The Effect of Using Number Pocket Media on the Ability to Calculate Summation of Tens in Deaf Children

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Abstract: There is a problem for deaf students in learning mathematics, namely that the students have not been able to understand how to calculate the summation of tens with a maximum final result of 99. This is because students tend to be passive during learning; in summation, students also sometimes make mistakes when calculating numbers with large numbers using the finger counting method, so students calculate with the wrong final result. This study aims to determine how much influence the use of number pocket media has on the ability to calculate the addition of tens in deaf children at SLBN Cicendo, Bandung City. The method used is a pre-experiment with a one-group pretest-posttest design. Data were collected through written tests. The subjects in this study were grade 12 SMALB students at SLBN Cicendo, Bandung City. The data obtained were analyzed using the Wilcoxon Signed Ranked Test. The results of this study show a significant influence between the use of number pocket media and the ability to calculate the summation of tens in deaf children at SLBN Cicendo, Bandung City.

Abstrak: Terdapat permasalahan pada peserta didik tunarungu dalam pembelajaran matematika yaitu peserta didik tersebut belum dapat mengerti cara berhitung penjumlahan bilangan puluhan dengan hasil akhir maksimal 99. Hal ini disebabkan peserta didik cenderung pasif saat pembelajaran, selain itu peserta didik juga terkadang keliru saat menghitung angka dengan bilangan besar dengan metode menghitung menggunakan jari, sehingga peserta didik menghitung dengan hasil akhir yang salah. Penelitian ini bertujuan untuk mengetahui seberapa besar pengaruh penggunaan media kantong bilangan terhadap kemampuan berhitung penjumlahan puluhan pada anak tunarungu di SLBN Cicendo kota Bandung. Metode yang digunakan adalah pre-eksperimen dengan desain one group pretest-posttest. Data dikumpulkan melalui tes tertulis. Subjek pada penelitian ini adalah peserta didik kelas 12 SMALB di SLBN Cicendo Kota Bandung. Data yang diperoleh dianalisis menggunakan Wilcoxon Signed Ranked Test. Hasil dari penelitian ini adalah terdapat pengaruh yang signifikan antara penggunaan media kantong bilangan terhadap kemampuan menghitung penjumlahan bilangan puluhan pada anak tunarungu di SLBN Cicendo Kota Bandung.

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A. Introduction

Learning is a basic process throughout human life, where individuals acquire, process, and store information and develop skills and attitudes. This process occurs in formal environments such as schools and everyday life through social interaction and experience. This is supported by the opinion (Rahayu, 2019) that learning is a process or effort made by each individual to obtain a change in behavior in the form of knowledge, skills, attitudes, and positive values as an experience to gain several impressions from the material that has been studied.

Learning for deaf children has challenges and special needs that differ from children's. Deafness is a condition in which a person experiences hearing loss, affecting their ability to communicate and receive information through hearing. According to research conducted by Marschark Mark et al (in Rahayu, 2018), it can be concluded that the achievement of deaf children in early school is influenced by the characteristics of the level of hearing loss, other disorders experienced, and placement in school. Deaf students have difficulty connecting concepts because they have a pattern of thinking based on what they see. Therefore, a special approach and learning method are needed to support their development (Rahmah, 2018).

Nunes et al (2014) argue that one of the difficulties experienced by deaf children is encoding information, which is converting what is seen into data or messages. Hearing loss can hinder their ability to communicate effectively with teachers and peers. This directly impacts their ability to understand subject matter, including mathematics. Mathematics, with its abstract nature and frequent teaching through verbal communication, makes it a subject that requires a special approach to be accessible to deaf children.

Most students consider mathematics difficult because they have to calculate using specific formulas. Although mathematics is a fun subject, it can also be considered challenging. There is no exception for deaf students; some students consider mathematics difficult because they have to calculate. Therefore, the role of teachers is vital in providing fun mathematics learning.

For deaf children, the experience of learning mathematics often requires a more visual and concrete approach to understanding complex concepts because deaf children have barriers in their language skills. Learning for deaf students that is not verbalized and comes from sight impacts the achievement of deaf children compared with hearing children. In this context, the number bag media becomes a very valuable tool. This media does not depend on hearing or speech, so it is very suitable for deaf children who rely on sight as the primary means of communication and understanding (Bilqis, 2022).

