A Study on the Effectiveness of a Board Game as a Training Tool for Project Management

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***Abstract*—Nowadays, games have become one of the useful tools in training. Many instructors and educators have chosen to use games to enhance the way of delivering the course content. An effective game will help the student to understand the concept quickly and get involve in experiential learning. The student can manage and solve the problem as in the actual situation. This study will focus on the effectiveness of board game as a training tool for project management. Two test methods were used in this study which arepilot-test and post-test. These methods were chosen to analyze the effectiveness of using *TASKMANAGER* Board Game as a teaching tool in increasing the student's comprehension and understanding of the concepts and strategies in project management. Three sub-components assessed were motivation, user experience and learning using Kirkpatrick's level one training evaluation based on the perception of the students. The result obtained indicated that the use of *TASKMANAGER* board game as a training tool for managing project has a positive impact on student's learning. It helps students to experience the situation of managing projects to improve their time management, human resource and communication skill.**

***Index Terms*—Board Game; Project Management; Teaching Tool.**

I. INTRODUCTION

Education now is very challenging. In an effort to educate the young generation, various training tools have been used. These materials have been designed to facilitate student in understanding the subject. Previously in the traditional training method, many instructors assumed that students will be able to understand the whole teaching and learning goals while in reality is that many students only achieve partial goals. There are even some do not achieve any of the goals. Therefore, an effective approach should be used to encourage and inspire when used during teaching [1].

The implementation of a tool like board provides a non-threatening, playful and competitive environment where a student can learn from their mistakes due to their weaknesses and failures in achieving the learning goals [2]. The board game is a game involving a counter or token that placed or moved on a board game provided by a set of instructions. Board games can be classified into two categories that reflect the realities of life or vice versa [3]. TASKMANAGER Board Game is also referring to a game or an exercise which incorporated elements of project management. This game was built to enable the students to understand the concepts on how to manage the project. This edutainment game gives students an opportunity to experience how to deal with problems and challenges in managing a virtual project [3]. This indoor activity is simple and easy to be done. Game elements provide a competitive environment, discussion and problem-solving with fellow team members about the content as the way to educate students to work in teams. These games are simulated from real project management scenario. It is used to impart the competencies, knowledge, skills and attitude to the students in time management, human resource and communication skills.

This game has been successfully used for college students and executives to learn project management techniques. However, it was never used as a training tool for secondary school students. So, the purpose of this research is to study the effectiveness of using TASKMANAGER as a tool in training project management. Understanding the rules and objectives of the game will help to maximize the student learning outcome [4]. The rest of the paper is structured as follow, section 2 provides the background of the research, presenting TASKMANAGER and how it works in training Project Management. In section 3, the methodology of the research and in section 4 will be results and analysis while in section 5, evaluation discussion and conclusion.

II. BACKGROUND OF THE RESEARCH

In an era when many students are oriented towards game or simulation, it is the best opportunity to use the game as a training tool. The use of game becomes the latest phenomena to try to engage the students fully in learning. According to Reid *et al.,* (2012) the usage of simulation game provides a better learning platform compare to traditional teaching method [5]. Furthermore, Carlos & Gabriel (2007) pointed out that traditional learning teacher-centered have been complemented with student centred like game to give the student or player ability to do self-learning [3]. It can be concluded that learning by game gives a positive impact to the student learning ability. Furthermore, Cook *et al.,* (2005) indicated that board game is an important tool to provide hands-on and heads-on skill and knowledge development for people on all subject and also very useful, effective and enjoyable for all ages [1]. This is supported by [6] that claimed that the use of games as a teaching tool has attracted 96% of the students' interest in project managing compared to the usual. A board game like

DELIVER was developed to help undergraduate students in controlling the project performance by applying the Earned Value Management technique [8]. In addition, Von Wangenheim *et al.*, (2013) also claimed that feedback obtained from the use of SCRUM and PHARM games show positive effects on learning [7]. The results of previous studies are illustrated in Table 1.

