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Experimental Results on the Integration of MMOG's Elements and Instructional Design Criteria into Mobile Learning

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Abstract

We have developed a prototype system of integrating immersive elements from Massive Multiplayer Online Game (MMOG) and systematic principles of Instructional Design Methodology (ID) into Mobile learning (M-learning), in order to counter M-learning's preceding problems of low motivational level towards learning and weak standards to deliver the learning environment. This paper reports on the experiment results of testing the prototype system with students of Waseda University and Malaysian volunteers.

1. Introduction

In today's world, Mobile learning (M-learning) concept had been known as the next growth of E-learning. However, M-learning is still rated by many to be in its early life stage and endured many problems similar to its predecessor, in a much exacerbated level due to today's limited technological capacity [1], mainly on issues of motivation insufficiency and lack of a generic concrete framework. Our research is to tackle these foregoing problems by proposing the dual-integrations of Massive Multiplayer Online Games (MMOG) technology and Instructional Design (ID) methodology as the solution.

The paper begins by focusing on the selected functionality of MMOG and ID integrated into the prototype system, clarified with related literature reviews of past researches. This is followed by explanations of the experiment sessions conducted to compare the rate of motivational and learning efficiency between an ever-proposed M-learning system and the proposed prototype system. The paper also discuss in detail on the results gained from the experiment, highlighting the rate of effectiveness of the proposed system over its conventional counterparts for a mobile learning environment. The paper closes with conclusion of the issues of the obtained results and comparison discussion, together with on-going future works.

2. Literature Reviews

The two focused M-learning problems mentioned in this research is in calamitous need of a concrete solution as these 'wireless mobile technologies for education' are still incredibly diverse and incompatible to fully achieve a large scale impact on learning [2]. Nokia had even advised a number of usability principles due to the lack of prescribed instructional design strategies and principles in M-learning standards today [3].

Games technology had always been linked with researches on motivations since E-learning and the same integration interest had attracted researchers for M-learning [4] [5]. However, most of these researches are not entirely focused improving the learning standards, especially for higher education institutions level [4]. For this reason, principles and methodologies especially for using games to maintain their engagement aspect in the learning environment need to be further researched and established [6].

One of the most well-known game genres that can deliver such engagement and immersive values is the MMOG [7] which is one of the primary focuses of our research. The integration of instructional content had also been noted as one of the significant principles that should be taken into account during educational considerations of M-learning [8]. Thus our research is to design and develop a pertinent learning environment, based on sound pedagogical principles that will ensure the optimization in the M-learning environment [9] and test it with our volunteers.

3. The developed prototype system

We have developed 2 types of systems, one is the ever-proposed system (or typical conventional M-learning system) and the other is our proposed system. The Ever-Proposed system is developed mainly focusing on the primary elements of a common mobile learning system, while the proposed system, to be referred to as MMOM (Massive Multiplayer Online M-learning) is developed by previous research analysis on the improvement of the common mobile learning system by integrating it with selected components of MMOG and ID.

3.1 Ever-Proposed M-learning System

The basic functions of the Ever-Proposed system are divided into categories of Courseworks, Forum, Email, Chat and Schedule. These functions are the most generally used processes in almost any academically completed mobile learning system [10]. For starters, the Coursework category allows the students to read lecture notes, do classworks, homeworks and exams, as well as submitting them to the lecturers via upload and receiving back their results. The Discussion Forum on the other hand, is a common form of communicating with one person to another in the entire cycle of mobile learning. It allows students to submit their threads about a questions or topic of discussion on the system and reply to other threads. The Email system functions by allowing emails to be sent and stored sent emails in an Outbox folder, and received emails in the Inbox folder. The Chat system behaves as any typical online messenger systems, whereby the users are able to send and received messages between one another. Finally, the Schedule is a viewable-only content page to show the timetable that the student needs to follow for their next class.

3.2 Proposed MMOM System

As stated, the proposed system was developed as an enhancement to the conventional system, thus some of the functions are modified to be better, while the rest are newly added on. They had been divided into 2 essential parts: the *MMOG aspects*, and the *Switch*

Views. The MMOG aspects consist of Game-based Interaction (Animated Avatars, Bubble-Chat and Interactive Collaboration), Immersive Interface (Game-based interface and Free-roaming 2D graphic environment), Gameplay Control, and the Reward System. As for the Switch Views elements, it consists of Interact Menu, Email Menu, Discussion Forum Menu, Blackboard Menu, Coursework Menu, Personal Record Menu, Schedule Menu, and Reward Menu.

