



The Use of *Block Dienes* Media for Improving Mathematics Learning Achievements of Deaf Students

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Abstract. Background of this research is the low achievement of fourth grade deaf students in mathematics. This research has objective of knowing the use of block dienes for improving mathematics achievement in mixed count operation material toward fourth grade deaf students in SLB Negeri Sragen Academic year 2018/2019. Approach used in this research is quantitative research approach with *pre-experimental One-Group Pretest-Posttest Design*. Subject of this research are five deaf students of fourth grader in SLB Negeri Sragen. Data collection technique is 15 items of an essay test. The test items have been validated by four experts. Data analysis used *nonparametric* statistic *Wilcoxon Sign Rank Test* with SPSS 24 software. Data descriptive result is obtained that average score of essay pre-test is 26,640 and the post-test is 34,96. Results of statistical analysis scale nonparametric test Wilcoxon Sign Rank Test obtained score The calculation of the statistical test test statistic from the *pre-test* and *post-test* scores obtained the results of $Z_{\text{count}} = -1,633$ with Asymp. Sig. (2-tailed) = 0.102. The probability value in Z_{count} is then compared with a predetermined significance level, namely = 0.05. Based on the results of calculations, there is no significant difference between the results of the pre-test and post-test scores with P value of 0.102 which is larger than the significance level of 0.05. The results of the study stated that 3 from 5 subjects experienced an improvement in learning achievement and two other subjects did not experience an improvement. It can be concluded that the research hypothesis "The use of Block Dienes Learning Media for Improving Mathematics Learning Achievement in Mixed Count Operation Materials for fourth grade deaf students at SLB Negeri Sragen in Academic Year 2018/2019" cannot be accepted.

Keywords: Block dienes, mathematics learning achievements, mixed count operation, deaf student

1 Introduction

Deaf children have normal or average intelligence; however, intelligence development is influenced by language development, deaf children will show low intelligence because of their difficulty of understanding language [1]. (dwidjosumarto, 1990) stated

that someone who is not or less able to hear sounds can be define as deaf. In addition, according to [2] limit the definition of deaf in terms of losing the ability to hear.

Based on the definitions above, it can be stated that deaf children are children who experience difficulties in hearing caused by the malfunction of partial or whole of the hearing function so that children need special guidance and education in order to develop the language and potential of the child as optimally as possible[3] stated that, "learning achievement is a maximum effort achieved by a person after carrying out learning efforts. Meanwhile, mathematics learning achievement is the result or ability of a student of studying mathematics obtained from the test results transformed in the form of symbols, letters and sentences. Focus of mathematics learning achievement will be improved by researcher in this research is learning achievement on mixed count operation material.

Mixed count operation is an operation or calculation that involve more than two numbers and more than one operation. Completion of mixed count operation mix refers to certain agreements, one level of addition and subtraction. [4] Based on the results of observations, students consider mathematics is not beneficial because mathematics is only related to numbers. Moreover, students also find it difficult when they have to deal with mathematics. Meanwhile, in the research setting it was found that there were no teachers who used learning media, most of the teachers still used the lecturing method, that was considered boring and less attractive to students' enthusiasm in learning, especially in mathematics, students seemed to have difficulty in understanding the teacher's intentions in lecturing method[1] stated that " teachers are required to be able to set the children so they will understand the subject matter explained, and teachers are expected to be able to use learning media that attracts attention and matches the material ".

Media can be in the form of technology, games and others. One of the forms of learning media used in the learning process is *block dienes* media. According to [5] "*dienes block* is a teaching aid that used to teach the concept of many objects, compare and arrange many objects, the place value of a number as well as addition, subtraction, multiplication and division operations based on the grade level" through *dienes block*, students are guided to learn addition operations and storing techniques. In the mixed count operation, there are addition, subtraction, division and multiplication operations that have more than one operation. If we are wrong or inverted in doing it, there will be different or wrong results at the end [4], [6]

Baugh research [6] that "approximately 90% of a person's learning outcomes are obtained through the sense of sight, and only about 5% is obtained through the sense of hearing and 5% by other senses"[7] in his thesis entitled the effect of using block dienes teaching aids on students' mathematics learning outcomes on the subject of multiplication and division, said that block dienes was developed by a mathematician from hungary named dr. Zoultan paul dienes. Based on the findings of the research done by [8] there is a significant improvement ability toward mentally retarded children . While the research done by [9] stated that *block dienes* learning media has been proven to improve children's ability to *perform* addition operations. [10] also states that the dienes block media is effective in increasing the ability of reduction operations for deaf children.

