

# Learning Management by Using Design Thinking Blended with Gamification

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This research aimed to synthesise knowledge on learning management by using design thinking blended with gamification. This research analysed and synthesised assorted content from documents and researches, as well as reviewed literature. The results indicated that design thinking is a thinking process for solving problems. It is a user-centred process focussed on understanding problems and new solutions in order to form desirable guidelines and innovations for users. There are 5 steps in learning management comprising the following: understand the problem, define the problem, ideate, prototype and test. Gamification is the technical and mechanical integration of a game which consists of rules, scoring, game levels, player cooperation, coins, and feedback. These components are implemented in the first 3 steps of learning management in order to motivate students with enjoyment, learning support, challenges, and stimulation in problem-solving.

**Key words:** *Design Thinking, Gamification, Learning management.*

## Introduction

The learning process in digital society is changing rapidly, so instructional management must be coherently adjusted to that change. The instructional process needs to be diversely managed by focussing on problem-solving in order to improve the students' thinking process, which allows them to learn and practise in real situations. For learning management, the instructor needs to focus on the diversification of learning management by changing traditional lecture courses into problem-based learning in order to improve students' thinking processes. This is in line with the National Education Act B.E. 2542 (1999), Amendments (Second National Education Act. B.E. 2545 (2002)) and (Third National Education Act. B.E. 2553 (2010)), which have the objective to significantly improve the quality of student learning. Chapter 4 Section 24 states that schools and related institutes should provide learning content and activities in accordance with students' interests and proficiencies, with consideration for individual



differences. Students should be equipped with skills practice, the thinking process, problem-solving, and situation-based learning (Ministry of Education, 2010).

From the study of related concepts and researches, it was found that design thinking is one of the tools that can support students' creative problem-solving capability. It's the learning management which highlights the students' confidence in creative thinking via practical activities; showing empathy, bias towards action or build to think, and different ideation. It also encourages students to develop problem-solving skills and proficiency. The research of the REDlab team (Research in Education and Design Lab) recommended that the integration of design thinking in academic contents is the efficient learning tool in widely promoting interdisciplinary academic content (Carroll et al., 2010). It can be said that design thinking is learning management that enables the development of students' creative thinking.

Another problem in learning management that is generally found is the lack of learning motivation. If students' motivation and achievement can be elevated, academic accomplishment will be boosted accordingly. In contrast with students with low motivation, they will always pursue high academic achievement (Tella, Ayeni, & Popoola, 2007). Therefore, the instructor plays an important role in solving problems and elevating students' motivation. Gamification is learning management that is used to motivate students via the integration of a game's technique and mechanism, which is adapted in diverse learning management contexts (Kapp, 2012; Liu, Cai, Yang, & Han, 2015). The implementation of a game's mechanism changes learning management from lecture course to interactive activities that encourage students' involvement (McGonigal, 2011; Pappas, 2013). Nah et al. (2014) mentioned that the existence of the gamification strategy in learning benefits students' academic achievement, involvement, and success. For these reasons, it is necessary to construct new learning management approaches to trigger and draw more attention, involvement, and capability in students' creative work.

This study aims to develop a learning management model by using design thinking with gamification to support creativity among undergraduate students. The design thinking concept is applied to design learning activities which make students the centre of innovation design. Students are encouraged to participate in both individual and team activities which will stimulate and support advanced thinking. Gamification is integrated into the learning management to motivate student learning, entertain the students, support learning, create challenges, and allow them to problem-solve. These will engage the students and make them enthusiastic, which in turn contributes to learning and teaching development that supports thinking in the 21<sup>st</sup> century.

## **Objectives of the Research**

The main objective of this study was to synthesise the learning management model by using design thinking with gamification.