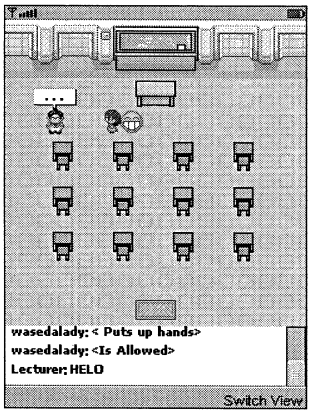

Fig. 1 - The Proposed MMOM System, featuring examples of animated avatars, bubble-chat, interactive collaboration, game-based interface, and free-roaming 2D graphic environment

Animated Avatars: Upon using the proposed system, each student is able to personalize an 'avatar' to represent their own self inside the learning environment. These avatars can be selected from either a boy or a girl, and users will be able to move around the learning environment and interact with other student's avatars.

Bubble-Chat: Whenever a student had send a chat message to another person in the learning environment, there will be a 'comic-bubble' displayed on top of their avatar. This display lets other users in the classroom knows that the person had sent a message, and it is shown in the chat area at the bottom of the classroom. *Ragnarok Online* [11], a popular Asian MMOG, had implemented this feature for their player's usage. This feature promptly saves the space in displaying long message in the learning environment.

Interactive Collaboration: By means of using avatars, students will be able to move around in the classroom and interact with one another using not only just via chatting, but also using the provided *emoticons*. Emoticons are symbol or combination of symbols used to convey emotional content in written or message form. We had developed 4 different emoticons for the student's usage, which are a *Smiley* (to indicate a happy moment), a *Thumb Up* (to indicate a good job or agreement), a *Thumb Down* (to indicate a bad job or disagreement), and an *Open Hand* (to indicate saying a Hello, or raising a hand to ask a question). The lecturer's voice is also able to be heard by automatic-play during classroom sessions to add in more interactivity, meaning that if the students have any questions, they are able to ask from the lecturer via chatting.

Game-based interface: The classroom was designed by means of simulating a 2-dimensional interface that was used by many popular MMOGs. The lively big classroom and vibrant colors utilized in those games had added the touch of 'fun' instead of a real-life actual classroom where students perceive it as a place of 'no-fun' to go to.

Free-roaming 2D graphic environment: In addition to the game-based classroom, students are able to move freely in the classroom using their avatars and

interactive emoticons. Adding in more elements aside the classroom, the level of immersive for the environment is extended as students are also able to move freely outside of the classroom towards a pathway leading to the Reward Shop and to a door to exit the proposed system.

Gameplay control: This feature was derived from the standard controls of almost any videogames controllers today, including MMOG, which is the 'Up, Down, Left, Right' directional movements. In our learning environment, students are able to move their avatars around the classroom using these movements when they press the buttons on the directional-pad of the mobile device. Besides that, by keying in selected buttons, students are able to bring out the emoticons to show their graphical emotions. These elements are quite popular, standard factor to interact in today's top MMOGs.

Fig. 2 – The Reward Shop (part of the Reward System) where students can buy their items

Reward System: This feature focus on the Coursework functions of the proposed system. In the conventional M-learning system, once a student had submitted their completed classwork or homework, they will receive their results, and the whole process stops there. Eventually this process will repeat again on future classwork/homework. As for our proposed system however, directly when the students receive their results, they will also receive a bonus called Reward Points. These reward points are awarded in align to their received results point (if they answered 5 correct questions, they will receive 5 reward points). The function of these reward points is to allow the students to buy more in-system items such as clothes and hats, in order to customize their avatars to be more attractive than the default looks when they first registered to the system.

Interact Menu: This consist of two parts whereby the user is able to interact using the public chat or private chat. In the Public Chat, whenever the student posted a message, it will be displayed in the public chat bar for everyone to read, whereas in the Private Chat, the student is able to select any of the other available students in the classroom and chat with them in a private session without other people's interference.

Blackboard Menu: Students are able to select from two options for this feature; to enter as a User of the Blackboard, or to enter as a Viewer of the Blackboard. Upon entering as a User, students are able to fully utilize the functions to draw and write on the screen via the provided tools. The tool also allows the students to erase the contents, as well as choosing a color to draw. As a Viewer, students are able to view what had been drawn by the previous User on the screen.

Personal Record Menu: This is a viewable screen that automatically

updates the student's information on their studies record. The records include name, gender, classwork/homework points, exam points, reward points, and the number of classwork/homework left uncompleted.

Reward Menu: As mentioned, the reward points will be given upon the number of correct answers accumulated from answering questions of classwork, homeworks and examinations. In this menu, there are two options provided, which are 'My Rewards' and 'Reward Shop'. In My Rewards option, students are able to view all the reward items that they have acquired from buying at the Reward Shop. As for Reward Shop option, it is a direct entrance function into the Reward Shop instead of walking from outside the classroom (this function was implemented to ease the experiment session).

Email, Discussion Forum, Coursework, and Schedule Menus: These functions are the same as in the conventional M-learning system. A research had been conducted previously stating that even if learning is to be provided in game-based adaptation, it is essential to include other elements (educational or motivating) in order to strengthen the quality of learning [12].

