JURNALTATSQIF
Jurnal Pemikiran dan Penelitian Pendidikan
Volume 21, No. 2 (December) 2023
Site: http://journal.uinmataram.ac.id/index.php/tatsqif Email: jurnaltatsqif@uinmataram.ac.id
P ISSN: 1829-5940
E ISSN: 2503-4510

IMPROVING STUDENTS' MOTIVATION AND LEARNING OUTCOMES WITH SCIENTIFIC LEARNING APPROACH

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Abstract

With the decrease in COVID-19 cases in Indonesia, learning activities are expected to return to normal in the new academic year 2022/2023. To increase the interest and motivation of civil engineering students, a student-centered approach is needed in theory-practicum learning. Scientific learning approach was implemented to increase students' motivation and learning outcomes of Civil Engineering students after the Covid-19 Pandemic. This study is class action research conducted at Politeknik Negeri Ketapang with 29 samples. The scores of learning interest, learning motivation, and learning outcomes were analyzed by comparing student scores with the KKM (Minimum Completeness Criteria) score and making a percentage of class completeness. In cycle I, the completeness of student motivation and interest in learning was still less than 50%, so it was continued to cycle II, and at the end of cycle II, motivation and interest in learning still had not reached 50%, then the cycle was continued. At the end of cycle III, it was found that motivation and interest in learning were 68.97% and 79.31%, respectively. In addition to motivation and interest in learning, researcher also compared it with student learning outcomes in each cycle. It was found that, on average, the number of students who completed the percentage of completeness and the minimum and maximum scores for student learning outcomes also increased in each cycle. So, it can be concluded that the scientific approach can improve learning motivation and learning outcomes through classroom action research.

Keywords: Learning Motivation; Learning Outcomes; Scientific Approach

INTRODUCTION

With reduced cases of Covid-19 in Indonesia, it is estimated that learning will return to normal in the 2022/2023 school year. To prepare for this, lecturers are expected to have carried out an analysis of the developmental needs and potential growth of students (Ramadhan et.al., 2021). In addition, lecturers should also develop strategies according to what is needed by students (Hidayat, 2021). This preparation is made so that the lecturers are

fully prepared to carry out learning, considering that learning is a basic process of education (Hosman, 2014). During online learning, students are not supposed to come to campus every day. This greatly influences student learning motivation so that it impacts their learning outcomes (A'adadiyyah & Nurul, 2021). Lecturers are expected to have prepared an appropriate approach to foster student learning motivation with the aim of increasing learning outcomes (Adi, 2020).

There are several appropriate approaches to increase learning motivation and learning outcomes, namely the counseling approach, the scientific approach, the PAKEM approach, and others (Chairudin, 2020). Each approach is used for different types of student conditions and for different types of courses. To increase the motivation and learning outcomes of civil engineering students in learning practicum theory, a student-centered approach is needed, involving process skills, and aiming to provide direct learning experiences. The approach appropriate to the course is a scientific approach. The scientific approach can be applied with the support of the right learning model (Ain, 2018). There are four learning models that can be applied to this approach, namely problem-based learning (PBL), project-based learning (PJBL), discovery-based learning (Discovery Learning/DL), and inquiry learning (Inquiry Learning) (Farkhan & Maragustam, 2022). The scientific approach is a learning process designed so that students actively construct concepts, principles, or laws. This construction process is carried out with the stages of observing, formulating problems, submitting hypotheses, collecting data, analyzing data, drawing conclusions, and communicating (Sufairoh, 2016). Another opinion about the scientific approach is learning that adopts scientific steps in building knowledge through scientific methods whose learning processes touch the realms of attitudes, knowledge, and skills (Ayu, 2018).

The scientific learning process is equated with the scientific method which refers to techniques of investigation of phenomena or symptoms to

gain new knowledge or to correct and integrate previous knowledge (Munfiqoh & Nurdyansyah, 2015). Based on the description above, the formulation of the problem from this research is how to increase learning motivation and learning outcomes of Civil Engineering students with a scientific approach. The purpose of this study was to determine the application of scientific approach learning to the motivation and learning outcomes of Civil Engineering students after the Covid-19 Pandemic.

