

Instructional Explanation Strategies: Forms Of Teachers Pedagogic Decisions To Help Students Understand The Concept Of The Sinus Rule

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Abstract— This study investigates the teacher's pedagogical decisions in providing instructional explanations to help students understand the concept of the Sinus rule. Using qualitative research forms, with expert category teachers who have the characteristics of providing process-oriented instructional explanations to help students understand the concept of Sine rules. The strategy steps used when giving instructional explanations when learning in class are recorded audio-visual, conducted in-depth interviews and analyzed. The results showed there were five strategic steps in providing instructional explanations that were identified as a form of teacher's pedagogical decisions when implementing learning. The teacher's pedagogical decisions can help students understand the concept of the Sinus rule. Therefore, the form of teacher's pedagogical decisions in providing process-oriented instructional explanations needs special attention.

Index Terms— Teacher Pedagogic Decisions, Instructional Explanation, Process-Oriented, Expert Teachers.

1 Introduction

The implementation of mathematics learning by teachers can be prioritized using innovative steps and focus on the communication process to ensure students actively listen, take responsibility, have an open mind and engage in mathematical practice [1]. For this, the process of making and implementing decisions in taking various actions during learning is needed [2], [3]. This makes teacher decision making an important priority in learning [4]. Thus, how to see and interpret events related to actions, adapt and shape class situations and make choices when choices are available, decision making becomes an important aspect in research related to mathematics teachers [5]. Research on teacher decision making is important because it has efficient implications that can reveal the inner world of successful teachers [6]. This has been done with several reviews, including (a) the components used in teacher decision making [7]; (b) pedagogical decisions in learning mathematics [8], [9], [10]; (3) interaction decisions when learning in class [11]. Teacher decision making in teaching practice is something that influences each other in a complex manner, including resources (consisting of instructional media and teacher knowledge), goals, orientation (concerning teacher beliefs) which are the basis for choosing among available alternatives. Teaching is a complex cognitive skill, so it requires the right decision making [12], including when the teacher decides to give instructional explanations. It is intended to help communicate the subject matter to students so as to facilitate understanding of newly discovered ideas [13]. An example is doing strategic steps when giving material

explanations. Instructional explanations are very strong, unique and important moments in learning mathematics [14]. Through instructional explanations, the teacher helps students gain an understanding of rules, mathematical concepts [15]. If it is designed and implemented in a quality and complex manner, it will produce effective and meaningful learning for students [16], [17], [18]. Several other studies that more specifically investigate instructional explanations also help students correct errors regarding skills, concepts, principles and procedures when studying on their own [19], [20], [21]. However, research evidence is still needed regarding the orientation of the implementation of instructional explanations, such as teacher's explanation of the process or product-oriented mathematical material [22], [23], [24], [25], [26]. For this reason, it is necessary to conduct research on the teacher's pedagogical decisions in providing instructional explanations to help students understand concepts.

2 METHOD

2.1 Form and Research Approach

This study is in the form of qualitative research with a descriptive case study approach. A descriptive case study is a way to present a complete description of a phenomenon in the context in which it is studied [27], namely instructional explanation strategies as a form of teacher's pedagogical decisions. Instructional explanation strategies used by teachers to help students understand the concept of the sine rule.

2.2 Research Subject

The chosen subject for this study was one of the mathematics teachers who was found to have a unique, different way, in terms of providing instructional explanations on the material Sine rules with a process-oriented tendency and involving students fully in the learning process. The teacher is part of 65 people from 22 high school in Sambas Regency, Indonesia. The selection of the subject is also because the person concerned is willing to be the subject of research and is able to communicate what is thought when choosing and doing the instructional explanatory strategy steps in the material Sine rules.

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2.3 Data Collection

The data of this study were obtained from video recordings and interview results. The procedure of this research includes (a) preparation, the researcher examines the theory of instructional explanations and pedagogical decisions of the teacher, (b) implementation, the researcher determines the research subject, observes and conducts interviews about instructional explanation strategies, (c) analysis, the researcher carries out the analysis and based on the steps instructional explanation strategies that teachers do.

