



# The Application of Beads Media to Improve the Dynamic Addition of Mathematics Learning Outcomes of Students with Hearing Impairment

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**Abstract:** The aim of the study was to improve the learning outcomes of dynamic addition math using bead media for students with hearing impairments in class VI SLB Negeri 5 Jakarta. The study used an action research method. Data collection uses quantitative data from test results, while qualitative data is collected by observation, interviews and documentation. The subjects in this study were 4 students with hearing impairments. The research was carried out in 2 cycles, in cycle I 75% of students were able to reach / exceed the passing grade and achieve learning objectives while in cycle II 100% of students were able to exceed the KKM value and achieve learning objectives. The results showed that bead media was able to improve students' learning outcomes because it had a role as a bridge of information from teachers to students when planting the concept of dynamic addition material.

**Keywords:** *Learning Outcomes; Mathematics; Addition; Bead Media; Students with Hearing Impairment*

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## I. Introduction

Children with hearing impairments are defined as children who have a partial or complete loss of hearing ability that requires special education services, as stated by (Desiningrum, 2016). In the previous sentence, it is stated that children with hearing impairments require special education services, education services that can be provided by teachers when learning to adjust to the characteristics of students. The intelligence characteristics of children with hearing impairments are the same as those of children in general who have high, average and low levels (Haenudin, 2013). Children with hearing impairments in the process of being able to capture information cannot receive it as quickly as hearing children because this is related to the language they have and the ability to analyze and synthesize. This becomes related to the material that students learn at school, especially mathematics.

Mathematics is one of the sciences related to numbers, data analysis, geometry, measurement and calculus so that mathematics is abstract. Linda and Muliarsari did research related to mathematics learning needs in students with hearing and speech impairments in Pandeglang, in the study they found that students have difficulty in learning mathematics if the teacher only conveys material orally without any real objects (concrete), students also need a longer time in understanding mathematical concepts due to language limitations so that teachers need to use a total communication approach using concrete objects, oral communication and signaling (Linda and Muliarsari, 2021).

Based on the results of field observations conducted by researchers for five months at a special school in the Jakarta Barat area, specifically at SLB Negeri 5 Jakarta, the mathematics skills of students with hearing impairments in class VI are in the category of incomplete in achieving learning objectives for basic arithmetic operations, dynamics addition (addition with saving techniques). This is based on findings in the field related to the ability of students in mathematics with the results of 4 out of 5 students have not been able to solve dynamic addition problems. This finding is supported by the results of the initial ability test conducted by the researcher, the results of the ability of students NA 100 points, FT 30 points, RI 60 points, CH 30 points, and HA 10 points. In the Merdeka Curriculum, mathematics learning outcomes for children with hearing impairments in grade VI in simple arithmetic operation material, one of which is that students are able to add two numbers with a maximum result of 50 and must reach passing grade of 70 points.

According to the researcher's observation with the class teacher, during the implementation of learning, the researcher noticed the teacher's classroom management skills during math subjects. Teachers tend to use the lecture method without any media that can be props in addition material, teachers also are likely to pursue learning materials so that in the delivery of material the teacher does not reflect back on learning activities and results in less meaningful learning activities. To be able to improve learning outcomes, it is necessary to adjust learning activities to the characteristics of students, learning mathematics for students with hearing impairments as visual individuals requires the help of alternative learning media that are interesting and easy to use, for example is using beads media.

Beads in the form of small balls are accompanied by a number place value board, for unit number values the bead shape has one ball, while for dozens number values the bead shape is composed of ten balls. Beads are usually used for static to dynamic addition. The principle of using bead media is to place the bead according to the number value place on the board and perform the addition counting operation. The use of bead media in learning math has been done by (Fauzy, 2015) in class II SLB PGRI Badas Kediri Regency. He conducted a class action research with the title Improving Mathematics Learning Outcomes (Addition) Through the Use of Bead Media for Mild Tunagrahita Students in Class II SLB PGRI Badas Kediri Regency, the results of the study showed an increase in the learning outcomes of students after experiencing two cycles of action on addition material with a maximum result of 20, bead media was able to increase learning activities to be more meaningful and active.