Table 1
Board Game and the result of the previous study

Board Game	Subject	Result	Target user
DELIVER	Earned Value Management	Point out a very positive effect on the game.	Undergraduate computer program
SCRUMIA	Project Management Concepts	The players are engaged and immersed in learning the task.	Undergraduate computer program
WiseMoney	Basic financial education	This game is useful and formative assessment	Teacher and students
PHARM	Pharmaceutical industry	Performance significantly higher	Professional
SIMSOFT	Human Resource Management		Professional

A. Taskmanager Board Game

TASKMANAGER intended to be a collaborative game. It can be played in a group of 4 to 6 of players with different roles as stated in Table 2. TASKMANAGER module consists of 4 stages in which the players have to finish their task by within the time given. Square Connectible Plastic Blocks are used in building the projects. Each project has a different shape of the object in accordance with the appropriate level. TASKMANAGER Game emphasizes how to manage the project in terms of time management, human resource and also communication skill in the group. Figure 1 shows the components of TASKMANAGER.

Table 2
TASKMANAGER Board Game members' role and responsibility

Role	Quantity	Responsibility
Chief Executive Officer (CEO)	One person per group	CEO is responsible for managing decision and for implementing the Company's long and short term plans.
Project Manager & Team members	Three or four people per group	Project managers are responsible for the planning, management, coordination and financial control of a project. Project Manager ensures the project is completed on time and within budget, that everyone else is doing their job properly.

Figure 1: TASKMANAGER components

B. Task Manager Module

The effective module of teaching and learning for secondary school students should meet the needs of educational objectives in Bloom's Taxonomy. The cognitive levels in Bloom's Taxonomy are Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation [10]. In addition, the goals and rules of the game must be clear in order to achieve maximum learning outcome. The aim of using this game as a training tool for managing project management is to train students about the importance of time management, human resource and communication skills in daily life. After playing this game, students are expected to be more efficient in skillfully using the three skills mentioned above. Figure 2 shows Bloom's taxonomy of educational objective for the cognitive domain.

The student should know, understand and be able to apply the project management techniques in TASKMANAGER Board Game in managing projects. They need to:

i. State the important concept in managing project– time management, human resource management, communication skill (remembering)
ii. Explain the process in managing project (understanding)
iii. Play the game – implementing the concept (applying)
iv. Analyse the strategies - able to identify the strengths and weakness of effectiveness and efficiency of completing tasks (analysing)

Figure 2: Bloom's taxonomy of Educational Objective for the Cognitive Domain

III. GAMEPLAY

At the beginning of the game, students will be divided into 4 to 6 players in one team. Every team needs to assign one CEO and one or more Project Managers. CEO is responsible for managing decision and for implementing the Company's long and short term plans. Project manager is responsible for the planning, management, coordination and financial control of a project. Project Manager ensures the project is completed on time and within budget while monitors the progress and efficiency of all members under his or her responsibility. The game instructor will then states the rules, explains the tasks, divides the task material among teams and set the game time. The CEO of each team chooses the project card by spinning the project board. After taking the project card, each group will have to discuss and plan to build the project within one minute. After that, each group will start building their project using plastic blocks as project resources within the given time. The first group that manages to complete the task on time will be given 10 points. The instructor will deduct the points if the project is delayed or incomplete. After the first stage, the instructor will then compile the results for every team and gives a general assessment of all the teams' performance. Next, each of the team will undergo a self-reflection process to identify their strengths and weaknesses in their strategies. In every stage, the instructor will change the project based on the level of difficulties.

IV. RESEARCH METHOD

This study uses TASKMANAGER board game as a tool in training project management for secondary students at SMK Syed Hassan.It is done on 50 form four students of SMK Syed Hassan in Kangar, Perlis.

A. Purpose and Procedure

The goals of the TASKMANAGER are to help students to understand the importance of time management, human resource, communication and effective teamwork skills to achieve project requirements. This study uses pilot test and post-test design. TASKMANAGER begins with each student plays the game and being asked to fill the survey after each stages the game. All comments are collected and identified to improve the existing module in accordance with the level of understanding. Post-test game used is to identify the effectiveness of TASKMANAGER board game as a training tool for managing the project. The flow of research is briefly explained in Figure 3.

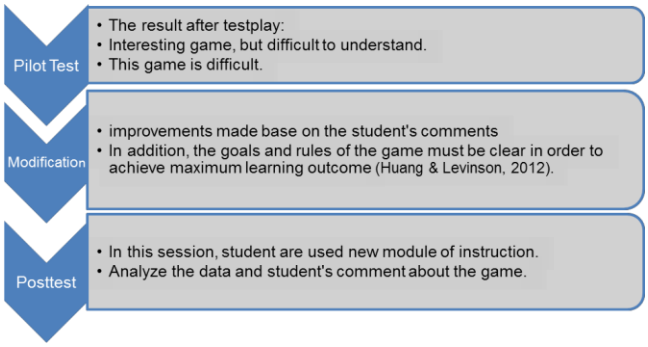

Figure 3:Flow of the research

B. Pilot Test

TASKMANAGER begins with each player fill the survey form after the completed a game. There were 10 students involved to ensure the success of this test play. Observations were made during this test play while all comments were collected to improve the existing module.

