(RESEARCH ARTICLE)

KaSAYSAYan: The integration of Philippine history as an interactive and informative mobile game application using unity game engine

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Abstract

A positive outlook on learning is crucial in achieving one's success. An apparent thing is that students lose motivation in learning Philippine History. They either find it hard to understand, or end up forgetting what they have learned when time goes by. The aim of this study is to create an Android-based adventure trivia game that teaches students about the Philippines while making it interactive. The content of the game is directly referenced from learner's modules already implemented into the elementary curriculum.

Keywords: Game-based learning; Mobile Game; Unity Engine; Philippine History

1. Introduction

Learning with the use of visual aids has proven to be one of the most effective methods of teaching. And with the rise of technology as another tool for learning, maximizing its functions would greatly affect students' learning skills. Gamification of subjects can make learning much more relevant to them. With the right use and context included in the game, its educational purpose and relevance will bloom for itself. Students lose motivation in learning Philippine History. Having an interactive learning experience gives the students the chance to take control of the way learn and an opportunity to get hands-on experience with the subject matter.

2. Related literature and studies

Today's generation of elementary students tend to grow up surrounded by gadgets and technology due to the fast-evolving era of the 21st century. Hence, they now learn digitally and virtually. They have grown accustomed to the assistance of technology that their standard for learning should also be technical. They tend to search for applications that can stimulate their curiosities and enthusiasm in a learning environment. They always seek engaging methods of learning as to how kindergartners are taught to connect the dots of the correct and corresponding pair of answers. Even more so in the current hybrid of learning – offline and online. [1]

Game-based learning borrows certain gaming principles and applies them to real-life settings to engage users. Additionally, Dinscore defined it as designing learning activities that can gradually introduce concepts, and guide users towards an end goal. Games are a highly social and interactive experience (Prensky, 2001). A crucial part of the learning process also involves enjoyment and fun. According to Prensky, Video games offer a plethora of benefits, citing 12 different elements which he believes makes games more engaging mediums over traditional means like books. [2]

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Scholars from an array of fields have become more and more interested in video games, which are maturing mediums and industries. Majority of educators ignore computer games and video games. Designing interactive digital learning environments requires an understanding of the dynamics behind these design considerations. Furthermore, video games serve a variety of sociocultural functions, bringing people together, serving as outlets for budding teenagers, and contributing to overall youth culture. [3]

3. Methodologies

The research development that the researchers use to ensure the development of the software is the Agile Software Development methodology. Agile methodology has 5 phases which are the requirements, design, develop, test, and deployment. Agile based software development provides an effective solution to the challenges presently being faced by the software industry including ever-increasing software complexity, dynamic user requirements, low budgets, and tight schedules.

Before anything else, the researchers planned and gathered all the necessary information for the system. Design and development immediately take place after planning. Testing is also done in order to scope out possible faults and bugs in the system. Once the system is fully functional and has met the requirements then it is now subject to final review and finally, deployment.
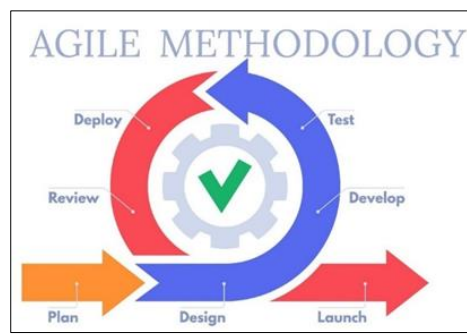

Figure 1 Agile Software Development

3.1. Hardware and Software Components

There is no specific hardware required for the study. A Laptop will be used for developing the application. Aforementioned device is a Huawei Matebook D15 with an AMD Ryzen 5 3500U Processor, 8GB (gigabytes) of Random Access Memory (RAM), and a Windows 10 operating system. The C# Language will be used as the main programming Language and Visual Studio via the Unity Engine serves as the compiler of the code.
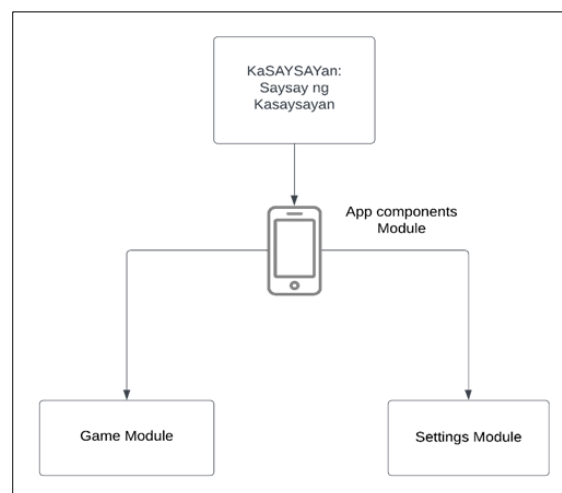
3.2. System Architecture

Figure 2 System Architecture

Figure 2 below shows the overview of the structure of the game, starting from running itself, and for players to choose two modules. the actual game module, and the settings module which consists of developer notes and adjustable volume within the game.