## **Literature Review**

### ***Design Thinking***

Herbert A. Simon (1916–2001) explained that the important factors that lead to successful design and solutions are the consistent understanding of the involved persons and solution targets, which are required to enable continued growth. David Kelley, a founder of IDEO and Stanford d.school, subsequently presented a design concept that put humans at its centre to design a product based on user understanding. This was in agreement with design thinking being a tool to create innovations (Camacho, 2016), consistent with (Brown, 2013) who suggested that design thinking was a design process, which focusses on humans at its centre, to design and develop a solution to create innovations. It integrates human needs, technology, and what businesses require to be successful. (Cross, 2006) opined that design thinking was an integrative method between the problems and creative solutions, using the knowledge, experience, and skill of others, who have particular knowledge in specific problems as important components in the design. In addition, (Johansson-Sköldberg et al., 2013) stated that design thinking was the optimal way to create innovations. This was explained as being achieved by placing the problems and new solutions that are considered by users at its centre – to understand problems, including inspiration, thinking, and implementation.

It can be seen that design thinking is a concept which does not focus on problems but instead focusses on problem-solving, including searching to resolve problems faced by users and practical processes to create innovative problem-solving.

Several organisations have applied guidelines to design thinking models to develop innovations. For example, the Stanford d.school, UK Design Council, and HPI D-School Germany, have applied the concept of, (Plattner, Meinel, & Weinberg, 2009) IDEO Human-Centred Design, and FITCH Singapore; as shown in Table 1.

**Table 1:** Synthesis of the design thinking models

Stanford d.school	Design Council	HPI D-School, Germany	IDEO Human-Centred Design	FITCH Singapore	Conclusion
1. Empathise	1. Discover	1. Understand	1. Inspiration	1. Discover	1. Understanding a problem
2. Define	2. Define	2. Observe	2. Ideation	2. Define	2. Define a problem
3. Ideate	3. Develop	3. Point of View	3. Implementation	3. Design	3. Ideate
4. Prototype	4. Deliver	4. Ideate		4. Deliver	4. Prototype
5. Test		5. Prototype			5. Test
		6. Test			

From Table 1, synthesis of the design thinking process consists of 5 key steps; 1) Understanding a problem, 2) Define a problem, 3) Ideate, 4) Prototype, and 5) Test.

It can be concluded that design thinking is a thinking process to help gain a deep understanding of problems to create innovation in a way which considers users to be the centre of the design. Creating innovations can therefore fulfil users' problems and needs as far as possible, while teachers must understand the fundamental user factors, including characteristics, knowledge, intelligence, environment, and culture. Design thinking can be done in different ways, such as understanding from observations and understanding from interviews. The problems can then be defined by compiling gathered data and developing an in-depth understanding of the problems in order to understand users' problems and needs. Next, data synthesis is conducted by pattern grouping. Pattern grouping categorises users' problems to clearly understand the problem characteristics. The in-depth user needs are then analysed to understand the users' inspirations, desires, expectations, and overall needs. After defining user problems, 'ideate' is performed to resolve problems. In this process, a target is to find a creative idea to fulfil users' problems and needs as far as possible through brainstorming. Brainstorming is the most important element in this step as it allows various ideas to be gathered and selected which are expected to meet the users' needs. A prototype can then be created by testing ideas and evaluating whether they can solve problems and meet the targets' needs. The creation of prototypes must be situation-specific simulation and should be tested as soon as possible, since this will allow the prototype to be quickly modified and improved. Lastly, the prototype is tested to evaluate the design. Design thinking emphasises users as the centre or human-centric design, meaning that users are required to participate in the process so that their opinions and suggestions can be gathered to further the prototype development. This entire process should be conducted repeatedly and properly to ensure that the innovation can correctly and entirely meet the users' needs.

