

Feasibility Study of Gamification in Primary School Curriculum Design in Hong Kong

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Abstract

Grew up with digital technology, primary school students expect education should be immersed into ICT and STEM. According to a recent local research conducted by The University of Hong Kong, students are addicted to gaming, spending more than three days per week on average. To steer students back to study, curriculum design needs to be reformed to be more attractive. The aim of the current work is to study and present the benefits of adding game elements into the current curriculum, such as increasing the motivation and engagement of students. The methodology used in this study is via a control experiment, which lasts for one semester. One class of students use the traditional curriculum, while another class uses gamified curriculum design, which the curriculum elements such as assignments, quizzes, and examinations are re-designed to become quest-based. Depending on the performance of students, each quest can reward students with game scores and certain single-use perks, such as privileges to extend the deadline of homework for one day. Without needed to wait for their classmates, students can finish a quest and start another if the prerequisites, such as completed related lecture, have been met. At the end of the semester, the effectiveness of the gamified curriculum design can be reviewed by comparing the performance changes of two classes of students. The experiment can as well be re-run and extended to a wider base of test subjects to obtain more accurate results. We hope that this study will give insights to future curriculum reform.

Keywords: Gamification, Class participation, Curriculum reform, game-based learning

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Introduction

Students in Hong Kong are grown up with Information and Communication Technology (ICT); smartphones and tablets are the primary entertainment source since their childhood. At the same time, their schools are encouraged by the Hong Kong government to start offering Science, Technology, Engineering, and Mathematics (STEM) in recent years.

However, traditional curriculum lacks playful elements, only focuses on academic performance. Students tend to recite answers instead of learning the knowledge behind the assignments, quiz, and examinations. Such a result-oriented approach makes students and parents stressful. There are quite a number of student suicides recently; more than 10 students killed themselves in the last two years. The situation has to be remedied.

Gaming is proven to be an effective learning medium to educate students in the last decade [1]. However, excessive gaming will drive students away from study. In a recent local research conducted by The University of Hong Kong [2], upper primary school students are extremely addicted to gaming and lose focus on study.

Over two thousand primary four to six students from eight schools participated in the study. In average students play video games more than 8 hours per week; about 14% of respondents play more than 21 hours per week, which is more than 3 hours per day. The research only counts the video gaming time, excluding other entertainment such as watching YouTube and television. The students have insufficient time to study and rest. The phenomenon is indeed alarming.

Gaming addiction can lead to very serious problems. From the Diagnostic and Statistical Manual for Mental Disorders, fifth edition [3], authored by the American Psychiatric Association, gaming addiction refers to uncontrollable and persistent engaging in gaming, leading to significant impairment.

The problem is propagating, as it does not take long for these students to enter higher education. Curriculum gets more difficult in higher education levels, students will lose focus on study.

Traditional teaching method in Hong Kong has a general impression of boring, repetitive and examination-oriented. Students always struggle not to lose focus on study, especially when there is a lot of entertainment around them in Hong Kong.

It is suggested that the current curriculum should be redesigned to become as attractive as video gaming, to steer students' interest back to study.

The aim of the study is to study and present the benefits of adding game elements into the current curriculum, in order to increase motivation and engagement of students.

Methodology

The methodology used in this study is through a control experiment. Duration of experiment lasts for two semesters, four months each. The experiment will take part in primary schools. For the sake of fairness, students will be randomly split into two groups. The first group will take part in the newly gamified curriculum, while another group takes part in the traditional

curriculum. At the end of the first semester, two groups will exchange curriculum methods in order to have more accurate results.

The first stage of the gamified curriculum changes the assignments, quizzes, and examination of students' Mathematics subject into quests.

In the traditional curriculum, after teacher teaches a topic, he/she will give out an assignment for students. Once the assignment is finished, the teacher will proceed to teach the next topic. Then, usually in the middle of the semester, there will be a quiz followed by an examination near the end of the semester. Student performance is evaluated by the accuracy of the assignments, quiz, and examination, in terms of marks.

In the gamified curriculum, teacher will announce a list of Quests, which has similar contents as the assignments of the traditional curriculum, to students. Some quests may have no requirements, that means that students can start and finish the quest at anytime they want; while some quests have prerequisites, such as students have to clear two other quests in order to start these quests. With this approach, students can learn time management as well.

Once students with fast learning pace have completed all standard quests, some bonus difficult quests with extra rewards will be unlocked, which requires students to team up with their classmates in order to complete the task. Such tasks not only can encourage them to take up tough challenges, but it can also train up the teamwork and leadership ability of primary school students. Students with slower learning pace can still finish all standard quests with the guidance of teachers. In such curriculum design, fast learning students do not require to wait for other students to start learning new knowledge. Additionally, teachers can issue limited-time Quests to students, for students to challenge and obtain additional rewards.

After finishing a quest, students will be rewarded with Quests Scores, which is the primary currency of the gamified curriculum. If a student performs well in a Quest, he/she will be rewarded with certain single-use perks, such as privilege to extend the deadline for one day.

There are two kinds of quest rewards: Quest Score and Perks. Quest Score is the primary key to rank students' performance. If the student finished a quest earlier than the deadline, he/she will earn extra Quest Scores; on the other hand, if the student finished a Quest accurately, he/she will earn more Quest Scores.

Perks are single-use special abilities. Students can only earn perks when they finished a Quest with excellent results. Some suggested perks are as follows:

- Extend the deadline for one day
- Double Quest Score for one Quest
- Unlock bonus Quest

Student performances are recorded on a web-based platform. Teachers, students, and parents can monitor the performance as well as completed and ongoing quests online, anytime and anywhere. Moreover, a leaderboard that displays a list of top students can be set up and displayed in school to encourage students to strive for the best among their classmates.

To review the performance of the gamified curriculum, the academic performance of both groups of students will be compared to review the effectiveness at the end of each semester.

Review metrics include the willingness of study, happiness throughout the study experience, and the problems encountered during the study. Reviews will be performed in a short interview as well as a questionnaire to the participating students.

To obtain more accurate results, the whole experiment can be re-run and extended to:

1. a wider base of test subjects, such that more primary schools can participate;
2. a wider spectrum of subjects, such as science subjects; and
3. secondary school and tertiary education students.

Furthermore, with the aid of modern technology, the gamified system can be integrated with existing Learning Management Systems (LMS) to provide seamless e-learning experience to the students.

Apart from web-based systems, a mobile companion app can be developed to allow students to keep track of their progresses when they are out of campus, and allow them to team up with other classmates; to facilitate constructive communication, students in the same team can communicate with each other using the built-in messaging feature. The app is also capable of delivering notifications to notify students once a limited-time Quest is available for them to complete.

Conclusions

On the whole, it is hoped that the feasibility study of gamification of primary school curriculum design in Hong Kong elaborated above can give meaningful insights into the future curriculum reform and help alleviate the situation of students losing focus on their study currently faced by teachers and parents.

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