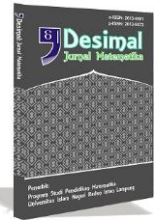




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Comparative analysis of the math learning process implementation in perspective of teachers' work period

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ABSTRACT

The role of mathematics teachers in the success of the learning process can be seen from the perspective of the work period, which reflects the level of experience. Therefore, this research aims to analyze the comparison of the implementation of the mathematics learning process from the perspective of the teacher's work period. The type of research carried out in this study is qualitative descriptive research. The subjects in this research were 2 mathematics subject teachers at one of the state junior high schools in South Lampung, with the criteria being 1 junior teacher and 1 senior teacher. Data collection techniques use participant observation, interviews, and documentation. The implementation of the learning process is measured using instruments in the form of observation sheets and interview guides. The observation sheet uses the Guttman scale and the Likert scale. The data analysis technique uses Miles and Huberman's steps, which consist of data collection, data presentation, data reduction, and verification or drawing conclusions. Based on the research results, it was found that both junior and senior teachers had good criteria for implementing the mathematics learning process. So, it can be concluded that differences in teachers' work periods do not affect the process of implementing mathematics learning. Based on these results, support from the school must play an important role. Both junior and senior teachers must receive sufficient support from school management, continuous training, and guidance so that they can achieve good criteria in implementing the mathematics learning process.

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INTRODUCTION

Mathematics is an excellent subject for developing students' intellectual competence (Lubis, Widada, Herawaty,

Nugroho, & Anggoro, 2021), because mathematics has been integrated in various areas of life (Pradana, Rizki Putra, & Rahmawati, 2022). Mathematics is an

intrinsic component of science, part of its structure, its universal language, and an indispensable source of intellectual tools (Pahmi, Priatna, Dahlan, & Muchyidin, 2022) and is taught at every level of education (Septiadi, Yuliati, & Widyastuti, 2022; Agung Putra Wijaya, 2020). Apart from that, according to Safari, Darwis, Kurnia, & Basuki (2023), mathematics is one of the subjects that are essential to the basic construction of science and technology. It can be concluded that mathematics, as a universal subject, develops students' intellectual competence and plays a key role in the basic construction of science and technology in various fields of life and levels of education.

Learning mathematics is a relatively permanent process of changing a person's behavior, and these changes are the result of acquiring knowledge or skills related to communication, quantity, space, and structure (Sukardjo & Salam, 2020). In studying mathematics, a student must understand the topic or content of the material in stages because learning mathematics always connects old material with the material to be studied (Sakdiah, Mukhayat, & Pradana, 2023). Judging how vital the role of mathematics is today, learning mathematics is assumed to be a need and necessity that must be fulfilled (Anggraini, Rinaldi, Syazali, & Pradana, 2023) and very important to learn (Pradana & Noer, 2023).

The implementation of the mathematics learning process that needs to be carried out by each teacher includes preliminary activities, core activities, and closing activities (Sobarningsih, Sugilar, & Nurdiansyah, 2019). According to Juano & Pardjono (2016), the success of the learning process is the main thing that is desired in implementing education in schools. A teacher is an individual who contributes to the effectiveness of the learning process. Teachers must have the ability to understand students and their

various differences in order to be able to help students face learning difficulties (Abdullah, 2017). The effectiveness of the learning process lies on the shoulders of the teacher, because teachers tend to be active (Ulfah, Yerizon, & Arnawa, 2020). So, the role of the teacher really determines the success of the learning process (Permanasari & Pradana, 2021).

The role of mathematics teachers in the success of the learning process can be seen from the perspective of the work period, which reflects the level of experience. Mathematics teachers who have been teaching for years have an advantage in understanding classroom dynamics (Nuryani & Handayani, 2020), student characteristics (Pratama & Lestari, 2020), and identifying various problems and planning alternative solutions for further improvements in mathematics teaching (Udil, 2021). With this experience, senior teachers should be able to deliver material in a more varied and enjoyable way for students (Rahmadhani & Noviani, 2023), recognize students' learning styles more effectively, and design teaching strategies that are more focused on solutions (Saragih, 2023). On the other hand, junior teachers, who may have more limited teaching experience but a high enthusiasm for learning, can take a more creative approach (Suardipa, 2019) and bring fresh energy to the classroom. The combination of the learning wisdom of senior teachers and the innovative spirit of junior teachers can create a dynamic and successful learning environment for students.

