Switch: Jurnal Sains dan Teknologi Informasi
Volume. 2 No. 4 September 2024
e-ISSN : 3032-3320, dan p-ISSN : 3032-3339, Hal. 99-107
DOI: https://doi.org/10.62951/switch.v2i4.190
Available online at: https://journal.aptii.or.id/index.php/Switch

The Relationship of Interest and Metacognitive Ability through a Project-Based Learning Model on Reaction Rate Materials at Dian Harapan Holland Village Manado School

Miracle Lendo[1*], Soenandar M. T. Tengker[2], Jeanne Tuerah[3]
[1-3]Chemistry Education Study Program, FMIPAK, Universitas Negeri Manado, Indonesia

Address: Jl. Kampus Unima Tonsaru, Kec. Tondano Selatan, Kab. Minahasa, Sulawesi Utara, Indonesia
Author's correspondence : 20506002@unima.ac.id

Abstract. This research using the PTK (Classroom Action Research) method which aims to be able to find efforts to increase student activities through project-based learning models, to improve cognitive abilities and student learning interests. Learners are educational subjects considered active in shaping their chemistry learning achievement. The subjects this study is students of class XI IPA 2 SMA Dian Harapan Holland Village Manado. The focus of this research is the cognitive ability and learning interest of students. The results showed that the cognitive ability and interest in learning class XI IPA 2 SMA Dian Harapan Holland Village Manado there is an increase marked by an increase in the average score from cycle I to cycle III. There was also an increase in the activity of students. Therefore, the implementation of the Project Based Learning Model (PjBL) can provide a good and positive response for students.

Keywords: Metacognitive Ability, Learning Interest, Project Based Learning, Chemical Reaction Rat.

1. INTRODUCTION

Education functions to improve abilities and shape the character and civilization of a more dignified nation to educate the life of the nation (Fitriani 2018). The purpose of national education is to develop the potential of students to become human beings who believe in and fear God Almighty, are healthy, knowledgeable, capable, creative, have noble character, are independent, and become democratic and responsible citizens (Asmaroini, A. P. 2016). Therefore, the government is expected to contribute directly to developing the educational curriculum in Indonesia.

One of the efforts made by the government is to implement and develop the competency-based curriculum of the 2013 curriculum into a prototype curriculum. In this curriculum, it is a continuation of policies on learning as a form of action from the Covid-19 pandemic (Laila, I., Marliansyah, I. S., & Wardarita, R. 2022). This prototype curriculum is a competency-based curriculum to support learning recovery by implementing project-based learning (PjBL) (Fiangga, S., et al. 2022). Project-based learning or (PjBL) is one of the learning models that is considered efficient and effective as recommended in the independent learning curriculum (Wahyudin, 2023). This project-based learning emphasizes problem-solving so that students can develop and practice their cognitive abilities directly

Received: Juli 03,2024; Revised: Juli 18,2024; Accepted: Agustus 22, 2024; Online Available: Agustus 24,2024

The expected cognitive ability is not only limited to understanding concepts, but a higher thinking process accompanied by the ability to control the cognitive process (Kartyka, 2019). Metacognitive ability is one of the 21st century skills that students urgently need to improve the quality of chemistry learning, as well as in facing the global market on a wide scale. Therefore, metacognitive abilities must be made a special target for chemistry learning. 21st century learning innovation is seen as a powerful tool to support innovation in project-based learning systems (Bellou, Papachritos & Mikropoulus, 2018). Through this innovation, it is hoped that students can build a sense of love and increase interest in learning in the classroom.

