

Science Learning Achievement of Class IV Students at State Elementary School 2 Segeran

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ABSTRACT

This study aims to improve learning achievement by enhancing the Problem-solving learning model in science lessons on plant material in class IV students at State Elementary School 2 Segeran, Juntinyuat District, Indramayu Regency. This is a Class Action Research (CAR) conducted in 2 cycles. The research subjects were 29 Class IV students at State Elementary School 2 Segeran, Juntinyuat District, Indramayu Regency. Research data was obtained through tests, observations, and documentation. Data analysis used a qualitative descriptive analysis technique. The study results showed an increase in the learning achievement of Class IV students at State Elementary School 2 Segeran, Juntinyuat District, Indramayu Regency through the Problem-solving learning model. Improvement in learning achievement is indicated by an increase in the average percentage of aspects of student learning outcomes from 41% in pre-cycle to 51% in cycle I, then increased to 82% in cycle II. Based on these results, it can be concluded that there is an increase in student learning achievement in learning through the application of the Problem-solving learning model in the Natural Sciences subject matter Plants in class IV students at State Elementary School 2 Segeran, Juntinyuat District, Indramayu Regency.

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1. INTRODUCTION

Education is an essential tool for human beings because it's a fundamental necessity of the entire society. The good and bad of the youth, who should be encouraged to pursue quality education, determine the country's future [1]. Teachers and educators are the main actors in ensuring a stable education system. They should be able to improve their capacity for teaching and learning even more. According to Law No. 20 of 2003 on the National Education System states, "Educating is an exercise in planning and preparation for creating a learning environment conducive to developing pupils' potential" [2]. In addition, to smarten the life of the nation, to develop students' potential to become human beings with faith and devotion to God, to have noble character, and to be democratic and responsible

citizens, national education plays an important role in developing skills and shaping the character and culture of a dignified nation. Natural Sciences is one of the main subjects and curriculum of Indonesian education.

There are internal and external factors, such as the level of intelligence, and external factors such as school attendance, commitment to learning, and parental support, which can affect student learning [3]. Teachers have become concerned about students' lack of interest in learning, which makes them less enthusiastic and more unprepared for lessons. This results in a less active classroom environment, reduced interaction between teachers and students as well as the passive attitude of pupils when they receive teaching materials.

Teachers have an important role to play in developing meaningful learning experiences for their students. To achieve this, there is a need for changes in classroom organization, the selection of teaching models, teaching and learning strategies, and independence in learning [4]. Apart from that, teachers must also try to keep students motivated and actively involved in the learning process [5].

Various factors, including low student interest and motivation, less than optimal teacher performance on the part of teachers, or insufficient support facilities can contribute to a lack of effectiveness in science education [6]. To overcome this, teachers need to be more professional in their involvement of students in the teaching process and build closer relationships between them and with pupils as well as the local environment so that they can provide a good learning experience. In principle, teachers with experience in teaching have unconsciously carried out several other activities that are not listed in the lesson plan but have carried out classroom action research [7].

The results of observations in class IV Students at State Elementary School 2 Segeran for the 2022/2023 Academic Year indicate several problems. In learning, students have less motivation, less enthusiasm, and less engagement. Teachers tend to rely on the lecture model, which creates a rigid learning process without any change. There is also a lack of willingness on the part of the teacher to apply the learning models he has learned. There's less interaction between teachers and students, there's a lack of appreciation for the active student. Rather than relating lessons to the needs of pupils, teachers focus on disseminating knowledge. Furthermore, the availability of training resources and educational facilities is still inadequate. Student learning achievement in general is still below the Minimum Completion Criteria, which is set by each school with different standards. The following Mid-Semester score data are available for Semester 1:

Table 1. Mid-Semester Score Data for Semester 1

Nu.	Subject	Average Value
1	Analyze the relationship between animal and plant forms.	70,25
2	Explain the function of the shape parts of animals and plants.	35,84
3	Compare the life cycles of animals and plants.	60,85

In addition, the author wishes to carry out research entitled "Science Learning Achievement of Class IV Students at State Elementary School 2 Segeran" from this background.

2. METHOD

Classroom Action Research (CAR) is a type of research done by the teacher to solve learning problems in class [8]. By the systematics of classroom action research, this is a study that improves problems in teaching processes or enhances teacher education practices [9]. CAR is an action research that can be seen, sensed, and experienced in its implementation. The question then arises whether the training practices that have been put in place so far are highly effective [10].

