

Hortari: a Gamification Application for Engaged Teaching and Learning in Higher Education

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Abstract - The primary purpose of this study is to create gamification application in both web and mobile to motivate and engage students in learning their lessons to a certain subject. The incorporation of gamification into classroom activities has shown positive results in terms of student's performance and productivity.

Incorporating lessons, creating syllabus, and integrating table of Specification are among the fundamental features of the application that made it distinctive to the other existing gamification application. Integrating Table of specification in the application helps the students to recognize main ideas, key skills, and the relationships among concepts more easily. Creating a detailed course syllabus showed connection between course goals and course requirements and have been found to be most effective in achieving positive student outcomes. The results of the test survey and evaluation form were analyzed and proved the effectiveness of usability and functionality of the application.

Keywords - Mobile App, Gamification, Syllabus, Table of Specification, Lessons

I. INTRODUCTION

Education has both social and cognitive roles. As a social role of Education, it provides a foundation to overcome human condition, poverty, vulnerability, inequality, and exclusion and offers solution in creating opportunities for a culture everyday life suitable with nature and so as in accordance with advancements human beings have achieved. In its cognitive role, education is one of the ingredients in making a social individual with enhanced mental, moral, and many other capabilities. These capabilities help a person acquire, use, and transfer knowledge and skills. Education can produce a generation of individuals who are better prepared for any career and can make greater contributions to society (Cagadas, 2013). It implies a discipline and development by means of study and learning.

However, there are some sort of critical issues in education today and these issues are important to education. One of these issues is student learning. According to Dewitt (2014), learning is one of the important matters in achieving student's success. Often teachers and educators focus on teaching but it is the learning that matters most. Human beings are unique among all living organisms in their primary adaptive specialization lies in identification with the process of learning.

Nowadays, students are no longer motivated to reach its highest potential particularly in educating oneself. Based on a review research from various sources, it was found that while existing efforts to increase student achievement are an important part of education reform, they have not focused enough on what it takes to motivate students in schools (Crotty, 2013). This is supported by ACS Distance Education (2011) stating that learning requires motivation. Educators and learners are the very important in the learning process. Thus, both must need to develop strategies to motivate each other during learning process, and its outcomes. Jan Plass (2013) claimed that games have the ability to visualize things of creating open-ended environments for people to explore things of engaging and motivating learners. In other words, game motivates learners. They are essential in delivering learning and to use data to help players understand how they are doing, what they need to work on and where to go next. Games are activities in which participants take part for enjoyment, competition, and learning (Lahri, 2015). Amy Paturel (2011) stated that people who played games especially in computer-games made decisions 25% faster than others without sacrificing accuracy. Research done by Dr. Arne May at Germany's University of Regensburg (2008) clearly shows that learning produces a demonstrable increase in brain's gray matter in mere weeks and brain scientists over the world agree that game's challenge-achievement-reward loop promotes the production of dopamine in the brain, reinforcing our desire to play. Study shows that playing games is a form of active learning and enhances visual and mental capabilities that provide students with opportunities to develop their skills, act freely, show competency, and work together (Hotz, 2012).

Nowadays we are surrounded by a wide range of concepts related to games that can be used with learning purposes and one of them is gamification. Gamification is the application of game-like mechanics to non-game entities to encourage a specific behavior.

It promotes competition and helps students track their own progress. A popular example of gamification is Deloitte's Leadership Academy, which uses rank, rewards, missions and leader boards as one of the ways to encourage its employees and client companies to log on, take courses and continue corporate training despite busy work schedules. Like most attempt to improve the system of learning, gamification has setbacks which is considerably significant. Despite of the motivation and encouragement that a gamification could give to its users, poor design of the game leads to disengagement and confusion (Bellotti et al, 2009). Moreover, Bellotti stated that some of the existing applications of gamification also do not meet the learning needs of all students. In addition, Adam Hollander (2014) proclaimed that the reason most gamification failed is because of lack of planning and strategy to the system. Ledda (2014) revealed that some of the reasons why existing applications in gamification failed is because the developer don't analyze the real needs of the users, what the learners do not know, what do the developers want the learners to do at the end of the course, and why use gamification for the goal of their company. In connection to the statement of Ledda, in creating a gamification, one must have to be able to visualize what type of gamer will be playing. One should also design the activities according to the knowledge they have about that topic and according to the learning outcomes.