## ***Gamification***

Gamification is an application related to the mechanics of a game, without using the game to motivate the students for learning. This is because game design stimulates students to participate and supports study effort (Gee, 2003), (Kapp, 2012). Application of the principle and game elements when designing the experience inspired by the game, may support the participation of students to learn and solve problems during playing. Students can self-evaluate and track their progress against recommendations, thus supporting self-learning (Zimmerman, 1990). Moreover, gamification can also support students to have motivation through alternatives and cooperation, which enhances the students' responsibilities, leading to better understanding and content expertise, thus providing higher educational efficiency (Chi, Feltovich, & Glaser, 1981). For example, (Poole, Kemp, Patterson & Williams, 2014) found that gamification could support the participation of students and support the learning process. It was suggested to be an efficient tool to support relationships and the learning of students, including positive emotional responses towards teaching and learning.

The strategy principle of gamification is classified into 2 types (Kapp, Blair, & Mesch, 2014): 1) Structural gamification uses game elements to drive students through changed content. However, the content is not part of the game, but rather the structure that causes the students to like the game. The main purpose of this gamification is to stimulate the students to be part of lessons and to participate in the learning process via rewarding; and 2) Content gamification uses game elements, and thinking like the game, (to adjust the content to be more similar to the game), and is related to the teaching content.

**Table 2:** Synthesis of fundamental gamification elements

<b>Elements</b>	<b>Kai (2013)</b>	<b>Kapp (2012)</b>	<b>Paharia (2013)</b>	<b>Nah et al. (2014)</b>	<b>Jackson Michael (2016)</b>	<b>Conclusion</b>
Feedback		✓	✓	✓	✓	✓
Transparency			✓			
Goals		✓	✓		✓	
Leaderboards				✓		
Badges	✓	✓	✓	✓	✓	✓
Levels	✓	✓	✓	✓	✓	✓
Competition	✓	✓	✓			
Points	✓	✓	✓	✓	✓	✓
Images and audio		✓	✓			
Rules	✓	✓			✓	✓
Cooperation	✓	✓	✓			✓
Time		✓			✓	

From Table 2, and the synthesis of the fundamental gamification elements, the author used the following fundamental gamification elements for this study; 1) rule, 2) points, 3) levels, 4) cooperation, 5) badges, and 6) feedback.

It can be concluded that gamification is a concept which uses game elements to stimulate and motivate students to learn. Gamification consists of competition and challenges in situations that students are required to overcome. Teachers then integrate game elements as learning strategies of learning management by defining interesting problems, explaining situations to make students set themselves a target, and encouraging students to achieve those targets. Students must follow the rules and show their scores to push students and identify the students' knowledge level. Moreover, gamification supports team learning, opinion sharing, and opinion listening. Students will be rewarded for their achievement. After these steps, feedback should be provided that includes observations from activities to support students' understanding. The students' characteristics and class levels must be considered to design suitable gamification and technology should be selected that can be applied to gamified learning activities.