A partnership between teachers and researchers, where they work together to solve problems that will be investigated by the CAR collaborative approach, is a relationship. Through this process, teachers and students are closer to each other, enabling mutual recognition, learning, and increased professionalism. Planning, action, observation, and reflection form the basis of research on classroom actions. According to Kemmis and McTaggart, the following research design is used in classroom action.

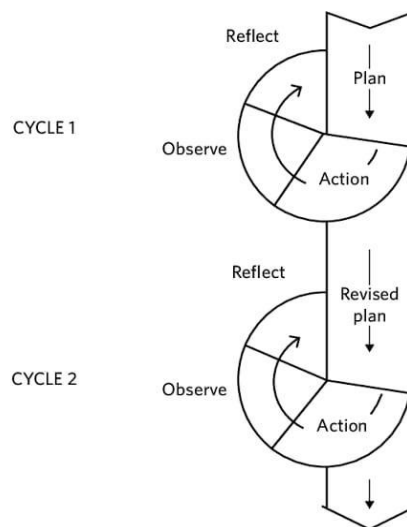


Figure 1. CAR Model by Kemmis and McTaggart (1998)

The research was carried out on class IV Students at State Elementary School 2 Segeran Juntinyuat in November in the odd semester of the academic year 2021 to 2022. The size of the sample was 23 students. Tests and non-tests are the tools for obtaining results from this research. The written test used to determine students' understanding of the material on the theme "Animals and Plants in My Home Environment" is in the form of a short essay which is carried out at the end of each cycle. Meanwhile, the non-test used to support the results of this research is in the form of an observation sheet containing notes describing the activities of researchers and students in learning activities carried out in class.

To determine the percentage of completeness and improvement in working ability, quantified data have been collected from the initial assessment carried out on an individual basis followed by a comprehensive evaluation. In the meantime, qualitative information was obtained using observation sheets from data collection instruments. Observation sheets shall be used to monitor the progress of the learning process and to determine the increase in the number of learning activities and students' ability to answer questions.

To calculate learning completeness and analyze teacher and student activities, a formula is used:

$$P = \frac{f}{N} \times 100\% \quad (1)$$

With:

- P = Percentage number
f = Frequency of activity that occurs
N = Total Number of activities

3. RESULTS AND DISCUSSION

This research was carried out in 2 cycles, with each cycle comprising 2 meetings. Each meeting was allotted a duration of 2 lesson hours (equivalent to 2×35 minutes). The teacher's activities were observed and recorded during each teaching and learning process meeting. The research data was collected and analyzed in several stages: planning, implementation, observation, and reflection.

3.1. RESULTS

3.1.1 Cycle 1

3.1.1.1 Planning Stage

During the planning stage, the researchers conducted the following activities:

- a. Create a syllabus and lesson plan for the cycle I using a learning model.
- b. Researchers, as both teachers and observers, use this guide to observe teacher performance and student activities during the learning process.
- c. Prepare and organize the study area, including a designated table and necessary stationery for assignments.
- d. Create assessment tools, including question sheets, to measure student learning outcomes based on indicators and learning objectives.
- e. The teacher assessed the researcher's performance using an observation sheet during problem-solving model learning activities.
- f. The teacher forms student groups of 6 at the beginning of the learning process.

3.1.1.2 Implementation Stage

This stage is scheduled for Tuesday, November 29, 2022, at 07.15-08.45 Western Indonesia Time. The initial activity of the stage is a problem-solving learning activity. The teacher will begin the class by greeting the students and inquiring about their well-being and attendance. This will be followed by a prayer led by the class leader or the student who arrived first. The teacher will also emphasize the importance of discipline towards teachers. All students are required to sing the songs "Indonesia Raya" and "Garuda Pancasila". The teacher should instill a sense of nationalism among the students as it is essential for their growth.

In the core activity, the teacher will explain the goals and objectives of the lesson to motivate the students to learn. The teacher will present reading materials related to the science lesson on plants. The students will then be divided into study groups, and the

teacher will explain how to form these groups and ensure that each group transitions efficiently. The teacher will guide each group throughout the learning process. Following that, the teacher will evaluate the material taught, and each group will present their work.