Number pocket media provides an intuitive and easy-to-understand way for deaf children to visualize numbers and basic math operations (Kundarsih & Santoso, 2022; Suprabawati, 2022). By moving stick ice cream along the bag, children can add it in a way that is easy to understand and accessible. This allows them to develop math skills without the communication barriers often experienced using traditional methods.

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In addition, using number pocket media also allows deaf children to learn independently or in groups without requiring constant assistance from instructors or therapists. They can be actively involved in exploration and experimentation, strengthening their understanding of mathematical concepts. Thus, number pocket media is not only an effective learning tool but also helps increase the independence and self-confidence of deaf children in facing mathematical challenges (Ahudulu, 2018).

Various studies have applied number-pocket learning media to help deaf students learn mathematics. This learning media allows objective analysis of multiple factors that affect learning, including hearing impairments. Number pocket media in mathematics subjects has encouraged increased counting skills in SLB Jepara to improve their understanding of recognizing numbers 1-10. In addition, number pocket media can improve the math skills of deaf children in SLB by improving compound addition counting.

Most of the research that discusses number bags is applied more to regular students than to deaf students. The characteristics of deaf students in understanding language are different from those of regular students due to limited access to spoken language and understanding abstract learning (Putranto, 2015). In addition, research on number bags is not yet concrete. This is an obstacle for deaf students who must use concrete learning media so that students understand learning more quickly. Research on concrete number bag media is conducted in SLB, and research focusing on students with special needs is still limited.

The preliminary study found students with hearing impairments at the senior high school (SMA) level at SLBN Cicendo, Bandung City. These students do not understand how to calculate the addition of tens with a maximum final result of 99. According to the results of interviews conducted with mathematics teachers, students tend to be passive during learning; students can only understand the material for a moment. At the next meeting, students forgot how to calculate the addition of tens. Students are sometimes less careful or mistaken when calculating large numbers using finger counting, so they calculate with the wrong final result.

Learning to count tens with a final result of 99 in mathematics for deaf students requires something new. However, several studies have shown that number pocket media can help deaf students understand the addition operation. The learning experience directly involving students will help deaf students understand abstract material. Thus, this study aims to determine the extent of the influence of the use of number pocket media on improving the ability to calculate the addition of tens in deaf children. These findings are expected to provide new insights and evidence for those involved in special education (Riyanti, 2023; Ratnasari, 2016; Pratama, 2019).

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B. Method

This study uses a quantitative approach with an experimental method. Sugiyono (2019) stated that experimental research is a method used to find the effect of specific treatments on others under controlled conditions. Experiments are conducted to determine the effects of treatment, so this study uses an experimental method to examine the impact of using number pocket media on the ability to calculate tens in deaf children.

The experimental design used a one-group-pretest-posttest design. Arikunto (2019) said that one group pretest-posttest design is a research activity that provides an initial test (pretest) before being given treatment after being given treatment, then gives the final test (posttest). In this design, a pretest is done before providing therapy so that the treatment results can be known more accurately by comparing the conditions before and after the treatment.

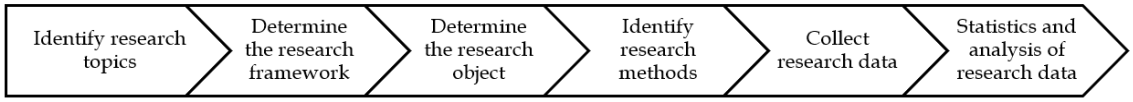

Figure 1. Research Flow

Population and Sample

The population in this study is a subject that can potentially be a source of data collection, but in a form that is still general and broad. The population in this study were deaf students in grade 12 of SMALB SLBN Cicendo, Bandung City, totaling six students. The sample in this study uses a saturated sampling technique. According to Sugiyono (2015), the saturated sampling technique is a sampling determination technique when all population members are used as samples.

Data Collection Technique

This study uses tests as its data collection technique. The test is a fill-in test to measure the ability to understand the addition of deaf students in grade 12 of SMALB. It is given at the beginning before treatment (pretest) and after treatment (posttest). The assessment criteria used in this study use a score between 0 and 1.

