease of use with a mean of 4.49, user satisfaction with a mean of 4.20, learnability with a mean of 4.22 and attractiveness with a mean of 4.20, all has the equivalent of "Strongly Agree". The application as a whole garnered an overall mean of 4.27, which is an indication that the users gave it a very favorable evaluation of all the usability sub-characteristics is concerned.

IX. CONCLUSIONS

After careful analysis, the researchers drew these conclusions.

Although the users were generally satisfied with the subject matter incorporated into the iSEA application, more studies are needed in order to truly evaluate the level of knowledge of the users before and after the using the iSEA application.

With the favorable evaluation by the users, the iSEA application can be conceivably considered ready for deployment for use and more extensive testing in the world at large.

X. RECOMMENDATIONS

Based from the conclusions, the following recommendations are presented to maximize the efficiency of the proposed application.

1. The can be immediately made available for installation on Android devices.
2. Expansion of the incorporated subject matters to include all ASEAN members, not just the initial two nations.
3. The incorporation of multiplayer capability via the Internet to increase the functionality as well as fun from the point of view of the users.
4. Eventually porting to other mobile platforms such as Apple iOS and Windows Phone OS.

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