Previous research has discussed the implementation of learning process standards, which state that mathematics teachers have not been able to develop core learning activities (Sobarningsih et al., 2019). Wijayanti (2020) stated that the comparison of senior teachers' scores tends to be higher than that of junior teachers based on academic supervision assessments. They assumed that this

difference might be caused by several factors, such as teachers' work periods.

It is known that differences in teachers' work periods have been identified as factors that influence teacher performance (Devitha, Baharuddin, & Purnamawati, 2021; Sugito, Suyitno, & Kuntoro, 2019), teacher professionalism (Subehan, Syamsir, & Rahman, 2022; Wardoyo & Supriyoko, 2018), and classroom management skills (D. Rahmawati, 2020). Junior teachers may face challenges in designing and implementing appropriate learning strategies, while senior teachers may have broader experience but may be stuck in established methods.

In this research, we will compare the implementation of the mathematics learning process based on the teacher's work period; this is the element of novelty that is introduced. Therefore, this research aims to analyze the calculations for implementing the mathematics learning process from the perspective of the teacher's work period.

METHOD

This research uses qualitative descriptive research methods. The

subjects of this research were 2 mathematics subject teachers at one of the State Junior High Schools in South Lampung, with the criteria being 1 mathematics teacher with < 5 years of service (junior teacher) and 1 mathematics teacher with \geq 5 years of service (senior teacher). Data collection techniques use participant observation, interviews, and documentation.

The implementation of the learning process is measured using instruments in the form of observation sheets and interview guides. The observation sheet instrument contains several components for assessing the implementation of mathematics learning, consisting of preliminary activities, core activities, and closing activities. The observation sheet uses the Guttman scale and the Likert scale. The Guttman scale is used to measure the condition of a component with two types of firm answers, namely present or absent. A Likert scale with an interval of 1-4 is used to measure the implementation score of a component of the learning process with the criteria presented in Table 1.

Table 1. Likert Scale

Score	Answer Choices
1	Deficient
2	Sufficient
3	Good
4	Very Good

Data analysis uses descriptive analysis. Based on the data obtained, the analysis process uses the developed Miles and Huberman model, consisting of Data Collection, Data Reduction, Data Presentation, and Conclusion: Drawing or

Verifying. The development in question occurs during the Data Reduction stage, which includes three major processes: data selection, data simplification, and data abstraction. For more details, it is presented in Figure 1.

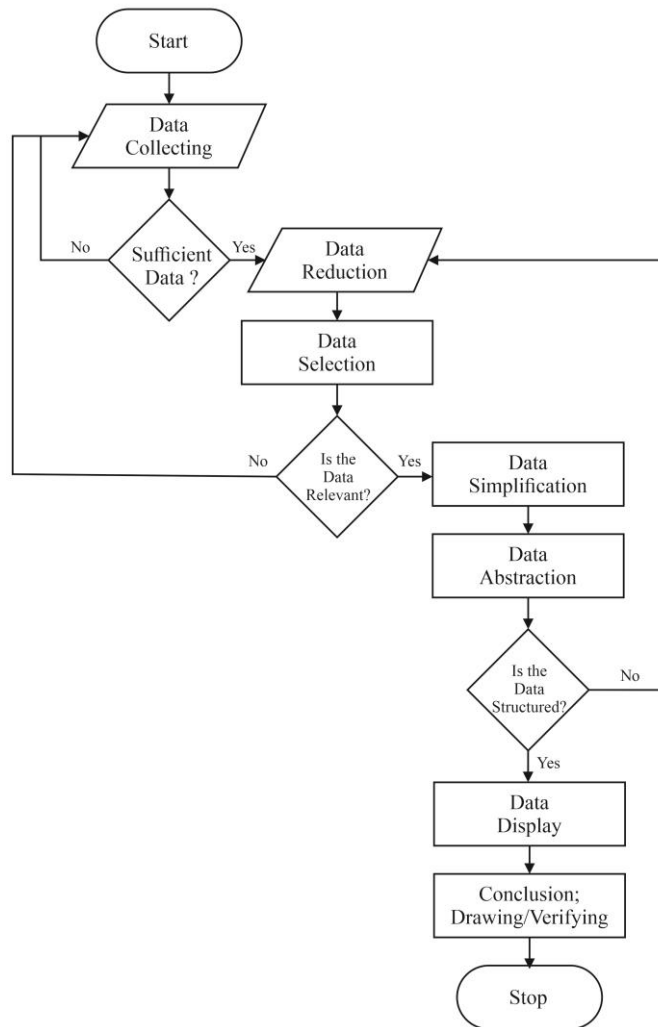


Figure 1. Developed Miles and Huberman Model Flowchart

The determination of the final score uses the following formula:

$$final\ score = \frac{total\ score \times 100\%}{score\ acquisition}$$

To make it easier to interpret the research results (final scores) obtained from the observation sheet, the researcher refers to the criteria for interpreting the final scores as presented in Table 2.