Table 1. Instrument

Measured Aspects	Indicator	Question Items	Score		Note
			1	0	
Ability to calculate the addition of tens with a	Students can calculate the addition of tens as "tens plus ones" with a maximum final result of 99.	1. 23 + 2 =			
		2. 15 + 9 =			
		3. 35 + 3 =			
		4. 29 + 7 =			
		5. 42 + 3 =			

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Measured Aspects	Indicator	Question Items	Score		Note
			1	0	
maximum final result of 99	Students can calculate the addition of tens as "units plus tens" with a maximum final result of 99.	6. 2 + 26 =			
		7. 7 + 45 =			
		8. 5 + 67 =			
		9. 4 + 74 =			
		10. 5 + 83 =			
	Students can calculate the addition of tens as "tens plus tens" with a maximum final result of 99.	11. 13 + 15 =			
		12. 29 + 31 =			
		13. 30 + 35 =			
		14. 40 + 17 =			
		15. 22 + 14 =			
		16. 17 + 60 =			
		17. 50 + 24 =			
		18. 23 + 33 =			
		19. 39 + 26 =			
		20. 16 + 23 =			

The assessment criteria measure children's abilities in terms of numeracy skills.
Assessment criteria :
Score 1 = If the student answers correctly
Score 0 = If the student answers incorrectly

Data Processing Technique

The data that has been entered will be processed using the Wilcoxon signed rank test. According to Dewantari et al (2023), the Wilcoxon test is a statistical method used to test the difference between two paired data, with the number of data samples always being the same. The Wilcoxon signed rank test procedure for paired data (the signed-rank test for paired observation) is the same as the signed-rank test on a single population. The difference lies in the data being tested. In testing paired data, the data used is different from paired data.

The hypothesis that can be tested through the Wilcoxon Signed Rank Test is whether there is a difference in the average between two groups of paired data. If the probability value $n < 0.05$, then there is a difference in the average. Conversely, if the probability value $n > 0.05$, the average is not different.

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C. Result and Discussion

Result
Reliability Test

Reliability testing in this study used Cronbach's Alpha reliability through SPSS 27. According to Budiastuti & Bandur (2018), the range of Cronbach's Alpha values is as follows:

Table 2. Reliability Coefficient Value Range

Reliability Coefficient	Criteria
0	Lack of reliability
>0.70	Reliability is acceptable
>0.80	Good reliability
0.90	Excellent reliability
1	Perfect reliability

The following are the results of the reliability test of the assessment instrument for adding tens of numbers of materials, with a maximum final result of 99 obtained using SPSS version 27.

Table 3. Reliability Test Result

Cronbach's Alpha	N of Items
.714	20

Based on the table above, the reliability test result is 0.714. This means that the coefficient value can be stated as reliable because it is included in the acceptable reliability.

Table 4. Improvement Difference Pretest-Posttest per Subject

No.	Subject Name Initials	Pretest Score Result	Posttest Score Results	Difference in Improvement
1.	B	55	85	30
2.	D	35	75	40
3.	F	75	100	20,5
4.	G	60	75	15
5.	H	75	100	20,5
6.	T	85	100	15

Based on the overall score, it is known that the range of subject improvement scores is 15 to 40. The highest improvement was shown by subject D, with an improvement difference of 40. Before being given treatment, the subject obtained a score of 35; after that, the subject obtained a score of 75. Table 4.5 also shows the lowest improvement shown by subjects G and T. This is because subject T had obtained a high score with a good category before being given treatment, and subject G was still wrong and not careful when calculating the addition of tens with the form "tens plus tens."

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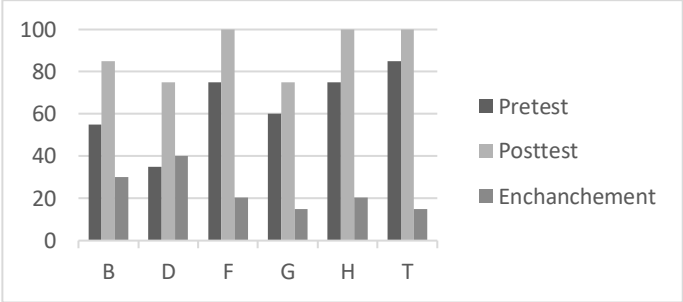

Figure 2. Improvement DifferencePretest-Posttest per Subject

Figure 2 displays comparative data on the ability to calculate the addition of tens with a maximum final result of 99 before and after treatment. This supports the statement that subject D obtained the highest increase, and subjects G and T obtained the lowest score increase. In addition, figure one also shows that subject D obtained the lowest score during the pretest and posttest, with a value of 35 during the pretest and 75 during the posttest.