4. Experiment Procedures

The experiment was conducted from February 2008 until June 2008. The volunteer testers comprised of students from Waseda University and Malaysian individuals. The testers were required to sign a memorandum as well as providing brief background information regarding themselves in regards to gaming and mobile learning. They were also given an instructional manual on how to perform the testing via explaining the functionalities of the developed prototype, including the author's previous research papers as reference reading.

The experiment consists of testing two applications: an ever-proposed system of M-learning, and the proposed system. In the beginning, testers were required to register their User ID, Password and Level of User (Student B for boy/male and Student G for girl/female), and these information were required to be written down in their questionnaire forms that were given shortly during the experiment. The experiment starts by introducing the ever-proposed system, which is divided into basic elements of a common mobile learning system, namely Courseworks, Chats, Forum, Email and Schedule. The testers are explained on how each of these functions works and how it relates to the experiment, whereby it will later be used as the point of comparison to the proposed system.

In the next stage of the experiment, the testers were introduced to the proposed system, which consists of the Classroom and the Switch View functions. Again, the testers were elaborated on the functions, specifically focus on the motivational factors as well as the efficiency issues on delivering the learning to the students. The explanation is conducted via practical demonstration on how these functions works. This allows the testers to test the functions and ask questions during the explanation. Once all the details had been explained, the testers are then allowed to explore and test on their own of all the functions in the proposed system as much as they

want. During their time of testing on their own, they are also given the questionnaire forms for them to fill in. In doing so, if there are certain functions that they do not understand, they are able to test back the system or ask from the authors. The experiment ends once they had completed the questionnaires.

6. Analysis Discussion on MMOM Results in Comparison to Ever-Proposed M-learning System

Even though all the testers own a mobile phone, with 70% of them having prior gaming experience, 50% to 60% of them never had any mobile learning or actual MMOG experience. Upon experimenting on both the ever-proposed system and the MMOM proposed system, we are able to analyze their feedback on the applications in a comparison perspective of the systems functions, its motivational values, and its usefulness.

6.1 User Friendliness

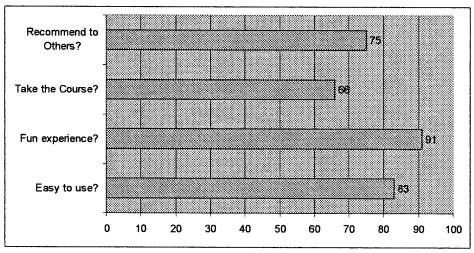

Fig. 3 – Result of User Friendliness

Almost 60%-90% of the testers had concluded that our MMOM system promotes user friendliness aspects by means of easy to use and fun experience, as well as considering on taking the course plus recommending it to their contacts.

6.2 Educational Competences

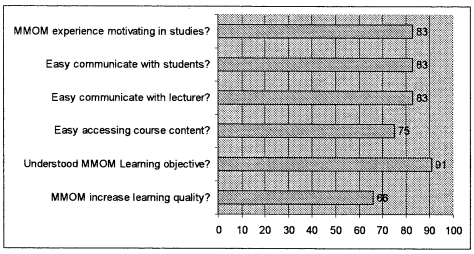

Fig. 4 – Result of Educational Competences

Similar encouraging feedback had also been obtained on measuring the quality of learning for our proposed system. At the rate of 60%-90% of the students supports the MMOM in the issues of quality of learning, easiness of accessibility as well as motivational experiences during the testing period. In conjunction to the issue, the instructions given in the MMOM is fully grasped by the student to ease their learning.

6.3 Technical Practicability

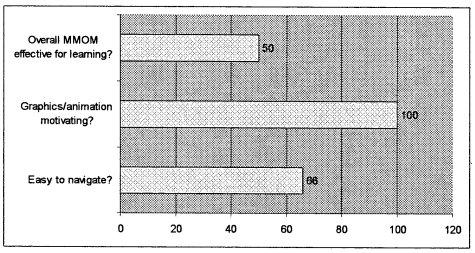

Fig. 5 – Result of Technical Practicability

Again, 50%-100% of the students gave positive feedback and found that the navigation was fairly easy to use. Added with motivating graphics and animations, controls in the MMOM had given the results from the students that it is very effective for mobile learning.

