

Influence of Project-Based Learning Model and Emotional Intelligence on Critical Thinking Skills of Students in SMAN 1 Pangkep



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ABSTRACT: This research aims to analyze the differences in critical thinking skills between students who are taught using the project-based learning model and the discovery learning model at SMAN 1 Pangkep students, describing the differences in critical thinking skills between students who are taught using a learning-based project model and the discovery learning model who have high emotional intelligence at SMAN 1 Pangkep, describes the differences in critical thinking skills between students taught using the project-based learning model and the discovery learning model who have low emotional intelligence at SMAN 1 Pangkep, analyzing the interaction between learning models and emotional intelligence on the critical thinking skills of SMAN 1 Pangkep students. The type of research uses a true experimental 2x2 factorial design with a research sample of two experimental classes and two experimental classes. The research elements used are teaching modules. The research instruments were critical thinking skills questions and emotional intelligence questionnaires, carried out at SMAN 1 Pangkep. The results of this research show differences in the critical thinking skills of students who are taught using the project-based learning model using the discovery learning model. For high and low emotional intelligence, there are differences in the critical thinking skills of those taught using the project-based learning model and those taught using the discovery model. There is no interaction between the learning model and emotional intelligence on the critical thinking skills of SMAN 1 Pangkep students.

KEYWORDS: Project Based Learning, Discovery Learning, Emotional Intelligence, Critical Thinking Skills

INTRODUCTION

The era of globalization is a manifestation of the 21st century related to very rapid advances in technology and information. Facing this era requires innovation in various fields, especially in the field of education, which is the basic field for preparing society. Innovation in the education sector can start with the implementation of the curriculum. The current curriculum is the 2013 curriculum and the independent curriculum. The independent curriculum is designed to provide learning freedom to students which can encourage students to become active and independent learners. The success of implementing the independent curriculum depends on the learning process carried out by educators.

The implementation of learning is influenced by the selection of appropriate learning models, methods, and strategies to produce effective and innovative learning, including physics learning. Physics Learning is a fundamental study related to the order of the universe. The abstract nature of physics learning demands that students not only master the concepts but that students can also implement these concepts. So it is necessary to develop students' skills to be able to apply learning theories in real life. One of them is critical thinking skills which are part of high-level thinking skills. Critical thinking skills are high-level thinking skills in making decisions that can be trusted and accounted for (Nasution, 2018). Critical thinking skills can also be interpreted as students' skills in analyzing and evaluating information (Ennis, 2018). A critical thinker can think openly, analyze, and gather relevant information with abstract ideas, and communicate ideas and findings effectively.

Based on the results of observations made at SMA Negeri 1 Pangkep, several facts were obtained, including: (1) students are less able to work on physics questions if they do not match the examples given by the teacher, (2) students are less able to solve problems that require reasoning, (3) students are less able to solve problems that require reasoning, (3) some students do not pay attention to the teacher's explanations, (4) the physics laboratory provided by the school is not used optimally and (5) students have high enthusiasm for activities that use skills. From several facts that have been stated, this can have an impact on the low level of learning success, including the critical thinking skills of students at SMAN 1 Pangkep.

Students' critical thinking skills can be overcome by implementing a learning model that emphasizes students' activeness in learning. One way is to apply a project-based learning model, which is a learning model that has an evaluation syntax by critical

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thinking indicators. The project-based learning model involves high-level thinking skills in completing tasks based on challenging questions/problems, designing, solving problems, making decisions, and giving students opportunities to work (Ramadiyanti, Muderawan & Tika, 2016). According to Sari and Angreni (2018), the project-based learning model is a learning process that directly involves students to produce a project. Project-based learning models can also be defined as innovative learning that provides learners with opportunities to autonomously construct their own learning (Eliza, Suriyadi & Yanto, 2019). The steps of project-based learning consist of posing questions, designing a project, creating an activity schedule, monitoring the project's progress, assessing the project, and evaluating the experience (Kemendikbud, 2014). This is by constructivism theory which emphasizes the importance of processes that involve the way students learn.