Scientific approach comes from the word science. Interpretation reveals that science (knowledge) is one of human knowledge, something is said to be scientific (scientific), if something is logical and empirical. Logical means in accordance with the laws of logic, which can be understood by reason, while empirical is something that can be observed with the senses (Kholifah, 2019). Scientific approach (scientific approach) in learning based on scientific processes by carrying out logical steps (according to reason) and empirical (obtained from the senses). In addition, the essence of the scientific approach is to provide learning experiences to students and educators so that they can position themselves as facilitators, motivators, educators and others (Mujahidin, 2017).

The scientific approach to learning involves process skills such as observing, classifying, measuring, predicting, explaining, and concluding. In carrying out these processes, the help of educators is needed (Ida & Irawan, 2021). However, the teacher's assistance must decrease with increasing maturity of the educator or the higher the class of students (Mahzum, 2014). The seven criteria for a learning approach can be said to be scientific learning (Hilda, 2015). A. Learning materials are based on facts or phenomena that can be explained with a certain logic or reasoning, not just mere guesswork, fantasy, legend or fairy tales. B. Through the teacher's explanation, student responses and educator educative interactions, students are free from immediate prejudice, subjective thinking, or reasoning that is stored from the flow of logical thinking. C. Encourage and inspire students to think critically,

analytically and appropriately in identifying, understanding, solving problems, and applying learning material. D. Encouraging and inspiring students to be able to think hypothetically in seeing differences, similarities, and links to one another from learning materials. E. Encouraging and inspiring students to be able to understand, apply, and develop rational and objective patterns of thinking in responding to learning material. F. Based on accountable concepts, theories, and empirical facts. G. Learning objectives are formulated in a simple and clear but interesting presentation system.

According to Shoimin (2014), the learning process that implements the scientific approach will touch on three domains, namely attitudes (affective), knowledge (cognitive), and skills (psychomotor). With such a learning process, it is hoped that learning outcomes will produce productive, creative, innovative, and affective students through strengthening integrated attitudes, skills, and knowledge.

The scientific learning approach by touching these three domains can be explained as follows: a) the realm of attitudes embraces the transformation of substance or teaching materials so that students "know why"; b) the realm of skills involves the transformation of substance or teaching materials so that students "know how"; c) the realm of knowledge involves the transformation of substance or teaching materials so that students "know what" (Shoimin, 2014). The end result is an increase in the balance between the ability to become good human beings (soft skills) and humans who have the skills and knowledge to live a decent life (hard skills) from students who include aspects of attitude competence, knowledge and skills. The scientific approach (scientific approach) in learning how is intended includes observing, asking, reasoning, trying, forming, networking for all subjects. Learning Motivation Learning motivation is a change in energy within a person (personal) which is characterized by the emergence of feelings and reactions to achieve goals. However, according to Clayton Alderfer in Nashar (2014), learning motivation is the tendency of students to carry out learning

activities that are driven by the desire to achieve the best possible achievement or learning outcomes.

Learning motivation is one of the criteria that influence learning outcomes. Therefore, learning outcomes are closely related to learning motivation. This is consistent with the findings of several researchers that learning motivation has a significant influence on student learning outcomes (Baber, 2020; Sulnawir, 2021; Tohari, 2019). The scientific approach can increase student learning motivation (Munib, 2017). In addition, classroom approach research with a scientific approach is also proven to improve learning outcomes (Yuliani, Purwasih, & Afrilianto, 2021; Lestari, Pratama, & Jailani, 2018). Last point, interest in learning is also proven to increase with learning based on the scientific approach (Wibowo, 2017). An overview of the relationship between the variables to be studied can be seen in the framework in Figure 1.