Table 2. Final Score Interpretation Criteria

Score Range	Criteria
86 - 100%	Very Good
71 - 85%	Good
55 - 70%	Sufficient
< 55%	Deficient

RESULTS AND DISCUSSION

The assessment of the implementation of the learning process for the two mathematics teachers in this study included three components of activity assessment: preliminary

activities, core activities, and closing activities. The following are the results of the descriptive analysis of the implementation of the learning process for each activity.

Preliminary Activities

In this preliminary activity assessment component, five indicators are

measured. The results can be seen in Table 3.

Table 3. Comparison of Core Activity Assessment Components

No.	Indicator	Junior Teacher	Senior Teacher
1.	Carrying out apperception and motivation	1	2
2.	Prepare students physically and psychologically to start learning activities	1	2
3.	Link current learning material with students' experiences on the way to school or with previous themes	3	3
4.	Ask questions that are related to the theme being studied	3	3
5.	Inviting students to be dynamic or do an activity related to the material	2	1

Based on Table 3, senior teachers have advantages in providing apperception and motivation to students. Senior teachers often find it easier to apprehend and motivate students because they have developed interpersonal skills, student understanding, and sensitivity to individual needs over many years in the world of education. Apperception and motivation activities need to be carried out by the teacher so that before taking part in the lesson, students are equipped with a high enthusiasm for learning (Susilo, 2016).

According to Satria & Kusumah (2019), good apperception will improve children's motivation to learn. Students who have high learning motivation will be more motivated to learn, process information or knowledge, and express ideas and thoughts that are in their minds when compared to students who have low motivation (Husniah, 2018). Students who have high motivation will study harder and continue learning without giving up so that the learning results they obtain will be better (T. P. Anggraini, Abbas, Oroh, & Pauweni, 2022). However, it is important to remember that a teacher's ability to carry out apperception and motivation does not only depend on length of experience but also on commitment to continuous learning, flexibility, and

adaptability to educational developments and changes in student needs.

Apart from that, senior teachers can prepare children physically and psychologically (Erданu, Zulkifli, & Noortyani, 2019) better for starting learning activities than junior teachers. Over time, senior teachers develop a deeper understanding of students' physical and psychological needs. They can be more sensitive to cues in students' behavior or mental health that may not be easily detected by junior teachers. Several things that teachers do on this indicator include asking about student attendance and straightening students' seats so that everything is orderly (Sobarningsih et al., 2019).

In this preliminary activity, junior teachers excel at inviting students to carry out activities related to the material (Suciana, 2018). Based on the results of interviews with junior teachers, they tend to be more open to innovation and new teaching methods. They are more likely to try fresh and creative approaches to getting students to participate, including the use of technology or interactive learning approaches. In addition, junior teachers adapt more easily to changes because they have experienced more recent training and learning. However, each teacher has their own uniqueness and strengths in this introductory activity.

Success in creating a dynamic learning environment involves a combination of various teacher skills and attitudes.

Core Activities

In this core activity assessment component, there are 8 indicators that teachers need to master, namely: 1) mastering the mathematics material being taught; 2) implementing educational strategies; 3) applying a scientific approach; 4) observing aspects; 5)

carrying out authentic assessments; 6) utilizing learning resources and media in learning mathematics; 7) triggering and/or maintaining student involvement in mathematics learning; and 8) using correct and appropriate language in mathematics learning.

a. Teachers Master the Material Taught

In this indicator, three sub-indicators are measured. The results can be seen in Table 4.

Table 4. Comparison of Assessment Components of Indicator 1 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	The ability to adapt material to learning objectives	4	4
2.	The ability to relate material to other knowledge that is integrated in a relevant way with the development of science, technology, and life	3	4
3.	Presenting material in themes systematically and gradually (from easy to difficult, from concrete to abstract)	4	4

Based on Table 4, it shows that there is no significant difference between junior and senior teachers regarding mastery of the material taught. Of the three sub-indicators measured, all had good scores. These results are in line with research by Nur'aini & Ruslau (2023), which states that mathematics teachers have mastered the material and concepts, as well as the general application of the material, so that students can easily understand and like the teachers.