Constructivism theory defines learning as not just memorizing but the process of constructing knowledge through experience (Yanti, 2019). One of the figures of constructivism, Dewey, in his book *Democracy and Education*, explains that education is a reconstruction of experience that adds meaning to the experience and the ability to direct further experience (Simatupang, 2019). Dewey considers learning to be a series of practical social experiences where students learn by doing, collaborating, and reflecting with other people (Rusli, Hermawan & Purnama, 2021). The activity of constructing knowledge through experience is not only caused by external factors but can also be caused by internal factors.

Internal factors that can influence the learning process and can have an impact on student's critical thinking skills are students' intelligence. Goleman (2002), states that intellectual intelligence contributes around 20% to achieving success in life, while 80% is contributed by non-intellectual intelligence known as emotional intelligence. Emotional intelligence is a person's ability to control and motivate themselves (Putra, Ramadhani, Andhika, Agustina & Pitriana, 2022). This is also related to how to maintain a balance between emotions and reason (Wuwung, 2020). According to Goleman (Wuwung, 2020), the dimensions of emotional intelligence consist of self-awareness, managing emotions, utilizing emotions productively, empathy, and building relationships. The process of managing emotions is very necessary in the learning process which always confronts students with problems that must be solved based on learning concepts, including project-based learning models.

Assumptions related to project-based learning models and emotional intelligence influence students' critical thinking skills by research conducted by Anggreni, Festiyed, and Asrizal (2019) which suggests that the project-based learning model (PjBL) as a whole has a positive effect on students' critical thinking skills. Other research was conducted by Darwis, Ali, and Helmi (2020) who stated that there is a positive relationship between emotional intelligence and students' critical thinking skills. It will be easier and easier for students to improve their critical thinking skills because they have emotional intelligence or it can be interpreted that high and low emotional intelligence can influence students' critical thinking skills (Darwis, Ali & Helmi, 2020).

Based on the explanations above, it is known the role of project-based learning models and emotional intelligence on students' critical thinking skills. Therefore, to prove the truth of the theory that has been presented, the author conducted research entitled "Influence of project-based learning model and emotional intelligence on the critical thinking skills of students at SMAN 1 Pangkep"

METHOD

This research is a True Experiment research (real experiment) which was carried out in the odd semester of the 2023/2024 Academic Year at SMA Negeri 1 Pangkep. The research design used is a factorial 2 x 2 design which can be seen in table 1 below.

Table 1: Research Design

Emotional intelligence	Learning Model (A)	
	Project Based Learning (A1)	Discovery Learning (A2)
High (B1)	[A1B1]	[A2B1]
Low (B2)	[A1B2]	[A2B2]
Σ	[A1B1] + [A1B2]	[A2B1] + [A2B2]

Source: (Kadir, 2010)

Information:

A1B1 : High emotional intelligence group taught using the project-based learning model

A2B1 : High emotional intelligence group taught using the discovery learning model

A1B2 : Low emotional intelligence group taught using the project-based learning model

A2B2 : Low emotional intelligence group taught using the discovery learning model

The population in this study was all class XI students at SMAN 1 Pangkep with a research sample of four classes selected using a simple random sampling technique. The research variables consist of 1) independent variables: project-based learning model and discovery learning model; 2) moderator variables: high and low emotional intelligence; and 3) dependent variables:

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critical thinking skills. Data collected in the research used an emotional intelligence questionnaire which was prepared to refer to aspects of self-awareness, managing emotions, using emotions productively, empathy, and building relationships. Apart from that, data was also collected using critical thinking skills tests with indicators proposed by Facione, namely interpretation, analysis, inference, evaluation, and explanation. The data analysis techniques in this research are divided into two, namely 1) descriptive statistical analysis by calculating the average, standard deviation, maximum score, minimum score, and frequency distribution; 2) inferential statistical analysis using a two-way analysis of variance (ANOVA) test which previously carried out a prerequisite test in the form of a normality test using the Liliefors test and homogeneity of variance test.