### **Research Methodology**

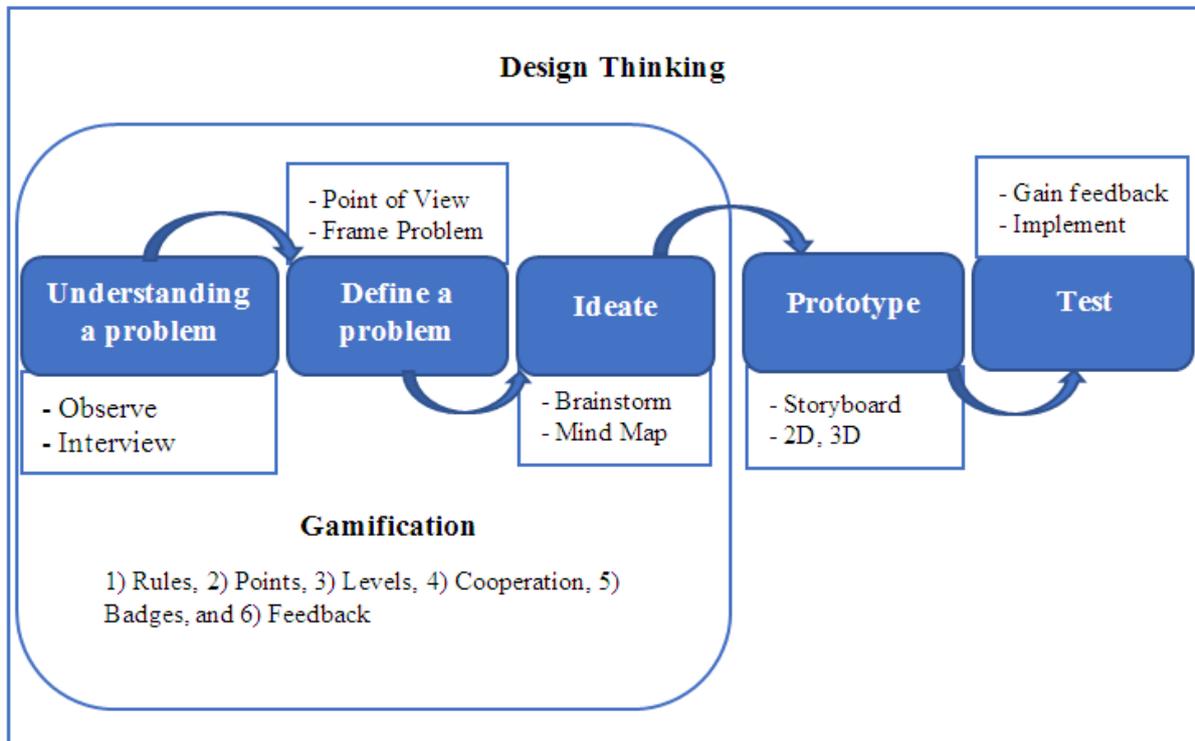
This qualitative research conducted documentary research. The researcher studied 34 documents, researches and reviewed related domestic and overseas literature. A document synthesis form was used as the tool in this research. The quality of the tool was verified by an expert quality auditor.

After that, content analysis and frequency were used to analyse the data collected from the document synthesis form. The research concluded a concept and guideline for learning management by collaborating designing thinking with gamification.

### **Research Finding**

From the literature review and content synthesis, the author suggests learning management guidelines by using design thinking and gamification; as shown in Figure 1.

**Figure 1.** Learning management using design thinking with gamification:



From Figure 1, Learning management using gamification, consists of 5 steps, as follows:

### **Step 1: Understanding a Problem**

Understanding problems, including a target group, to deeply stimulate the thinking process and to lead to creative thinking to solve problems.

The process in this step is based on understanding a target group by observation or interview, as follows;

1. Lecturers organise group activities for 4-5 students.
2. Lecturers use informal techniques to create situations from lesson content using non-suggestive questions.
3. Students evaluate situations.
4. Students search for problems and present problems via Digital Board application.

Applying gamification in this step, the lecturers allow the students to present problems and motivate them by issuing points to stimulate the thinking process, and opinion sharing, by using the Digital Board application. The lecturers then evaluate the students' opinions (via Digital Board application) and provide feedback, before proceeding to the next step.

## **Step 2: Define a Problem**

The data was analysed by pattern grouping, which is used to find relationships between students to group them and understand the problems. This can be done by grouping problems, and by analysing data links and relationships such as duplicate data and data similarity. In-depth data from the problem can then be extracted to solve the problems.

The process in this step assigns students to discuss/debate in a group before analysing; 1) Pain, 2) Need, 3) Motivation, and 4) Gain

Applying gamification in this step, the lecturers assign the students to identify; 1) Pain, 2) Need, 3) Motivation, and 4) Gain by the Digital Board application. The lecturers then motivate by giving points and evaluating the analysis of; 1) Pain, 2) Need, 3) Motivation, and 4) Gain, which was presented by the students to provide feedback, before moving to the next step.

## **Step 3: Ideate**

Finding a creative idea, which can solve problems by team brainstorming to attain the most diverse idea. The best idea is then selected, with the expectation to be able to solve problems and meet the needs of the target group.