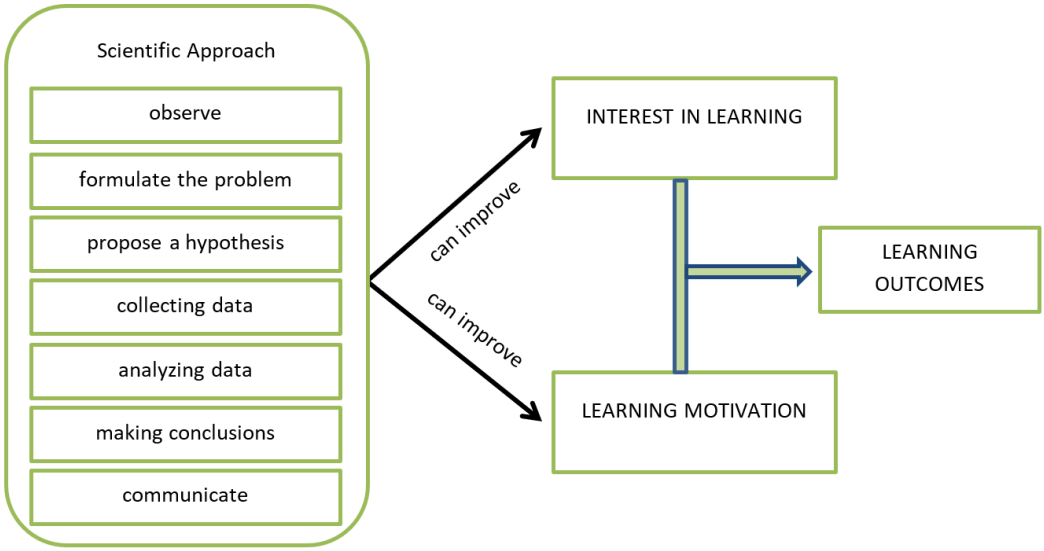

Figure 1. Framework of thinking

Several studies have been conducted to apply a scientific approach. The results obtained varied from increased creativity, learning outcomes, learning motivation, science process skills, critical thinking, interest in learning, and so on. Here the researcher wants to use a scientific approach to

increase interest and motivation to learn. Learning on a scientific approach will be carried out by adjusting civil engineering concepts.

METHOD

In this study, the authors used a descriptive research approach. The use of this research approach is adapted to the main objective of the research, namely to find out the increase in student learning outcomes through learning with a scientific approach in the Soil Mechanics course. In the research that has been done, researchers will usually use the same learning model in the scientific approach, but in this study, learning will be carried out by combining the four existing models in the scientific approach so that learning is more interesting and can increase student motivation and learning outcomes (Kholifah, 2019).

The type of research used is Classroom Action Research (CAR). This type of research is one of the efforts that can be made to improve the quality of the roles and responsibilities of educators, in this case lecturers, especially in managing learning (Sanjaya, 2011). This research was conducted at Ketapang State Polytechnic, West Kalimantan. The research was conducted on September 5-14, 2022, in the odd semester of the 2022/2023 Academic Year. The subjects in this study were all students in class A, totaling 29 people. While the object of this study is the motivation and learning outcomes of soil mechanics through learning with a scientific approach. The data taken were in the form of student learning motivation, student learning outcomes, student and lecturer activities, and lecturers' ability to manage learning. The instrument used in this study used a percentage test with a quantitative method (Sudijono, 2005).

The equation for calculating individual completeness is as follows:

$$P = \frac{R}{N} x100\%$$

Where:

P = percentage of classical completeness

R = score obtained

N = maximum score

While the equation for calculating classical completeness is as follows:

$$P = \frac{f}{n} x100\%$$

Where:

PK = percentage of classical completeness

f = frequency of students who complete

n = total number of students

Individual mastery of the material to be determined is achieved when student scores reach KKM (Minimum Completeness criteria) ≥ 75 or with conversion values ≥ 2.66, while classical mastery is achieved when 85% of students pass the KKM. Lecturer and student activities are said to be good if they get a result of at least 75%. Conversely, if the results obtained are below 75%, the activities of lecturers and students are said to be lacking or not good. This is in accordance with the opinion of Mulyasa (2012) which says that "learning is said to be successful if at least 75% of the number of students is motivated to learn using learning media." Categories can be seen in Table 1. Analysis of student response data to learning using a scientific approach using a questionnaire. Student responses are said to be good if they obtain results of at least 75%. Conversely, if the results obtained are below 75%, the student's response is said to be poor or not good.

Table 1 Categories of Learning Data Analysis Results (adaption from Rahayu, Mawardi & Astuti, 2019)

Percentage	Category
90%-100%	Very Good
80%-89.99%	Good
65%-79.99%	Pretty Good
55%-64.99%	Not Good
≤54,99%	Very Poor

RESULT AND DISCUSSION

The research was conducted in class (offering) 1A of the Road and Bridge Construction Engineering Study Program, Ketapang State Polytechnic for the 2022/2023 academic year. The research was in the form of classroom action research which was carried out for three cycles. Research analysis was carried out by describing descriptions of the tests in each cycle, descriptions of lecturer and student activities, descriptions of lecturer classroom management, and descriptions of student responses to learning with a scientific approach in Soil Mechanics courses. The value of the results of data collection on student learning motivation from cycle 1 to cycle 3 can be seen in Table 13. Recapitulation of data such as averages, completeness presentation, completed amount, incomplete amount, minimum, and maximum can be seen in Table 14. Then, the value of student learning outcomes from cycle 1 to cycle 3 can be seen in Table 15. In addition, recapitulation data such as averages etc. can be seen in Table 16.

