

The Effect of Gamification Teaching on Learning Outcomes and Satisfaction in the Electrical Energy Topic

อลีนา จันทมาตร¹, ปรานนิชา พิวันแก้ว², ศิริพร ว่องไววิริยกิจ³ และ นิภาพรณ คงบางพระ⁴

Aleena Chanthamard¹, Prannicha Piwankeaw², Siriporn Wongwaiwiryakit³ and Nipaporn Kongbangpra⁴

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์ 1) เพื่อเปรียบเทียบผลการเรียนรู้ของนักเรียนชั้นประถมศึกษาปีที่ 2 หลังเรียนกับเกณฑ์มาตรฐานด้วยการจัดกิจกรรมการเรียนรู้วิทยาศาสตร์ด้วยเทคนิค Gamification เรื่อง พลังงานไฟฟ้า นำศึกษาและ 2) เพื่อศึกษาความพึงพอใจของนักเรียนของนักเรียนชั้นประถมศึกษาปีที่ 2 ต่อกิจกรรมการเรียนรู้ในครั้งนี้ โดยกลุ่มตัวอย่างเป็นนักเรียนชั้นประถมศึกษาปีที่ 2 จำนวน 39 คน จาก 1 ห้องเรียน โรงเรียนสาธิตแห่งมหาวิทยาลัยเกษตรศาสตร์ วิทยาเขตกำแพงแสน ภาคเรียนที่ 2 ปีการศึกษา 2561 จำนวน 1 ห้องเรียน

จำนวนทั้งสิ้น 39 คน คน ได้มาโดยการสุ่มตัวอย่างแบบกลุ่มโดยใช้ห้องเรียนเป็นหน่วยสุ่ม (Cluster Sampling) ผลการวิจัยพบว่า 1) ผลการเรียนรู้ของนักเรียนหลังการเรียนวิชา วิทยาศาสตร์ เรื่อง พลังงานไฟฟ้า นำศึกษา โดยใช้เทคนิค Gamification มีค่าคะแนนเฉลี่ยสูงกว่าเกณฑ์ร้อยละ 80 ที่ตั้งไว้ ($t(38) = 3.840$) อย่างมีนัยสำคัญที่ระดับ 0.05 และ 2) ค่าคะแนนเฉลี่ยความพึงพอใจของนักเรียนต่อการจัดการเรียนรู้ในครั้งนี้ อยู่ในระดับมาก โดยมีค่าคะแนนเฉลี่ย = 2.82 (S.D. = 0.403)

คำสำคัญ : ผลการเรียนรู้, ความพึงพอใจ, พลังงานไฟฟ้า, gamification

¹คณะศึกษาศาสตร์และพัฒนศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ วิทยาเขตกำแพงแสน

Faculty of Education and Development Sciences, Kasetsart University Kamphaeng Sean Campus

Email: aleena_chanthamard@hotmail.com

²คณะศึกษาศาสตร์และพัฒนศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ วิทยาเขตกำแพงแสน

Faculty of Education and Development Sciences, Kasetsart University Kamphaeng Sean Campus

Email: iprannicha@gmail.com

³คณะศึกษาศาสตร์และพัฒนศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ วิทยาเขตกำแพงแสน

Faculty of Education and Development Sciences, Kasetsart University Kamphaeng Sean Campus

Email: Janesiri1996@gmail.com

⁴โรงเรียนสาธิตแห่งมหาวิทยาลัยเกษตรศาสตร์ วิทยาเขตกำแพงแสน ศูนย์วิจัยและพัฒนาการศึกษา

Kasetsart University Laboratory School Kamphaeng Saen Campus Educational Research and Development Center

Email: Nipaporn0990791122@hotmail.com



Abstract

The objectives of this research were 1) to compare the learning outcomes of second grade students after learning science using gamification techniques on electrical energy and 2) to study the students' satisfaction of second grade students toward this science lesson using gamification techniques. The samples were 39 second-grade students (one classroom), by cluster sampling from Kasetsart University Laboratory School, Kamphaeng Saen Campus. We found that (1) the students' mean score after on electrical energy after learning science using gamification technique was statistically higher than the proposed criteria at 80% ($t(38) = 3.840$) at the significantly level of 0.05 and (2) the mean score of students' satisfaction toward this learning management was at the high level (mean = 2.82 and S.D. = 0.403).