A good teacher is a teacher who can present material gradually (from easy to

difficult, from concrete to abstract). Thus, mathematics teachers must be truly able to master the material to be taught to students so that learning objectives can be achieved (Hasibuan, Saragih, & Amry, 2018).

b. Teachers Apply Educative Learning Strategies

In this indicator, five sub-indicators are measured. The results can be seen in Table 5.

Table 5. Comparison of Assessment Components of Indicator 2 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Carry out learning in line with the competencies required	3	3
2.	Do the learning sequentially	3	4
3.	Effectively control the class	4	4
4.	Implementing contextual learning	2	3
5.	Carrying out learning that allows the growth of positive habits (Nurturant Effect)	1	2

Based on Table 5, the indicator assessment components for senior teachers show that there are no components that have deficient criteria.

However, junior teachers still have problems implementing learning that allows the growth of positive habits (the Nurturing Effect), as evidenced by the lack

of criteria achieved. According to Albay (2019), positive habits are intelligent thinking habits used in solving mathematical problems.

Based on the results of interviews with junior teachers, he has not been able to fully identify and respond to various student learning styles. Every student has different needs, preferences, and learning styles. Students tend to have positive habits when they are engaged in learning according to their learning style. Learning experiences that are directly felt by students will foster positive habits in them (Dharma & Siregar, 2015). This is what becomes an obstacle for junior teachers in cultivating positive habits in students.

Apart from the lack of experience due to the working period of <5 years, junior teachers have not fully developed

skills in creating an environment that supports the growth of positive habits, so they experience difficulties in managing student behavior effectively. Junior teachers still need time to develop strong interpersonal skills for building positive relationships and emotional connections with students, while senior teachers have been building connections with students for years. Teachers who have strong interpersonal intelligence tend to be able to adapt and get along with other people (Muzayanah, 2017).

c. Teachers Apply a Scientific Approach

In this indicator, five sub-indicators are measured. The results can be seen in Table 6.

Table 6. Comparison of Assessment Components of Indicator 3 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Presenting topics or material that encourages students to carry out observing activities	3	3
2.	Provoke students to ask questions	2	4
3.	Presenting activities that encourage students to collect information or data	2	2
4.	Presenting activities that encourage students to associate with or process information	3	3
5.	Presenting activities that encourage students to be skilled at communicating results verbally and in writing	3	4

Based on Table 6, there is an imbalance in the implementation criteria for sub-indicator 2, namely teachers provoking students to ask questions. Senior teachers are very good at implementing it, while junior teachers only meet sufficient criteria. According to Mutholib, Sujadi, & Subanti (2016), teachers should facilitate students asking questions; teachers must have appropriate methods because one of the characteristics of active students is asking questions (Fitrah, Yantoro, & Hayati, 2022). If students still have difficulty and rarely ask questions (N. K. Rahmawati & Hanipah, 2018), then the student is still classified as passive. This is because junior

teachers do not have sufficient experience in managing class discussions. Junior teachers sometimes lack the confidence to lead discussions or feel hesitant to provide adequate responses to students' questions.

To overcome these difficulties, junior teachers need to continue learning and developing over time. Receive feedback from students, collaborate with colleagues, and continue to improve interpersonal and teaching skills so that it can help improve junior teachers' ability to stimulate student activity (Farida, 2015).

- d. Observed Aspects In this indicator, four sub-indicators are measured. The results can be seen in Table 7.

Table 7. Comparison of Assessment Components of Indicator 4 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Provoke students to ask questions	2	3
2.	Present activities that encourage students to collect information and data	4	4
3.	Presenting activities that encourage students to associate with or process information	3	3
4.	Presenting activities that encourage students to be skilled at communicating results verbally and in writing	3	4

Based on Table 7, it can be seen that all sub-indicators for senior teachers have criteria, as well as for junior teachers. However, junior teachers only met sufficient criteria in sub-indicator 1. This clarifies the previous statement that junior teachers still have difficulty provoking students to ask questions.

On the other hand, in sub-indicator 2, both junior and senior teachers have the same score. They are very good at presenting activities that encourage students to collect information and data needed for problem-solving (Eismawati, Koeswanti, & Radia, 2019). The two

teachers designed observation activities where students were asked to collect data by observing certain phenomena or events in their surrounding environment. In addition, both teachers presented mathematics case studies in which students were asked to collect data to solve a problem or answer a specific question.