3.3. Evaluation

To evaluate the data gathered in this study, the researchers used a validated and widely accepted evaluation tool, that can determine the accuracy and the quality of the system. To add, the researchers also prepared a short quiz via Google Forms related to Philippine History for respondents to take before and after playing the game. Which will then be evaluated via the ISO 25010:2011 to check the software quality of the system.

4. Result and discussion

The researchers have gathered 40 students to serve as the respondents of the study. With all of them successfully evaluating the game, and 32 proceeding to answer the pre-gameplay and post-gameplay assessment.

Based on the test performed by the researchers to assess the quality of "KaSAYSAYan", the results are as follows.

4.1. Pre Gameplay Result

Figure 3 shows the distribution of points scored in the pre gameplay assessment. Which was comprised of 9 short-answer type questions relating to Philippine History. After filtering responses, a mean of over 3.65 over 9 points was summed up. With majority of the respondents scoring only 3 out of 9 points.
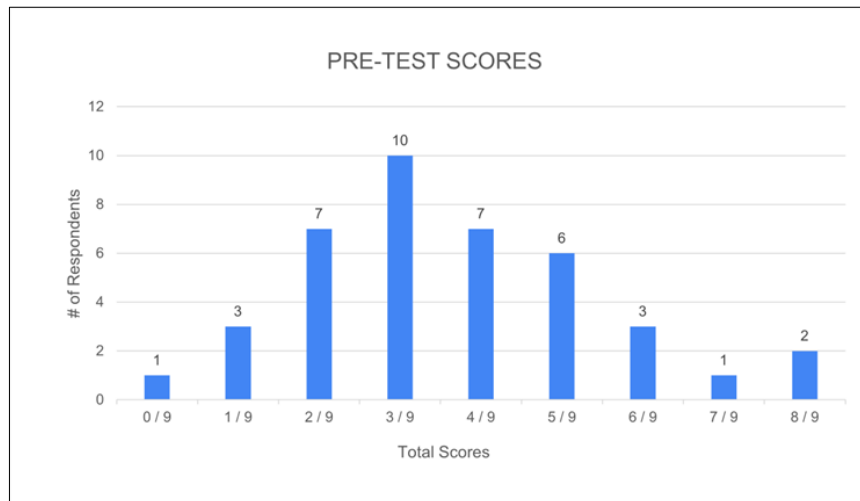

Figure 3 Pre Gameplay Results

4.2. Post Gameplay Result

Figure 4 shows the distribution of points scored in the post-gameplay assessment. Which was comprised of 9 short-answer type questions relating to Philippine History. After filtering responses, a mean of over 6.13 over 9 points was summed up. With majority of the respondents scoring 8 out of 9 points. Showing visible improvement in comparison to the pre-test results.
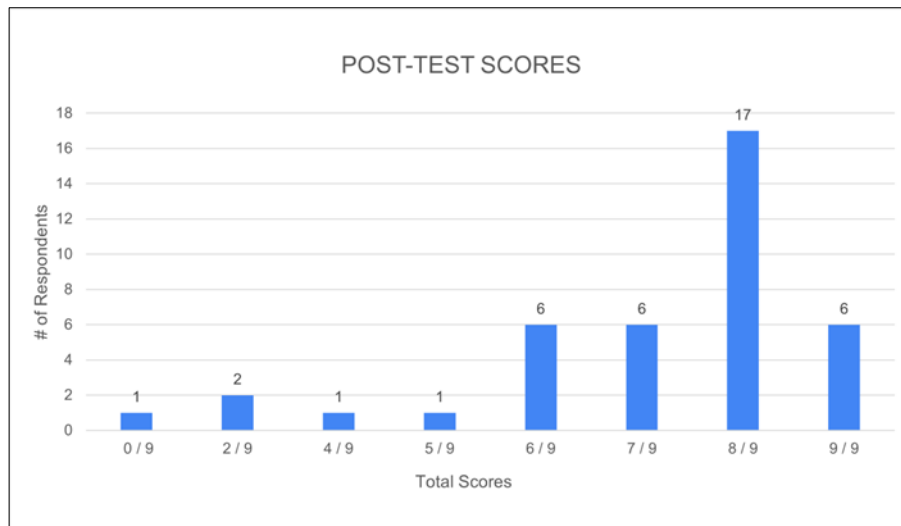
Figure 4 Post Gameplay Results

