

F-035

# Evaluation Analysis of a Game-based and Instructional Designed Mobile Learning System

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## 1. Introduction

An experiment had been conducted on the studies of implementing Massive Multiplayer Online Game (MMOG) elements and Instructional Design Methodology (ID) into Mobile Learning (M-learning) with Waseda University's students and Malaysian volunteers, in order to counter M-learning's preceding problems on low motivational level of learning and weak standards to deliver the learning environment [1]. This paper reports on the evaluation analysis of the experiment results, focusing on the issues of evaluation strategies from the educational aspect and heuristic assessment to highlight its rate of effectiveness over a conventional mobile learning system, as well as suggestions for future work's improvements.

## 2. Experiment Procedures

In order for the experiment to be conducted, 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 MMOM system. The Ever-Proposed system is developed primarily focusing on the key elements of a common mobile learning system, while the proposed MMOM system (Massive Multiplayer Online M-learning) is developed by the preceding research study on the enhancement of the common mobile learning system by integrating it with selected components of MMOG and ID.

The experiment begins by introducing the ever-proposed system (as shown in Figure 1) and explaining its functions, which is separated into fundamental elements of a common mobile learning system, namely Courseworks, Chats, Forum, Email and Schedule.



Fig. 1 The Ever-Proposed System with functions such as Courseworks, Chat, Forums, Email and Schedule

The next step is that the testers were introduced to the proposed MMOM system (as shown in Figure 2), whereby it consists of the Classroom and the Switch View functions.

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Once again, the testers were detailed on the functionalities, distinctively focused on the motivational issues as well as the efficiency concerns on delivering the learning to the students.



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

Throughout their point of testing on their own, they were also given the questionnaire forms for them to fill in. In doing so, if there have been certain functions that they do not comprehend, they were able to experiment back the usability of the system [2].

## 3. End Results and Analysis Discussion

Although all the testers possess a cell phone, with 70% of them having prior gaming experience, 50% to 60% of them have no experience on any mobile learning before. From the experiments conducted, we are able to examine their feedback on the applications in an assessment standpoint of the systems functions, its motivational values, and its usefulness.

### 3.1 General Issues

User Friendliness	Yes	No
Recommend to Others?	75%	25%
Take the Course?	66%	34%
Fun Experience?	91%	9%
Easy to Use?	83%	17%

Fig. 3 User Friendliness Results from Experiment

From Figure 3, approximately 60% - 90% of the testers had positively expressed that our MMOM system promotes better user friendliness by means of easy to use and fun experience, over and above considering on taking the course plus recommending it to all of their contacts. By adapting the MMOG style to allow players to play at ease, the similar instructions were practically appreciated by the testers in our proposed system.

Educational Competence	Yes	No
MMOM experience: Motivating in Studies?	83%	17%
Easy Communicate with Students?	83%	17%
Easy Communicate with Lecturers?	83%	17%
Easy Accessing Course Contents?	75%	25%
Understood MMOM Learning Objective?	91%	9%
MMOM Increase Learning Quality?	66%	34%

Fig. 4 Educational Competence Results from Experiment

Comparable great feedback had also been attained on measuring the quality of learning for our proposed system as shown in Figure 4. From the measurement, 60% - 90% of the students support the MMOM in the matter of quality of learning, simplicity of accessibility, as well as motivational experiences during the testing period. In concurrence to the subject, the instructions provided in the MMOM are fully understood by the testers to ease their learning.

Technical Practicability	Yes	No
Easy to navigate?	66%	34%
Graphics/animation motivating?	100%	0%
Overall MMOM Effective for learning?	50%	50%

Fig. 5 Technical Practicability Results from Experiment

From the Technical Practicability issue in Figure 5, 66% of the students gave positive feedback and found that the navigation was fairly easy to use. However, even with the added with motivating graphics and animations that received 100% full good support, only 50% of the testers concluded that the overall proposed MMOM system is effective for learning. For rectification, we will continue our research on the improvement of the system for a much better result in the future.