RESULT AND DISCUSSION

The critical thinking skills data analyzed descriptively was obtained from the final score of the critical thinking skills test for experimental class 1 and experimental class 2 as follows.

Table 2: Statistics on Critical Thinking Skills Scores for Students in Experimental Classes 1 and 2

Empirical	Learning Model (A)	
	Project-Based Learning (A1)	Discovery Learning (A2)
Maximum Ideal Score	32	32
Manimum Ideal Score	0	0
Maximum score	30	26
Minimum Score	12	8
Sample size	71	71
Average score	20,32	17,80
Standard deviation	3,86	4,05

Source: Processed Primary Data (2024)

Table 2 shows the differences in scores in classes taught using project-based learning and discovery learning models. The maximum and minimum critical thinking skills scores of classes taught using the project-based learning model are higher than the critical thinking skills scores of classes taught using the discovery learning model. The comparison of these scores is also clarified by the average score obtained in classes taught using the project-based learning model, namely 20.32, and for classes taught using the discovery learning model, the average score obtained is 17.80. A more detailed comparison of scores for experimental classes 1 and 2 can be seen in the following results of categorizing critical thinking skills scores.

Table 3: Distribution of Categorization of Students' Critical Thinking Skills Scores in Experimental Classes 1 and 2

Interval	Category	Experiment 1		Experiment 2	
		Frequency	Percentage (%)	Frequency	Percentage (%)
28 - 34	Very High	3	4,22	0	0
21 - 27	High	27	38,03	18	25,35
14 - 20	Medium	39	54,93	42	59,16
7 - 13	Low	2	2,82	11	15,49
0 - 6	Very Low	0	0	0	0
Amount		71	100	71	100

Source: Processed Primary Data (2024)

The critical thinking skills score for experimental class 1 is dominantly in the medium and high categories with frequencies of 39 and 27 respectively, which in terms of percentages are 54.93% and 38.03%. Apart from that, data in the low category is 2 with a percentage of 2.82% and data in the very high category is 3 with a percentage of 4.22%. As for the very low category, there were no students who obtained scores in that range. As for experimental class 2, the critical thinking skills data obtained showed that the majority of students were in the medium category, namely 42 students with a percentage of 59.16%. 11 students scored critical thinking skills in the low category with a percentage of 15.49% and in the high category, there were 18 people with a percentage of 25.35%. Meanwhile, in the very low and very high categories, there were no students who obtained critical thinking skills scores

Apart from that, the results of the descriptive analysis of the emotional intelligence of students in experimental class 1 and experimental class 2 in class XI of SMAN 1 Pangkep can be seen in Table 4.

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Table 4: Statistics of Emotional Intelligence Scores for Experimental Class 1 and 2 Students

Class	Physics Emotional Intelligence Score		Average
	Maximum	Minimum	
Experiment 1	179	132	149,9
Experiment 2	176	129	147,8

Source: Processed Primary Data (2024)

Table 4 shows that the emotional intelligence score of experimental class 1 or the class taught using the project-based learning model is higher than that of experimental class 2 or the class taught using the discovery learning model, both in terms of maximum score, minimum score, and average score.

The inferential data analysis technique is carried out to test the hypothesis using parametric analysis, namely variance (ANOVA) with factorial design 2 x 2. The following summary of test results was obtained.

Table 5: Summary of Variance Analysis Test Results (ANOVA)

Variant source	Degrees of freedom (db)	Sum of squares (JK)	Mean Square (RJK)	F count	F table (0.05)	Test Decision
Between Columns	3	1368,14	456,05	81,02	2,73	H_0 ditolak
Antar A	1	1208,01	1208,01	214,62	3,97	H_0 ditolak
Between B	1	156,33	156,33	27,77	3,97	H_0 ditolak
AB Interaction	1	3,80	3,80	0,68	3,97	H_0 diterima
In Ex	71	405,26	5,63			

Source: Processed Primary Data (2024)

The table above presents several conclusions regarding the hypothesis which are explained as follows.

