

Application of Role-playing Game Strategies in Teaching and Learning High School Physics

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Abstract

This research aimed to develop the instructional activities package based on the concept of Gamification education on rotational motion topic. The sample group, consisted of 29 students in grade 10th at Sisaket Wittayalai School, Sisaket province during the semester 2 of academic year 2014, was selected by volunteer sampling. The research applied the one group pretest-posttest design. The research instruments included the instructional activities package, the lesson plan, and the achievement test. The results shown that the instructional activities package based on the concept of Gamification education on rotational motion was efficient at 85.87/88.15. Learning activity which attracted the students the most had the higher average score after studying than the one before studying with the statistic significant .05 and the high level of learning progress at 0.74.

Keywords: Gamification, Rotational Motion, Achievement Test

Introduction

The information and communication technology survey on household from National Statistical Office disclosed that ‘Thai teenagers spent time on playing online games on computer and mobile phone and other devices 60.7 minutes a day, in an average which was the highest rank in Asia, and seemed to spend more time in the future’[1]. If the outstanding character of the online games could be applied in the teaching and learning process, it would help increasing the students’ learning achievement and progress. One of the online games which is very popular is Role-playing game: RPG which the players play the role of the character in the game. The rule is to collect the experience points, score points, badges, levels, leaderboard, and challenges which corresponds with ‘the teaching and learning development in The Challenge to Gamification of Education’[2]. The online survey of Playbasis, the Singapore Startup company, with 500 participants during 19 June to 1 July 2014 showed that Thai consumers were interested on Gamification, particularly in purchasing brand name products and service to collect the points. 88% of them decided to purchase brand name products with the collected points while only 12% of them did not considered the point. 85% selected the brand name products with gamification although it had a high price whereas 15% chose the general brands products with the reasonable price.

In short, Thai consumers who were get used to collecting points for the premiums responded to the Gamification concept in high level. From this reason, the researcher aimed to develop the instructional

activities package based on the concept of Gamification education on rotational motion.

Definition of Term

“**Gamification**” in this study refers to the game based learning approach that the researcher applied in the teaching and learning process. “**RY**”, stand for Roy Yak, refers to the learning experience of the learners from the instructional activities package. “**Level**” refers to the learning level of the learner after testing from teachers and the qualified classmates. Experience refers to doing exercise in Physics textbook Volume 2, Chapter 7. “**Skill tree**” refers to the table of skills the students obtained after level upgraded.

Materials and Methods

This research was one group pretest posttest design which collected data by volunteer sampling of 29 students in grade 10th to achieve the efficiency at 75/75, to compare an achievement between before and after the study plan and ‘the learning progress analysis applying’[3]. The research started with the pretest applying the 30 minutes achievement test. Then, the lesson plan was operated. Lastly, the posttest applying the same test was conducted and analyzed the data collected.

