

Teacher Representation Gestures As A Means Of Communication For Students With Deafness In The Material Of Multiplication Of Integer Numbers

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Abstract: *The understanding of deaf students is very dependent on how the teacher communicates. The teacher uses gesture as the main communication in the learning process. Gesture representation of the teacher acts as a facilitator. Students' difficulties in solving problems can be helped by using gesture representation. This research is a qualitative research with research subjects are teachers from PGRI Among Putra SLB. This study aims to find out and describe the teacher's representational gesture as a communication for deaf students in multiplication of whole numbers. Methods of data collection using observation, interviews, and documentation. The triangulation used is time triangulation and method triangulation. The analysis technique used is data reduction, data presentation, and drawing conclusions. After processing the data in a qualitative descriptive manner, the result was that the teacher's representational gesture as a communication for deaf students in the multiplication of whole number material included iconic gestures and metaphoric gestures. In addition, there are teacher gestures that are not included in one of the 4 types of gestures, namely semi-deictic gestures.*

Keywords: *Representation Gesture, Communication, Multiplication of Whole Numbers, Deafness*

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1. INTRODUCTION

Education is an absolute necessity that must be met by every individual. One crucial aspect of education is the teaching and learning process, which involves interaction between teachers and students (Marfuah, 2017). This interaction fosters reciprocal communication to achieve learning objectives. The primary goal of the teaching and learning process is student understanding of the material being taught. Furthermore, effective communication in delivering material is also a competency that teachers must master (Prangin-Angin, 2018). This communication competency determines success in helping students absorb the material being taught.

A teacher's communication skills significantly influence the success of learning. A teacher's quality in teaching can be seen from students' responses during the learning process (Bavelas, 1995).. For example, nodding or other gestures indicate that students are responding positively and understanding what the teacher is saying. Furthermore, gestures can convey not only more information than what is said, but also important information that is not contained in the spoken words (Elvierayani & Susanti, 2018).. Therefore, gestures have a significant positive impact on listener comprehension.

One strategy teachers use in mathematics learning is often embodied cognition, or embodied knowledge (Elvierayani & Kholiq, 2019). Gesture is a special tool in embodied cognition because it is closely related to speech and serves as the primary bridge between internal imagery (mental space) and the symbolic expression of mathematical ideas (Elvierayani & Susanti, 2018).. Therefore, gesture can bridge action and thought and support discussions between speakers and listeners. Therefore, different gestures will provide different benefits in learning.

Representational gestures are commonly used in mathematics teaching and learning activities (Elvierayani & Susanti, 2018). Representational gestures are movements used to represent objects. Representational gestures also depict semantic content (ideal units in the brain) either written or metaphorically through the hands and a series of movements (Ridho Elvierayani & Susanti, 2018). Thus, teachers use not only pointing gestures but also representational movements to connect related ideas in mathematics learning.

Previous research has shown that representational gestures influence a person's understanding of material (Prayitno, 2016). Therefore, all teacher movements, which are physical actions and serve as visual representations of an object, will accompany, replace, and align with inconsistencies in speech to explain the material. Representational gestures include iconic and metaphoric gestures (Hendriana & Sagita, 2021). Iconic gestures explain the relationship between a physical form and hand movements, such as depicting how long or short an object is.

Iconic gestures are also closely related to speech, depicting what is being said through hand movements. In mental representation, metaphoric gestures are almost identical to iconic gestures (Elvierayani & Susanti, 2018). However, metaphoric gestures depict abstract concepts such as knowledge and language. Intrinsically, the movements in iconic gestures coincide with the parts of speech that convey the same meaning (Kurniasih et al., 2020). Metaphoric gestures, on the other hand, present images of the invisible (abstraction).

Teacher gestures act as facilitators in mathematics learning (Hendriana & Sagita, 2021). Students' difficulties in solving math problems can be helped by the use of teacher gestures. However, not all teacher gestures function effectively as communication tools in learning. A study conducted at the University of Wisconsin in the United States found that more instructional gestures actually confuse students with special needs in understanding the material taught by teachers (Yeo et al., 2017). Some gestures can lead to miscommunication in mathematics learning.

