# Imagineering Gamification on Cloud Technology to Enhance the Innovative Skill

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**Abstract:** The purpose of this research study were (1) to synthesize the conceptual framework of Imagineering gamification on cloud technology, (2) to design and develop the model of Imagineering gamification on cloud technology to enhance the innovative skill, and (3) to evaluate the developed model. The sample of this research were 5 experts in information communication technology in education using purposive method. The research tools were the Imagineering gamification model on cloud technology to enhance the innovative skill learning and the evaluation form of the developed model. The results of the research showed that the Imagineering gamification model on cloud technology had five elements which were Imagineering Approach, Gamification elements, Occupational Science, User, and Social Cloud. The Imagineering learning activity on cloud technology had six steps included; imagination, design, development, presentation, improvement and evaluation. The gamification element using in the Imagineering gamification model on cloud technology consisted of six elements included; (1) Point (2) Level (3) Badge (4) Leaderboard (5) Reward and (6) Achievement. The Evaluation of the Imagineering gamification model on cloud technology to enhance the innovative skill learning was at much appropriate level ($\bar{x}$= 4.15, *S.D.* = 0.47).

**Key words:** Imagineering, gamification, cloud technology, innovative skill.

## 1. Introduction

The current educational approach has changed radically from the past. The objective was to create the desirable characteristics in students. The courses are designed to improve the complex thinking skills, both analytical thinking and creativity along with social skills. Students would be able to work with others and communicate with each other effectively and have skills in creating innovations, either in the form of artifacts or method, together with moral awareness. Moreover, the education management has been converted to be more digital according to social and economic context. The innovations were created and presented to society continuously.

Enhancing the students to have the ability to innovate is one of the major goals for education in the 21st century. The idea is to focus on developing the skills of learners individually either for preparing them for higher education or developing the skills for an occupation [1]. One of those skills is creativity and

innovation [2]. The process of creating innovations begin with innovative thought. In order to enhancing the way people think innovatively, there are some factors required including: questioning, comparing, observing and the ability to come up with solution that nobody has ever think of before [3].

Innovative skill is the skill that combines creativity, critical thinking and problem solving. Innovative thinkers would be able to create, improve, analyze and evaluate in order to develop the usual concept. In term of social skills, the innovative thinkers would be able to work constructively with others, can communicate or convey ideas to others effectively and listen to the opinions of their colleagues, be able to understand the reality and create a product or concept that can be use in real life [4].

Imagineering approach is a new concept in learning management. The word Imagineering is a combination of the word "Imagine" and "Engineering" means implementing new ideas using a combination of technical skills and a creative imagination. Imagineering is the approach to bring the imagination or idea into artifacts or innovations which can develop the learners of 21st century that focusing on learning on their own can cause creativity and the creation of innovations [5] using a thought process combined with creative design to bring the abstract or imagination into a concrete object with the most approximation through the engineering technique [6].

In order to enhance the learners to think innovatively, not only the learning approach is required, but also the repetition to keep learners maintaining their thinking level. Maintaining constant innovative thinking within people or an organization can be achieved by learning daily, through competition, awards and from mentors. Such factors are consistent with the concept of gamification which is successful in the online-based business, aimed to improve user engagement and can also improve an individual's ability to comprehend digital content and understand a certain area of study [7]. In the field of education, gamification is the term of using game-like mechanic or game-like thinking approach and applying to an educational context to make learning more fun and more appealing [8]. In Addition, another activity that will help support innovative thinking is brainstorming. Sharing the new ideas will help the team to create new concepts that came from information being shared. The technology that provided the ability to building a network between learners to interact together is a form of social cloud technology, which is a form of services and resource sharing between users whom are connected via social networks [9].

As mentioned, using the Imagineering approach combined with gamification and social cloud could enhance innovative thinking skills within students. This could support them in being able to create a solution or innovation from their imagination and make it usable in real life, in accordance with the 21st century goals.

## 2. Research Objective

1) To synthesize the conceptual framework of Imagineering gamification on cloud technology.
2) To design and develop the model of Imagineering gamification on cloud technology to enhance the innovative skill.
3) To evaluate the model of Imagineering gamification on cloud technology to enhance the innovative skill.