The data was obtained from the pretest and posttest results using the Wilcoxon test formula. According to Solidayah (2015), the Wilcoxon rank test compares the mean value of a variable from two paired sample data. The Wilcoxon test functions to test differences between paired data, to test comparisons between observations before and after (and after) given treatment, and to know the effectiveness of treatment (Windi et al., 2021).

Table 5. Data Analysis Result with Wilcoxon Signed Rank Test

	N	Mean Rank	Sum of Ranks
Posttest – Negative Ranks	0_a	.00	.00
Pretest – Positive Ranks	6_b	3.50	21.00
Ties	0_c		
Total	6		

a. Posttest ≤ Pretest
b. Posttest ≥ Pretest
c. Posttest=Pretest

The interpretation of Table 5 is negative rank or the difference between the results of calculating the addition of tens of digits in the pretest and the result of calculating the addition of tens of numbers posttests 0, whether at any value of N, mean rank, and also the sum of ranks. The value zero indicates no decrease or reduction in the value. Pretest to value posttest.

Favorable ranking, namely the positive difference between the results of calculating the addition of tens of numbers in the pretest and the result of calculating the addition of tens of numbers in the posttest. Based on the table above, it is known that there are six positive data (N), which means that the six subjects experienced an increase in their scores. Pretest to score posttest. The mean rank or the average increase is 3.50. Meanwhile, the number of positive rankings or the sum of ranks is 21.00.

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Ties are the similarity of values between pretest and posttest. Referring to the results of the data output, it is known that the value is 0. This shows that there are no equal values between pretest and posttest. The following presents the statistical test results obtained.

Table 6. Test Statistics

	Posttest – Pretest
Z	-2,214$_b$
Asymp.Sig. (2-tailed)	.027

a.Wilcoxon Signed Rank Test
b.Based on negative ratings.

After data analysis, a hypothesis test is also necessary for a study; this hypothesis test is done to test the truth of a hypothesis presented in the study. The hypothesis to be tested in this study is as follows:

Ho: O1 = O2 (There is no significant influence between the use of number pocket media on the ability to calculate the summation of tens in deaf children)
Ha: O1 ≠ O2 (There is a significant influence between the use of number pocket media on the ability to calculate the summation of tens in deaf children)

The hypothesis test decisions in this study are:

If Asymp. Sig Z ≤ 5% (α = 0.05), Ho is rejected, and Ha is accepted. So, the hypothesis in this study reads: "There is a significant influence between the use of number pocket media and the ability to calculate the summation of tens in deaf children," which **can be accepted as accurate.**

If Asymp. Sig Z ≥ 5% (α = 0.05), Ho is accepted, and Ha is rejected. So, the hypothesis in this study, "There is no significant influence between the use of number pocket media on the ability to calculate the summation of tens in deaf children," **cannot be accepted as accurate.**

Based on output test statistics in Table 6, it is known that Asymp. Sig. (2-tailed) has a value of 0.027. Because 0.027 is smaller than 0.05, it can be concluded that the alternative hypothesis (Ha) can be accepted as accurate because there is a difference between the results of calculating the addition of tens in the pretest and the result of calculating the addition of tens of numbers in the posttest. The conclusion is: "There is a significant influence between the use of number pocket media on the ability to calculate the summation of tens in deaf children."

Discussion

This study was conducted to determine whether or not the independent variable, namely the number bag learning media, influences the dependent variable, namely the ability to calculate the addition of tens in deaf children. The researcher chose to use the

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number bag media in mathematics learning, especially in the material on calculating the addition of tens, because it is by the selection criteria put forward by Sudjana & Rivai (2010: 4-5), namely (1) Accuracy with learning objectives, (2) Learning materials are factual, (3) Ease of obtaining media, (4) Teacher skills in using it, (5) Time available to use it, and (6) By the level of student thinking (Rahayu Y., 2018).