2.4 Data View

After obtaining permission from the concerned teacher, the researchers began to make observations. Instructional Explanation or Explanation of the Sinus rule material begins with the teacher submitting the problem, "Can we determine the unknown side of any triangle, if the length of one side and the sides are known? (followed by drawing a triangle of any kind in Fig. 1). After that, the teacher asked the student to draw any triangle he or she made on the board in full size. But first, the teacher gives an explanation of how to draw the object. Then the teacher visits each student and examines the result of the drawing. The right ones are praised, and the ones that aren't right are asked to correct while giving the direction. All students are given a solid understanding of how to draw well and correctly, according to the size requested.

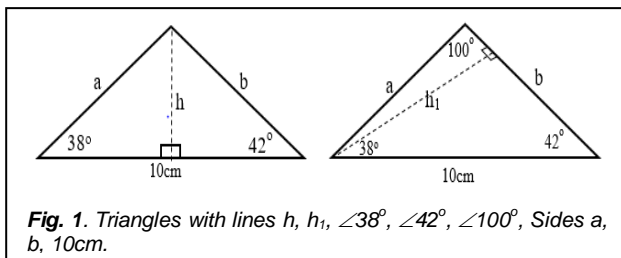


Fig. 1. Triangles with lines h , h_1 , $\angle 38^\circ$, $\angle 42^\circ$, $\angle 100^\circ$, Sides a , b , 10cm.

Next, the teacher invites students to find the Sine rule formula using Fig.1 as a basis. The teacher engages students in finding the formula and trying to make all students understand and understand where the formula came from. Found a formula like that looks like Fig.2.

Figure 2 shows the handwritten Sine Rule formula: $\frac{a}{\sin 42^\circ} = \frac{b}{\sin 38^\circ} = \frac{10}{\sin 100^\circ}$. Below the formula is the text "Aturan Sinus".

Fig. 2. The Sine Rule Formula

After finding the formula for the Sine rule, the teacher then invites students to use the formula to find the lengths of sides a and b of the triangle. From the calculation using the formula, obtained $a = 6.85\text{cm}$ and $b = 6.34\text{cm}$. Then the teacher asks students to take measurements of sides a and b of the triangles made on each book. The measurement results are close to the calculation results. Together with students, the teacher makes the assertion that, if the image is made according to the specified size, then the results of the calculation and measurement will be the same.

3 RESULTS AND DISCUSSION

Based on the explanation above, it appears that the teacher in explaining the material in us rules was identified with students taking a number of strategic steps, each of which was followed by certain actions.

3.1 Drawing Object

The first step in providing an explanation is drawing objects. The teacher makes pictures of objects in accordance with the material being studied on the board while giving explanations to students. Then ask students to draw the same picture as the one on the board, according to the specified size. Students draw using a long measuring ruler and arc to measure angles. During the drawing process, the teacher smoothly explains and performs examination steps to improve the drawings made by students.

3.2 Constructing Formulas

The second step of the strategy provides an explanation of the material constructing the equation. The teacher and students use pictures to find the sine rules formula. The process of constructing equations, the teacher as always trying to explore the initial knowledge of students, giving short questions, explaining, responding, checking, emphasizing the relationships between equations used.

3.3 Using Formulas

The third step in the strategy of providing material explanation is to use equations. Done with students to find the value of the length of the side that was asked using the equation found. The process of using equations, the teacher smoothly responds, gives short questions, explains, checks and confirms the steps of using equations.

3.4 Checking Results

The fourth step of the strategy of explaining the material is to check the results. Teachers work with students during the drawing process, constructing the formula of Sine rules, and using the formula of Sine rules to find the lengths of any triangle. Step by step the teacher examines the results of the teacher by circling from table to table with the student, correcting the error, making the correct statement, and measuring the results using the formula.