Table 13. Recapitulation of Student Learning Motivation

CYCLE I			CYCLE II			CYCLE III		
Num	Poin	Status	No	Poin	Status	No	Poin	Status
1	33	Not Completed	1	50	Not Completed	1	67	Not Completed
2	38	Not Completed	2	38	Not Completed	2	71	Completed
3	44	Not Completed	3	42	Not Completed	3	90	Completed
4	51	Not Completed	4	68	Not Completed	4	93	Completed
5	45	Not Completed	5	59	Not Completed	5	89	Completed
6	41	Not Completed	6	62	Not Completed	6	89	Completed
7	32	Not Completed	7	57	Not Completed	7	65	Not Completed
8	37	Not Completed	8	63	Not Completed	8	65	Not Completed
9	70	Completed	9	89	Completed	9	95	Completed
10	39	Not Completed	10	54	Not Completed	10	71	Completed
11	38	Not Completed	11	67	Not Completed	11	68	Not Completed

12	72	Completed	12	79	Completed	12	96	Completed
13	38	Not Completed	13	65	Not Completed	13	68	Not Completed
14	41	Not Completed	14	56	Not Completed	14	68	Not Completed
15	52	Not Completed	15	65	Not Completed	15	94	Completed
16	45	Not Completed	16	60	Not Completed	16	89	Completed
17	35	Not Completed	17	54	Not Completed	17	44	Not Completed
18	35	Not Completed	18	58	Not Completed	18	63	Not Completed
19	49	Not Completed	19	79	Completed	19	90	Completed
20	46	Not Completed	20	76	Completed	20	89	Completed
21	47	Not Completed	21	68	Not Completed	21	89	Completed
22	57	Not Completed	22	80	Completed	22	91	Completed
23	46	Not Completed	23	69	Not Completed	23	71	Completed
24	49	Not Completed	24	72	Completed	24	89	Completed
25	55	Not Completed	25	68	Not Completed	25	91	Completed
26	55	Not Completed	26	79	Completed	26	93	Completed
27	47	Not Completed	27	45	Not Completed	27	67	Not Completed
28	57	Not Completed	28	78	Completed	28	90	Not Completed
29	56	Not Completed	29	82	Completed	29	91	Completed

Student motivation from cycle I to cycle III can be seen in Table 13. Student grades will be compared with the minimum completeness criteria or abbreviated as KKM. It can be seen that in cycle I, only 2 students got points above the KKM (70%). Whereas in cycle II, there were 9 students who got points above the KKM, so there was an increase of 7 students. Because the number of students who get points above the KKM has not reached 50%, the cycle continues until cycle III. And at the end of cycle III, there were 20 students who got points above the KKM. This means that student learning motivation is increasing from each cycle.

Table 14. Statistical Description of Learning Motivation

Description	CYCLE I	CYCLE II	CYCLE III
Average	46,55	65	70
Completeness Presentation	6,89%	31,03%	68,97%
Completed Amount	2	9	20
Incomplete Amount	27	20	9
Minimum	32	38	44
Maximum	72	89	96

In Table 14, it can be seen that on average, the number of completeness, minimum scores, and maximum values increases in each cycle. The average increase from cycle I to cycle II was higher than cycle II to cycle III.

Table 15. Recapitulation of Student Learning Outcomes

CYCLE I			CYCLE II			CYCLE III		
No	Score	Status	No	Score	Status	No	Score	Status
1	17	Not Completed	1	67	Not Completed	1	83	Completed
2	17	Not Completed	2	67	Not Completed	2	100	Completed
3	33	Not Completed	3	83	Completed	3	83	Completed
4	83	Completed	4	83	Completed	4	83	Completed
5	33	Not Completed	5	67	Not Completed	5	83	Completed
6	50	Not Completed	6	67	Not Completed	6	100	Completed
7	0	Not Completed	7	67	Not Completed	7	100	Completed
8	17	Not Completed	8	67	Not Completed	8	83	Completed
9	50	Not Completed	9	100	Completed	9	100	Completed
10	17	Not Completed	10	67	Not Completed	10	83	Completed
11	17	Not Completed	11	67	Not Completed	11	67	Not Completed
12	83	Completed	12	100	Completed	12	83	Completed
13	17	Not Completed	13	67	Not Completed	13	83	Completed
14	17	Not Completed	14	67	Not Completed	14	83	Completed
15	83	Completed	15	83	Completed	15	83	Completed
16	33	Not Completed	16	67	Not Completed	16	83	Completed