## 3. Research Methodology

The research was conducted into 3 phases as follow: (1) An analysis of Imagineering gamification on cloud technology to enhance the innovative skill by reviewing documents, literature and related research in the scope of Need analysis, Input analysis, User analysis, and Gamification element analysis. (2) A development of Imagineering gamification on cloud technology to enhance the innovative skill. (3) An evaluation of Imagineering gamification on cloud technology to enhance the innovative skill.

## 4. Result

### 4.1. The Synthesis Result of Imagineering Gamification on Cloud Technology to Enhance the Innovative Skill

1) The result of need analysis

Innovation started from innovative thinking, encouraging people to think innovative which include many factors: Learning daily, Competitions, Rewards, Recognition and Mentors [4]. There are skills required that encouraging innovative thinking [10] including: (1) Questioning (2) Observing (3) Experimenting (4) Networking (5) Associating. Another activity that support innovative thinking is brainstorming which allow learners to share their opinion or information that lead to new ideas or concepts[11].

2) The result of input analysis

- Imagineering is the implementing of creativity in designing and creating the solid objects from imagination. The process consisted of six steps: (1) Imagine is the first step of the process that allow learners to brainstorm for ideas and to imagine the possibilities. (2) Designing is the process to changing imagination to reality [12] in the form of sketch, storyboard, script or prototype.(3) Development is the process of transforming works from designing step into real solid object.(4) Presentation is the process that allow learners to present their finding. The teachers can use various methods or types of media to allow the transferal of students' ideas [13] (5) Improvement is the process for learners to improve their works by using criticism from presentation step. (6) Evaluation is the process of making recommendations. Learners should be able to suggest appropriate advice that they have developed or gained in completing their project, either from their work process or from product quality investigations.
- Cloud Technology is the form of internet connection which can be application or network as a service. Cloud technology allow people to access or sharing information via mobile device [14]. The cloud technology that used in this study is social cloud which is the system that support data or resources sharing between users in social network. Social cloud is social network platform that come with cloud system. User can customize their usability or their data sharing while the system provide social mechanic to help people keep their interaction with other while control their own service manually [15].
- Occupational Science is the learning area of occupations and technology contributes to development of learners in acquiring knowledge and understanding basic skills essential to their lives, can apply knowledge with creativity and competitiveness in Thai society and the world community. The main contents of the learning area were Life and Family, Design and Technology, Information and Communication Technologies (ICTs) and Occupations [16]. According to Thailand's Basic Education Core Curriculum B.E. 2551, learners' quality had define as follow: (1) Understanding in technological processes and levels; have creativity in problem-solving or responding to needs; construct objects and utensils accurately and safely or use methodology according to the technological processes by conveying ideas through an image, leading to constructing work pieces or models of the ideas and reporting results; choose to apply technologies creatively to life, society and the environment and manage technologies through reducing use of resources or choose to apply technologies without negative effects on the environment. (2) Understanding in basic principles of communicating data, computer networks, and principles and methods of solving problems or implementing projects through ICT processes; skillful in searching for and communicating data through computer networks in a moral and ethical manner, and use of computers for solving problems and constructing applications of ICTs for presentation of accomplished tasks.

3) User analysis

- Teacher are people who have the knowledge and have responsibility in teaching occupational science or technology who play the role as facilitators, encouraging learners to create things from imagination, define assignment that leads to result productivity, support collaboration learning and giving positive

criticisms. The role of teacher in Imagineering gamification model on cloud technology for enhancing the innovative thinking skills were (1) Define mission and giving scenario. (2) Be a facilitator. (3) Be an observer. (4) Be a coach or a mentor. (5) Be a commentator.

