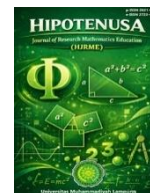




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Teacher communication model with deaf junior high school students in mathematics learning at SLBN Sukamaju



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ABSTRACT

The purpose of this study was to determine the communication model of teachers with deaf junior high school students in mathematics learning at SLBN Sukamaju. This study is a qualitative descriptive study. The subjects of this study were teachers and deaf students at SLBN Sukamaju. The research subjects were selected using a purposive sampling technique. The data in this study were the results of observations using observation sheets and interview recordings. Data collection was carried out by conducting classroom observations, recording interviews, and writing down necessary notes. The collected data were then reduced. Data reduction was carried out simultaneously with data triangulation. The results of this study concluded that the communication model of teachers with deaf students is a top-down question model. The teacher starts the conversation with a question. Before the teacher explains the material, the teacher asks about the student's condition. Before the teacher asks the student to answer the question, the teacher asks about the student's personal life to ensure that the student returns to focus on learning. This communication model is a two-way communication model that provides opportunities for students to respond and ask questions regarding things they do not understand.

1. Introduction

Education is a form of effort to realize the young generation as a whole human being who has high cognitive, spiritual and social abilities so that they are able to adapt to changes in the times [1]. Furthermore, Ramadhani & Suryani [2] stated that education is a lifelong journey in developing one's potential to be able to live and continue life. Education is classified into 3 forms, namely informal, formal and non-formal education. Each form of education needs to be an important concern for everyone, especially formal education. Formal education is a series of activities so that someone can learn academic skills, and this education begins

at the elementary level and continues to college [3]. Formal education is very important to be obtained by all Indonesian citizens. This is in line with the 1945 Constitution, paragraph 1, article 31, namely "Every citizen has the right to education". Every Indonesian citizen has the right to receive a decent education, including children with special needs, however, some citizens still do not receive a decent education, one of which is due to physical and mental limitations such as those found in children with special needs [4]. Formal education for children with special needs is called special education or special education. Special education is education provided for students with physical disabilities, one of which is deaf children [5].

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"Deafness" is the term for someone who has limited hearing, making them unable to hear well or unable to hear at all [6], [7]. Deaf children experience several barriers to verbal communication, causing them to prioritize sight for information acquisition, such as lip movements and sign language. Deaf children have language and speech abilities that differ from those of children in general because their abilities generally involve hearing.

Deaf children face various challenges, but good and effective communication can help them develop [8]. Deaf children require communication in their own unique way to effectively convey the meaning of what is being communicated [9]. Difficulties in communication result in deaf children having a limited vocabulary, difficulty understanding abstract words, and a poor understanding of common language styles [7]. Communication difficulties experienced by deaf children can lead to several problems, such as difficulty understanding aspects of language, including mathematical language in the form of numbers [10]. This information indicates that deaf children experience unique learning difficulties, particularly in mathematics.

Mathematics is a crucial learning material that every student must master because it serves as a tool for applying various other fields of study and for developing mathematics itself [11]. The importance of mathematics necessitates its study by all students, including deaf students. This demonstrates that deaf students must master mathematics, particularly addition and multiplication. However, the reality is that most deaf students lack mastery of addition and multiplication. As expressed by a mathematics teacher at Sukamaju Special Needs School (SLBN),

A junior high school mathematics teacher at Sukamaju Special Needs School stated that most deaf students have difficulty understanding mathematical problems, particularly those related to addition and multiplication. Addition and multiplication are two crucial arithmetic operations. Aunio & Räsänen [12] state that addition is a basic mathematical skill necessary to develop other mathematical knowledge and skills. Addition is a basic operation used to introduce multiplication. Multiplication is an arithmetic operation considered more difficult than addition [13]. The majority of life's problems are closely related to addition and multiplication, especially those related to business. The importance of knowledge about addition and multiplication operations makes it imperative for students to

master them.

Mastery of addition and multiplication operations will be good if the teaching and learning process is carried out effectively. The effectiveness of learning for deaf students is greatly influenced by good communication between teachers and students. Husna [14] states that conceptual mastery of material can be built by involving communication skills, both verbally and in writing. Communication is the process of forming, receiving, conveying, and managing a message that occurs within or between two or more people for a specific purpose [15]. Masdul [16] states that communication is a fundamental and essential process in human life. The importance of communication between teachers and students requires teachers to be able to use various methods to build good communication, especially with deaf students.

The communication between teachers and deaf students that is often used is Indonesian Sign Language (BISINDO) [17]. BISINDO is a sign language that uses expressions, body positions, hand movements, and eye contact that has been developed by deaf children. Based on observations on June 11, 2024, it was discovered that the sign language used by mathematics teachers at Sukamaju State Special Needs School (SLB Negeri Sukamaju) was oral. Teachers explained the material with lip movements, but if students did not understand the material presented, the teacher would use body language or send messages via WhatsApp.

Several communication methods used by mathematics teachers with deaf students have not been formulated into a specific communication model that can explain good communication between the two. Several researchers have studied sign language with deaf children, but none have examined and formulated a communication model between teachers and students. This indicates the importance of conducting research focused on the communication model between mathematics teachers and deaf students. Thus, it is necessary to conduct research with the aim of determining the communication model of teachers with deaf junior high school students in mathematics learning at Sukamaju SLBN.