- e. Teachers Carry Out Authentic Assessments

In this indicator, three sub-indicators are measured. The results can be seen in Table 8.

Table 8. Comparison of Assessment Components of Indicator 5 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Observe students' attitudes and behaviors in the following lessons	4	4
2.	Assessing students' skills in carrying out individual or group activities	3	4
3.	Document the results of observing students' attitudes, behaviors, and skills	1	1

Based on Table 8, it shows that junior and senior teachers are good at directly observing students' attitudes and behaviors while learning mathematics (Hidayad, Masrukan, & Kartono, 2017). and assessing their skills in carrying out individual or group activities. However, both are still lacking in documenting the results of observing students' attitudes, behaviors, and skills. This is due to limited time, which makes it difficult for teachers to systematically document every aspect

of students' attitudes, behaviors, and skills. S Apart from that, the many other demands and priorities faced by teachers make this documentation a lower priority compared to other tasks that are considered more urgent, such as curriculum preparation, lesson preparation, and extracurricular activities.

- f. Teachers Utilize Learning Resources and Media in Learning In this indicator, five sub-indicators are measured. The results can be seen in Table 9.

Table 9. Comparison of Assessment Components of Indicator 6 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Demonstrate skills in utilizing learning resources	4	4
2.	Demonstrate skills in using learning media	4	1
3.	Produce interesting learning resources and learning media	4	1
4.	Involving students in the use of learning resources	4	2
5.	Involving students in the use of learning media	3	1

Based on Table 9, overall, it is found that junior teachers excel in this indicator. On the other hand, there are three sub-indicators where senior teachers still have deficiencies. Senior teachers lack the ability to demonstrate skills in using learning media and producing interesting learning media. This is because senior teachers are less familiar with the latest technological developments or new digital learning tools to support the implementation of the mathematics learning process.

Based on the results of the interviews, they also felt that the traditional or conventional teaching methods they had used for years were quite effective, so they did not feel the need to switch to using other learning media. This statement contradicts the research results of Firdaus (2023), who

stated that senior teachers combined teaching aids and PowerPoint media in learning.

In sub-indicator 5, senior teachers also do not involve students in using learning media. This is a result of the lack of teachers in producing learning media. Senior teachers have a skeptical view of the effectiveness of learning media. Again, they feel that the traditional teaching methods they have used for years are quite effective, so they do not feel the need to use learning media. This indicator is a weakness of senior teachers during the mathematics learning process.

- g. Teachers Trigger and/or Maintain Student Involvement in Learning

In this indicator, five sub-indicators are measured. The results can be seen in Table 10.

Table 10. Comparison of Assessment Components of Indicator 7 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Fostering the active participation of students through interaction between teachers, students, and learning resources	3	4
2.	Respond positively to student participation	3	3
3.	Demonstrate an open attitude towards student responses	3	3
4.	Demonstrate a conducive personal relationship	4	4
5.	Cultivate students' joy and enthusiasm for learning mathematics	2	2

Based on Table 10, starting from sub-indicator 1 to sub-indicator 4, both junior and senior teachers received good or even very good criteria. However, in sub-indicator 5, both junior teachers and

new senior teachers received sufficient criteria. This is caused by the teacher's approach to students, which is not yet optimal. Teachers sometimes adopt a teaching approach that is monotonous,

formal, and focuses too much on theoretical explanations without providing practical applications.

During learning, researchers saw that students had different learning styles. When teachers use teaching methods that do not suit the students' preferences and learning styles, students feel less interested and enthusiastic. So, it is important for teachers to pay attention to the diversity of teaching methods, make

connections with everyday life, provide context and meaning, and create an environment that supports enjoyable learning.

h. Teachers Use Correct and Appropriate Language in Learning

In the last indicator in this activity, three sub-indicators are measured. The results can be seen in Table 11.

Table 11. Comparison of Assessment Components of Indicator 8 in Core Activities

No.	Sub-Indicator	Junior Teacher	Senior Teacher
1.	Use spoken language clearly and fluently	4	4
2.	Use good and correct written language	4	3
3.	Convey the appropriate message and style	3	4

Based on Table 11, both junior teachers and senior teachers have good and very good criteria for using correct and appropriate language in learning. They use simple, clear, and precise language to explain complex mathematical concepts. Because language is crucial for improving opportunities for students to learn mathematics (Erath, Ingram, Moschkovich, & Prediger, 2021).