The process in this step is team brainstorming by presenting extreme opinions to get diverse ideas, which are presented by Digital Board and Mind Map applications.

Applying gamification in this step is related to assigning each group to present their opinions about other groups' ideas by using the following 3 functions:

1. Heart: is the other groups' evaluation towards the extreme creative idea. The number of hearts will be converted to points.
  2. Star: is the lecturers' evaluation, which uses a rank from 1-5. The number of stars will be converted to points.
  3. Vote: has 2 types, Like and Unlike. The number of votes will be converted to points.
- The total points will be sorted, and 3 badges will be awarded; 1) Gold medal, 2) Silver medal, and 3) Bronze medal.

## **Step 4: Prototype**

The testing of developed ideas to see whether it can solve problems and meet the needs of the target group. Prototype creation involves drawing a chart on paper to develop a model, depending on the innovation.

The process in this step is related to developing a prototype or model on a computer, using the following formats; 1) 2D and 3D model generating 2) Storyboard generating

### **Step 5: Test**

The testing of a prototype to evaluate the design. The process in this step tests the efficiency of the prototype before its use, and includes evaluating. This is to edit and improve the prototype quality, meet users' needs, and to create better solutions to problems. The evaluation is done based on functionality, cost, appearance, utilisation, and maintenance.

### **Discussion and Conclusion**

The content synthesis in this study was used to develop a learning management model by using design thinking with gamification. It was found that the design thinking process had 5 steps, consisting of: Step 1: Understanding a problem – including a target group, to deeply stimulate the thinking process and to lead to creative thinking to solve problems. Step 2: Define a problem – analyse all the information by grouping the problems together to understand one issue characteristics as clearly as possible. Step 3: Ideate – finding a creative idea, which can solve problems by team brainstorming to attain the most diverse idea. The best idea is then selected, with the expectation to be able to solve problems and meet the needs of the target group. Step 4: Prototype – the testing of developed ideas to see whether they can solve problems and meet the needs of the target group. and Step 5: Test – the testing of a prototype to evaluate the design. The process in this step tests the efficiency of the prototype before its use and includes evaluating when lecturers use forms to evaluate the design, when gamification was used during the first 3 steps to manage the learning environment. The Digital Board and Mind Map applications were used to support the learning of the design thinking process in order to develop brainstorming to create innovations, creative thinking, and cooperation. This finding is consistent with (Tsalapatas et al., 2018), who stated that using a digital service learning design, by using the gamification principle, supports the design thinking process. This was because it supported creative thinking and cooperation, and let students learn from experience and create motivation from challenges in the real world. Moreover, the present findings are also consistent with (Chia Yuan Hung, 2018), who suggested that using the design thinking process with gamification supported teaching of curriculum design with graduate students who were planning to be teachers, and/or had been teachers. The design thinking process supported the students to participate in presenting and sharing about curriculum design and using gamification to organise the learning environment to promote the attention of students towards learning. It also corresponds with Lloyd (2013), who studied distance learning management with design thinking. The research found that this learning management could equip students with creative thinking skills, which can raise their consciousness and awareness about contributing their involvement, which is then conducive to systematic problem-solving.



Therefore, learning management by using design thinking with gamification will support students to be able to problem-solve creatively. Creative development through activities allows students to practise by focussing on gaining a deep understanding of others. Moreover, creative development stimulates students to create a variety of ideas. Learning management using design thinking with gamification will be beneficial for learning since it can create different experiences and support skills and problem-solving abilities among students. Activities are done through fun and challenging environmental management. Students will feel as if they are in competitions and participating in their learning. Consequently, students will be more engaged and enthusiastic about their learning. The gamification concept can be applied to every class level and subject. Additionally, game structures can be integrated into design lessons with interesting content and which support student participation. This is because students will feel that they are in a game environment and have learning targets through interaction, participation, achievement accumulation, rewards, and promotion. Students will absorb content through activities which involve learning through play.



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