Keyword: student outcomes, satisfaction, electrical energy and gamification

Introduction

In the basic education curriculum, Science plays an important role in our present and future world communities, as it concerns all of us in our daily lives and livelihoods. Science also involves technologies, instruments, devices and various products at our disposal, which facilitate our life and work. All these benefit from our scientific knowledge, which is combined with creativity as well as other disciplines. Science enables us to develop our thinking skills in various respects-logical, creative, analytical and critical. (Basic Education Core Curriculum B.E. 2551, 2008) The learning area of science is aimed at enabling learners to learn this subject with emphasis on linking knowledge with processes, acquiring essential skills for investigation, building knowledge through investigative processes, seeking knowledge and solving various problems. Learners are allowed to participate in all stages of learning, with activities organized through diverse practical work suitable to their levels. The main content are prescribed in 8 topics, the electrical energy topic is situated in the fifth learning standard. The learning indicator for the electrical energy topic for grade 2 students is student can experiment and explain that electricity is a form of energy, explore and cite examples of electric appliances at home that can transform electrical energy into other forms of energy.

The problems in learning the electrical energy topic are: cognitive development, practical, learners' quality, skills, capacity and desirable characteristics of learner and psycho-social; especially motivation and relevance of the subject material. From the analysis of second grade students' performance before teaching by science learning management by gamification techniques, it was found that the top-three favorite subjects that students like the most are Music and Arts, Home economics and technology, and English. And the top-three least favored subject that students do not like the most is Mathematics, Sciences, and Thai Social studies. And from the analysis, it was found that the science learning styles that the students liked the most were learning through playing games. (64.86 percent of all students). The advantages of the techniques of learning by gamification are bringing the mechanics



of the game to create interesting things in learning, motivation and excitement in learning. There is a process that is easy to understand complex things by using events in daily life to classify activities as a game. (Karl M. Kapp, 2012: 26-49).

To encourage students to play games while learning the content that the teacher wants the students to receive. The researcher has thought of teaching methods using gamification techniques to stimulate students to be interested in science. This will make the learners gain more knowledge and understanding because it could make students enjoy with learning and could develop the science learning outcomes and get high level on the satisfaction in science.

Research Objectives

1. To compare the learning outcomes of second grade students after learning science using gamification techniques on fun electrical energy.
2. To study the students' satisfaction of second grade students towards the lesson after learning electrical energy using gamification techniques.

Scope of research

Content scope

Strand 5: Energy

Standard Sc5.1: Understanding of relationship between energy and life; energy transformation; interrelationship between substances and energy; effects of energy utilization on life and the environment; investigative process for seeking knowledge; and communication of acquired knowledge that could be applied for useful purposes. Students can experiment and explain that electricity is a form of energy.

Population

The target group was the second-grade students from one classroom, 39 students from Kasetsart University Laboratory School, Kamphaeng Saen Campus, and cluster Sampled from the population of the second grade students from 3 classrooms, 118 students from Kasetsart University Laboratory School, Kamphaeng Saen Campus.

Methodology

1. Research instrument

1.1 Science Learning Management Plan (S12101) on fun electrical energy using gamification technique of second grade students.



Table 1: The content of fun electrical energy

No.	Content	duration (hours)
1	Battery and type of battery	1
2	Electrical from battery	1
3	How's battery work	1

The learning management plan of Electrical energy had been examined to 3 experts including measurement and evaluation.

- The evaluation of all 3 experts has an IOC value between 0.67-1.00 and the revision has been made according to the recommendations of experts.

1.2 Achievement test of electrical energy

- Create an achievement test on Electrical energy which consists of 18 questions covering the content and expected learning outcomes by using 3 multiple choice questions

- The test was tried out with 40 third-grade students from Kasetsart University Laboratory School, Kamphaeng Saen Campus, then analyze difficulty (p) should be between 0.2-0.8 and the value of discrimination (r) between 0.6-0.9. For the reliability of the entire test using the Cronbach's Alpha = 0.825.

1.3 Students' satisfaction towards learning management (s12101) on fun electrical energy of second grade students

- Create the students' satisfaction towards learning management consisting of 8 questions and three rating scale, about the learning management, activities, media and measurement and evaluation of learning.

- The students' satisfaction towards learning management had been examined to 3 experts and the revision has been made according to the recommendations of experts.

2. Research data collection

- Teaching by the learning management plan of Electrical energy for one week.
- Students take the posttest after studying.
- Students' satisfaction towards learning management.