The need to be able to distinguish the right content of the game in the Gamification greatly helps students in successfully driving their motivation and engagement in learning their lessons to a certain subject. The researchers created a tool that focuses on the necessary learnings that students must absorb.

II. METHODOLOGY

Fig. 1. shows, how to apply the table of specification in the application. The teacher needs to indicate the subject and the class name in creating a class. After which, the teacher have to upload the course syllabus first

then create his TOS. After creating the TOS, the teacher needs to upload his lessons before he can activate his class. The teacher has the privilege to monitor and manage his class, he can also upload the assessments he made and can view the students' grades. At the end of the semester, the teacher must deactivate his class.

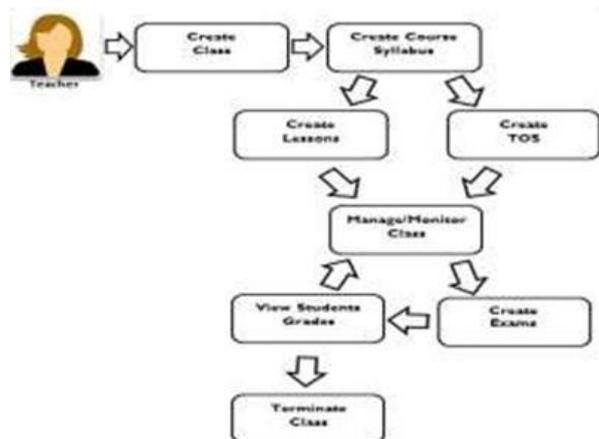


Fig. 1 Flow Diagram in Integrating Table of Specification

Fig. 2. shows, the general data flow of the Hortari application. The diagram illustrates the general process of the entity involve. The School administrator has the authority to input all the necessary data of the teacher together with his info to be registered in the application. The school admin can also view the teacher's information who registered the users. The teacher can also create class syllabus, table of specification, exams, and lessons. The teacher, who created the class can also track the student's progress report and student's grade especially those who enrolled in the class. The course syllabus will be the basis in creating the table of specification, syllabus needs class info to integrate table of specification in this class. The student can view exams and lessons of the class where he is registered. The student can also take exams and launch lessons together with his info to be generated in the application.

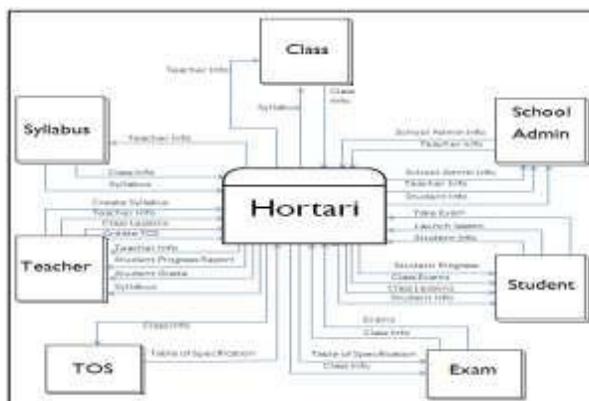


Fig. 2 Context Diagram of Hortari Application

Fig. 3. shows, the representation that defines the structure and behavior of the system. There are 3 users in the application, the school admin, the teacher and the student. It is where the school admin can Create, Read, Update and Delete in the system. The school admin also has the authority to add and register a teacher. While the teacher can create and manage his class, he can also view his class status. By the use of API, the student can join class and can view class update. Accessing the internet allows the users to access the data from the database. The user can also input data to the database.