Based on these problems, the researchers are interested in carrying out research entitled "The Application of Beads Media To Increase The Mathematics Learning Outcomes of Students With Hearing Impairment In Class VI SLB Negeri 5 Jakarta Barat".

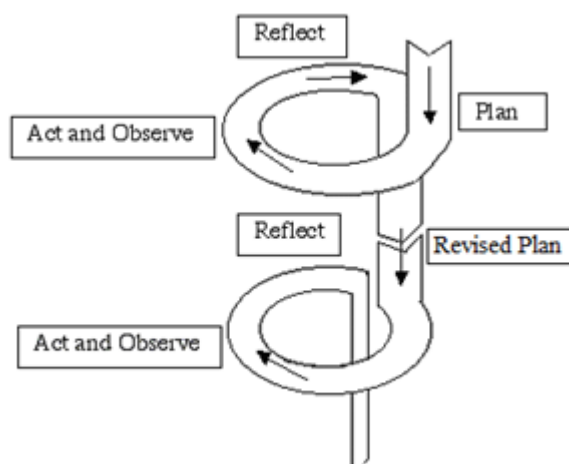


Fig. 1. Action Research Cycle by Kemmis and Mc.Taggart



Fig. 2. Beads Media and Board

## II. Method

The research method conducted is action research. The definition of action research is a study conducted in the classroom as an evaluation of learning in the form of real actions and structures to analyze and seek the impact of interventions provided for the results of learning activities in the classroom (Sanjaya, 2016). The research action design that will be used is the Kemmis and Mc. Taggart's design, the reason for choosing the model is the cycle described by Kemmis and Mc. Taggart is more structured than other models because it describes plan, act and observation, and reflection in several cycles in detail.

Plan, in the planning stage, researchers pay attention to matters relating to the problems to be studied, the time and place of research, research subjects, and the expected results of research activities. Research planning was carried out by coordinating with the class teacher. Act and Observe, the act and observe stages are described by applying research activities to the subject by applying bead media to learning the addition of two numbers with a maximum result of 50 using concrete objects in class VI SLB Negeri 5 Jakarta. The expected result of using bead media in learning mathematics in class VI is an increase from previous learning outcomes. In the action stage, researchers will conduct 3 (three) learning meetings and 1 (one) meeting for the final evaluation of the cycle.

Reflection, the reflection stage is usually carried out after carrying out an evaluation at the end of the learning meeting, at the reflection stage the researcher reviews the results of the actions that have been done related to the learning outcomes of students whether they have achieved the research objectives or not and will later become a consideration in planning and action in the next cycle.

## III. Results and Discussion

### A. Results

The results of research obtained from the field in the form of learning outcomes, observation results, and interview results become the basis for analyzing research data. Analysis of research data is carried out to see the results of the actions that have been given to students with hearing impairments in class VI SLB Negeri 5 Jakarta as an effort to increase the learning outcomes of addition math using bead media.