Students also acknowledged miscommunication regarding the material being taught by a grade VIII teacher at the Among Putra PGRI Special Needs School in Tulungagung. Interviews revealed that deaf students experience miscommunication with their teacher's gestures during math lessons, particularly when multiplication by tens. Students don't understand the teacher's gestures, thus hindering their understanding of multiplication. Teachers often repeat the material two or three times until students fully understand it.

A grade VIII teacher at SLB PGRI Among Putra Tulungagung also revealed that deaf students have not mastered oral motor skills well. So it is not uncommon for students to be confused and have difficulty in learning mathematics due to a lack of vocabulary and not understanding instructions from the teacher. The learning process carried out by a teacher for children with special needs (deaf) cannot be equated with the teaching and learning process carried out in regular schools (Sunanto, 2016). Children with special needs are children who experience deviations or abnormalities (physical, mental-intellectual, social, emotional) in the process of growth or development compared to other children of the same age (Riadin & Usop, 2017). Therefore, in the teaching and learning process, students with special needs require special education services.

The learning methods of students with special needs vary from one student to another because the types of children with special needs vary. The types of special needs that attract the attention of parents and teachers are (1) mental retardation, (2) learning difficulties, (3) hyperactivity, (4) emotional retardation, (5) deaf-mute impairment, (6) blindness, (7) autistic, (8) physical impairment, and (9) gifted children (Juniansyah, 2017). Children with hearing impairments are children who experience obstacles in their language development (Rahmah, 2018). This occurs due to the loss or lack of hearing ability caused by damage or malfunction of part or all of their hearing aids.

Deaf students require guidance, special education, and appropriate gestures in the learning process to avoid miscommunication (Ridho Elvierayani & Susanti, 2018). Other types of students with special needs can use their sense of hearing to understand the teacher's explanations, but this is different for deaf students. Deaf students use teacher gestures as the primary communication tool in learning (Rahmah, 2018). Therefore, the role of teacher gestures in the mathematics learning process significantly influences the understanding of deaf students.

Based on a preliminary study conducted, the use of gestures by special needs teachers in deaf-blind classes varies widely. Teachers tend to use a lot of body gestures (arms and hands) along with deep expressions when explaining mathematical concepts in class. It was also found that some representational gestures were used by the subjects, as seen in the following observation results.



Figure 1. Teachers Represent Numbers Using Gestures

At the beginning of the lesson, the teacher conducted an apperception session with the multiplication operation material. The subject wrote an example of a unit multiplication on the board as a lead question.

However, the student did not respond to what the teacher asked. So, at the 02.00 minute mark, the teacher made a representational gesture by making icons of each number on the board as shown in Figure 1. After the gesture was made by the teacher, the student was seen scratching his head, indicating that he did not understand what was conveyed.

According to McNeill, teacher gestures are crucial in communication because they help students understand what is being conveyed (McNeill, 1994). However, preliminary studies have shown that deaf students experience miscommunication with teacher representational gestures. Similar to previous research by Amelia Yeo et al., it was found that eighth-grade students with special needs experienced confusion in understanding the material taught by their teachers due to the excessive use of instructional cues or excessive teacher gestures (Yeo et al., 2017).

Based on the explanation that has been delivered, the teacher's representational gestures as a means of communication for deaf students in the multiplication of whole numbers material cannot be concluded in detail. Therefore, the researcher was attracted to conduct this research with the formulation of the research problem, namely how the teacher's representational gestures as a means of communication for deaf students in the multiplication of whole numbers material. Based on this formulation, the purpose of this research is to determine the teacher's representational gestures as a means of communication for deaf students in the multiplication of whole numbers material.

2. METHOD

The method used in this research is qualitative research. This type of research is a case study, because the researcher will describe the current situation systematically and factually with the aim of explaining and solving the problem being studied (Arikunto, 2013). This research was conducted at the PGRI Among Putra Special Needs School, located in Kromasan Village, Ngunut District, Tulungagung Regency. This research took place in March of the 2025/2026 academic year, specifically during the second semester.

