

Research Article

Powtoon Media for the Understanding of Deaf Mathematics

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Abstract.

This study aims to determine the role of *Powtoon* animation media on the understanding of deaf students in mathematical arithmetic operations. This study uses mixed methods so that the data is generated from the observation process described in percentages. The subjects of this study were 3 deaf students of class VIII SMP-LB. The research data collection used observation sheet instruments, test questions instruments, and open questionnaires. The results showed that the animated *Powtoon* media played a very good role in the interests, attitudes, motivation, and involvement of students in the learning process that increased students' understanding abilities. The research is expected to contribute in creating an innovative learning process with the help of visual media for deaf students. It is hoped that there will be more attractive visual media, so that the deaf students can achieve their learning goals in the process of learning mathematics.

Keywords: deaf, powtoon media, understanding mathematics.

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1. INTRODUCTION

Disability is one of the diversity of students whose needs and rights must be met in education. The approach used in Indonesia regarding disability is a medical or charity-based approach[1]. With this approach, the community considers disabilities as a disadvantaged group so that they are unable to compete with others. As expressed by [2] which states that the challenge of disability is the many discriminatory practices and stereotypes given to people with disabilities in the learning process.

One example of a student with a disability is deaf. Deafness is categorized partly (hard of hearing) and completely (deaf) [3]. The loss of hearing ability causes problems experienced by deaf students, namely the lack of vocabulary and the lack of ability to understand verbal information, even though verbal information is very much needed in the learning process. This is in line with the research conducted by [4] and [5] which

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states that the limitations of deaf students in hearing lead to a lack of ability in obtaining vocabulary which also makes the limitations of students in abstract thinking needed in learning, one of which is learning mathematics.

The teaching of mathematics is expected to train students in thinking, communicating, and solving mathematical problems that are applied in everyday life [6], through the training stage using the basis of mathematical thinking, namely thinking logically, critically, rationally, honestly, and effectively and ready to face and solve problems which are the goals of learning mathematics [7]. One of the factors that cause learning difficulties of students, as stated by [8] and [9]”The academic achievement of DHH students depends on the interaction of many factors, including those that are intrinsic to students themselves, such as expressive and receptive language abilities, family characteristics, and their experiences inside and outside school”.

In special education, the material provided is material whose implementation can be directly applied in everyday life because the main purpose of education for deaf students is how they can live independently despite their limitations. Students with disabilities are offered fewer opportunities to engage in meaningful mathematics, as special education classrooms and curriculum are focused on procedural rather than conceptual instruction [10].

Students generally receive basic knowledge starting from the time they can communicate and more knowledge is obtained from what they hear. The impact of hearing impairment that occurs from birth is the difficulty of the child’s learning process, especially in terms of speech and language skills [11]. This is one of the factors they experience slowness in the intellectual process because they only learn from what they see so that the learning process must focus on visuals so that deaf students can follow learning well. For this reason, learning media are needed that can help students understand learning material through their eyesight.

The role of mathematics media is very important in the learning process so that the material presented by educators is easy and fast to be maximally accepted by students [12] and [13]. One of the learning media that can be used to visualize theory is the *Powtoon* application. *Powtoon* is an information technology-based web application that can be used in making cartoon animation presentations or videos easily [14]. The use of media that displays animation causes deaf students not to get bored easily and is more interested in learning mathematics and helping students to think actively to create motivation so as not to be lazy to learn. *Powtoon* animation has advanced features on one screen, which can create various animations as needed to increase understanding, as stated [15] which states that *Powtoon* animation is one of the media that can provide

understanding. to students about learning mathematics. According to [16] to improve learning efficiency, creative use of media is needed to facilitate the achievement of learning objectives. It is important to ensure that the teaching and learning approach for students with special needs goes hand in hand with learning current [17]. Research conducted [18] Stating that the initial condition before learning using animated media was the ability to count operations for deaf students was low, then increased when given treatment. The use of *Powtoon* media in previous studies focused on learning mathematics in elementary schools, while in this study *Powtoon* animation media was used in junior high schools with hearing-impaired students so that what was considered was how students understood the media just by looking.

2. RESEARCH METHOD

The method used in this research is mixed methods. The combination research method is a research method that combines qualitative methods and quantitative methods to be used in research to obtain more objective data [19]. This study uses a sequential explanatory design type, namely a combination research method by combining qualitative and quantitative research methods sequentially where the first stage of research is carried out using qualitative methods and the second stage using quantitative methods. The type of qualitative data obtained in this study is data from observations using observation sheet instruments and open questionnaires that have been validated by experts, while the types of quantitative data in this study are test questions that have been tested for validity and reliability then the results are presented with the formula (1) proposed by [20].

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

With P: Presentation, f: The number of students in the indicator, n: The number of students in the class. After getting the results in the form of a presentation, then the presentation is interpreted according to the criteria and presented in the form of a diagram. The criteria used are the criteria according to [21] as follows Table 1.