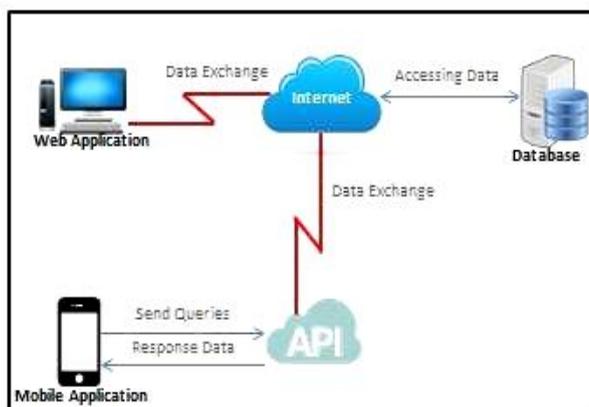


Fig. 3 System Architecture of the Hortari Application

III. HIGHLIGHTS OF FINDINGS AND DISCUSSION

The following features are the different screenshots of the Hortari Web and Mobile Application.

A. Hortari Web Application Interfaces for School Administrator

1) Manually Register a Teacher

Fig. 4. shows, how to register a teacher by the school admin. The fields namely: Department, email, and contact are the fields that a school admin must fill up before successfully registering a teacher.



Fig. 4 Screenshot of Registering a Teacher Manually

B. Hortari Web Application for Teacher

1) Add Class

Fig. 5. shows, how to add a class by the teacher. He must fill up the fields namely: Class Name, Description, and Subject before he can successfully add a class.



Fig. 5 Screenshot of Adding a Class

2) Updating a Class

Fig. 6. shows, how to update a class by the teacher. Updating a class include changing the class name, adding course syllabus, table of specification, and lessons.



Fig. 6 Screenshot of Updating a Class

3) Add Syllabus

Fig. 7. shows, how the fields are to be filled up by a teacher to add a syllabus. In adding a syllabus, course code, course title, unit credit, time allotment, prerequisite/s, course requirements, and course content must be filled up. An existing syllabus can be used, or otherwise create a new one.



Fig. 7 Screenshot of Adding Syllabus

4) Create Table of Specification (TOS)

Fig. 8. shows, the next step in creating a TOS. A teacher must input the percentage of the cognitive domain he added in TOS. All the fields must be necessarily filled up.



Fig. 8 Screenshot of Creating TOS

5) Create Class Lessons

Fig. 9. shows, how to create class lessons. By clicking the button Add a lesson, the

teacher will be able to add new lesson to his class. There are maximum of 50 points in one topic. The points will be used and get by the student who will open and tackle the lesson.



Fig. 9 Screenshot of Creating Class Lessons

C. Hortari Mobile Application Interfaces for Student

1) Input Student Class Key

Fig. 10. shows, the second landing page of the student. After filling up his information, he must enter a class key given by his teacher to enter a class.



Fig. 10 Screenshot of Inputting Student Class Key

2) Student Class Dashboard

Fig. 11. shows, the class dashboard which the student can take lessons, view announcements and Leaderboards are among the privileges of the student inside his class. By clicking the button take lesson, a student will proceed to the game he must play. By clicking the button announcements, student can view announcements if there are any announcements given by the teacher. Leaderboards displays the lists of players in

order of their scores.



Fig. 11 Screenshot of Student Class Dashboard

3) The Game

Fig. 12. shows, the environment of the game play. Inside the game, a student will find all the books and read the content. Each book he finds has corresponding points.

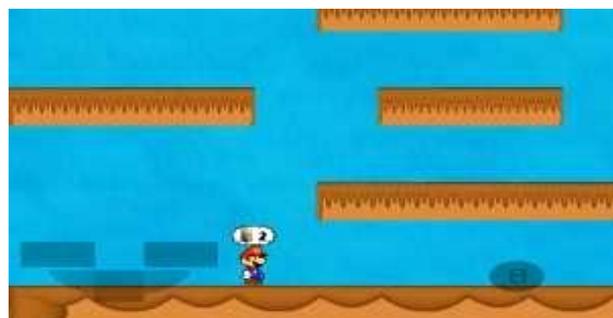


Fig. 12 Screenshots of the Game

D. System Evaluation

Table I shows the result of the test survey and evaluation form in evaluating the usability of mobile evaluated by students. Thirty (30) students evaluated the application. As shown in the table, 67% of the respondents strongly agree that they are satisfied with the mobile app. 50% strongly agree that the interface of the application was pleasant. 47% found the application very engaging specially the game. 43% of the respondents felt very confident in using the app. 60% strongly agree that most people would learn to use the mobile application very quickly. 53% agree that the various functions in this mobile app were well integrated.