The primary instrument of this research is the researcher herself. She is responsible for collecting data and acting as the planner, implementer, data analyst, and interpreter of the data obtained, as well as the reporter of the research results (Sugiyono, 2014). The data source for this study was an eighth-grade mathematics teacher at the PGRI Among Putra Special Needs School. The researcher conducted observations and observed the teacher's representational gestures in the eighth-grade classroom for deaf students. The subjects selected also had good communication skills, and this information was further clarified through interviews. After completing the audio-visual recording of the lesson in the deaf class, the subjects conducted interviews with the researcher to support the meaning of their representational gestures.

The data collection techniques used by the researchers were observation, interviews, and documentation. The process for compiling and developing observation and interview guidelines is as follows: First, draft observation and interview guidelines. These guidelines are then validated by experts and practitioners based on the validation sheet. If any deficiencies are found, they will be revised, and so on until they meet the criteria, meaning the observation and interview guidelines are valid and ready for use. Documentation, in the form of photographs and audio-visual (video) recordings during the learning process, will be used as attachments to determine the implementation of the learning and as evidence of the research conducted.

The triangulation used was method triangulation and time triangulation. Triangulation is a method used in qualitative research to check and establish validity by analyzing data from multiple perspectives (Emzir, 2014). Time triangulation in this study was carried out by observing the subjects twice, but at different times, to test the credibility of the data. The results of these observations were compared and conclusions were drawn. Meanwhile, method triangulation was carried out by comparing information or data using different methods, namely observation, interviews, and documentation. The results of observations from these various methods were compared and conclusions were drawn.

The data analysis process in this study includes data reduction, data presentation, and drawing conclusions (Miles et al., 2018). Data reduction was carried out by focusing on the teacher's representational gestures in teaching multiplication of whole numbers to deaf students, referring to indicators of iconic gestures and metaphoric gestures. Meanwhile, data presentation was carried out by collecting information from the results of data reduction to compile narrative texts, from which conclusions could be drawn. The results of these conclusions came from audio-visual recordings of the teacher's learning in class, observation sheets, and

interviews. The researcher drew conclusions in the form of representational gestures used and the purpose of each use of these gestures.

3. RESULTS AND DISCUSSION

The following are the results of observations of teacher gestures in learning to multiply whole numbers and the results of interviews between researchers and research subjects are presented.



Figure 2. The teacher begins the lesson by reading the Al-Fatihah letter.

At 07.10-07.12 WIB, the teacher's representative gestures were already visible from the beginning of the lesson. The teacher used iconic gestures to lead students in reciting the Al-Fatihah letter together. The teacher symbolized each reading of the Al-Fatihah letter with the movements of his right hand (K1). This movement was carried out to train students' oral skills so they would get used to reading this letter before learning. Students were also seen reciting the Al-Fatihah letter devoutly, they raised their hands while following the reading as exemplified by the teacher. This is based on the results of interviews conducted by researchers as follows.

- | | | |
|----------|---|-------|
| <i>P</i> | : Do you always start every lesson by reciting Al-Fatihah together, Ma'am? | K1.P1 |
| <i>S</i> | : Yes, Ma'am, to encourage the children to pray and train their oral skills in reciting the surah. | K1.J1 |
| <i>P</i> | : Have the children memorized Surah Al-Fatihah, Ma'am? | K1.P2 |
| <i>S</i> | : They almost know it all, Ma'am, but if I don't use gestures, they can't read it on their own. So I still have to lead by example. | K1.J2 |



Figure 3. Teacher Greets Students

After reciting Surah Al-Fatihah together, at 7:12-7:13 a.m. WIB, the teacher greeted the students (K2). The greeting was accompanied by an iconic gesture, namely a hand movement depicting the greeting. The purpose of this gesture is reinforced by the following interview results.