After the learning activity, the teacher will award prizes and recognition to students for their individual and group learning efforts and results. In the closing activity, the students and teacher will summarize the lesson's results and sing one of the regional songs to promote a sense of nationalism. The class will conclude with a joint prayer led by one of the students.

3.1.1.3 Observation Stage

Researchers observed the learning process during science lessons on plant material using a problem-solving learning model. The learning process was observed to be moderately accurate (good) based on the results, as students are still in the stage of adjusting and adapting to this learning method. As it is still a new method, many students are not yet focused on learning. Therefore, improvements need to be made in the next cycle. Table 2 and Table 3 below show the results of observations of teacher and student activities.

Table 2. Recapitulation of Cycle I Teacher Observation Results

Nu.	Observed Aspects	Rating			
		4	3	2	1
1.	Convey basic competencies and learning objectives.		√		
2.	Give appreciation to students regarding learning material.	√			
3.	Give clear instructions regarding today's learning rules before the start of the activity.		√		
4.	Guiding students to form students to form several groups.		√		
5.	Guiding each group of students according to the material in the learning activities.		√		
6.	Ensure students are accustomed to carrying out learning activities.			√	
7.	Provide feedback on practice questions about today's learning material.		√		
8.	Check student activity results sheets related to today's lesson material.			√	
9.	After the learning process is complete, the teacher confirms the learning material.			√	
10.	Teachers motivate students to learn.		√		

Table 3. Recapitulation of Cycle I Student Observation Results

Nu.	Student Learning Activities	Rating			
		1	2	3	4
1.	Student readiness in learning.		√		
2.	Student courage in answering.		√		
3.	Student activity in group activities.	√			
4.	Student courage in presenting in class.		√		
5.	Listen to the teacher's explanation.				√
6.	Ability to master the material.			√	
7.	Cooperation in group activities.		√		
8.	Student responsibility in carrying out assignments.		√		
9.	Student courage in expressing opinions.		√		
10.	Student courage in asking questions.		√		

Based on the results of these observations, it can be concluded that the students' activity in cycle I was not optimal. This can be seen from the scores obtained, which only reached 29% of the total score during ongoing learning. Therefore, there is a need for further improvement to enhance student activity. As a result, cycle II will be conducted to achieve this goal.

After conducting student research, the next step is to assess the cycle test I as a reference for the pre-cycle data. The results of the cycle I test can be viewed in the following table.

Table 4. Cycle I Student Learning Results

Completeness	15 Student's	52%
Not Completed	14 Student's	48%
The Highest Score	85	
Lowest Value	20	
Average	65,7%	

According to Table 4, the evaluation test scores in cycle I have improved compared to the pretest scores. The average score of students in cycle I was 65.7%. Out of the total number of students, 15 students (53%) achieved the Minimum Completion Criteria, while 14 students (47%) did not. Although there was an improvement in student learning outcomes in the first cycle, reaching the Minimum Completion Criteria score of 70 remained a challenge as only 40% of the total number of classical students were able to do so. This means that 60% of the total number of students still needs improvement, which will be addressed in the next cycle.

3.1.1.4 Reflection Stage

At the end of each implemented action, an evaluation stage is carried out to assess the suitability between the implementation and the predetermined plan. Based on the observation results, several deficiencies and weaknesses were identified in the implementation of the Problem-solving learning model in cycle I. For instance, the teacher did not prepare the learning tools and media used and was not optimal in providing guidance and motivation to students who did not understand the material. Additionally, the teacher did not have complete mastery over the subject, which resulted in suboptimal student activity. Therefore, based on the issues discovered in Cycle I, the research was continued in Cycle II.

3.1.2 Cycle 2

3.1.2.1 Planning Stage

In cycle II, the following activities have been carried out about learning planning:

- a. Create a syllabus and lesson plan for cycle II using the multiliteracy learning model.
- b. Prepare observation guidance for monitoring teacher performance and students' activities in the course of learning. Researchers as teachers and classroom teachers who observe the implementation of learning are using this observation guide.

- c. Prepare and maintain the study area, including a table for studying and the necessary supplies for the completion of the assignment.
- d. To display the learning outcomes of students in line with indicators and educational objectives, develop evaluation tools such as question papers.
- e. Using the problem-solving learning model, the teacher assessed the researcher using an observation sheet on the teacher's performance and the activities of the students in the classroom.
- f. When learning begins, the teacher shall organize groups of students. The students are grouped, each of which consists of four pupils.