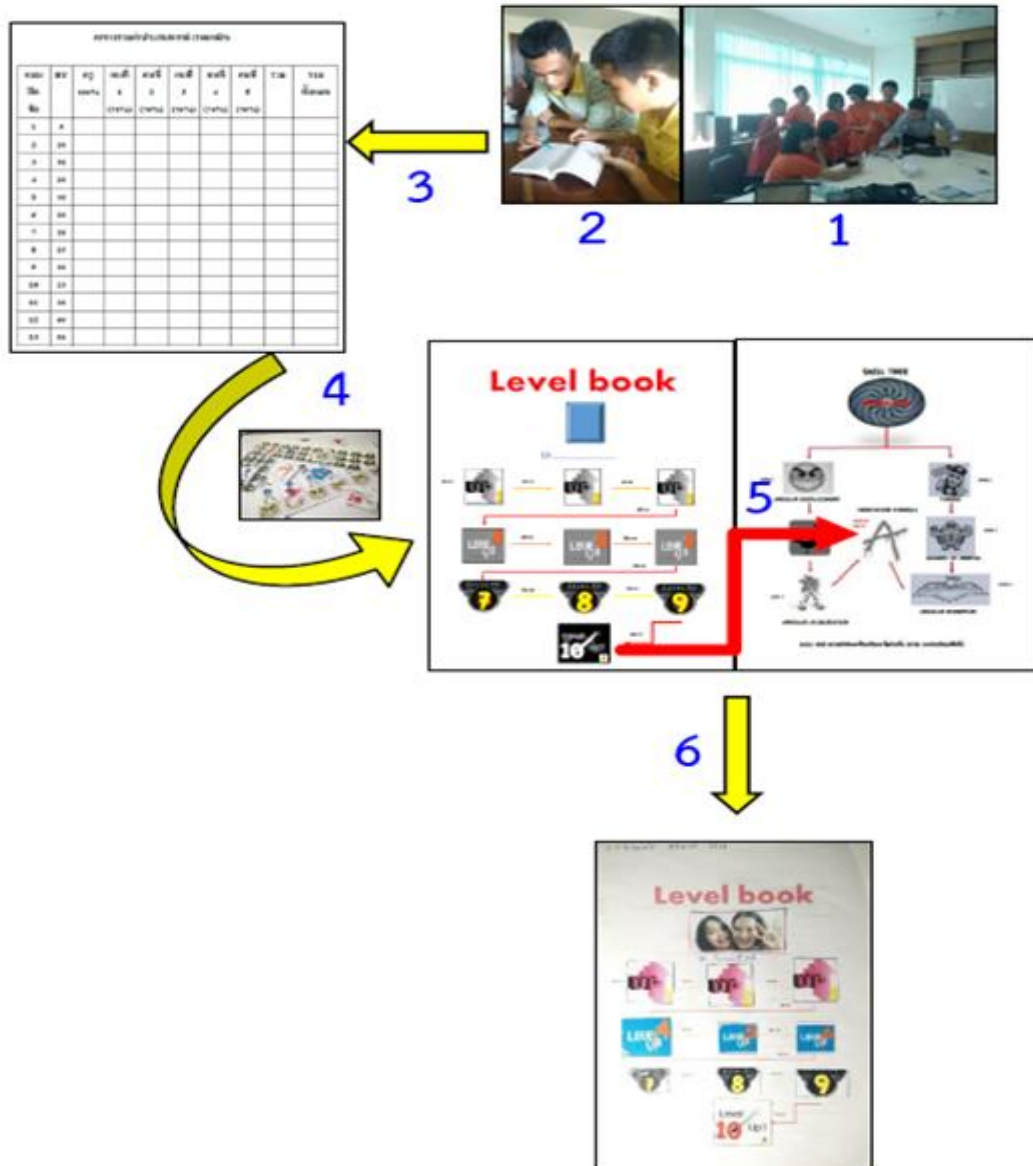


Figure 1. Teaching and Learning

Research Tools

The instructional activities package based on the concept of Gamification education consisted of 3 parts. 1) the level book 2) physics textbook Volume 2 by The institute for the Promotion of Teaching Science and Technology and 3) exercise book.

Teaching and Learning sequence are 8 steps as following: (Figure 1)

1. Students were taught by traditional teaching strategy for 8 hours in 2 weeks.
2. Students done the exercise on the exercise book.
3. Discuss with teachers or the classmates who had discussed with teachers to record RY. RY was different in each student. Students who had

discussed the exercise with the classmates who had discussed with teachers would get 70% RY and the classmates got 30%. To gain 100% RY, the students had to discuss the exercise with the teachers directly.

4. The students' level would be upgraded according to the percentage of RY gained from the exercise discussion with teachers or classmates. The more exercise had been done and discussed, the more RY obtained.

5. The level was represented by the sticker received the teachers when the levels are completed.

6. Once the study plan accomplished and the students collected the experience in 4 weeks, the students had the different levels according to the RY obtained.

Results and Discussion

The Efficiency of instructional activities package

The research defined E_1/E_2 as 80/80 because the sample group was the students who had the satisfied achievement level. The acceptance of the

instructional activities package based on the concept of Gamification education in rotational motion was at 85.87/88.15, which was higher than the standard. Hence, the instructional activities package which the researcher had developed was applicable.

Table 1: Students' pretest and posttest score

Testing	N	Mean	%	S.D.	t-value	<g>
Pre-test	29	8.47	52.93	2.61	14.17*	0.75
Post-test	29	14.10	88.13	1.37		

The results of data analysis comparing the differences of the average score between before and after employing the instructional activities based on the concept of Gamification education by applying the achievement test showed that the average score before studying was 8.47 and those after studying was 14.17 with the p critical value was 1.70. It implied that the average score before studying was higher than the one before studying with the difference in statistical significance at .05. Therefore, the instructional activities package based on the concept of Gamification education in rotational motion allowed the students to have more understanding which resulted in the higher average score. The learning progress evaluation by applying average normalized gain, <g> found that the learning progress in rotational motion was 0.75 or in other words, the actual learning progress was decreasing 74.78% from the highest possibility which was the high gain level.

Conclusions

The comparison of the average score before and after studying and the learning progress of the students who studied rotational motion applying the instructional activities package emphasizing on Gamification revealed that the average score of the students after studying was higher than the average score before studying with the difference in statistical significance at .05. Normalized gain showed that the learning process was 0.74 which was in the high gain level. Thus, the instructional activities package based on the concept of Gamification education motivated students to do and review the exercise from the instructional activities package once they understood the application. From the observation of the researcher, most of the students were enthusiastic to keep upgrading their level.

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