- | | | |
|----------|--|-------|
| <i>P</i> | : After reciting Al-Fatihah, did you say "salam" (greeting), ma'am? | K2.P1 |
| <i>S</i> | : Yes, ma'am, so the children know that learning is about to begin. | K2.J1 |
| <i>P</i> | : What was the purpose of your gesture when you said "salam" earlier, ma'am? | K2.P2 |
| <i>S</i> | : Yes, so they're better prepared to learn. | K2.J2 |

Based on the results of interviews conducted by researchers (K2.J2) with teachers, this shows that teachers use iconic gestures in the form of finger movements forming the letter W to illustrate the greeting reading. This movement is accompanied by the teacher's greeting to focus students' attention and so that students understand that learning will soon begin. The students' responses are seen as they understand the teacher's greeting and follow the teacher's movements with the intention of responding to the greeting.



Figure 4. The teacher greets students by saying "Good morning"

After greeting the students, the teacher greeted them in a friendly manner (K3) between 7:13 and 7:14 a.m. WIB, encouraging them to be more enthusiastic about learning by using iconic gestures. The teacher folded her right arm toward her right shoulder and touched her right arm with her left hand while saying "Good morning." Students were seen following the teacher's movements by using the same gestures to respond to the greeting. This is based on the following interview results.

- P* : Greeting them is still accompanied by gestures, right, ma'am? K3.P1
S : That's right, that's sign language, Ma'am. So that they are more enthusiastic about learning, we greet them first before learning starts K3.J1



Figure 5. The teacher writes the title of the material to be studied.



Figure 6. The teacher reminds students of the material they have studied.

The teacher uses a writing gesture (M1) at 07.14-07.15 WIB. The teacher writes the title of the material to be studied, namely "Multiplication in Columns". Students still pay attention to what the teacher writes. After finishing writing, the teacher reads the material studied, "multiplication in columns downwards" while still using iconic gestures (K4). The teacher also asks students, "still remember?" with a finger gesture pointing from the head upwards (K5). Students have not responded anything. Then the teacher asks students to open their books with a hand gesture like opening a box while saying "Where's your book? Math book" with iconic gestures (K6). Not long after that, students take out their notebooks to take notes on the material to be studied.



Figure 7. Teachers Conduct Apperception

The teacher opened the notebooks the students had taken and reviewed their notes. Then, she gave the students a probing question (apperception) at 07.15-07.16 WIB. The apperception given by the teacher was related to the multiplication operation of single numbers. Initially, the teacher wrote the multiplication 4×5 on the board and asked the students to solve the problem (M2). After a while, the students did not respond to the teacher. The teacher then used an iconic gesture accompanied by the words "what is four times five?" to emphasize the problem given to the students (K7). As recorded in Figure 7.

At 07.16-07.18 WIB, the teacher asked one of the students to work on the problem on the whiteboard by pointing gesture using the marker he was holding (D1). The student who was appointed was willing to answer

the given question and came forward to write his answer on the whiteboard. The teacher appreciated the student's courage and the answer given by giving a thumbs up while praising "20, correct", this indicated that the student's answer was correct (F1).



Figure 8. Teacher Discusses Apperception Questions with Students

Then the teacher discussed the problem with iconic gestures followed by the words "Four times five how can you get 20?" (K8). No students answered yet, then the teacher repeated the question, "How do you do it?" (K9). At 07.18-07.21 WIB, the teacher used writing gestures on the whiteboard by writing $5+5+5+5$ (M3). Then the teacher used iconic gestures to symbolize each number he wrote using his fingers followed by the words "five plus five, plus five, plus five. Five is four" (K10).



Figure 9. Teacher Explains Multiplication Steps

The teacher asks students to calculate the calculation using iconic gestures followed by the question "five plus five, how much?". Seeing the teacher's iconic gestures that symbolize each number asked and its operation ($5+5$), students quickly answer using sign language which means "ten". The teacher writes the answer on the board (M4). At 07.21-07.23 WIB the teacher asks again, "ten plus ten, how much?" using iconic gestures, namely symbolizing the number with their fingers (K11). Then the students quickly answer "twenty" using their sign language. After that, the teacher concludes "four times five, twenty. With the long method, the result is also the same" using iconic gestures (K12). At 07.23-07.25 WIB, the teacher gives another example problem using writing gestures while asking students "Now try twenty-three times two in a stacked way" (M5).