17	0	Not Completed	17	50	Not Completed	17	50	Not Completed
18	0	Not Completed	18	50	Not Completed	18	100	Completed
19	50	Not Completed	19	83	Completed	19	83	Completed
20	33	Not Completed	20	67	Not Completed	20	83	Completed
21	33	Not Completed	21	67	Not Completed	21	100	Completed
22	83	Completed	22	83	Completed	22	100	Completed
23	17	Not Completed	23	67	Not Completed	23	83	Completed
24	33	Not Completed	24	67	Not Completed	24	83	Completed
25	83	Completed	25	83	Completed	25	83	Completed
26	33	Not Completed	26	83	Completed	26	100	Completed
27	0	Not Completed	27	67	Not Completed	27	83	Completed
28	33	Not Completed	28	83	Completed	28	100	Completed
29	33	Not Completed	29	83	Completed	29	100	Completed

Table 16. Statistical Description of Learning Outcomes

Description	Siklus I	Siklus 2	Siklus 3
Average	34	73	87
Completeness Presentation	17,24%	37,93%	93,10%
Completed Amount	5	11	27
Incomplete Amount	24	18	2
Minimum	0	50	50
Maximum	83	100	100

CYCLE I

At the end of each cycle, students filled out two questionnaires, namely the motivational questionnaire and the interest in learning questionnaire. The average value of student learning motivation in cycle 1 is 39.1. The maximum and minimum scores for learning motivation in cycle I were 20 and 72. The number of questions in the learning motivation questionnaire was 20 items. Each question can be answered with points 1-5. So that the

minimum points that a student might get is 20 and the most likely maximum is 100 points. If seen from the average value obtained, student learning motivation is still below the specified standard, namely 75% of the maximum points (75 points).

In addition to motivation, the variable that is measured is learning outcomes. The lecturer gave 6 questions to measure the achievement of indicators in cycle 1. Based on the results of the cycle I tests, out of 29 students, only 5 students completed individually or scored more than 75. Then the classical completeness score in cycle I was 17.24%. . Of the 6 questions given by the lecturer in cycle I, 12 students answered questions 1 and 2 correctly. Number 3 can be answered correctly by 11 students. Number 4 can be answered correctly by 10 students. Number 5 can be answered correctly by 8 students. And number 6 can be answered correctly by 7 students. Student activity during the learning process with a scientific approach in cycle I was 55% and was categorized as not good. While the activity of lecturers during the learning process with a scientific approach in cycle I was 70% and was categorized as quite good.

Weaknesses and obstacles in implementing the learning process in cycle I are as follows:

a. Based on the results of the first cycle test, there were only 6 students who scored above the KKM. So, it can be said that 82.76% of students in the class have not finished yet. This can be caused by a lack of providing material reinforcement or example questions.

b. Based on the results of student and lecturer activity assessments, there were several stages that were not implemented properly, and there were even stages that had not been implemented. This happens because the application of learning with a scientific approach is new for lecturers and students.

CYCLE II

The results of learning motivation after cycle 2 were also measured by giving a questionnaire. The questionnaire given is the same as the questionnaire in cycle I.

Learning outcomes are measured by giving 6 questions. Based on the test results in cycle II, it can be seen that out of 29 students, 11 students completed individually or scored more than 75. So the classical completeness score was 37.93%. Of the 6 questions given by the lecturer in cycle I, question number 1 was answered correctly by 17 students. Numbers 2 and 3 can be answered correctly by 23 students. Number 4 can be answered correctly by 25 students. Number 5 can be answered correctly by 21 students. And number 6 can be answered correctly by 18 students. Student activity during the learning process with a scientific approach in cycle II was 78% and was categorized as quite good. While lecturer activity during the learning process with a scientific approach in cycle I was 88% and categorized as good.