3. RESULTS AND DISCUSSION

The learning process using visual media *Powtoon* for deaf students begins with a preliminary question and answer activity, the delivery of the material to be discussed, the researcher distributes student worksheets to be studied. The learning continued

TABLE 1: Presentation Description.

Percentage	Description
$80 < P \leq 100$	Very High
$60 < P \leq 80$	High
$40 < P \leq 60$	Enough
$20 < P \leq 40$	Low
$0 < P \leq 20$	Very Low

with the core activities using the *Powtoon* animation video as a medium. The learning ends by making a summary together and doing the exercises to find out the students' understanding of the material that has been studied. Here are some examples of animated *Powtoon* media shows used in the mathematics learning process in Figure 1.

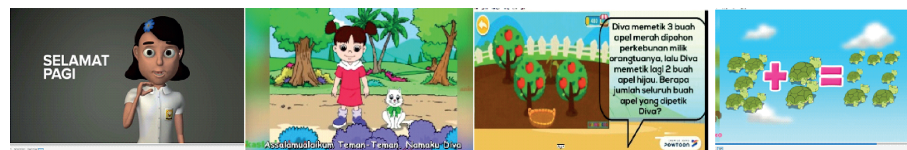


Figure 1: Example of animation powtoon.

The ability to solve problems in mathematical arithmetic operations in arithmetic operations using *Powtoon* animation media for deaf students was analyzed from two essay questions at four learning meetings and three essay questions at one final meeting as an evaluation of the material that had been delivered during the previous four meetings. The results of students' problem-solving abilities regarding mathematical arithmetic operations are shown in the following Figure 2.

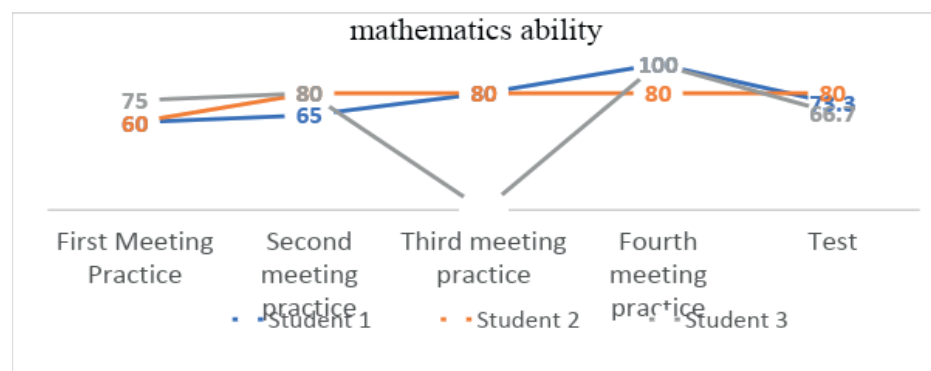


Figure 2: Mathematics ability.

The ability to understand students in completing arithmetic operations on story questions using animated *Powtoon* media varies. Judging from Figure 1, the scores of student-2 students from the first training session increased at the next meeting, while student-1 and student-3 experienced a decrease in scores on tests, due to a lack of practice in mixed arithmetic operations. Working on test questions requires an

understanding of determining the solution that should be used. student-1 and student-3 have difficulty determining what arithmetic operation to use. This is in line with research conducted by [18] that there is an effect of the use of game media on the ability of counting operations which is shown by an increase between the pretest and posttest scores.

Research conducted by [22] states that the use of media as a learning aid can improve multiplication skills for deaf children. Learning mathematics for deaf students is carried out by increasing the number of practice questions to improve the ability to solve math problems. The material that has been conveyed in learning must be reviewed frequently so that it is not forgotten by deaf students. The benefits of mathematics presented are applied in everyday life so that students know the meaning of learning mathematics. That way, the learning process of mathematics will be liked by students because they know the meaning and benefits of studying mathematics.

The effectiveness of *Powtoon* animation media in learning mathematics for deaf students is seen from four categories, namely the involvement of students in the learning process, the attitudes of students during the learning process, the interest of students in learning mathematics, and the motivation of students in participating in mathematics learning. Effectiveness is seen based on observational data obtained during four meetings. Based on research conducted by [23] the use of animation media can change the concept of abstract counting operations to be more concrete and the form of animation makes students more interested and enthusiastic in participating in learning. The involvement and the attitudes of students in mathematics learning are shown in the following Figure 3.

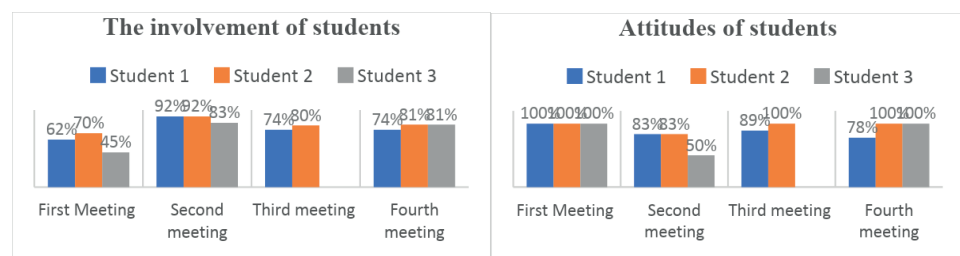


Figure 3: The involvement and attitudes of students.