Then the teacher asked one of the students, “Yan, can you do it?” using an iconic gesture (K13). Since there was no response from the student, using an iconic gesture, the teacher explained the steps for doing multiplication by symbolizing each number and its operation one by one (K14). The teacher gave another example problem, namely 14×2 , and asked the students, “Who can do it? Come on, try it” using an iconic gesture (K15) at 07.25-07.29 WIB. The student did not respond, finally the teacher pointed to one of the students using the marker he was holding (D2).



Figure 11. Teacher Helps Students Work on Problems on the Blackboard



Figure 12. The teacher gives the third example question.

Then the teacher guided the student who came forward to work on the second example problem by symbolizing each number and calculated operation using iconic gestures (K16). The other students were seen listening to the teacher's explanation. After working on the second example problem on the board, the teacher used a metaphorical gesture by giving the student a thumbs up while saying "This is correct, now you're smart" (F2). Then the student returned to his seat. At 07.29-07.32 WIB, the teacher pointed to another student using his index finger while saying "You now" (D3). Then the teacher wrote another example problem, namely 13×3 , on the board (M6).

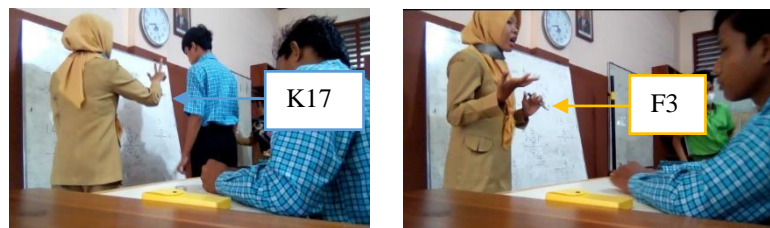


Figure 13. Teachers Help Students Understand the Steps of Building Multiplication



Figure 14. Teacher Writes Practice Questions

The designated student is willing to come forward and work on the problem. The teacher helps students complete the problem with iconic gestures, symbolizing each number to be calculated accompanied by words, while correcting any mistakes (K17). After completing the task, the teacher asks the other students using metaphorical gestures “Can you do it? Easy huh? Now I will give you a problem” (F3). However, before giving some practice problems, the teacher asks the students again “Do you want to write it down first or not?” while pointing to the whiteboard using a whiteboard eraser (D4). The teacher erases the example problems worked on with the students on the whiteboard. Then at 07.32-07.38 WIB, the teacher uses writing gestures on the whiteboard to write 8 multiplication practice problems that the students must work on (M7).



Figure 15. Teacher Gives Practice Questions to

After completing the practice questions, the teacher offered counting media to students if they had difficulty calculating using metaphoric gestures (F4). The teacher observed the students working on the practice questions and approached one of the students' desks to check their work. The teacher pointed out one of the students' calculations that was not quite right using deictic gestures (D5). At 07:38-07:42 WIB, the teacher helped one of the students who had difficulty working on the practice questions by using iconic gestures, namely illustrating the addition operation because the student was still confused about when numbers should be added and when they should be multiplied (K18). To help students understand multiplication, the teacher also wrote the steps in the student's notebook using writing gestures (M8).



Figure 16. Teachers Look at Students' Work and Help with Difficulties

In an inappropriate step, the teacher used a deictic gesture to point in the student's notebook (D6). Then, the teacher appreciated the student's correct answer using a metaphorical gesture by raising her thumb while saying "Good" (F5).