Based on the findings of the relevant researches, problems that related to mathematics has proven to be solved by using *block dienes* media, whether or not *dienes block* media is matches with the characteristics of deaf especially in learning mathematics with mixed count operations material. Based on the research background, the researcher conducted a research on "the effect of the use of *block dienes* media aimed to know the effectiveness of the *dienes block* media for improving mathematics learning achievement in mixed count operations toward fourth grade deaf students at slb negeri sragen academic year 2017/2018

2 Research Method

[1]This research carried out in SLB Negeri Sragen from June to October 2018. This research used experiment method in the form of One Group Pre-test – Post-test design. With purposive sampling 5 subject, Technique data used in this research is 15 items of essay written test. The test who used in pre test and post test is valid and reliable because before it we do try out. Data analysis technique used in the research is Wilcoxon Sign Rank Tes using SPSS 24 version. More about the submission template.

3 Research Finding

The findings of the research cover the score of pre-test and post-test to the activities that have been carried out during the research. The data of test score is as follow:

Table 1. pre-test and post-test score:

No	Subject	Pre-test	Post-test
1	I	55	73
2	M	18	36
3	F	36	45
4	Mu	27	27
5	Fa	9	9

From the table Subject I get score better than pretest which is pretest 55 and post test 73, subject M get 18 in pre test and 36 in post test, subject F get 36 in pretest and 45 in post test , subject Mu get same score in pretest and post test and the same result for Fa is 9 in pretest dan posttest

Table 2. data analysis calculation

		Ranks	
		N	Mean RankSum of Ranks
posttest – pretest	Negative Ranks ^{0a}	,00	,00
	Positive Ranks ^{3b}	2,00	6,00
	Ties ^{2c}		
	Total	5	

a. posttest < pretest

b. posttest > pretest

c. posttest = pretest

Data from table 2 shows that the results of the *Wilcoxon Signed Rank Test* analysis between the *pre-test* and *post-test* scores, no subject obtained a *negative rank*, there were two subjects who had the same value (ties) and a subject obtained a *positive rank*, so that not all of the subjects experienced an improvement scores during the posttest with a *mean rank* (average rank) of 2.00 and a *sum of rank* of 6.00.

The calculation process after calculating the ranking of the *pre-test* and *post-test* data is calculating the test results. Calculation of test results also uses the *Wilcoxon Signed Ranks Test* analysis. Based on the non-parametric calculation of the *Wilcoxon Signed Ranks Test*, the Z_{count} results along with *Asymp* will be obtained. Sig (2-tailed) or P value. This research uses a significance level of = 0.05 or 5%. Following are the results of statistical test calculations

Table 3. statistic test result

Test Statistics ^a	
	posttest – pretest
Z	-1,633 ^a
Asymp. Sig. (2-tailed)	,102

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

The calculation of the statistical test test statistic from the pre-test and posttest scores obtained the results of $Z_{count} = -1,633$ with *Asymp. Sig. (2-tailed)* = 0.102. The probability value in Z_{count} is then compared with a predetermined significance level, namely = 0.05.

Based on the results of calculations, there is no significant difference between the results of the pre-test and post-test scores with P value of 0.102 which is larger than the significance level of 0.05. The results of the study stated that 3 from 5 subjects experienced an improvement in learning achievement and two other subjects did not experience an improvement. It can be concluded that the research hypothesis "The use of *Block Dienes Learning Media* for Improving Mathematics Learning Achievement in

Mixed Count Operation Materials for fourth grade deaf students at SLB Negeri Sragen in Academic Year 2018/2019" cannot be accepted.

4 Discussion

This research has objective of knowing the effect of block dienes learning media usage to improve mathematics achievements for fourth grade deaf students in SLB Negeri Sragen Academic year 2018/2019.

The hypothesis regarding the use of Dienes block learning media has an effect on improving learning achievement in mathematics with mixed count operation material for fourth grade deaf students in SLB Negeri Sragen cannot be accepted. It can be seen from the results of data analysis which shows that the use of block dienes learning media for improving learning achievement in mathematics with mixed count operation material has increased after being treated compared to before being treated but not significantly.