TABLE I
USABILITY EVALUATION RESULT IN MOBILE

No.	Criteria	n	Strongly Disagree	Disagree	Fair	Agree	Strongly Agree	Total
1	I think that I would like to use this mobile application frequently.	30	13%	23%	7%	40%	17%	100%
2	I found the mobile application unnecessarily complex.	30	7%	3%	70%	17%	3%	100%
3	I thought the mobile app was easy to use.	30	13%	7%	13%	20%	47%	100%
4	I think that I would need assistance to be able to use this mobile app	30	50%	20%	23%	7%	0%	100%
5	I found the various functions in this mobile app were well integrated.	30	0%	7%	13%	53%	27%	100%
6	I thought there was too much inconsistency in this mobile app.	30	70%	0%	17%	13%	0%	100%
7	I would imagine that most people would learn to use this mobile app very quickly.	30	0%	0%	10%	30%	60%	100%
8	I found this mobile app very cumbersome to use.	30	60%	0%	33%	7%	0%	100%
9	I felt very confident using the mobile app.	30	0%	0%	17%	40%	43%	100%
10	I needed to learn a lot of things before I could get going with this mobile app.	30	30%	0%	53%	13%	3%	100%
11	I found the application very engaging specially the game.	30	0%	0%	13%	47%	40%	100%
12	The interface of the application was pleasant.	30	0%	0%	3%	40%	57%	100%
13	Overall, I am satisfied with this Mobile app	30	0%	0%	3%	30%	67%	100%

Table II shows the result of the test survey and evaluation form in evaluating the functionality of mobile evaluated by three (3) experts. 2 out of 3 experts agree that the game respond according to its instructions. Majority of the experts also agree that the buttons and other major transactions in the system respond according to their functions like taking lessons and viewing announcements and leaderboards.

TABLE II
FUNCTIONALITY EVALUATION
RESULT IN MOBILE

No.	Criteria	Remarks
1	Do clickable items stylistically indicate that they are clickable?	Yes
2	Do the buttons respond according to their functions?	Yes
3	Does the user can log proper username and password based on their accounts?	Yes
4	Is it readable? Consider type face, font size, color contrast.	No
5	Does the page load quickly for mobile users?	Yes
6	Does the user able to take lesson successfully?	Yes
7	Does the user able to view announcements?	Yes
8	Does the user able to view leaderboards?	Yes
9	Does the game respond according to its instructions?	Yes
10	Is the application free from errors?	No

IV. CONCLUSIONS

The Hortari Gamification Application has undergone tests to know whether the problems of existing gamification applications have been resolved and the objectives of the study have been met and gather information on the outlook of the user about the usability and functionality of the proposed application.

Thirty respondents evaluated the usability of the mobile application. Based on the result, majority of the respondents strongly agree that they are satisfied with the application. Fifteen respondents evaluated web application's usability and majority of them strongly agree that they would become productive in using the application. On the other side, 3 experts evaluated the mobile application's functionality. Sixty-six percent of them said that they were able to take lessons, view leaderboards and announcements, and play game.

After revealing the result, the application clearly shows that it answers to the objectives of the student. By integrating table of specification in the system, it is proven that the knowledge and learning of the students are directly linked to the learning that the subject must provide to the students.

V. RECOMMENDATIONS

The results on the dry run of the Hortari Gamification application; the proponents can say that the proposed application lacks some functions that can cater all the needs of the respondents. Therefore, it is highly recommended that the application will continuously be modified to best fit the needs of the respondents.

Hortari Gamification Application recommendations are as follows:

1. The syllabus will be update in any time without affecting the data that the TOS used.
2. The system will able to upload csv and excel to register students.
3. Improve the functionality in calculating TOS.
4. There will be social interactions in the system (e.g. forum, grading system).

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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