### 3.2 MMOM Features Results

Avatar Movements	Yes	No
Is it Fun?	100%	0%
Is it Motivating?	83%	17%
Is it Useful for Learning?	91%	9%

Fig. 6 Avatar Movements Results from Experiment

Judging from the outcomes shown in Fig. 6, the feedback received had not only encouraging results on the issue of better motivational of learning but also its level of usefulness. Almost 70% - 100% of the students establish high level of interest towards the avatar movements feature.

Moving Outside the Classroom	Yes	No
Is it Fun?	83%	17%
Is it Motivating?	58%	42%
Is it Useful for Learning?	75%	25%

Fig. 7 Moving Out of Classroom Results from Experiment

Similar progressive results are also received at 50% - 80% from the students who had express full attention on the elements of moving outside of classroom (MOOC). Although the fun factor of unrestricted to just the classroom had taken a particular interest by the testers by the rate of 83%, only a low 58% of them had decided that it is motivating for learning. More research is indeed in needs to be covered in this area to include further elements on increasing the motivation of learning.

Emoticons	Yes	No
Is it Fun?	100%	0%
Is it Motivating?	91%	9%
Is it Useful for Learning?	83%	17%

Fig.8 Emoticons Results from Experiment

Bubble-Chat	Yes	No
Is it Fun?	91%	9%
Is it Motivating?	75%	25%
Is it Useful for Learning?	83%	17%

Fig.9 Bubble-Chat Results from Experiment

Real-time interactivity with other fellow testers in the proposed system had also peak their interest through the inclusion of emoticons and bubble-chats features. 80% - 100% of the testers support the usefulness and immersive factors of utilizing the emoticons, while the same aspects reached a high 70% - 90% rate for the Bubble-Chats.

Voice Element	Yes	No
Is it Fun?	83%	17%
Is it Motivating?	83%	17%
Is it Useful for Learning?	91%	9%

Fig. 10 Voice Element Results from Experiment

The Voice element had also received good reviews by gaining 80% - 90% of positive feedback from the testers. However, although still regarded as a good addition, we assume that the testers who voted 'No' for this section 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.

Blackboard	Yes	No
Is it Fun?	75%	25%
Is it Motivating?	75%	25%
Is it Useful for Learning?	75%	25%

Fig. 11 Blackboard Result from Experiment

Significant interest had been gained from the Blackboard system from the tester's feedback, as the interactivity of using the tools and viewing the creation using the tools is at the core of eye-catching as well as importance towards relaying lecture materials to them. High positive rates of 75% were concluded that the Blackboard element is fun, motivating and especially useful for learning, due to its function's near similarity to a real blackboard.

Reward System	Yes	No
Is it Fun?	100%	0%
Is it Motivating?	100%	0%
Is it Useful for Learning?	100%	0%

Fig. 12 Reward System Result from Experiment

The most highly regarded elements in the entire MMOM system by far is the Reward system. At an astounding 100% rate of good reviews, testers had recognized that this feature had extensively amplified their level of interest to do their coursework due to the attractive MMOG feature.

### 4. Conclusion and Future Works

The finalized results obtained from the experiments have been very heartening in our research field, but there are still much open roads for improvements. It also includes the center 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.

### 5. References

- [1] Md Khalid, M.F. and Kameyama W.(2007). Efficient Interaction Tool for M-learning Using MMOG Technology. 情報処理学会研究報告.情報学基礎研究会報告, IPSJ SIG Notes, Vol.2007, No.34, pg. 69-74.
- [2] Reeves, T. C., Benson, L., Elliot, D., Grant, M., Holschuh, D., Kim, B., Kim, H., Lauber, E., & Loh, S. (2002). Usability & instructional design heuristics for e-learning evaluation. ED-MEDIA 2002: Proceedings of World Conference on Educational Multimedia, Hypermedia & Telecommunications. Denver: June 24-29.