In the initial condition before being given treatment, several subjects had sufficient ability to calculate the addition of tens in the form of "tens plus units" and "units plus tens." This is proven by the subject's score when the pretest on indicators I and II, as listed in Table 4.11, respectively, obtained the average value pretest of 73.3 and 86.7. In addition, the subject still has difficulty calculating the addition of tens in the form of "tens plus tens," as evidenced by the average results pretest. The subject on indicator III obtained a score of 48.3.

The subject still made many errors in indicator III because the subject calculated large numbers using the finger counting method, so the subject made mistakes when calculating addition in the form of "tens plus tens" with large numbers. This is explained by Rasvianty (2009) that "Problems in learning to count that are often experienced by deaf children include: Children with hearing impairments are less active during the learning process so that the material given by the teacher is less able to motivate children to learn; Difficulty in receiving and interpreting auditory stimuli, especially when participating in the teaching and learning process, where the way the material is presented emphasizes verbal information; Difficulty understanding the concept of material in mathematics learning without the help of objects or images that can concretize the concept of the material." (Septiani., 2017).

Before being given treatment, it was known that the subject was still mistaken about calculating the addition of tens. This was because the subject did not understand the place value, so when calculating the addition of tens, the subject was still confused about tens and units. The data obtained by researchers in the field shows that the learning media of number bags can significantly influence the ability to calculate the addition of tens.

The study's results showed an increase in deaf children's ability to calculate the addition of tens, meaning that the number bag learning media can be applied to children in general, adapted into concrete learning media, and used for deaf children.

In this study, researchers processed data using the tests Wilcoxon Signed Rank Test with SPSS 27. The results show that Asymp. Sig $Z \leq 5\%$ ($\alpha = 0.05$). This indicates that the hypothesis proposed by the researcher can be accepted, namely that there is a significant influence between the use of number pocket media and the ability to calculate the summation of tens in deaf children.

The data processing results show that each subject experienced an increase in each indicator, except for subject G, who experienced no increase in indicator III. This is because subject G was less careful when working on the posttest. Subject D experienced the highest growth compared to the other subjects. Meanwhile, subject T obtained the lowest ranking because subject T scored highest when the pretest was implemented.

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Learning without concrete learning media confuses the subject with the abstract concept of learning mathematics. For example, counting tens using fingers confuses children when the fingers used to count are used up. The disadvantage of the number bag learning media in this study is that counting the ice cream sticks to the desired number takes a long time.

From the description of the application of number bag learning media in this study, the number bag learning media positively influences the ability to calculate the addition of tens with a maximum final result of 99. In addition, through the number bag teaching media, learning becomes more enjoyable and makes the subject active in the classroom. The number bag media is visual-tactile, which can help the subject understand how to calculate the addition of tens with a maximum final result of 99. From the results of this study, it is known that teachers can use the application of the number bag learning media to improve the ability to calculate the addition of tens with a maximum final result of 99 in deaf children.

D. Conclusion

Based on the results of research data processing and discussion, it can be seen that the use of number bag learning media in teaching numerical counting in the aspect of calculating the addition of tens with a maximum final result of 99 with students with hearing impairments can improve the ability to calculate the addition of tens of children. The researcher concluded that learning to calculate the addition of tens using number bags learning media can be an effective learning medium to integrate kinetic and visual experiences into a complete unit so that students can understand how to correctly calculate the addition of tens. The study also showed that using number bag learning media to calculate the addition of tens resulted in a reasonably high increase. This is because the number bag media is a concrete and tactical-visual learning media, making it easy for students to understand. The increase in students' counting abilities proves that there is an influence of the use of number bag learning media in improving the ability to calculate the addition of numbers.

The results of this study can practically help optimize the ability to calculate the addition of tens with a maximum final result of 99 in deaf children. This study is also a basis for conducting more in-depth research to develop appropriate learning media through adjustments in appropriate learning for deaf students, namely using number bag learning media to improve the ability to calculate the addition of tens with a final result of 99 in deaf students.

The results of this study are expected to be a reference for further researchers to continue research by completing, adding, and modifying related to the ability to calculate tens with a maximum final result of 99. Recommendations for further researchers are to explore the integration of number bag learning media with digital technology, such as mobile applications or interactive software, that can provide students with direct feedback and minimize errors when calculating the number of ice cream sticks used. The disadvantage of this study is that students need a long time when calculating ice cream

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sticks when calculating addition with large numbers. Therefore, further researchers can create applications or software for number bag learning media to make learning time more efficient.

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