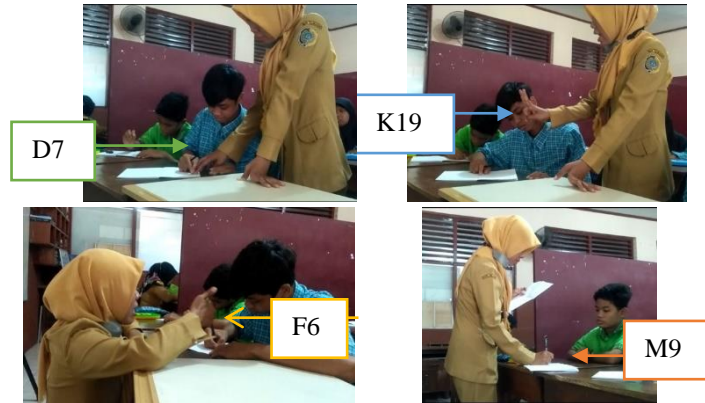


Figure 17. Teacher Corrects One of the Students' Work

At 07:42-07:46 WIB, the teacher reviewed the work of other students. The teacher pointed out the student's writing because there was an inaccurate calculation using a deictic gesture (D7). To make it easier for students to understand the problem, the teacher used an iconic gesture to symbolize the number (K19). After the student understood the steps, he was able to work on the problem correctly. The teacher appreciated him by saying "Huh, right" while raising his thumb (F6). At 07:46-07:56 WIB, the teacher corrected the student's work while occasionally writing to correct incorrect calculations (M9).



Figure 18. The teacher closes the lesson by praying, saying hello, and greeting "Good afternoon"

After completing the corrections, the teacher invited the students to tidy up their books and stationery, then prayed together using iconic gestures (K20) at 07.56-07.59 WIB. Students were seen praying with the teacher. Then the teacher and students read "Amen" after finishing the prayer using iconic gestures (K21). After that, the teacher said a greeting while still using iconic gestures (K22) and the students responded to the greeting with the same gesture. The lesson closed with the teacher greeting the students "Good afternoon" using iconic gestures (K23).

Based on the data presented above, it can be concluded that the teacher fulfills the four gesture indicators well. The teacher can use each gesture appropriately in every learning step to help deaf students understand the concept of multiplication of whole numbers. Deictic gestures, which are identical to pointing, are always used by teachers to make students more focused on the material being discussed. The teacher also uses iconic gestures when explaining operations and numbers that students must calculate. To appreciate student understanding, the teacher always uses metaphorical gestures so that students feel recognized for their abilities. The teacher also

uses writing gestures to clarify the material being taught. The following table shows the distribution of the number of gestures among teachers.

Table 1. Distribution of the Number of Gestures in Teachers

<i>Gesture Indicator</i>				<i>Quantity</i>
<i>Deiktik Gesture</i>	<i>Ikonik Gesture</i>	<i>Metaforik Gesture</i>	<i>Writing Gesture</i>	
7	23	6	9	44

Representational gestures include iconic gestures and metaphoric gestures. Table 1 shows that teachers most frequently use iconic gestures. This indicates that deaf students greatly need iconic gestures in understanding the material on multiplication of whole numbers. Because iconic gestures describe information verbally and depict the words with their hands simultaneously. These gestures are used by teachers to depict numbers and arithmetic operations in explaining the steps of the multiplication concept. Meanwhile, metaphoric gestures are often used by teachers to appreciate student understanding. These gestures depict emotional traits and things that cannot be seen with both eyes, only through figurative language without physical form. This is in accordance with research (Elvierayani & Susanti, 2018) which states that deaf students understand teacher explanations based on the most frequently used gesture, namely iconic gestures.

Researchers discovered several findings in their study. One was that some students experienced difficulty and frequent miscommunication in understanding multiplication concepts, not due to the teacher's inadequate gestures, but rather because their residual hearing was very limited. Therefore, these students required special guidance in their learning. This aligns with research findings (Bale, 2018) which showed that without sufficient understanding of the vocabulary presented, it is difficult for deaf students to comprehend lessons.

Researchers also found a teacher gesture that did not fall into any of the four types of gestures analyzed. This gesture occurred when the teacher pointed while moving his index finger in an X shape toward a student's incorrect work. This gesture is a semi-deictic gesture, because in addition to its purpose of pointing, the movement contains information the teacher wants to convey, accompanied by the statement "Is this multiplied or added?" This is in accordance with research (Elvierayani & Kholiq, 2019) which states that there are teacher gestures that have a dual purpose. Both pointing and hand movements that symbolize the operation of multiplication.