3.1.2.2 Implementation Stage

The teacher begins the class by greeting the students and asking about their news. This is followed by a prayer led by the class leader or the first student who arrives. Students are expected to show respect and discipline towards the teacher. The student named Shiva is required to sing the songs "Indonesia Raya" and "Garuda Pancasila". Teachers need to instill a sense of nationalism in their students.

The core activity of the class involves the teacher conveying the goals and motivation to the students so that they become enthusiastic about learning. The teacher presents the information related to science lessons on Plants through reading materials. After that, the teacher divides the students into several study groups and explains to them how to form study groups efficiently. The teacher guides each group in carrying out their learning process. After that, the teacher evaluates the material taught, and each group presents their work results.

At the end of the class, the teacher rewards or prizes the students for their individual and group learning efforts or results. The closing activity involves summarizing the results of the lesson and singing a regional song together to foster a sense of nationalism. The class ends with a joint prayer led by one of the students.

3.1.2.3 Observation Stage

After completing cycle I, it was found that the improvements were not significant enough to achieve the desired outcome. Hence, the research had to be continued in cycle II. Therefore, it is necessary to make improvements in the next cycle. This can be observed in the table of Teacher and Student Observation Sheet.

Table 5. Recapitulation of Cycle I Teacher Observation Results

Nu.	Observed Aspects	Rating			
		4	3	2	1
1.	Convey basic competencies and learning objectives.	√			
2.	Give appreciation to students regarding plant material in scientific-type problem-solving learning activities.	√			
3.	Guiding each group of students according to the material in the scientific type problem-solving learning activity.		√		
4.	Give clear instructions regarding today's learning rules before the start of the activity.	√			
5.	Ensure that students are accustomed to carrying out scientific-type problem-solving learning activities.	√			

Nu.	Observed Aspects	Rating			
		4	3	2	1
6.	Check student activity results sheets related to today's lesson material.		√		
7.	Provide feedback on practice questions about today's learning material.	√			
8.	Guiding students to form students to form several groups.	√			
9.	After the learning process is complete the teacher confirms the learning material in the scientific-type problem-solving learning activity.		√		
10.	Teachers motivate students to learn.		√		
	Amount	50	37,5		
	General		87,5		
	Category		Very Good		

In cycle II, Table 5 shows the recapitulation of observation results of teacher activities. 10 aspects were observed, and the total score obtained was 87.5, with a percentage of 87.5% and very high criteria. This result is an improvement from the observations in cycle I.

In addition to observing the teacher's activities during the implementation of the learning model, the observer also observed the students' activities while following the learning process. They applied the problem-solving learning model using the scientific approach type. The observer noted the following results regarding the student's activity during the learning process.

Table 6. Recapitulation of Cycle II Student Observation Results

Nu.	Student Learning Activities	Rating			
		1	2	3	4
1.	Student readiness in learning.				√
2.	Listen to the teacher's explanation.				√
3.	Student courage in asking questions.		√		
4.	Ability to master the material.			√	
5.	Student courage in answering.				√
6.	Student responsibility in carrying out assignments.				√
7.	Student courage in presenting in class.		√		
8.	Student activity in group activities.			√	
9.	Student courage in expressing opinions.			√	
10.	Cooperation in group activities.			√	

After observing student activities in cycle II, a score of 32 out of 40 was achieved with an 80% score, indicating an increase from cycle I. The teacher completed all activities outlined in the lesson plan, and implemented learning techniques efficiently, correcting any deficiencies from cycle I to cycle II.

In addition, student activities were very satisfactory, with high levels of motivation and participation in the learning process. This led to individual and group training results, as well as cycle II test results, meeting the desired Minimum Completion Criteria value.

Based on the above observation data, it can be concluded that student activities during cycle II were excellent, with significant improvement compared to cycle I. As a result, the research was concluded after cycle II. The next step is to assess the cycle II test

results, which will be a continuation of the cycle I test results. These results can be viewed in the following table.

