Comparing the Effect of Project-Based Learning and Discovery Learning on Students' Futsal Learning Outcomes

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Abstract: The aim of this study was to find out (1) if project-based learning could significantly influence students' cognitive, affective, and psychomotor learning outcomes in futsal learning, (2) if discovery learning could significantly influence students' cognitive, affective, and psychomotor learning outcomes in futsal learning, and (3) if the influence of project-based learning on students' cognitive, affective, and psychomotor learning outcomes in futsal learning is different from that of the discovery learning. The study was conducted using an experimental design. The samples were seventh grade students at MTs AL-Marwah Kabupaten Bandung chosen using a cluster random sampling technique. The data were collected through an objective cognitive test, an affective questionnaire, and observation sheets to measure the psychomotor learning outcomes. A MANOVA test was used to conduct the hypothesis testing. Based on the results of data analysis, it was concluded that (1) project-based learning significantly influenced students' cognitive, affective, and psychomotor learning outcomes in futsal learning, (2) discovery learning significantly influenced students' cognitive, affective, and psychomotor learning outcomes in futsal learning, and (3) the influence of project-based learning on students' cognitive, affective, and psychomotor learning outcomes in futsal learning was not significantly different from that of the discovery learning.

1 INTRODUCTION

The development of Curriculum 2013 was the continuation step of the Competence Based Curriculum Development that was initiated in 2004 and KTSP 2006 that include the behaviour, knowledge and skills in an integrated manner. The aim of the physical education is comprehensive, it covers the cognitive, affective and psychomotor domains (Anderson et al., 2016).

Unfortunately, until today, the focus and attention on the effort to improve the comprehensive physical education learning result, which are cognitive, affective and psychomotor, are often neglected by the educators (Schools, 2013). The facts show that there are still lots of physical education at schools that are still teacher-centered and only focus solely on movement concept mastering so that the cognitive and affective aspects are neglected (Approach, 2009).

The alteration on the teaching process in curriculum 2013 includes a) scope of competence characteristics oriented: 1) the behaviour to accept, perform, respect, appreciate, and practice 2) the skill to observe, ask, try, sense, present, and create, and 3) the knowledge to know, understand, apply, analyse, evaluate, and create: b) to use scientific approach, the character competence based on levels. C) to prioritize the project based learning and discovery learning models (Kirk, 2015; Dearden, 2014).

The Project-based Learning is a learning model that uses projections or activities as a learning process to achieve the competence of behaviour, knowledge and skill (Approach, 2009; Gibbes and Carson, 2013). The project-based learning uses the projects as an initial step to integrate new knowledge and skill based on real experience (Beaumont et al., 2011). The project-based approach is a learning whose innovative emphasis is on contextual issues (Approach, 2009). In this project-based learning, the students learn actively and will be made actively hands-on (through physical activities) and minds-on (through thinking/mental activities) (Ang and Penney, 2014).

The Discovery Learning model is a learning theory defined as a learning process that occurs if the students are not presented with learning in its final form, but are expected to organize it by themselves (Dean, 2010). Referring to Bruner's opinion, that

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"Discovery Learning can be defined as the learning that takes place when the student is not presented with subject matter in the final form, but rather is required to organize it himself" (Washio et al., 2015). The basic of Bruner's idea is an idea of Piaget which stated that kids must play an active role in the learning process in the class. Bruner used the method called Discovery Learning where the students organize the materials learned with one final form Dalyono (Steele et al., 2016). The Discovery Learning method is to understand the concept, meanings and the relations through an intuitive process to finally reach the conclusion Budiningsih. The discovery takes place if the individuals involved, particularly in using the mental process to find some concepts and principles. The discovery is performed through observation, classification, measurement, prediction, definition and inference (Washio et al., 2015) the process is called the cognitive process while the discovery is the mental process of assimilating concepts and principles in the mind.

The importance of the study result that consists of the cognitive, affective and psychomotor for the students, urges the teachers to innovate their teaching (Quay et al., 2016). The Project-based learning model and Discovery Learning are based on the constructivism theory and is expected to be a learning process that can improve the study results of the students (Keenan and Keenan, 2016).