2. Method

2.1 Research Design and Participants

This study used a descriptive qualitative approach. Qualitative research is appropriate for interpreting social and educational phenomena in their natural context, with the researcher acting as the main instrument [18]. The participants were

mathematics teachers and deaf junior high school students at Sukamaju Special Needs School (SLBN). The participants were selected through purposive sampling based on their direct involvement in mathematics learning.

2.2 Data Sources and Instruments

The data consisted of classroom observation results, interview recordings, and researcher field notes. Observation sheets were used to document teacher and student communication during mathematics learning, while interview guides were used to obtain information about the communication strategies applied by the teacher. Field notes were used to record important classroom events that supported the interpretation of the observation and interview data.

2.4 Data Collection and Analysis

Data collection was conducted through classroom observations, recorded interviews, and research notes. The collected data were reduced by selecting information relevant to teacher–student communication patterns. Data reduction was conducted together with triangulation by comparing observation results, interview findings, and field notes to strengthen the credibility of the analysis.

3. Results and discussion

3.1 Classroom Communication Patterns

Classroom observations showed that the teacher established two-way communication with deaf students. The interaction usually began with the teacher asking about the students' condition, after which students responded to the teacher's question. The teacher then continued by providing an explanation of the mathematics material. This pattern shows that the teacher used preliminary questions to attract attention and prepare students to receive the lesson [19], [20].

3.2 Communication Tools Used by the Teacher

Interviews with the teacher revealed that several communication tools were used with deaf students, including finger pointing, facial expressions, lip movements, and mobile phones. The teacher delivered information about addition and multiplication using sign language supported by gestures and written symbols [21-25]. The sign language most frequently used in the classroom was adapted to the students' everyday communication habits [19].

When explaining mathematics material, the teacher often wrote directly on the board and gave commands or questions using sign language. Writing on the board helped students observe mathematical symbols and procedures visually, while gestures helped the teacher direct students' attention to specific parts of the explanation [26].



(a) (b)
Fig. 1. Teacher activities in classroom learning.

3.4 Visual and Gestural Communication in Mathematics Learning

Fig. 1(a) shows the teacher explaining a combination of multiplication and addition operations by writing on the board. During the explanation, deaf students appeared to focus more on the teacher's writing and gestures than on communication with peers. This indicates that the teacher's visual explanation became the primary source of information during mathematics learning.

Fig. 1(b) shows the teacher's hand gesture when selecting a student to communicate with. Before speaking to a student, the teacher pointed with the index finger to signal that the student was being addressed. This gesture helped the student recognize the direction of communication and prepare to respond to the teacher.

Teacher : "Yes, sir, when I want to talk to a student about anything, I usually ask about their condition first to ensure they have regained their focus."

Teacher : "Yes, sometimes I ask if they are healthy, sometimes, I ask if they are sleepy, and sometimes I ask if they understand."

The interview shows that the teacher-initiated communication by pointing to the student and asking about the student's condition before conveying the main message. This strategy was used to confirm that the student was attentive and ready to follow the learning activity [27-29].

Observation results also showed that, during problem-solving practice, the teacher asked questions before asking students to write their answers. Questions such as whether students understood or were ready to answer were used to refocus attention and encourage students to participate in the mathematics task.

Fig. 2 shows the teacher explaining material to a

student who needed additional assistance while another student solved a problem on the board. After students wrote their answers, the teacher gave a thumbs-up as feedback, whether the answer was correct or still needed correction. If the answer was incorrect, the teacher guided students again through visual explanation and questioning.



Fig 2. Teacher activity in class.

3.4 Top-Down Question Communication Model

Based on the observation and interview data, the communication model between teachers and deaf junior high school students at SLBN Sukamaju can be described as a Top-Down Question Communication Model [30-34]. This model is a two-way communication model dominated by the teacher, in which the teacher initiates interaction, asks guiding questions, provides visual cues, and confirms students' understanding through gestures or written explanations [36].

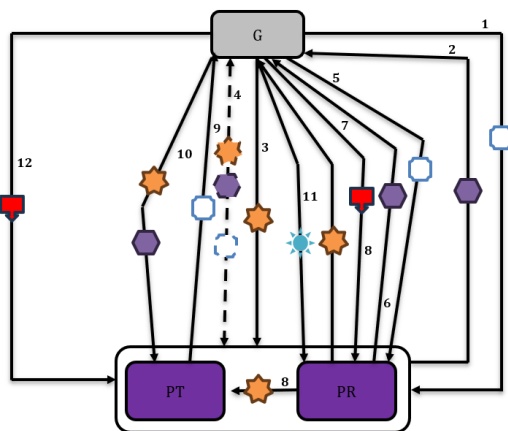


Fig. 3. Top-Down Question Communication Model

Description:

- : asking a question
- : answering a question that is asked
- : explaining mathematical understanding
- : giving appreciation
- : giving instructions to explain/solve a problem.
- : Direction of Communication
- : Teacher

- PT : Deaf students who are considered intelligent by the teacher
- PR : Deaf students who are considered less intelligent by Teacher.

4. Conclusion and suggestions

Based on the findings, the communication model between teachers and deaf students at SLBN Sukamaju is a Top-Down Question Communication Model. The teacher begins interaction by asking questions to gain students' attention and check their condition. Before explaining the material, the teacher ensures that students are focused, then delivers mathematical explanations through sign language, gestures, facial expressions, lip movements, and written representations on the board.

CRedit authorship contribution statement

Purna Bayu Nugroho: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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