Table 7. Cycle II Student Learning Results

Completeness	24 Student's	83%
Not Completed	5 Student's	17%
The Highest Score	90	
Lowest Value	25	
Average	71,7%	

According to Table 7, the evaluation test scores in cycle II have shown an increase in comparison to the scores in cycle I. The average score of students in cycle II was 79, with 24 students (80%) meeting the Minimum Completion Criteria. However, there were 4 students (20%) who did not meet the Minimum Completion Criteria. The learning outcomes of students in cycle II were successful, as 80% of students obtained a score of ≥ 70 (Minimum Completion Criteria score). As a result, the research was halted after cycle II.

3.1.2.4 Reflection Stage

The data obtained from observing the learning process, by applying the scientific approach type problem-solving learning method and students' activeness in participating, shows an increase in student learning outcomes. This improvement was observed in both cycle I and cycle II. In cycle II, students achieved the expected improvement, and the results of the student evaluation reached the Minimum Completion Criteria score, which exceeded the research target of 80%. Thus, the research was considered sufficient until cycle II.

3.2. DISCUSSION

Education is a continuous learning activity involving educators and students to change behavior and knowledge [11]. Learning environments that allow teachers to connect new situations to students' everyday lives are believed to improve problem-solving skills [12]. The problem-solving learning model is an innovative approach that enables students to engage directly in teaching and learning activities [13]. The problem-solving learning model prioritizes problem-solving skills [14]. Science lessons are popular among students because they relate to natural events, living creatures, and the environment [15]. The content of Natural Sciences in Elementary Schools aims to grow and enhance students' abilities through interactive, contextual, and collaborative learning [16]. The above research results present several discussion points.

3.2.1 Student Activity Results

The level of activity displayed by students during teaching and learning activities has a significant impact on the effectiveness of the learning process. According to Wiratama, meaningful learning involves the full engagement of students in the learning process, which ultimately leads to more effective learning outcomes [17]. Similarly, Astuti states that student involvement in the learning process can significantly influence their

learning outcomes [18]. Therefore, teachers should carefully select appropriate learning models and methods that encourage student participation and engagement, as the teacher's role in determining the learning model is critical to achieving desired learning outcomes [19].

To enhance the learning outcomes of science lessons and improve student engagement in the learning process of classifying animals based on their food type, the problem-solving learning model was chosen. Previous research led by Prasetyaningtyas has demonstrated the effectiveness of the problem-solving learning model in improving learning outcomes and student engagement [20]. The implementation of this model during cycle I resulted in an average score of 65.7% in the medium category, which improved to 71.7% in the high category during cycle II. Furthermore, all students expressed satisfaction with the problem-solving learning model.

However, the initial implementation of the problem-solving learning model during cycle I was not optimal, as students were still confused about the scientific type of problem-solving learning model that was being used for the first time at Segeran II State Elementary School. The level of student activity also did not meet the success indicators established, as evidenced by the analysis of student activity observation data, which obtained a score of 29 out of a total score of 40 with a percentage of 72.5%. These findings are consistent with those of Mudrikah, who found that student activity was low due to a lack of understanding of the instructions provided, as well as their unfamiliarity with the new learning model [21]. Consequently, the researchers made improvements to address these issues.

During cycle II, there was a significant increase in students' participation in the learning process compared to the previous cycle. They scored 32 out of 40, which equals 80%, and was categorized as "very high" participation. This indicates that implementing the problem-solving learning model in science lessons, specifically in classifying animals based on their food, can enhance students' participation in learning activities. A bar diagram is presented below to illustrate the observation data analysis of student activity.

The analysis of student activity observation data in this research aligns with previous studies, such as Suryanti, which concluded that applying problem-solving can improve both student activity and learning outcomes [22]. This research showed that the active criteria for student activity increased from 72.5% in the pre-cycle of learning activities to 80% in cycle II.

3.2.2 Teacher Activity Results

The research analyzed student activity observation data and found that the application of problem-solving can lead to an increase in student activity and learning outcomes. The results were consistent with a previous study conducted by Suryanti. The student activity in learning activities with active criteria increased from 72.5% in the pre-cycle to 80% in cycle II.

In the science lessons, the teacher used the scientific type problem-solving learning model to teach the classification of animals based on their type of food to class IV Segeran II State Elementary School. In cycle I, the teacher's activity was observed and scored

66.67%, which is in the high criteria range but did not meet the predetermined indicator of 80%. The analysis showed that the teacher lacked preparation in implementing the learning model, resulting in a lack of skills to execute the scientific-type problem-solving learning model.