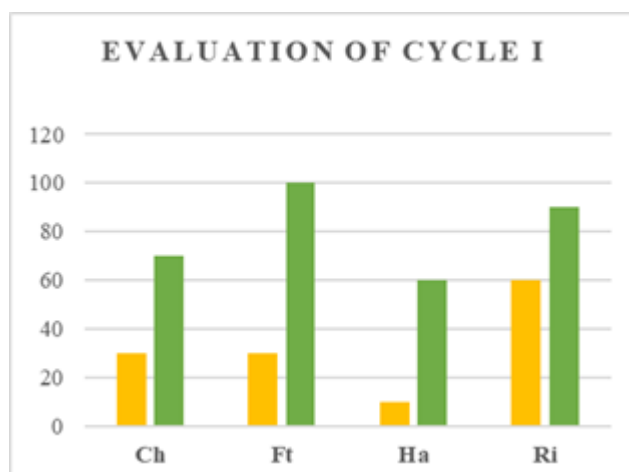


Fig. 3. Evaluation of Cycle I

#### 1) Cycle I

Increased learning outcomes in dynamic addition of two numbers occurred after the provision of action in the form of using beads media can be seen in chart 1. At the first meeting of cycle I, Ft, Ch, and Ha were still confused about the dynamic addition of two numbers, they still did not understand how to add numbers whose results were more than 10. The teacher showed how to add two numbers with the technique of storing using bead media, the teacher gave a demonstration of the use of the media and also explained the concept of dynamic addition. After seeing a demonstration of the use of the media and paying attention to the teacher when explaining the concept of dynamic addition, when working on the worksheet, students can get a good score. Although, at this first meeting Ha

was still difficult to pay attention to the teacher because Ha did not like math lessons and was easily distracted by his friends so the researcher fully assisted Ha while working on his worksheet.

In the second and third meetings, in discussing the material of dynamic addition of two numbers there were changes from Ft and Ch learners who began to be confident when working on dynamic addition problems, had begun to understand why there were numbers that needed to be stored and how to write the results of adding numbers correctly. Ri also showed a change from previously not understanding why numbers needed to be stored in the dozens column to understanding the function of storing these numbers so that understanding of the concept of addition with this storing technique became better than before. For Ha, the improvement is shown in the form of changes in attitude, previously Ha did not like math so he became indifferent when there was math learning and did not pay attention to the teacher, after the use of media that made it easier for Ha to understand the concept of dynamic addition and also helped him calculate the addition results Ha became more focused when the teacher was explaining and wanted to follow the learning well. Although, Ha was still assisted by researchers when working on worksheet, the assistance in the second and third meetings was only in the form of re-explanation and giving examples of how to do worksheet, occasionally researchers tried to remind Ha to recount the number of beads if Ha still suffered from miscalculation.

Based on the results of actions, observations, and evaluations, the use of bead media has succeeded in improving the learning outcomes of mathematics dynamic addition of two numbers. This is evidenced by the value at the end of the cycle evaluation, 3 out of 4 students or equivalent to 75% of the research sample have managed to get scores in accordance with the passing grade. However, there are some things that need to be improved from the actions and meetings in cycle I and this is a consideration for continuing the research to cycle II.

## 2) Cycle II

Reflecting on the learning outcomes in cycle I, the researcher and collaborator decided to continue the research to the cycle II stage with some improvements. Improvements were made to the learning method, in cycle I the teacher only used the demonstration method and a few applications of the Student Centered Learning (SCL) method while in cycle II planning the application of the SCL learning method will be more actively applied by involving students when showing how to solve dynamic addition math problems and checking the results of worksheet so that they are able to analyze the mistakes made by themselves and their friends can later become a reflection on their learning outcomes, and it is hoped that students will be able to draw conclusions about the learning process which will later be used for the collection of learning material concepts so that they can be applied in everyday life.