Based on Table 1, it can be seen that the comparison of the pre-test and post-test scores of each student has a difference (score difference), although not all of students experienced an improvement of score compared to the pretest score. It is strengthening in Table 3 which shows the results of statistical tests with Z count = -1.633 with Asymp. Sig. (2-tailed) = 0.102. The probability value in Z count is compared with a predetermined significance level, that is $\alpha = 0.05$. It is known that the calculated Z value is larger than the specified probability and it can be concluded that the opportunity or possibility of hypothesis cannot be accepted

[7] in his thesis entitled The Effect of Using Block Dienes Teaching Aids on Students' Mathematics Learning Outcomes on the Subject of Multiplication and Division, said that Block Dienes was developed by a mathematician from Hungary named Dr. Zoultan Paul Dienes. Based on the findings of the research done by [8] there is a significant improvement ability toward mentally retarded children. While the research done by [9] stated that *block dienes* learning media has been proven to improve children's ability to *perform* addition operations. [10] also states that the dienes block media is effective in increasing the ability of reduction operations for Deaf Children.

This value improvement can occur because this learning media is applied to the students for the first time, so it is quite attractive to students. the use of *block dienes* learning media is one of the active learning media that involves students directly in related research activities. This media was developed to create effective and efficient learning activities, especially in mathematics learning activities. [9] stated that *block dienes* learning media improves learning achievement in addition to the downward series operation. The results of the research by [11] stated that the use of the Dienes block learning media can improve the ability of tiered addition arithmetic operations in fourth grade deaf students at SLB YPAC Makassar. Research from [10] also states that the dienes block media is effective in increasing the ability of reduction operations for Deaf Children

Dienes block learning media has several advantages when applied to fourth grade deaf students at SLB Negeri Sragen: the students become more enthusiast in participating teaching and learning process by using learning media, students become more active in the learning process, students become easier to understand the subject matter presented by the teacher. Those all because students feel happy and interested in participating in the learning process. However, in the research process, it was found that *block dienes* did not really attract the attention of students who are multi-impaired (deaf and *hyperactive*) who are still busy with their activities.

Two from five students in this research did not experience score improvement, it is because two students were students with multiple disabilities (speech deaf and hyperactivity and learning difficulties). Based on the results of observations during research, one of the deaf students is also a *hyperactive* student so that in his delivery it cannot be optimum received by students who during *treatment* do things like banging on the table and going around the class. This student is very difficult to focus on paying attention to the teacher in front of the class. Meanwhile, other students who did not experience improvement in this study were children with learning disabilities who could be said to have intellectual abilities below other students.

The weakness of the researcher in this study is that there is no individualized educational program, the researcher only focuses on deaf students without paying special attention to students with multiple disabilities. In the learning process each person with disabilities has different interventions to their respective disabilities. In addition, it is also caused by the limited time of observation and research.

Teacher's class mastery is also one of the factors that must be considered, because if you do not care about the condition of the class and students, then what is delivered by the teacher will not be received optimally by students. Moreover, the teacher must provide material with an easy delivery in order make students fun and easier to understand. Learning is fun, so learning is not something that is boring yet something that is liked by students so that the subject matter will be easier to be understood by student because they do not feel forced to learn. Students will be more focused and receive lessons faster if they are given something that is fun, entertaining, and arouses students' interest and desire to follow the lesson well. The material accepted by the students makes the mathematics learning achievement of deaf children is improving. However, learning achievement is not only influenced by learning achievement itself but also by the *reinforcement* provided by the social environment, especially teachers and or parents [12]. Thus, it can be concluded that the use of *block dienes* learning media has no significant effect for improving the mathematics learning achievement of fourth grade deaf students at SLB Negeri Sragen in Academic year 2018/201[1]

5 Conclusions and Recommendations

Based on the findings of the research in chapter IV, three students experienced an improvement in their mathematics learning achievement in mixed count operation, two students did not experience it because one student was a deaf and one the other is *hyperactive* student, while the other student had a low level of learning concentration,

From the findings, it can be concluded that the use of *block dienes* learning media has no significant effect in improving the mathematics learning achievement of the fourth-grade deaf students at SLB Negeri Sragen in the 2018/2019 academic year. Based on the related theories and findings, the researcher suggests that students are expected to optimize their learning achievement in mathematics when applying *block dienes* learning media, if students experience difficulties, they are expected to ask the teacher who teaches or their classmates, additional treatment is needed for students who have a low level of learning concentration and are also *hyperactive* students. Teachers are expected to use *block dienes* learning media as an alternative to improve learning achievement in mathematics in fourth grade. It is expected that the other researchers can conduct research in different SLB (Special School) as a comparison research on the use of *block dienes* learning media to improve the learning achievement of deaf children in mathematics on mixed count operation in fourth grade, it is expected that better results are obtained.

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