Picture 1: Students played the game “Black out or Light on”

3. Data analysis

Data analysis is divided into 2 parts as follows

3.1 Compare the learning outcomes with the criteria of 80% by analyzing with the t-test (One-shot case study design)

3.2 Compare the students' satisfaction towards learning management with the rating scale assessment form

Rating scale	level of quality
2.34-3.00	Good
1.67-2.33	Intermediate
1.00-1.66	Should improve

Results

Part 1: Comparison of the learning outcomes after learning by science learning management by gamification techniques on fun electrical energy.

Table 2: Comparative analysis of learning outcomes of second grade students after studying with the criteria of 80% by organizing science learning activities by gamification techniques on fun electrical energy

Score	Full score	\bar{X}	S.D.	t	Sig.
Posttest	10	8.59	0.87	3.840	0.001

* *sig* < 0.05



From the analysis, it was found that the learning outcomes of students after studying with science learning management by gamification techniques on fun electrical energy of second grade students were significantly higher than the criteria $t(38) = 3.840$ significantly at the level of 0.05

Part 2: Students' satisfactions towards learning by using gamification techniques on fun electrical energy.

Table 3: The results of satisfaction in science of second grade students after organize learning process by science learning management by gamification techniques on fun electrical energy.

Number	The list to assessment	\bar{X}	S.D.	Meaning
1	I enjoy the learning activities.	2.84	0.369	High
2	I like learning activities and games.	2.78	0.420	High
3	The learning activities make students more understand science content.	2.81	0.471	High
4	The learning activities make students would like to study science more.	2.75	0.440	High
5	The learning activities make students more focus on science.	2.84	0.369	High
6	Students can apply the knowledge gained from learning activities to everyday life.	2.72	0.523	High
7	Students want more time for learning activities.	2.88	0.336	High
8	Students want teachers to organize learning activities in the next science period.	2.91	0.296	High
Average total		2.82	0.403	High

The average satisfaction of science learning management of students by gamification techniques on fun electrical energy of second grade students $\bar{X} = 2.82$ and $S.D. = 0.403$ which is in the high level.

Conclusion and Discussion

The results showed that, the learning outcomes of students after learning science using gamification techniques were higher than the criteria at 80% because the learners are motivated by hands-on and active learning opportunities. The students were able to accomplish a goal by choosing specific actions. They experienced the consequences of the actions, which was one of the ways that a



game-based learning experience is similar to real life, consistent with the research by Harrold (2015) that teaching by using gamification by giving the mission to the students into various stages. When students can complete the mission in each level, they will get points and challenge to move up to the next level. This technique encourages students pay attention in the lessons. Lastly, the process of decision making required during the games makes the brain to work harder. These activities can range from simple decisions to the formulation of complex strategies.

The result of students' satisfaction towards lesson after learning with gamification techniques was at high level (\bar{X} = 2.82 และ s.d. = 0.403). This may be because using games in the lesson, as part of teaching and learning, helps to create positivity around the lesson, motivates students with their participation and creates a positive attitude towards learning. Games can also create a positive memory and experience of learning for students in the classroom. In addition, the teacher use the reward as an incentive to make the learners want to learn more. This is consistent with the research of Jaito (2016). This has been said that the game is an educational innovation. Which most teachers agree that gaming activities can be motivated and useable. Therefore, it is an important duty of teachers to motivate student's learning to achieve their goals. It can be said that students with high learning motivation will also have a higher level of student outcomes (Roopkhai, 2014). Which shows the motivation in learning is an important factor for students to make students successful in their studies. In addition, the rewards from participation in activities of group make students motivated to show many of behaviors to gain the group rewards and try to avoid the behavior that will not receiving rewards, such as talking while listening to the teacher, playing in the group activities, according to Chou (2013), the gamification concept about rewarding mechanism requires students to complete challenges in order to receive rewards. Making students want to complete the challenge and be rewarded, consistent with the psychological principles of positive reinforcement.

Recommendations

Suggestions for practice

1. Improving the achievement in sciences requires the great amount of time to allow the learning ability to be improved gradually overtime and the stages which are not clear to students should be emphasized

2. The teacher should create learning environment and encourage students to engage in competition activities to make the students to realize the importance of genuinely join competition to ensure the effectiveness and enthusiasm of students in doing activities.



3. The amount of time using in group activities should be flexible in accordance with the lesson and the potential of the students. The teacher should not be too strict with the time and the teacher should practice often.

Suggestion for further study

1. The teaching of science learning management by gamification techniques should study the steps of using the learning activities thoroughly and adapt the learning activities appropriately and in accordance with life situations to fully develop understanding and learning outcomes.

2. This research does not compare the learning outcomes before and after studying, could not be known the learner's context before the experiment. And may study the developmental achievement outcomes of students.

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