6.4 Avatar Movements

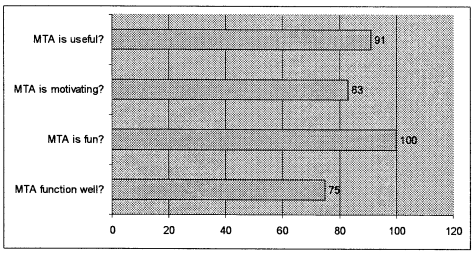

Fig. 6 – Result of Moving the Avatar (MTA)

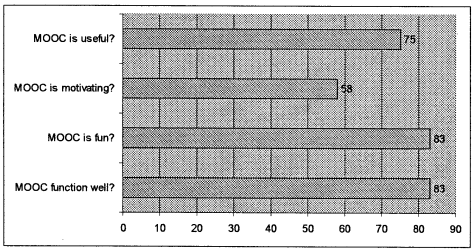

Fig.7 – Result of Moving Outside the Classroom (MOOC)

From the results shown in Fig. 6, the MMOG element integration with instructional functionality methods had given not only encouraging results on the issue of increase motivational of learning but also its level of usefulness. As we start on the issues of moving the avatar (MTA), almost 70%-100% of the students establish high level of interest towards the function. Fig. 7 shows 50%-80% of the students had also express full attention on the elements of moving outside of classroom (MOOC).

6.5 Emoticons, Bubble-Chats, & Voice

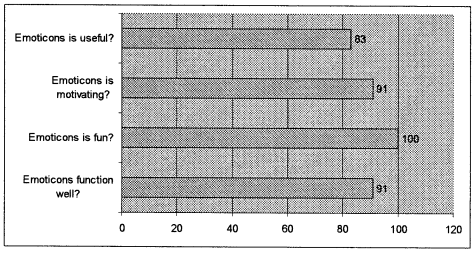

Fig. 8 – Result of Emoticon

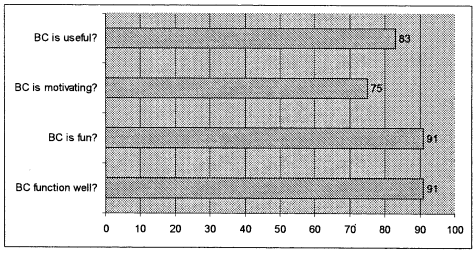

Fig.9 – Result of Bubble-Chats

The interactivity with other students in the MMOM had also peak the student's focus with the addition of emoticons and bubble-chats. Great results had been achieved from these integrations, whereby 80%-100% of the students support the usefulness and immersive points of using the emoticons, while the same aspects reached a high 70%-90% rate for the Bubble-Chats.

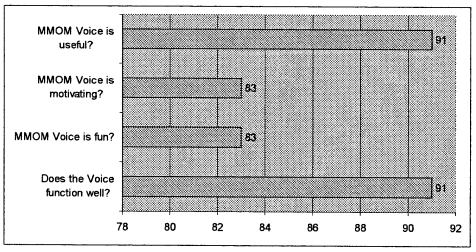

Fig. 10 - Result of Voice

The Voice element however only manages to gain 80%-90% of positive feedback from the students. Although still regarded as a good addition, students, we assume that the students had been too accustomed to the usage of the mobile phone itself as a tool to talk that it did not have enough motivation to offer.

6.6 Blackboard

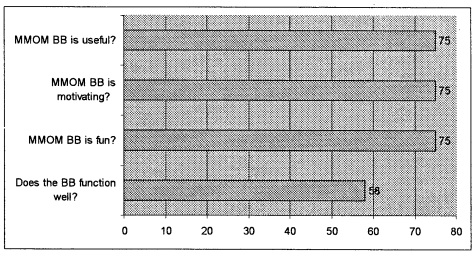

Fig. 11 – Result of Blackboard

The Blackboard system had gained considerable interests from the student's feedback, as the interactivity of utilizing the tools and viewing the creation using the tools is very attractive. However, on reviewing, students had given 50%-70% of their feedback, concerning themselves on the long method of using the tools.

6.7 Reward System

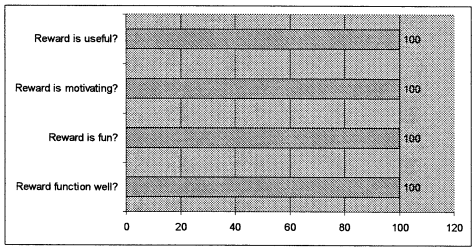

Fig. 12 – Result of Reward System

The Reward system is by far the most highly regarded elements in the entire MMOM system. With a whooping 100% positive feedback, students had acknowledged that this add-on had significantly increased their level of interest to do their coursework due to the attractive MMOG feature.

7. Conclusion and Future Work

The results obtained from the experiments had been very encouraging in the field of our research, but there are still much open roads for improvements. Possible improvements are the aspects of each individual functions such as the questions of increasing the motivational values of Discussion Forum, Teaching Materials and more. This also includes the core focus of future experiments on real-classroom scenario over long periods to compare the academic results between the conventional M-learning systems to our proposed MMOM system. There is no doubt that MMOM can be generically tailored into many fields of today's higher institutions.

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