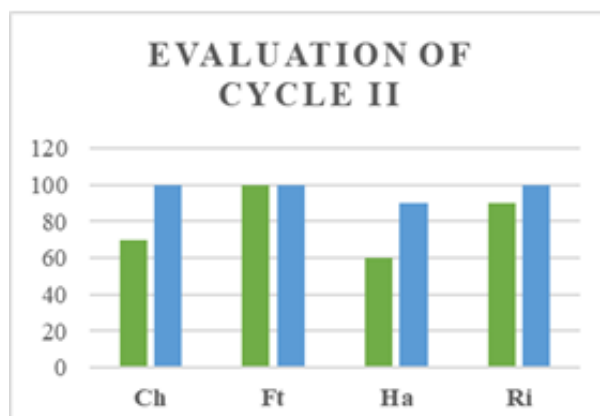


Fig. 4. Evaluation of Cycle II

The learning outcomes of students in cycle II showed an increase for Ch, Ri, and Ha while Ft, who had received a perfect score in cycle I, still showed consistency in his learning outcomes by obtaining the same score as his evaluation results in cycle I. The improvement for Ha and Ch was mainly obtained from the improvement of the learning activity plan made by the researcher and collaborator on the learning method and the reduction in the use of unit bead media. The SCL learning method helps Ch to be more focused when working on the worksheet, knowing that each learner will come forward in turn to solve the dynamic addition problem and will get a star as an

additional point, Ch always works on the worksheet calmly and double-checks the results of his calculations, is no longer in a hurry and has a desire to chat with Ri because the teacher exchanges seating positions, Ch becomes sitting next to Ha, and Ri sits side by side with Ft.

The improvement in learning outcomes for Ha was also quite significant in the second cycle, Ha had very rarely missed numbers when counting unit values in dynamic addition with a downward stacking form because the unit bead media that was reduced in use by the teacher made Ha no longer drop the beads which sometimes caused Ha's loss of concentration when counting. In cycle II, Ha also better understood the concept of addition with saving techniques without full assistance from the researcher. Ha began to want to check the results of his calculations on worksheet every meeting and during the end-of-cycle evaluation. Working on the worksheet every meeting also became a form of repetitive practice that affected Ha's ability to solve dynamic addition problems of two numbers and the provision of rewards increased Ha's enthusiasm when learning and made him want to show his best performance when coming forward to solve dynamic addition problems.

## *B. Discussion*

### *1) Cycle I*

The use of bead media in learning dynamic addition mathematics for students with hearing impairments succeeds in mediating the delivery of information conveyed by the teacher to students, this means that it is in accordance with the benefits of using the media that the media can clarify the meaning of information, provide planting of material concepts that are equal to all, improve learning outcomes and as a stimulus to increase learning motivation (Karo-Karo S. and Rohani, 2018). Media beads become explanatory of every abstract teacher's words such as "storing numbers" without media the concept of storage techniques becomes ambiguous because there is no detailed description of why number storage occurs if only explained verbally.

Based on the characteristics of language and communication of children with hearing impairments, due to the impairment of the sense of hearing, the language possessed by learners is limited and not as much as people who can hear, therefore the need for learning media that is concrete and visual. The need for the use of learning media for students with hearing impairments in the form of concrete and visual media in the results of their research on improving reading comprehension learning outcomes for students with hearing impairments (Juherna et al, 2021).

Utilizing concrete media in mathematics learning succeeded in improving learning outcomes and motivation of students, but not all students have the same ability to process the information received. Ha in cycle I was still making adjustments and starting to learn to like math so Ha needed more time than his friends.

### *2) Cycle II*

Based on the results of the analysis of actions in cycle II, all students managed to get scores far above the passing grade, 3 out of 4 children even got perfect scores in the final evaluation of cycle II. In cycle II there was an improvement in the form of classroom management in the seating arrangement sub-section which increased the focus of the learners, for Ha the change of seating also made him more noticed by the teacher because he felt cared for and could be clearer in seeing the teacher when he was carrying out a demonstration of the use of the media, so Ha became motivated in learning and his learning outcomes increased. This is in line with Hidayatullah's statement (Hidayatullah, 2021) that classroom management can improve student learning outcomes because it is also related to factors of good learning outcomes from the external environment.

The use of bead media coupled with the application of the SCL (Student Center Learning) method during the learning process of dynamic addition mathematics also plays an important role in improving the learning outcomes of students with hearing impairments. The assignment method which is a sub-part of the SCL learning method does have shortcomings if the teacher does not monitor and evaluate the results of the assignment work (Pertiwi, Nurfatimah, Hasna, 2022). Therefore, when giving assignments in the form of worksheet, the teacher conducts full monitoring and students evaluate together with the teacher and make mistakes as a learning process. The SCL method supports learners to be more confident and focused when working on worksheet because they want to show competition among friends so they try their best to get the best score and also pay attention to the teacher calmly when the teacher explains the material. As a result of using bead

media combined with the application of the SCL method, students can improve learning outcomes compared to the previous cycle.