2 METHODS

2.1 Participants

Seventh graders from two classes of 40 students with learning length of four weeks in MTs Al-Marwah Pameungpeuk, Kabupaten Bandung.

2.2 Instruments

2.2.1 Cognitive

The instruments to measure the cognitive domain regarding the students' knowledge of the materials taught in MC and BC (Main Competence and Basic Competence) and to evaluate the mastery level of the students is the objective test in form of multiple choices that consist of 28 questions with choices of A, B, C, and D.

2.2.2 Affective

The instrument to measure the affective domain is the scoring scale. The indicator revealed regarding to the values contained in the physical education about "cooperation, self-reflection", "behaviour profile in physical education", and "social, emotional/attitude test" consist of 24 questions.

2.2.3 Psychomotor

The instrument in this research used the scoring instrument for the skill in playing Futsal by using GPAI (Game Performance Assessment Instrument). The writer focused on three performance aspects on each decision made component (proper or improper), skill execution (effective or ineffective) and support (proper or improper).

2.3 Procedure

The sampling for the research was conducted randomly to the class groups in the population by using cluster random sampling technique. This procedure is used because it was not allowed to make a new class in order to choose the samples, therefore the sampling used the available class.

The steps in deciding the samples are: performing the random selection and then performing the random assignment.

The treatment is given for 12 meetings three times per week.

3 RESULTS

The data of the research result is analysed with the help of SPSS 22. The summary of the count result is as follows table 1:

Table 1: Data of Research Result.

Item	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Cognitive Initial Test Cognitive Final Test	-1.350	.489	.109	-1.579	-1.121	-12.337	19	.000
Affective Initial Test Affective Final Test	-2.700	.733	.164	-3.043	-2.357	-16.480	19	.000
Psychomotor Initial Test Psychomotor Final Test	-1.600	1.847	.413	-2.464	-.736	-3.875	19	.000

(1) The cognitive domain obtained the t-count for 12.337 with a significance value of 0,000 < □ 0,05; (2) Affective domain obtained the t-count for 16.480 with a significance value of 0,000 < □ 0,05; (3) Psychomotor domain obtained the t-count for -3.875 with a significance value of 0,000 < □ 0,05. With such value, it means that the H0 is rejected, meaning that there is a significant difference between the results of the initial and final tests of the cognitive, affective and psychomotor domains in the Project-Based Learning Model groups.

Table 2: Data of Research Result.

Item	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Cognitive Initial Test Cognitive Final Test	-.950	.394	.088	-1.134	-.766	-10.782	19	.000
Affective Initial Test Affective Final Test	-2.200	.523	.117	.-2.445	-1.955	-18.807	19	.000
Psychomotor Initial Test Psychomotor Final Test	-1.050	.759	.170	-1.405	-.695	-6.185	19	.000

(1) The cognitive domain obtained the t-count for 10.782 with a significance value of 0,000 < □ 0,05; (2) Affective domain obtained the t-count for 18,807 with a significance value of 0,000 < □ 0,05; Psychomotor domain obtained the t-count for -6,185 with a significance value for 0,000 < □ 0,05. Therefore, it means that the H0 is rejected, meaning that there is a significant different between the results of the initial and final tests of the cognitive, affective and psychomotor domains in the Discovery Learning Model groups.

Table 3: Data of Research Result.

Model Project Based-Learning		Model Discovery Learning	
Domain	Gain	Domain	Gain
Cognitive	1.35	Cognitive	1.60
Affective	2.70	Affective	2.20
Psychomotor	1.60	Psychomotor	1.05

Based on the result of the score gain data analysis, it showed that the Project-based Learning Model affects more significantly than the Discovery Learning Model toward the cognitive, affective and psychomotor learning results of the students in futsal learning.