- Overall, there are differences in critical thinking skills between students taught using the project-based learning model and students taught using the discovery learning model at SMAN 1 Pangkep students

Students' critical thinking skills for classes taught using the project-based learning model show that fluid material has improved compared to classes taught using the discovery learning model. This assumption is in accordance with the results of hypothesis testing that have been obtained using the ANOVA test $F_{\text{Count}} = 81,2$ and $F_{\text{Table}} = 2,73$ ($F_{\text{Count}} > F_{\text{Table}}$) so it can be concluded H_0 rejected or in other words H_1 accepted. This means that overall there are differences in critical thinking skills between students who are taught using the project-based learning model and students who are taught using the discovery learning model at SMAN 1 Pangkep students.

The differences in students' critical thinking skills in classes taught using the project-based learning model and classes taught using the discovery learning model are caused by the different approaches in the two learning models in developing critical thinking skills. The difference in the approaches to the two models is the focus on implementing the two learning models.

The project-based learning model focuses more on solving real problems with students creating a product. In the implementation process, the project-based learning model has a clear structure and guidelines starting from the planning, and implementation to the evaluation stages. This provides a framework for students to organize the thoughts they have in completing tasks systematically. This systematic implementation helps students apply all indicators of critical thinking skills proposed by Facione consisting of indicators of interpretation, analysis, inference, evaluation, and explanation.

The discovery learning model focuses on independent discovery with students encouraged to explore new concepts and ideas independently through experimentation, observation, and reflection. In the implementation process, the discovery learning model provides greater freedom for students to explore and discover their knowledge. This is useful for encouraging creativity and independence, but can also make it difficult for students to organize thoughts and apply critical thinking skills systematically.

The description of the differences in improving students' critical thinking skills with the project-based learning model and the discovery learning model, is in line with research conducted by Maubana (2020) which states that there are differences in the achievement of critical thinking skills and learning outcomes of students taught with the project-based learning model compared with with a discovery learning model.

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2. For students who have high emotional intelligence, there are differences in critical thinking skills between students taught using the project-based learning model and students taught using the discovery learning model at SMAN 1 Pangkep students

Research conducted using a project-based learning model in experimental class 1 and a discovery learning model in experimental class 2 showed differences in critical thinking skill scores in terms of emotional intelligence. This is because the use of learning models between experimental class 1 and experimental class 2 is different. The use of a project-based learning model in experimental class 1 certainly makes students more involved in the learning process from problem posing to project evaluation.

This explanation is by research data which shows that there are differences in the critical thinking skills of students who have high emotional intelligence, between students taught using the project-based learning model and those taught using the discovery learning model. The results of hypothesis testing using ANOVA obtained values F_{Count} amounting to 214,62 and F_{Table} of 3,97. Refers to the criteria for decision making with values $F_{\text{Count}} > F_{\text{Table}}$, then it can be concluded H_0 rejected or in other words H_1 accepted. This states that for students who have high emotional intelligence, there are differences in critical thinking skills between students taught using the project-based learning model and students taught using the discovery learning model at SMAN 1 Pangkep students.

The influence of emotional intelligence on critical thinking skills strengthens the assumption that students who have high emotional intelligence tend to be better at managing their own emotions and relationships with other people so that in the learning process they can have good interactions with peers and maintain focus on what they are doing or not easily influenced by other activities that are not related to the learning process. This is in line with research conducted by Darwis, Ali, and Helmi (2020) which found that there was a positive and significant relationship between emotional intelligence and Facione's critical thinking abilities in class X students at SMA Negeri 1 Gowa. This shows that students with high emotional intelligence are better able to control their emotions and focus on the task, so they are better able to think critically in solving physics problems.