C. Modification

After running the pilot test, the existing modules are modified accordance to the student ability. The modules are created based on Bloom's Taxonomy.

D. Post Test

Post-test game is used to identify the effectiveness of TASKMANAGER board game as a training tool for managing the project. There were 30 students involved in this post-test session (refer to Figure 4). The same questionnaires that were used during the pilot test were again used to collect data after the game application.

Figure 4: Post-test for TASKMANAGER Board Game

E. Instrument

In this study, a standardized questionnaire [8] is chosen as the evaluation model. It consists of three sub-components with 27 items of questions. The sub-components are user motivation, user experience, and learning. Table 3 shows the

sub-component of evaluation model. Questionnaire are uses5-Likert scale format of strongly disagree (1), disagree (2), neutral (3), agree (4), to strongly agree (5).

Table 3
Sub-Component of Evaluation Model

Sub-component	Dimension	Number of question
Motivation	Satisfaction	1 – 2
	Confident	3 – 4
	Relevance	5 – 7
	Attention	8 - 10
User experience	Competence question	11 – 12
	Fun	13 – 16
	Challenge	17 – 18
	Social Interaction	19 – 21
	Immersion	22 – 24
Learning	Knowledge	25
	Comprehension	26
	Application	27

V. RESULT AND ANALYSIS

The data are analyzed to identify the positive and negative aspect of the game following the sub-components of motivation, user experience and learning.

A. *Subcomponents of Motivation*

Sub-components of motivation are divided into 4 dimensions as shown in Figure 5. They are satisfaction (questions 1 and 2), confidence (questions 3 and 4), relevance (questions 5 to 7) and attention (questions 8 to 10).

a. *Satisfaction*

Regarding the dimension of satisfaction, both items are rated moderately positive. This shows that students are satisfied because they know the game content is related to their learning area.

b. *Confident*

For the dimension of confident, both items were rated positively because the students understand the content of the subject while playing the game.

c. *Relevance*

This item also rated positively by the student. This result shows that the student considered the content included in this game is related to their training subject.

d. *Attention*

This dimension rated moderately positive. The students enjoyed playing the game while understanding the learning objectives of the training. They were focused throughout the training session.