Based on the results of the research conducted, no representational gestures were found that caused miscommunication among deaf students in the material on multiplying whole numbers. This was obtained from interview data with teachers at SLB PGRI Among Putra and SLB-B Negeri Tulungagung. During the interviews, the teachers explained that many factors caused students to not understand what the teachers were conveying or to experience miscommunication during the lessons. These factors originated from the students themselves, not because of inappropriate or incorrect gestures by the teachers.

Teachers at SLB PGRI Among Putra explained that students who are deaf have varying levels of hearing impairment. Ranging from mild hearing loss to total hearing loss. These different levels of hearing impairment certainly affect the students' learning needs. Therefore, not all deaf students are able to grasp the concept of multiplication of whole numbers taught by the teacher or often experience misunderstandings in learning. This aligns with the statement that in school learning, deaf students must receive treatment using methods that match their level of hearing ability (hearing loss) (Rahmah, 2018).

The teacher also added that the oral ability of deaf students greatly affects their comprehension of the material being taught. With low oral ability, their vocabulary is limited. As a result, when the teacher explains multiplication of whole numbers, students have difficulty understanding it and miscommunication often occurs during learning. This is in line with research findings which show that without sufficient understanding of the vocabulary presented, it is difficult for deaf students to understand the lesson (Mullyana & Wijiastuti, 2019).

A teacher at SLB-B Negeri Tulungagung stated that actually the intellect of deaf students is essentially normal and does not have problems. However, due to limitations in hearing ability, deaf students experience difficulties in language or communication. As a result, their intellectual development becomes slow and makes students have difficulty understanding multiplication concepts explained by the teacher or frequent miscommunication during learning occurs. This aligns with the statement that due to communication barriers, deaf students experience delays in academics (Dahlan et al., 2020).

The teacher also added that the lack of learning media in schools is one of the obstacles for hearing-impaired students in learning. Media can be one of the solutions for teaching hearing-impaired students. It can

be done by showing photos, videos, letter cards, miniatures of objects, geometric models, and so on. The use of media can increase motivation and stimulate students to learn. This is in line with research results that show that hearing-impaired students who have limitations in speaking and hearing require learning media in the form of visual media (Dahlan et al., 2020).

4. CONCLUSION

Based on the findings of the researcher and the discussion that has been presented, it was concluded that the teacher's representational gestures as communication for deaf students at the stage of solving multiplication problems of whole numbers include iconic gestures and metaphoric gestures. In addition, there are teacher gestures that are not included in one of the 4 types of gestures. Namely the gesture when the teacher points while moving his index finger in an X shape towards the student's work that is not correct. This gesture is a semi-deictic gesture, because in addition to aiming to point, the gesture contains information that the teacher wants to convey by saying "Is this multiplied or added?".