- Student is the learner who following the engineering design process [17] who (1) Identified problem in order to find proper solution. (2) Create and develop prototype by analyze the current system or problem to detect the flaw. (3) Plan and examine their works 4) analyze and compare data in order to choose the best solution. (5) Design within consideration of engineering problem, technological possibilities and appropriateness. (6) Brainstorming for sharing ideas and opinion in order to come up with the best solution to solve the problems.(7) self-assessing both in productivity and process

4) Gamification element analysis

Gamification is the concept of applying game element and game design techniques in non-game context to improve user engagement or motivate people to achieve their goals [18]. In order to create engaging game-like experiences, there are functioning that need to consider which are game mechanics and game dynamics. (1) Game Mechanics are rules and responding in game that can create excitement and fun which can be in many form such as points, levels, challenges, virtual goods and spaces, leaderboards, gifts and charity. (2) Game Dynamics which can describe as human's fundamental needs and desires that can motivated by using game element such as reward, status, achievement, self-expression, competition and Altruism.

Documents related with using gamification in educational field were synthesized in order to select the proper gamification element for Imagineering gamification model on cloud technology as showed in Table 1.

Table 1. The Synthesis of Gamification Element for Imagineering Gamification Model on Cloud Technology

| Source | Gamification Elements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Points | Levels | Challenges | Badges | Virtual Goods | Leaderboards | Reward | Status | Achievement | Competition |
| Liu *et al*. [19] | ✓ | | | | | | ✓ | | ✓ | |
| Fernandes *et al*. [20] | ✓ | ✓ | | | | ✓ | | | | |
| Li *et al*.[21] | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | |
| Domínguez, A. *et al*. [22] | | ✓ | ✓ | ✓ | | ✓ | | | | |
| Simões, J. *et al*. [23] | ✓ | | | ✓ | | ✓ | ✓ | | ✓ | |
| Marko Urha *et al*.[24] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| L. de-Marcos *et al*. [25] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |

According to Table 1, the synthesis of gamification element consisted of 6 element: 1) Point 2) Level 3) Badge 4) Leaderboard 5) Reward and 6) Achievement

## 4.2. A Development of Imagineering Gamification on Cloud Technology to Enhance the Innovative Skill

Based on the related literatures review and gamification element synthesis, the development of Imagineering gamification on cloud technology to enhance the innovative skill can be presented, as shown in Fig. 2.

The Components of Imagineering gamification on cloud technology to enhance the innovative skill consisted of five components as follow:

- Imagineering approach consist of six steps: (1) Imagine (2) Designing (3) Development (4) Presentation (5) Improvement (6) Evaluation.

• Gamification consist six element: (1) Point (2) Level (3) Badge (4) Leaderboard (5) Reward (6) Achievement

• Occupational Science consist of four learning content (1) Life and Family (2) Design and Technology (3) Information and Communication Technologies. (4) Occupations

- Users included: (1) Teacher (2) Student.
- Cloud technology in the form of a social cloud.