3.5 Challenging Understanding

The fifth step of the strategy to provide a material explanation is to anchor understanding. The teacher does when the process of drawing any triangular object, constructs the formula of the Sine rules, uses the equation to find the length of the sides of any unknown triangle and adds examples of problems and their solutions. For the latter, in the process of understanding, the teacher checks the wrong and correct parts of the drawing results, confirms the terms of use of the Sine rule formula, confirms that the results of the use of the formula are in accordance with the measurement results, applies the new knowledge learned to the addition of additional examples.

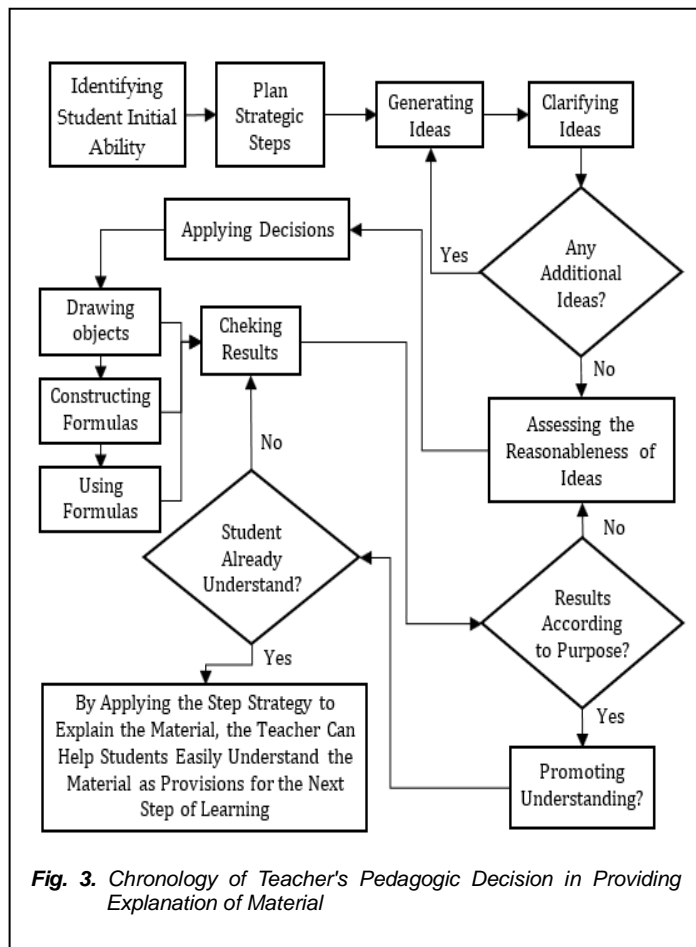
process. Especially if applied to the provision of new material will be studied by students. The initial concept obtained by students becomes very meaningful because they are invited to participate in the process of finding. Based on the steps that have been implemented by the teacher, the explanation of the material is a means by which pedagogic decisions are applied in interacting with students [30]. The topic of providing material explanations (instructional explanations) still needs to be studied in more depth. As further research, it can be investigated that the pedagogical decision-making component of teachers is certainly related to providing explanations of mathematical material.

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Based on the results of these studies, it shows that to provide an explanation of the material when learning in class, teachers need to innovate in the form of implementing certain strategic steps. The strategy step is a form of teacher pedagogical decision made based on a particular situation. Pedagogic referred to here is the process of transferring or sharing knowledge [28]. The pedagogical decision taken proved to be able to make the classroom more dynamic, bringing about intimacy between teachers and students. Such conditions attract students to dare to ask questions, submit suggestions or opinions and ask for clarification from the teacher. By understanding and mastering, it is hoped that student learning outcomes will improve. With the experience of learning about the way the teacher teaches, maybe one day when he becomes a teacher, he can develop the same pedagogy [29]. The flow of pedagogical decisions of teachers as shown in Fig. 3

4 CONCLUSION

The Use of Strategies in Providing Explanations Material with certain concepts in the learning process is very important. The use of the material explanation strategy step as a teacher's pedagogical decision form greatly helps students in understanding the concept of the material during the learning

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