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REFERENCES

- Arikunto, S. (2013). *Prosedur Penelitian Suatu Pendekatan Praktik*.
- Bale, A. M. (2018). Diajukan kepada Universitas Negeri Surabaya untuk Memenuhi Persyaratan Penyelesaian Oleh : JURUSAN PENDIDIKAN LUAR BIASA. *Pendidikan Khusus*, 1–16.
- Bavelas, J. (1995). Gestures Specialized For Dialogue. *Jurnal Personality And Social Psychology Bulletin*, 21, 295.
- Dahlan, U. A., Haliza, N., Kuntarto, E., & Kusmana, A. (2020). Pemerolehan bahasa anak berkebutuhan khusus (tunarungu) dalam memahami bahasa. *Jurnal Bahasa Sastra Dan Pembelajaran*, 2(1), 5–11.
- Elvierayani, R. R., & Kholiq, A. (2019). Gesture Siswa Tunagrahita Dalam Menyelesaikan Masalah Matematika. *Lintang Songo: Jurnal Pendidikan*, 2(2), 38–51. <https://journal.unusida.ac.id/index.php/jls/article/download/294/241>
- Elvierayani, R. R., & Susanti, I. (2018). Gesture Representasional Guru Sebagai Komunikasi Dan Strategi Dalam Pembelajaran Konsep Matematika Siswa Tunarungu Sekolah Dasar Luar Biasa Lamongan. *Jurnal Reforma*, 7(1), 46. <https://doi.org/10.30736/rfma.v7i1.47>
- Emzir. (2014). *Metodologi Penelitian Kualitatif: Analisis Data*. Rajawali Pers.
- Hendriana, B., & Sagita, M. (2021). Mengidentifikasi Gesture Matematis Siswa dalam Memecahkan Soal Geometri. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 5(2), 963–973. <https://doi.org/10.31004/cendekia.v5i2.558>
- Juniansyah, R. (2017). *PERAN KELUARGA D ALAM MERAWAT ANAK BERKEBUTUHAN KHUSUS D I SLB NEGERI A (TUNANETRA) PAJAJARAN KOTA BANDUNG*.
- Kurniasih, M. D., Darojati, H., Waluya, S. B., & Rochmad, R. (2020). Analisis Gesture Siswa Tunarungu dalam Belajar Matematika di Tinjau dari Gender. *JKPM (Jurnal Kajian Pendidikan Matematika)*, 5(2), 175. <https://doi.org/10.30998/jkpm.v5i2.5455>
- Marfuah. (2017). Meningkatkan Keterampilan Komunikasi Peserta Didik melalui Model Pembelajaran Kooperatif Tipe Jigsaw. *Jurnal Pendidikan Ilmu Sosial*, 26(2), 148–160.
- McNaill, D. (1994). Hand and Mind: What Gestures Reveal About Thought. *Language and Speech*, 37(2), 203–209. <https://doi.org/10.1177/002383099403700208>
- Miles, M. B., Huberman, A. M., & Saldana, J. (2018). *Qualitative Data Analysis: A Methods Sourcebook*. Sage.
- Mullyana, D., & Wijastuti, A. (2019). Kemampuan Pragmatik dalam Interaksi Sosial Anak Tunarungu Melalui Penggunaan Metode Komunikasi Total. *Jurnal Pendidikan Kebutuhan Khusus*, 3(2), 22–25.
- Prangin-Angin, E. (2018). *Gestur Guru dalam Kegiatan Pembelajaran di SMA Negeri 1 Kutalimbaru Kabutapen Deliserdang: Kajian Multimodal*.
- Prayitno, A. (2016). *Gesture Sebagai Strategi Dan Komunikasi Untuk Menyampaikan Konsep Aljabar Dalam*

Matematika. April 2013.

- Rahmah, F. N. (2018). Problematika Anak Tunarungu Dan Cara Mengatasinya. *Quality*, 6(1), 1. <https://doi.org/10.21043/quality.v6i1.5744>
- Riadin, A., & Usop, D. S. (2017). KARAKTERISTIK ANAK BERKEBUTUHAN KHUSUS DI SEKOLAH DASAR NEGERI (INKLUSI) DI KOTA PALANGKA RAYA Children Characteristics of Special Needs in Primary School (Inclusion) in Palangka Raya. *Journal of Health*, 17(1), 22–27.
- Ridho Elvierayani, R., & Susanti, I. (2018). Gesture Guru SLB sebagai Komunikasi dalam Pembelajaran Konsep Matematika pada Abk. *Seminar Nasional Sistem Informasi*, 9(2), 1495–1505.
- Sugiyono. (2014). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*.
- Sunanto, J. dan H. (2016). Desain Pembelajaran Anak Berkebutuhan Khusus dalam Kelas Inklusif. *Jassi Anakku*, 17(1), 47–55.
- Yeo, A., Ledesma, I., Nathan, M. J., Alibali, M. W., & Church, R. B. (2017). Teachers’ gestures and students’ learning: sometimes “hands off” is better. *Cognitive Research: Principles and Implications*, 2(1). <https://doi.org/10.1186/s41235-017-0077-0>