Based on the results of interviews, this was done to help students more easily understand complex mathematical concepts. So it can minimize confusion and increase students' level of understanding.

In addition, teacher involvement in conveying messages with variations in voice intonation that are friendly, enthusiastic, and appropriate to the context can make learning more interesting and increase student interest and understanding.

Closing Activities

The assessment component of this closing activity focuses on the teacher's condition in ending effective mathematics learning. There are two indicators measured, which can be seen in Table 12.

Table 12. Comparison of Assessment Components in Closing Activities

No.	Indicator	Junior Teacher	Senior Teacher
1.	Reflect or make a summary by involving students	3	3
2.	Carry out follow-up by providing directions for further activities or tasks	3	3

Based on Table 12, both junior and senior teachers have reflected and carried out follow-up well. Each teacher reflects by asking randomly appointed students to summarize and explain again what they have learned in mathematics at that time. It was seen that students were hesitant to explain and were even helped by their group friends in answering questions from the teacher. These results are in line with research by Silviani, Jailani, Lusyana, &

Rukmana (2017), who stated that the results of the reflection indicated that mathematics learning at the meeting at that time needed to be followed up, namely giving homework (PR). This action has also been implemented by mathematics teachers. So it can be concluded that the teacher's ability to carry out reflection and follow-up on the learning process that has been carried out (Gumiarta, 2019).

Based on the results of observations carried out in preliminary activities, core activities, and closing activities, it shows that all components measured during the implementation of mathematics learning

are in good condition. The following is a comparison of data showing the results of the analysis of the implementation of the mathematics learning process by each teacher.

Table 13. Comparison of Scores for Each Component of Implementing the Mathematics Learning Process

Teachers Activities	Junior Teacher			Senior Teacher		
	preliminary activities	core activities	closing activities	preliminary activities	core activities	closing activities
Score	10	102	6	11	103	6
Total		118			120	
Final Score		73.75% (Good)			75% (Good)	

Table 13 shows that the implementation of the learning process carried out by junior and senior teachers only has a score difference of 2 points. This states that the implementation of the learning process carried out by both junior and senior teachers is at the same level, namely, meets good criteria. Therefore, the implementation of the mathematics learning process does not have a significant difference when viewed from the teacher's perspective.

Although junior teachers may have less teaching experience, this is not always a determining factor in the quality of learning. Most senior teachers have accumulated years of experience, but high-quality junior teachers can compensate for this with a passion for learning and innovation. Apart from that, support from the school plays an important role. Both junior and senior teachers receive sufficient support from school management, continuous training, and guidance so that they can achieve good criteria in implementing the mathematics learning process. Therefore, the teacher is no longer a practical person who is satisfied with what he has done for years without any efforts to improve or innovate (A. P. Wijaya, Maulina, Tania, & Sesunan, 2023).

While there are differences in experience and years of service, it is important to remember that the quality of

learning is not necessarily tied to the categories of "junior teacher" or "senior teacher." Many factors can create an environment where both junior and senior teachers have the potential to provide good and meaningful learning for students, starting with attending education and training, having access to educational resources, institutional support, frequent self-reflection, and interpersonal skills development, as well as the commitment to students' mathematics learning. In essence, the elements of education must be involved to achieve the planned educational goals (Y. Rahmawati, Candra Pradana, Rinaldi, Syazali, & History, 2021).

CONCLUSIONS AND SUGGESTIONS

Based on the research results, it was found that both junior and senior teachers achieved good criteria in the process of implementing mathematics learning. So it can be concluded that differences in teacher tenure do not significantly influence the process of implementing mathematics learning. However, several things are advantageous to each teacher. Junior teachers are superior at utilizing learning resources and media in learning mathematics, while senior teachers are superior at applying a scientific approach. Therefore, there are still many factors that can influence the learning implementation process, rather than just being limited to

the categories of "junior teacher" or "senior teacher".

Even though we have received good criteria, there are still several notes that need to be addressed by junior and senior teachers. Junior teachers need to apply the Scientific Approach more often when provoking students to ask questions and collect information and data. Apart from that, it is necessary to find ways to foster positive habits (the Nurturant Effect) and student enthusiasm for learning mathematics. For senior teachers, they must be able to utilize innovative and interesting learning media and platforms so that students can be actively involved in learning mathematics. For both, it is necessary to document the results of observing students' attitudes, behaviors, and skills as often as possible during mathematics learning.

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