Weaknesses and obstacles in implementing the learning process in cycle I are as follows:

a. Based on the results of the first cycle test, there were only 11 students who scored above the KKM. So, it can be said that 62.07% of students in the class have not finished yet. This can be caused by the lack of student participation in learning activities.
b. Based on the results of the assessment of student and lecturer activities, there were several stages that were not carried out properly, even though there were no more stages that had not been carried out. This shows that there has been an improvement in the application of learning with a scientific approach for lecturers and students compared to cycle I.

CYCLE III

As with cycle I and cycle II, motivation to learn in cycle III also uses the same questionnaire. In cycle III, interest in learning was also measured by the questionnaire used in cycle I and cycle II. Learning outcomes in cycle III were measured by 6 questions. Based on the results of the cycle III test in the table

out of 29 students there were 27 students who completed individually or got a score of more than 75. So, the classical completeness score was 93.10%. Of the 6 questions given by the lecturer in cycle III, question number 1 was answered correctly by 28 students. Number 2 can be answered correctly by 24 students. Number 3 can be answered correctly by 28 students. Number 4 can be answered correctly by 23 students. Number 5 can be answered correctly by 25 students. And number 6 can be answered correctly by 24 students. Student activity during the learning process with a scientific approach in cycle I was 95% and was categorized as very good. While the activity of lecturers during the learning process with a scientific approach in cycle III is 100% and is categorized as very good.

In cycle III there is an increase both in terms of results and the learning process. The test results showed that there was an increase in the number of students who achieved KKM scores. Based on the implementation of learning, it can also be seen that the activities of students and lecturers have increased. This increase in cycle III occurred because the lecturer was able to manage learning very well. Apart from applying the scientific approach, lecturers have also been able to monitor student performance in groups. Lecturers are also able to foster enthusiasm for student learning.

From the observation of the learning cycle, it can be concluded that students' learning motivation has increased significantly from cycle I to cycle III. At first, only a few students achieved scores above the KKM, but through continuous learning, there was a significant increase. Cycle II showed a positive increase, and by the end of cycle III, as many as 20 students managed to achieve points above the KKM. This improvement reflects the effectiveness of the learning strategy implemented and an indication that the effort to increase students' learning motivation has been successful.

The increase in student learning motivation is further emphasized from the analysis of statistical description data. It can be concluded that there was a significant increase in student learning motivation from cycle I to cycle III.

This improvement is reflected in the increase in average, the increase in percentage of presentation completeness, and the number of students who successfully completed the task. Conversely, there was a decrease in the number of students who did not successfully complete the task.

This increase in learning motivation was also characterized by an increase in minimum and maximum scores, indicating a progression in individual student achievement. These results provide an indication that the learning strategies implemented in each cycle successfully impacted positively on students' progress in achieving learning objectives.

From the analysis of student learning outcomes in cycle I to cycle III, it can be concluded that there was a positive improvement. Initially, only a few students achieved scores above the KKM in the first cycle. However, through a continuous learning process, there was a consistent improvement in cycle II and cycle III.

The increase in learning motivation also occurred in Munib's research (2017). In addition, Sumayasa (2015) also found that student learning motivation was better with a scientific approach compared to conventional learning. Maduretno (2016) also proved that increasing learning motivation could improve student learning outcomes and achievement. Therefore, it can be concluded that the application of scientific approach learning can increase the learning motivation of Civil Engineering students after the Covid-19 Pandemic.

This increase reflects significant progress in student learning outcomes over time. Although the number of students scoring above the KKM in cycle II did not reach 50%, with the continuation to cycle III, there was a more substantial increase, signaling the effectiveness of the learning strategy implemented. Overall, students' learning outcomes showed a positive trend reflecting the continuous improvement in their understanding and achievement during the learning process.

The increase in learning outcomes also occurred in Yuliani, Purwasih, & Afrilianto's (2021) research that the scientific approach can improve learning outcomes in class action research. If this study took three cycles to achieve the desired classical completeness value, Lestari, Pratama, & Jailani's (2018) research only needed two cycles because classical completeness had been met. The difference in the number of cycles can be influenced by initial input. Hence, it can be concluded that the application of scientific approach learning can improve the learning outcomes of Civil Engineering students after the Covid-19 Pandemic.

CONCLUSION

Based on the results of data analysis and discussion, researchers can conclude that the application of the scientific approach in the first, second and third cycles can improve the motivation and learning outcomes of Civil Engineering students after the Covid 19 Pandemic. It is suggested that scientific learning approach is highly recommended toward an effective class, improving students' motivation and learning outcomes, in particular.

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