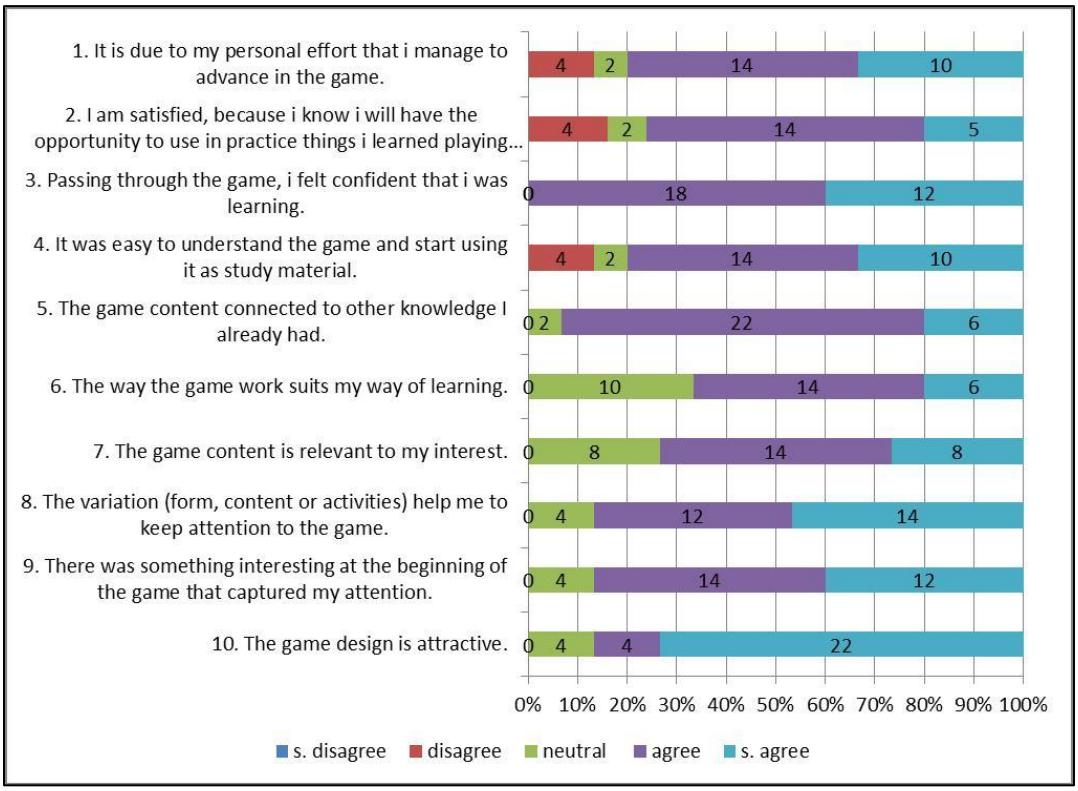

Figure 5: Diagram for sub-component of Motivation

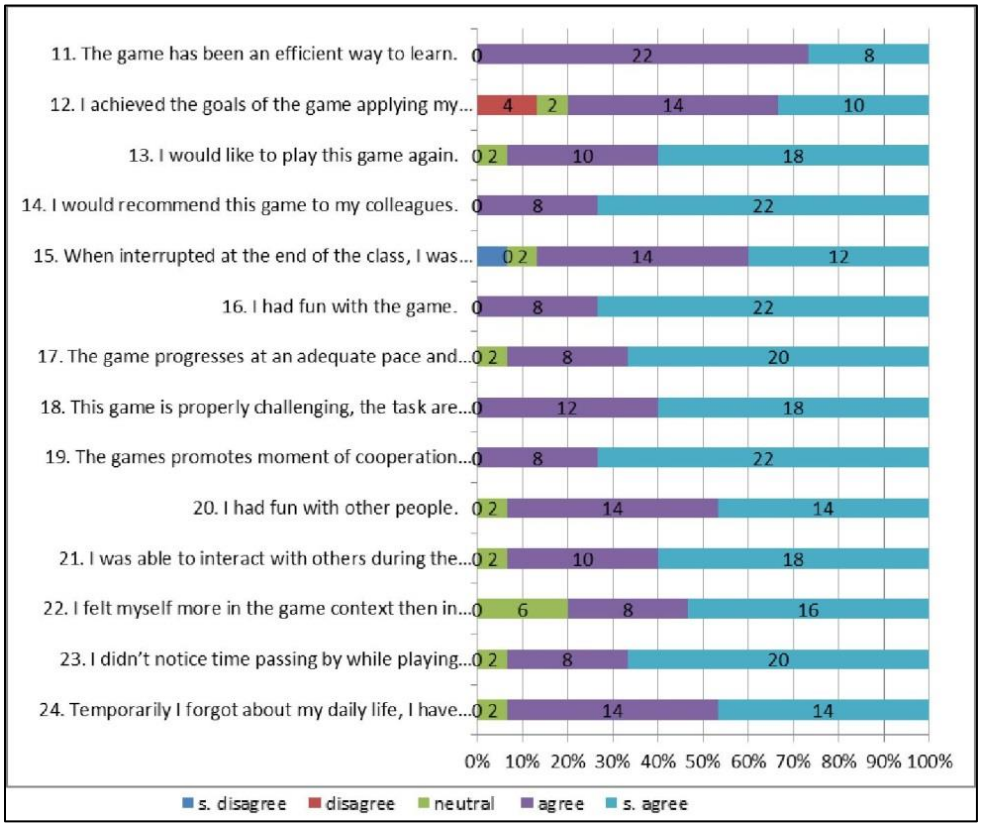

Figure 6: Diagram for sub-component of User Experience

B. Subcomponent of User Experience

Sub-components of User Experience are divided into five dimensions as shown in Figure 6. They are competence (questions 11 to 12), fun (questions 13 to 16), challenge (questions 17 to 18), social interaction (questions no 19 – 21) and immersion (questions 22 to 24).

a. Competence

Students expressed positively to competency meaning that they believed that the game is an efficient way to learn.

b. Fun

The majority of the students agreed that they had fun playing TASKMANAGER board game and would recommend it to others.

c. Challenge

This item rated positively by the student because this game was neither too easy nor too difficult to play.

d. Social interaction

The majority of the students strongly agree that this game help student in communication. During the gameplay, all students were cooperative and often communicated with each other.

e. Immersion

This item rated positively by the student. They forget the time passing. It shows that all the student give full attention on the training session.