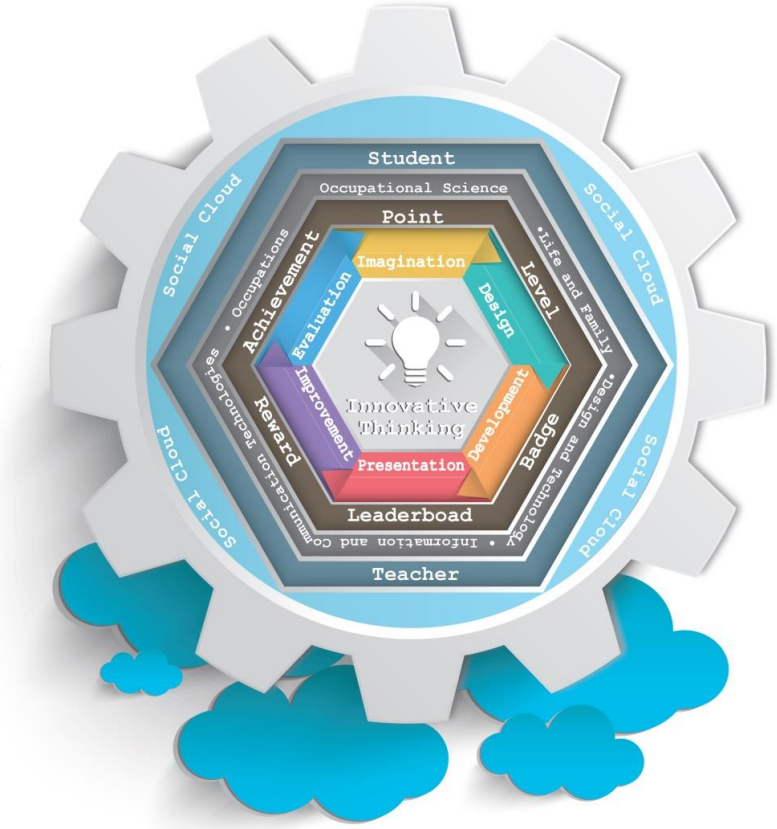


Fig. 2. The model of imagineering gamification on cloud technology to enhance the innovative skill.

According to Fig. 2, the objectives of the model is to enhance the innovative thinking skills of learners by the principle as follows:

Imagineering approach supported skills that required for improving innovative thinking skills. In order to come up with the solution of the scenario, the students have to begin with observing, questioning, associating and to improve networking skill through brainstorming. Moreover, Imagineering approach also promotes experimenting skill with the learning process.

Gamification was used as a tool to motivate learners to be participate with the learning activities and challenging learners to improve their skill continuously.

Occupational science has the learning area that aimed for encouraging student to constructing products innovatively and defined the learner's qualities that corresponding to Imagineering approach.

Social Cloud is the tool using for connected user as referred to teachers and students to interact, support collaborative learning and sharing educational resources.

### 4.3. The Evaluation Result of Imagineering Gamification on Cloud Technology to Enhance the Innovative Skill

According to Table 2, the appropriateness of Imagineering gamification on cloud technology to enhance

the innovative skill was at Much appropriate level ($\bar{x}$= 4.15, *S.D.* = 0.47). Considering each item, the highest rating item was the appropriateness of Imagineering gamification model on cloud technology at Much appropriate level ($\bar{x}$= 4.4, *S.D*. = 0.55), followed by the appropriateness of using gamification elements with Imagineering approach at Much appropriate level ($\bar{x}$= 4.2, *S.D.* = 0.45) and the appropriateness of using Imagineering approach to enhance the innovative thinking skills was at Much appropriate level ($\bar{x}$= 4.2, *S.D.* = 0.45). The lowest rating was the appropriateness of using Imagineering gamification model in occupational science was at Much appropriate level ($\bar{x}$= 3.8, *S.D.* = 0.45), respectively.

Table 2. The Evaluation of Imagineering Gamification on Cloud Technology to Enhance the Innovative Skill

| List of Evaluation | $\bar{x}$ | *S.D.* | Level of appropriateness |
|---|---|---|---|
| The appropriateness of using gamification elements with Imagineering approach. | 4.2 | 0.45 | Much |
| The appropriateness of using Imagineering approach to enhance the innovative thinking skills. | 4.2 | 0.45 | Much |
| The appropriateness of using Imagineering gamification model in occupational science. | 3.8 | 0.45 | Much |
| The appropriateness of Imagineering gamification model on cloud technology | 4.4 | 0.55 | Much |
| Total Average | 4.15 | 0.47 | Much |

## 5. Conclusion

According to the analysis result of related content, the Imagineering gamification on cloud technology to enhance the innovative skill consists of the Imagineering learning approach consists of six step: (1) imagine (2) design (3) development (4) presentation (5) improvement (6) evaluation which can encourage learners to improve their observing, questioning, associating, experimenting, and networking which are skills that required in order to create innovative thinking skills.

The gamification element consist of six items: (1) Point (2) Level (3) Badge (4) Leaderboard (5) Reward (6) Achievement which used as a tool to motivate learners to be participate with the learning activities and challenging learners to improve their skill continuously. In accordance with (Ionica and Leba, 2015) which states that the gamification techniques proved to be efficient from the point of view of rules, goals, problem solving and feedback for the activity that providing motivational means for innovation.

According to the evaluation, it was shown that the experts rated the model as much appropriate which showed that the Imagineering gamification model on cloud technology can enhance the innovative skill.

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