4.3. ISO 25010 Product Quality Characteristics

Table 1 ISO 25010 Product Quality Characteristics in terms of Functional Suitability

No.	Statements	Mean	Interpretation
1	Functional Completeness. The game is complete and fully functional.	2.8	Neutral
2	Functional Correctness. The game outputs the correct result based on the player's inputs	4.4	Agree
	TOTAL WEIGHTED MEAN	3.62	Neutral

Table 1 shows the Mean of sub-characteristics of Functional Suitability. The total mean score of the first statement is 2.8 equal to "Neutral.", the total mean score of the second statement is 4.4 equal to "Agree". The total weighted mean is 3.62 means that the respondents concur Functional Suitability is "Neutral."

Table 2 ISO 25010 Product Quality Characteristics in terms of Reliability

No.	Statements	Mean	Interpretation
1	Availability. The game is accessible when needed, even when offline	4.62	Strongly Agree
2	Fault Tolerance. The game can be played on different mobile devices with at least 4GB of RAM	4.43	Agree
	TOTAL WEIGHTED MEAN	4.52	Strongly Agree

Table 2 shows the Mean of sub-characteristics of Reliability. The total mean score of the first statement is 4.62 equal to "Strongly Agree.", and the total mean score of the second statement is 4.43 equal to "Agree". The total weighted mean is 4.52 means that the respondents Strongly Agree that Reliability is observed.

Table 3 ISO 25010 Product Quality Characteristics in terms of Portability

No.	Statements	Mean	Interpretation
1	Installability. The game can be successfully installed/uninstalled on your device	4.78	Strongly Agree
	TOTAL WEIGHTED MEAN	4.78	Fully Observed

Table 3 shows the Mean of sub-characteristics of Security. The total mean score of the first statement is 4.78 equal to "Fully Observed.", The total weighted mean is 4.78 meaning that the respondents Strongly Agree that Portability is Fully Observed.

Table 4 ISO 25010 Product Quality Characteristics in terms of Performance Efficiency

No.	Statements	Mean	Interpretation
1	Time Behavior. The processes of the game run smoothly and respond with little to no delays.	4.8	Agree
2	Resource Utilization. The amount and type of resources used in the game such as graphics and sounds are appropriate, and function correctly	4.21	Agree
TOTAL WEIGHTED MEAN		4.19	Agree

Table 4 shows the Mean of sub-characteristics of Performance Efficiency. The total mean score of the first statement is 4.8 equal to "Agree." The total mean of the second statement is 4.21. The total weighted mean is 4.19 means that the respondents Agree that Performance Efficiency is Fully Observed.

Table 5 ISO 25010 Product Quality Characteristics in terms of Usability

No.	Statements	Mean	Interpretation
1	Learnability. The game is able to educate players about the history of the Philippines	4.03	Agree
2	Appropriateness Recognizability. The game meets the needs and wants of the users.	4.4	Agree
TOTAL WEIGHTED MEAN		4.215	Agree

Table 5.0 shows the Mean of sub-characteristics of Usability. The total mean score of the first statement is 4.03 equal to "Agree.", the total mean score of the second statement is 4.6 equal to "Agree". The total weighted mean is 4.21 means that the respondents Agree that Usability is Fully Observed.

5. Conclusion and recommendation

The researchers have successfully developed a game that is significant in teaching Philippine History to students. Based on the results of both assessment tests, there is significant improvement in assessment scores in the post-gameplay test.

In terms of evaluation, all of the results per sub-factor are above average at most. Indicating a satisfaction towards the usage of the system.

Following the findings, testing, and evaluation procedures conducted by the researchers, the following recommendations were proposed:

Increase the number of available historical topics covered in the application.

Introduce more ways of gameplay to increase variety.

Implement more features to the game to increase its immersiveness such as, voice acting.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

References

[1] Bozkurt, A. (2017). Gamification, Education and E-learning: An interview with Andrzej Marczewski. ELearn, 2017(9). https://doi.org/10.1145/3148624.3137178

[2] Prensky, M.. (2001). Digital Game-Based Learning. McGraw-Hill, New York. 1. 10.1145/950566.950567.

[3] Squire, K. (2003). Video games in education. Int. J. Intell. Games & Simulation, 2(1), 49-62.