Students' interest in learning in the classroom can be seen in a sense of liking and interest in something or an activity in the learning process, without anyone commanding (Siagian, R. E. F. 2015). Interest in general is an acceptance of one's relationship with something outside oneself. The stronger or closer the relationship, the greater the interest in learning, especially in the form of projects (Anam, K. 2015). The relationship between learning interest and *the Project-Based Learning* (PjBL)-based learning model can be seen from the tendency of students to pay attention to learning topics and how to answer questions or problems given, the emergence of a sense of satisfaction because they like when they finish solving problems (Nur Anita 2019). One of the project-based learning topics that makes students interested and pay attention to and answer the questions or problems asked is reaction rate material (Muliaman, A., & Mellyzar, M. 2020). This is because the material is filled with concepts that can attract students' attention through every practicum experiment in the laboratory. Reaction rate material is also very closely related to daily life, for example such as cassava tape, yogurt, cheese, etc.

2. METHOD

In this study, the researcher uses the PTK method or Classroom Action Research which has the goal of increasing students' interest and metacognitive abilities by using *a project-based learning model*. This research was carried out in class XI Science 2 of Dian Harapan High School Holland Village Manado for the 2023/2024 academic year. This Class Action Research is carried out in stages with 3 cycles. Meanwhile, this research instrument is a tool used to collect data at the time of research. such as written tests, questionnaires, interviews, documentation and observations. In this study, there are 2 types of research instruments used, namely learning instruments and data collection instruments. The methods of collecting data to be used in this class action research are (1) Observation, (2) Carrying out end-of-cycle tests and achievement tests and (3) Documentation.

Every student during the learning process can be known to be complete if they get a score above 75 (KKM). The test for cognition in this study is carried out at the end of each cycle that is carried out to find out the learning outcomes of students. For example, to be able to find out the completeness of the student's personality, you can use the following formula:

Final Score = (Accumulated number of correct answers / Accumulated all questions) x 100 %

In addition, to find out the average score of the class per cycle, you can use the following formula:

Average score = (Score of all students / number of students)

Classical completeness can be said to have been achieved if the student's score meets the KKM with the provision of ideal achievement is more or equal to 75% of the total number of students in the class. To find out the completeness classically, the following formula can be used:

% KKM = (Number of students completed / number of students) x 100 %

Direct observation is an observation made on the process that occurs and is directly carried out by the observer. After the observation data of the affective domain of students in groups is obtained, then determining the percentage of the number of student groups with a minimum high affective domain learning outcome is used as follows:

Average score percentage = (Group/group activity score) x 100 %

After obtaining calculation data, the researcher can provide conclusions based on the targets to be achieved in this study. The improvement of student learning outcomes through affective aspects during the learning process can be seen by using *the project-based learning* method. Qualitative analysis uses word descriptions from observations during the learning process using the project-based learning method.

3. RESULT AND DISCUSSION

a. Cycle 1 Research Results

Cycle 1 Planning

The practicum method carries out the implementation of actions in cycle 1.

Implementation of Cycle 1

Observation Results of Cycle 1

- Teachers use discussion, lecture and question-and-answer methods, all students actively take notes but only some students actively answer questions.
- When teachers appoint students to answer questions, it seems that many still do not understand the concept of reaction rate.
- Some students looked bored When the lesson took place half the time.

Questionnaire Results:

Table 1

Questions	**Questions**
Do you like the learning process on the reaction rate material that has been studied? Yes Uncertain Not	What do you think of the material you have just learned? Clear Uncertain Unclear
Answer: Yes: 10 Uncertain: 8 No: 6	Answer: Clear: 12 Uncertain: 5 Unclear: 7

b. Results of Cycle II Research

Observation Results

- Teachers use the PjBL method, students are still confused.
- There are several students who are still struggling with the Collision Theory material.
- One group is not calm and finds it difficult to learn the material.

Questionnaire Results:

Table 2

Questions	Questions
Do you think learning with the PjBL method makes the learning process more interesting? Yes Uncertain No	What do you think is the learning process better using pictures or not? Yes Nervous Not
Answer: Yes: 14 Uncertain: 4 No: 6	Answer: Clear: 15 Uncertain: 7 Unclear: 2

Results of Cycle III Research

Observation Results

1) Students can better understand the PjBL method so that the classroom atmosphere is conducive.
2) The atmosphere of the discussion is more orderly and coherent.
3) The time given can be appropriate.