4 DISCUSSION

Based on the result of the data analysis, it can be seen that the Project-based Learning Model gives significant effects to the students' cognitive results in learning futsal (Stozhko et al., 2017). The Project-based Learning really allows the students to develop their cognitive aspects since it also requires the students to research, plan, design, and reflect their creations in the project (Stozhko et al., 2017). The futsal learning also helps each student to develop their affective aspect (Blumenfeld et al., 2011). In the

Project-based Learning, the students perform an active learning (Approach, 2009). The students are really required to perform actively in hands on (through physical activities) manner. All the aims will be achieved in the process of Project-based Learning Model, since the students involve actively in the learning process and this will improve the students' psychomotor aspects (Stozhko et al., 2017). This statement is strengthened by a researched conducted by Iwamoto et al. (2016) entitled "The Effect of Project-Based Learning on Student Performance" which showed that this particular model can improve the students' skill. Therefore, based on the result of the data analysis, theory of the experts and the results of the previous researches, they showed that the Project-based Learning gives significant effects on the result of the students' psychomotor in the futsal learning (Stozhko et al., 2017).

The Discovery Learning model affects significantly toward the students' cognitive, affective and psychomotor futsal learning results (Moy, 2016) The Discovery Learning model is a learning theory defined as a learning process that occurs if the students are not presented with the learning material in its final form (Dean, 2010). Therefore, the students must involve to learn actively in the class (Dean, 2010), by using the method called Discovery Learning, where the students organize the materials learned in a final form. The Discovery Learning method is to understand concepts, meanings, and relationships through an intuitive process to eventually reach the conclusion (Terms, 2016).

The Discovery Learning model process prioritizes an active participation from each student and identifies skill differences well. To support the learning process, an environment to facilitate the curiosity of the students in the exploration stage is required. Such environment is aimed so that the students can follow the learning process well, be more creative, work in a team as well as accepting feedback and suggestions discussed in groups to develop the students' affective aspect. All these can be achieved in the Discovery Learning model process since the students involve actively in the learning process (Bradley and Bradley, 2007).

In the Learning Concept, the Discovery Learning is the establishment of the categories or concepts that allow the generalization. As for the categorization seen in the Discovery which means the establishment of the categories or more known as coding systems (Anderson et al., 2016). The categories establishment and coding systems is formulated in the sense of relations (similarity and difference) that occur between the objects and events. Considering that a concept or categorization has five elements and that the students are deemed understand a concept if he/she knows all the elements of the concept which include: names, positive and negative examples, main or side characteristics, characteristics range, and the rules (Hammer and Hammer, 2009). The concept establishment is a two different categorizing activities that require different thinking process (Thomas, 2012). Some of the previous researches became the researchers' references for this research. Filippatou and Kaldi (2010) entitled *The Effectiveness of Project Based Learningon Pupils with learning Difficulties Regarding Academic, Performance, Group Work and Motivation.*

In this Project-based Learning, the students learn actively through hands on activities (physical activities). In the futsal learning, there are many physical movements such as running, passing, shooting, dribbling, and so on. By performing the Discovery Learning model, and individual's talent and skill can be developed (Çakici, 2013; Approach, 2009). Almost every adult has passed the three skill systems to state their skills perfectly. The three skill systems are known with three ways of presentation, namely: (1) Enactive presentation, a presentation performed through a manipulative action. With this, an individual finds out a reality aspect without using the thoughts or words. Thus, this consists of the presentation of the past events through motor response, this is performed in a set with activities to achieve a certain goal. For instance, one student inactively knows how to do the passing, dribbling and shooting, (2) Iconic presentation, it is based on internal thoughts, the knowledge is presented by a group of images that represent a concept, but this does not define the particular concept comprehensively, (3) Symbolic presentation, it is performed by using words or languages, proven by one's ability that pays more attention to proportion or statement instead of objects, gives a hierarchical structure on concepts and considers alternative probabilities in a combined way.

Consequently, based on the data analysis, theories of the experts and previous research results, it is stated that the Project-based Learning Model has more significant effects than the Discovery Learning Model toward the cognitive, affective and psychomotor of the students' futsal learning.

5 CONCLUSIONS

Based on the result of the research and the discussion, the writers conclude that:

(1) The Project-based Learning gives significant effects toward the students' cognitive, affective and psychomotor futsal learning results (Stozhko et al., 2017; Bilgin, 2015). (2) The Discovery Learning model gives significant effects toward the students' cognitive, affective and psychomotor futsal learning results (Terms, 2016). (3) The Project-based Learning Model affects more significantly than the Discovery Learning Model toward the students' cognitive, affective and psychomotor futsal learning results.

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