To address this issue, the teacher improved the learning process by evaluating the implementation of the learning model in cycle I and preparing in more detail for the next cycle. According to Nurhidayah's research, before implementing the make-a-match learning model, teachers should prepare a list of questions that are relevant to the material, an answer key that matches the questions, card clues to help students, and game rules that contain rewards for successful completion [23].

3.2.3 Observer Observation Results

During the implementation of scientific problem-solving methods in Cycle II of the learning process, a significant improvement was observed with a score of 70 out of a total of 72, which corresponds to a percentage of 97.22% and is categorized as "very high". This improvement was a result of the teacher evaluations and enhancements made during the previous cycle. Based on the study conducted by Tarigan in Watri, the researcher's activities during the first meeting of Cycle I was classified as "good" (82.14), and in the second meeting of Cycle I, the activities were also classified as "good". Moreover, the improvements continued in Cycle II, where the research activities during the first meeting were classified as "very good" (92.85), and during the second meeting, the activities were classified as "very good" with a score of 96.42 [24]. Therefore, it can be concluded that the improvements made by the teachers in each cycle lead to significant improvements in the following cycle. Attached below is a bar diagram illustrating the results of observing teacher activities during the implementation of scientific problem-solving learning.

3.2.4 Student Learning Outcomes

The research aimed to improve student learning outcomes in science lessons by implementing scientific problem-solving learning before and after conducting Classroom Action Research (PTK). The increase in student learning outcomes in each cycle indicates the success of implementing scientific problem-solving learning in the learning process.

Before implementing the research, 12 students (40%) had completed their studies, while 18 students (below Minimum Completion Criteria) had not completed their studies with an average score of 57.7. These results did not meet the classical indicators of success, so the research continued in cycle I at a different time. In cycle I, 16 students (53%) completed their studies, while 14 students (below Minimum Completion Criteria) did not complete their studies with an average score of 65.0. This showed an improvement from the pre-cycle stage, but it still did not meet the classical indicators of success, so the research continued in cycle II at a different time.

In cycle II, 24 students (80%) completed their studies, while 4 students (below Minimum Completion Criteria) did not complete their studies with an average score of 75.0. These results met the classical indicators of success, as students achieved a score exceeding the Minimum Completion Criteria (a score of ≥ 70) with a percentage of $\geq 80\%$

of the total number of students in one class of 30 students. Therefore, the research was stopped. The table and bar chart below demonstrate an increase in student learning outcomes.

Table 8. Comparison of the Percentage of Student Learning Completeness in Each Cycle

Cycle	Average value	Category	The number of students	Percentage
Pretest	41,4	Complete	16	55%
		Not Completed	13	45%
Cycle I	65,7	Complete	15	52%
		Not Completed	14	48%
Cycle II	75,3	Complete	24	83%
		Not Completed	5	17%

The research results are consistent with the study conducted by Maisya, which concludes that the implementation of scientific problem-solving learning can enhance student learning outcomes [25]. The improvement in student learning outcomes is evident from the increase in their scores. In the first cycle, the student's average score was 65.7, and only 52% of them achieved the required learning standards. However, in cycle II, the percentage of students who achieved the required learning standards increased to 83%, and the average score improved to 75.3.

4. CONCLUSION

Based on the results and discussion above, it can be concluded that the application of the scientific problem-solving learning model in science learning in class IV at Segeran II State Elementary School is considered very effective. This can be seen from the increase in students' learning activities when applying the Scientific problem-solving learning model in science learning, where students' learning activities in cycle I reached 51.7%, then succeeded in increasing in cycle II with a percentage of 90%.

Apart from that, students' science learning outcomes also increase in each cycle, where based on observations the average score of students in the initial condition (pretest) is only 41.4 with a percentage of 55% (16 students) out of 29 students achieving a score ≥ 70 (Minimum Completion Criteria score). In cycle I the average score was 65.7 with the number of students achieving a score ≥ 70 (Minimum Completion Criteria score) was 15 students out of 29 students or a percentage of 52%. Furthermore, in cycle II the average score increased again to 75.3 with the number of students achieving a score ≥ 70 (Minimum Completion Criteria score) being 24 students out of 29 students or a percentage of 83%.

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