Table 3

Questions	Questions
Do you think learning using teaching aids can be understood clearly? Yes Uncertain No	Write a conclusion of learning using the PjBL method according to what you know!
Answer: Yes: 20 Students Uncertain: 4 No: 0	

In chemistry learning activities, students are obtained from questionnaire scores answered by class XI Science 2 before the learning process. Data on students' chemistry learning outcomes was obtained from the scores of doing the chemistry learning outcome test that was tested in each cycle (I, II, III). A summary of the initial knowledge data and chemistry learning outcomes of students can be seen in the following table:

Table 4 : Student learning outcome data

No	Student Name	Cycle I	Cycle II	Cycle III
1	A.S	60	70	80
2	A.M	80	85	90
3	A.S	60	70	80
4	A.W	50	60	70
5	A.K	40	60	70
6	C.L	60	80	90
7	C.C	60	70	80
8	E.W	70	80	90
9	E.M	40	50	60
10	F.A	50	60	80
11	G.A	60	70	80
12	J.N	50	60	80
13	J.I.N	40	50	60
14	K.N	50	60	70
15	L.B	70	80	90
16	M.S	50	70	80
17	M.K	60	70	80
18	N.M	50	60	70
19	N.K	80	90	100
20	S.R	80	85	90
21	S.T	60	70	80
22	S.K	50	60	80
23	V.K	60	80	80
24	V.S	60	70	80

Table 5 : Comparison of value acquisition per cycle

Description	Cycle I	Cycle II	Cycle III
Acquisition of > 75	3 Students (12.5%)	7 Studemts (29.1)	7 Students (29.1)
Grade Point Average	5,79	6,91	7,95
Calculation data for each cycle	57,9	69,1	79,5

4. DISCUSSION

The research of the observation results in the first cycle (I) shows that students are still not familiar with *the project-based learning* model. This can be seen at the first meeting. Students are still too rigid in carrying out project-based procedures so the classroom conditions look a little rowdy and disorganized. To overcome this, teachers must provide more detailed and detailed information to students when they begin to feel confused in the learning process. The provision of this information is carried out not only for the first meeting but also for the next meeting. The results of the observation of student activities in groups in cycle I show that the average percentage of student activities that have paid full attention to the material provided is only around 41.66%. In the first cycle, some students still do not pay attention to explanations from teachers. Then, in cycle II, the average student who paid attention was given 62.50%. In the third cycle, 83.33% of students paid attention. This showed that the methods used by teachers had improved.

Based on the results of observations conducted in cycle I, students still have not reached the prescribed indicators; namely, at least 75% of students have an average score of 7.5 (Minimum Completeness Criteria/KKM). Students who got a score of ≥7.5 were 3 people (12.5%), and those who had not reached a score of 7.5 were 21 students or 87.50%. Starting from the chemistry learning results of students in the first cycle of actions that have not reached the success indicators in this study; namely, at least 75% of students have obtained an average score of at least 7.5 (Minimum Completeness Criteria/KKM), this research is continued in the second cycle of *the project-based learning* model continue to be implemented. Furthermore, referring to the results of the evaluation carried out in the second cycle, it is known that students' learning outcomes have increased, namely students who obtained a score of ≥7.5 as many as 7 people (29.1). And those who have not reached a > score of 7.5 are 17 students or 70.83%. In cycle III, 20 students obtained a score of 7.5 and above, 18 (75%), and 6 (25%) obtained a

score of less than 7.5. The average value obtained in cycle III was 7.95, with the absorption of the chemical material studied at 79.5. From this data, the increase in learning outcomes and students' interest in learning is inseparable from the success of teachers in implementing a varied learning model, namely *project-based learning*, which is supported by evaluation so that the process of implementing this learning model is better in each cycle.