C. Subcomponent of Learning

Figure 7 shows that the students believed that this game has a positive impact in their learning and helped them to apply them. It also confirmed by students' response that the students perceived an increase of knowledge (comprehension) and applied skills (application) in time management, human resource and communication skill covered by the game (Fig 8).

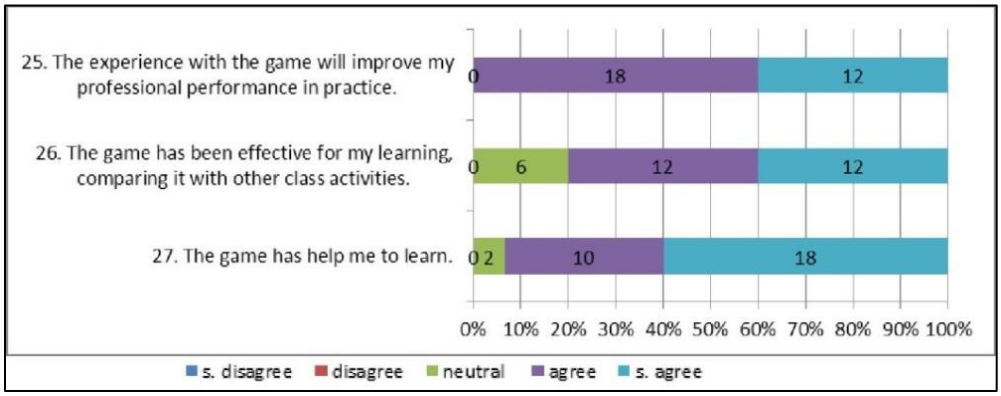

Figure 7: Diagram for sub-component of Learning

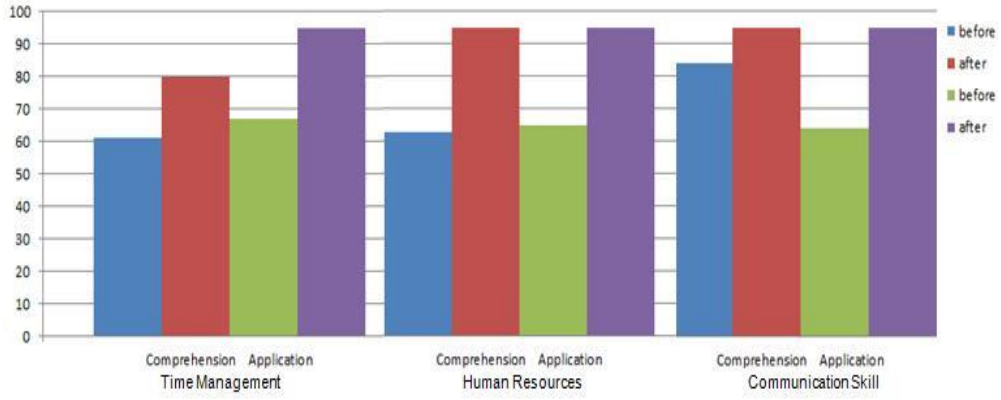

Figure 8: Average answers for knowledge levels

VI. CONCLUSIONS

This study proved that TASKMANAGER board game is an effective tool to be used as a training tool for managing project. It gives a positive impression to students to learn about project management concepts. Furthermore, the majority of the students said that they enjoyed playing the game. In addition, this game utilizes experiential learning in promoting understanding. Based on the observations done throughout the game, students were consistently focus on their objective and committed on the game. Overall students actively discussed and communicated with team members to complete their project. The element of competition requires the students to communicate with each other and got all the students to be actively involved in each stages of the game. On the other hand, based on our experience this game assisted the instructor during the explanation and self-reflection sessions. For the pilot test, one student indicates that this game needs to have a brief about rules and guidance on the game process. As a reflection of this comment, the set of direction and allocation of time for each stage of the game is examined and modified to its suitability

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