The involvement of students in learning mathematics using *Powtoon* animation media has increased from the first meeting to the second meeting. At the first meeting, students experienced learning adjustments with researchers and using animated *Powtoon* videos so that student involvement was still limited. The second meeting was the meeting with the highest level of involvement compared to other meetings. At the second meeting, the material presented was counting operations on story questions, students did not

hesitate to answer, ask and work on questions on the blackboard so that the level of involvement was high.

Students' attitudes in learning mathematics using animated *Powtoon* media varied but showed high categorical attitudes in following the lesson. At the time of learning, student-1 attitudes have decreased and increased which is influenced by the character of student-1 who is active and easily bored so that guidance is needed to restore student-1's focus while studying.

Special schools emphasize character education so that students have a good attitude so that they can be accepted in the community. Stable emotions were shown by deaf students during the research process, nothing happened outside the ability of the researcher to deal with students with special needs. This is supported by research conducted by [24] that there is an effect of the implementation of mathematics learning models and media on social attitudes.

The interest and the motivation of students in learning mathematics during the research process are shown in the following Figure 4.

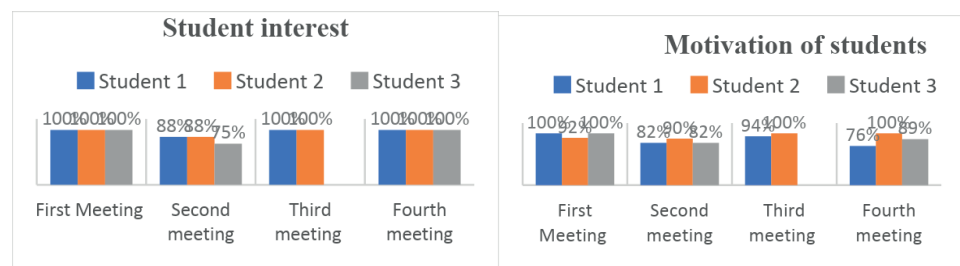


Figure 4: Interest and motivation of student.

The effect of using *Powtoon* animation media on mathematics learning for deaf students on learning interest is categorized as very high. Animated videos foster students' interest in learning the arithmetic operations on story questions. The decline in interest occurred at the second meeting but the decline was still in the high category. For other meetings, the interest shown by students is very high.

The use of attractive visual animation media increases the interest in learning mathematics for deaf students because during learning there are interesting things that students pay attention to. These results are supported by research conducted by [25] which states that learning mathematics using ICT media is more innovative so that it makes learning fun and students are interested in learning it.

The use of *Powtoon* animation media in mathematics learning for deaf students provides a very high category of learning motivation to students. At the second meeting, the students' motivation decreased but was still in the high category. Student-1 learning

motivation had fluctuations but was still in the high category. Motivation to learn student-2 decreased from the first meeting to the second meeting but increased for the next meeting and was in the very high category. The motivation to learn student-3 has decreased from the first meeting to the next meeting even though it is in the high category. The results of this study are supported by [26] which states that the use of media makes students more enthusiastic during the learning process of mathematics and reduces confusion in understanding mathematics lessons on subtraction arithmetic operations.

The animation provides a role in the process of learning mathematics for deaf students, but it is necessary to realize that the limitations of researchers in understanding SIBI are one of the obstacles in research, so this research needs to be accompanied by experts so that there are no misconceptions. In addition, the limitations of the use of animation media that can be used by deaf students need to be developed so that more animation media can be used by students with hearing limitations.

4. CONCLUSION

The results of the research and discussion that have been described regarding the analysis of the use of *Powtoon*-assisted animation media for the introduction of mathematical arithmetic operations can be concluded that the learning process begins with preliminary activities, the core activity is learning using *Powtoon* animation videos and ends with closing activities as evaluation. The results of the learning on the students' ability to solve mathematical arithmetic operations using animated *Powtoon* videos seen from the average practice questions were 78 while the average score of the final evaluation test was 73.3 so that the students' mathematical understanding was in the high category because it was in the interval $60 < p < 80$. *Powtoon* animation media fosters student attitudes in learning mathematics with an average percentage of attitude indicators in class 89%, *Powtoon* animation media fosters interest in learning mathematics for deaf students with an average percentage of class interest indicators is 95%, the effect of using *Powtoon*-assisted animation media on motivation learning mathematics with the average percentage of motivation indicators in class is 91%. All three are in the very high category because they are at $80 \leq p \leq 100$.

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