Based on the research findings in the field, researchers realize that although they have tried to conduct research according to plan, researchers still have limited when carrying out research. These limitations are the need to adjust the size of the beads according to the needs of students and a wider media board so that it can reduce the frequency of falling media while being used. The limits of this research can be an improvement and can be tried by teachers in dynamic addition math material with maximum results of more than 50 and other math materials such as dynamic subtraction and combined with learning methods that are more varied than the learning methods applied in this study.

#### IV. Conclusions

Based on the results of research and discussion in this study, it can be concluded that how to improve the learning outcomes of math addition in the material of dynamic addition of two numbers in students with hearing impairments is to use bead media. This can be seen from the results of the addition math ability test conducted in the initial ability test to the evaluation of cycle II. The increase that occurred in the first cycle evaluation with an increase of 40 points for Ch, 70 points for Ft, 50 points for Ha, and 30 points for Ri although there was an increase but the researcher and collaborator agreed to continue to cycle II with modifications to the use of bead media and increasing the difficulty of the questions given in the form of worksheet, as well as a reflection on classroom management and teacher learning methods.

Improvements made in cycle II from the results of the first cycle reflection caused the math learning outcomes of all students to improve at the end of cycle II, with an increase in points in Ch 30, Ft did not experience an increase but was able to maintain a score of 100 in cycles I and II, Ha managed to increase 30 points, and Ri 10 points. This shows that the use of bead media coupled with proper learning methods can improve the learning outcomes of addition math in students with grade VI hearing impairments at SLB Negeri 5 Jakarta.

#### References

- Desiningrum, Dinie Ratri. (2016). Psikologi Anak Berkebutuhan Khusus. Yogyakarta: PSIKOSAIN.
- Fauzy, Charis. (2015). "Peningkatkan Hasil Belajar Matematika (Penjumlahan) Melalui Penggunaan Media Manik-Manik Pada Siswa Tunagrahita Ringan Kelas II SLB PGRI Badas Kabupaten Kediri", Jurnal Ortopedagogia, 1(4), 336-342.
- Haenudin. (2013). Pendidikan Anak Berkebutuhan Khusus Tunarungu. Jakarta: LUXIMA.
- Hidayatullah, Agung. (2021). "Pengaruh Motivasi Belajar dan Manajemen Kelas terhadap Hasil Belajar Siswa", Edukatif: Jurnal Ilmu Pendidikan, 3(4), 1451-1459.
- Juherna, Erna, dkk. (2021). "Meningkatkan Kemampuan Membaca Pemahaman Pada Anak Tunarungu Lewat Media Gambar", Jurnal Pelita Paud, 5(2), 256-261.
- Linda dan Ajeng Muliastari. (2021). "Analisis Kebutuhan dan Perilaku ABK Tunarungu dan Wicara Dalam Pembelajaran Matematika Dasar di SKh Kabupaten Pandeglang", JP3M: Jurnal Penelitian Pendidikan dan Pengajaran Matematika, 7(1), 9-22.
- Pertiwi, Amalia Dwi, Siti Aisyah Nurfatimah, Syofiyah Hasna. (2022). "Menerapkan Metode Pembelajaran Berorientasi Student Centered Menuju Masa transisi Kurikulum Merdeka", Jurnal Pendidikan Tambusai, 6(2), 8839-8848.
- S, Isran Rasyid Karo-Karo dan Rohani. (2018). "Manfaat Media Dalam Pembelajaran", AXIOM, 7(1), 91-96.
- Sanjaya, Wina. (2016). Penelitian Tindakan Kelas. Jakarta: KENCANA.