5. CONCLUSIONS AND SUGGESTIONS

Based on the research and discussion results, conclusions can be drawn, including (1) The results of observation of student activities in groups in cycle I, the average percentage of student activities that have paid full attention to the material provided is only around 41.66%. In the first cycle, some students still do not pay attention to explanations from teachers. Then, in cycle II, the average student who paid attention was given 62.50%. In the third cycle, 83.33% of students paid attention. This showed that the methods used by teachers had improved. (2) Based on the results of observations conducted in the first cycle, the success indicator has not been achieved; namely, at least 75% of students have an average score of 7.5 (Minimum Completeness Criteria/KKM). Students who obtained a score of ≥7.5 were 3 people (12.5%), and those who had not reached a score of 7.5 were 21 students or 87.50%. Starting from the chemistry learning results of students in the first cycle of actions that have not reached the success indicators in this study, namely, at least 75% of students have obtained an average score of at least 7.5 (Minimum Completeness Criteria/KKM), this research is continued in the second cycle of *the project-based learning* model was carried out again. Furthermore, from the results of the evaluation carried out in cycle II, it is known that students' learning outcomes have increased, namely students who obtained a score of ≥7.5 as many as 7 people (29.1). And those who have not reached a > score of 7.5 are 17 students or 70.83%. In cycle III, 20 students obtained a score of 7.5 and above, and 18 (75%), and 6 (25%) obtained a score of less than 7.5. The average value obtained in cycle III was 7.95, with the absorption of the chemical material studied at 79.5.

Based on the results of the research that has been obtained, the advice that can be given is for teachers and prospective teachers always to give encouragement to students in learning and make the PjBL learning model one of the options in learning other chemistry materials to be able to encourage students to be more active and interested and able to improve students' way of thinking through improving metacognitive skills.

REFERENCES

Wahyudin, Y. (2023). Application of the project based learning model to improve student learning outcomes. Beginner: Journal of Teaching and Education Management, 1(2), 37–49.

Siagian, R. E. F. (2015). Pengaruh minat dan kebiasaan belajar siswa terhadap prestasi belajar matematika. Formatif: Jurnal Ilmiah Pendidikan MIPA, 2(2).

Nababan, K. (2019). Blended learning in high school chemistry to enhance students' metacognitive skills and attitudes towards chemistry. Journal of AIP Conference Proceedings, 2194(1).

Muliaman, A., & Mellyzar, M. (2020). Peningkatan hasil belajar menggunakan model project based learning pada materi laju reaksi. Chemistry in Education, 9(2), 91–95.

Laila, I., Marliansyah, I. S., & Wardarita, R. (2022). Kurikulum prototipe pendidikan paradigma masa depan. Jurnal Visionary: Penelitian dan Pengembangan di Bidang Administrasi Pendidikan, 10(2), 28–36.

Fitriyani, P. (2018). Pendidikan karakter bagi generasi Z. In Proceedings of the 7th National Conference of the Association of Postgraduate Programs of Muhammadiyah Aisyiyah Higher Education Institutions (APPPTMA). Jakarta, 23-25.

Fiangga, S., Prihartiwi, N. R., Kohar, A. W., Palupi, E. L. W., & Susanah, S. (2022). Pendampingan pengembangan realistic mathematics-project based learning untuk menyongsong kurikulum merdeka bagi guru SMP Trenggalek. Jurnal Anugerah, 4(2), 145–156.

Bellou, I., Papachritos, N. M., & Mikropoulos, T. A. (2018). Digital technologies: Sustainable innovations for improving teaching and learning. Springer International Publishing AG.

Asmaroini, A. P. (2016). Implementasi nilai-nilai Pancasila bagi siswa di era globalisasi. Citizenship: Jurnal Pancasila dan Kewarganegaraan, 4(2), 440–450.

Anam, K. (2015). Pengaruh media pembelajaran terhadap minat belajar siswa pada mata pelajaran PAI di SMP Bani Muqiman Bangkalan. Jurnal Pendidikan Islam, 4(2), 17.