3. For students who have low emotional intelligence, there are differences in critical thinking skills between students taught using the project-based learning model and students taught using the discovery learning model at SMAN 1 Pangkep students

The hypothesis test carried out shows that there is an influence of emotional intelligence on critical thinking skills not only for high emotional intelligence but also for low emotional intelligence. The results of the analysis of the hypothesis test carried out using two-way ANOVA obtained a calculated F_{Count} of 27,77 and F_{Table} 3,97. Refers to the criteria for decision making with values $F_{\text{Count}} > F_{\text{Table}}$, then it can be concluded H_0 rejected or in other words H_1 accepted. This means that for students who have low emotional intelligence, there are differences in the critical thinking skills of students who are taught with a project-based learning model and students who are taught with a discovery learning model at SMAN 1 Pangkep students.

This statement is also by the dimensions of emotional intelligence or the viewpoints and perspectives used to assess students' emotional intelligence. Students who have low emotional intelligence tend to find it difficult to manage their emotions which affects their social interactions, both interactions with teachers or myself as a researcher and with peers. In addition, students who have low emotional intelligence are more easily distracted by other activities that are not related to the learning process or find it difficult to maintain focus in doing something. This attitude is very contrary to the demands required in the learning process which requires students to be active in the learning process, in this case interacting with all individuals involved in the learning process.

The results obtained show that there are differences in critical thinking skills in students with low emotional intelligence who are taught with different learning models, proving that the learning model in experimental class 1 with the project-based learning model is more effective in improving critical thinking skills compared to the discovery learning model.

4. There is no interaction between the learning model and emotional intelligence on the critical thinking skills of SMAN 1 Pangkep students

This fourth hypothesis is tested by analyzing the pair of null hypotheses (H_0) and comparison hypotheses (H_1). The results of the hypothesis test carried out using the 2-way ANOVA test were obtained F_{Count} of 0,68 dan $F_{\text{Table}} = 3,97$. According to the decision-making criteria if $F_{\text{Count}} > F_{\text{Table}}$, for H_0 accepted and H_1 rejected. This means that there is no interaction effect between the learning model and emotional intelligence on students' critical thinking skills. The interaction that occurs in the project-based learning model and the discovery learning model with emotional intelligence.

The absence of interaction between the application of learning models and emotional intelligence on students' critical thinking abilities is also caused by the strong influence of each variable. This means that the Discovery learning learning model and the project-based learning model are quite significant in improving critical thinking skills, regardless of the level of emotional intelligence of students which can be seen from the acquisition of critical thinking skills scores for experimental class 1 students which tend to be higher than experimental class 2 both before and after being treated or taught using the Discovery learning model (experiment 1) and the project-based learning model (experiment 2). In addition, students with higher emotional intelligence tend to have better critical thinking skills, regardless of the learning model used.

The combination of a learning model with a certain level of emotional intelligence does not produce a greater increase in critical thinking abilities than if we only applied one of these variables separately. In other words, there is no strengthening or

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weakening effect that occurs when the two variables are combined. This is in line with what Amanda (2014) stated, which states that no interaction occurs because two or more independent variables have separate influences that are very strong (significant) on the dependent variable.

Apart from that, researchers cannot control all the factors involved in the learning process, thus there is no interaction between the learning model and students' emotional intelligence on critical thinking skills because there are many factors that influence the learning process. Syah (2012) states that the success of the learning process is influenced by internal and external factors. Internal factors that exist within individuals include attention, interest, talent, motivation, readiness, and fatigue. External factors include family factors, school factors, and community factors. All internal and external factors in learning are interrelated and influence each other so that the learning process is not only influenced by learning models and emotional intelligence but many influencing factors.

CONCLUSIONS

Based on the results of the research and discussion, the following conclusions were obtained: 1) There are differences in critical thinking skills between students who were taught using the project-based learning model and students who were taught using the discovery learning model at SMAN 1 Pangkep students; 2) For students who have high emotional intelligence, there are differences in critical thinking skills between students who are taught using the project-based learning model and students who are taught using the discovery learning model at SMAN 1 Pangkep students; 3) For students who have low emotional intelligence, there are differences in critical thinking skills between students who are taught using the project-based learning model and students who are taught using the discovery learning model at SMAN 1 Pangkep students; 4) There is no interaction between the learning model and students' emotional intelligence on the critical thinking skills of students at SMAN 1 Pangkep.

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