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The Application of Speaking Development on the Establishment of Object Vocabulary in Student with Hearing Impairment

Endang Rusyani[1,], Fauzia Nur Awaliah[1], Rina Maryanti[1], Dwi Fitria Al Husaeni[2], Risti Ragadhita[3], Budi Susetyo[1]*

[1]Departemen Pendidikan Khusus, Universitas Pendidikan Indonesia, Indonesia
[2]Departemen Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia, Indonesia
[3]Program Studi Kimia, Universitas Pendidikan Indonesia, Indonesia
*Correspondence: E-mail: endangrusyani@upi.edu

ABSTRACT

This study aims to determine the increase in the results of the application of speech development to the formation of object vocabulary in deaf children. The approach used is a quantitative approach with the Single Subject Research (SSR) experimental method in the A-B-A design. The A-B-A design used has three phases: 1) Before the intervention/treatment is given, 2) when the treatment/intervention is given in the form of speech development (B), 3) after the treatment is given (A2). The results of the study showed the mean level of the baseline-1 phase (A-1) 43.43%, the intervention phase 47.07%, and the baseline-2 phase (A-2) 51.48%. Then, in the intervention phase (B) to baseline-1 (A-1), there was a 50% overlap, while in the intervention (B) to baseline-2 (A-2) there was no 0% overlap. Each session experienced an increase, although not significantly. The influence of the intervention on the formation of the object vocabulary of deaf children can still be said to be quite increasing because it has increased both before being treated and after being given treatment. Thus it can be concluded that the application of speech development is sufficient to increase the formation of object vocabulary in deaf children. The application of speech development is very important for deaf children so that deaf children are able to function their speech organs well and so that deaf children are able to communicate with other people, both the implementation of speech development is carried out in class or providing additional classes outside of class hours.

ARTICLE INFO

1. INTRODUCTION

Language for humans has a very important role in their lives because with language humans can interact with other humans (Frith & Happé, 1994). In addition, language also plays a role in efforts to develop oneself, adapt, and social contact in fulfilling life as well as collecting and processing information (Fathman & Kessler, 1992). In mastering the human language, one must go through several processes, one of which is listening. By listening, humans can imitate the sounds of the language spoken by other people, and by hearing humans can obtain various information. Language can be formed verbally or by sign.

Deafness is a term for people who experience disturbances in the function of the hearing organ (Zahnert, 2011). A child who is deaf will have problems in the speech process which causes deaf children to experience delays and difficulties in forming their language, especially in receptive language (language/information captured) and expressive language (language/information expressed) (Ganur *et al.*, 2014). Deaf children have one of the characteristics, namely, poor vocabulary which makes it difficult to communicate with others (Humaera, 2015).

Deaf children can usually use sign language to communicate (Smith & Wolfe, 2016). However, sign language can only be understood by some people, which causes deaf children to be unable to communicate with other people who do not understand sign language. Therefore, optimizing speech organs is very necessary. Although, in terms the language that comes out will not be balanced with the people who hear. The optimization is done by speech development. The requirement for speech development is that deaf children must use a Hearing Aid (as knows as ABM) to understand the sounds that exist. However, as we know that not all deaf children use the ABM for several reasons. So, even if you don't use ABM, you can still do speech development by articulation movements.

Currently, there are researches on the application of speech development including the use of speech development in application engineering and parental communication with autistic children (Yusria *et al.*, 2021), increasing speech development skills for deaf children (Udiyani *et al.*, 2021), research on the effectiveness of speech development for deaf children (Ayudani, 2019) and research conducted by Al Hakim *et al.*, (2019) regarding the development of language training applications with an android-based speech development approach for deaf students. However, no research applies speech development to the formation of noun vocabulary for deaf children.

Therefore, this study was conducted to know how much improvement the application of speech development has to the formation of noun vocabulary in deaf children. In addition to this, this study also aims to determine the ability to form object vocabulary in deaf children before, during, and after the implementation of speech development. By doing this research, it is hoped that it can provide a speck of thought and information for the development of science regarding the application of speech development to the formation of object vocabulary in deaf children.

2. METHOD
2.1. Variable Operational Definition

There are two types of variables used in the study, namely the independent variable and the dependent variable. The independent variable in this study is the application of speech development where the main focus is on the letter m phenomenon. The phenom letter m is a bilabial letter that is easy to form in the speech organs of deaf children (Hernawati, 2007). While the dependent variable in this study is the formation of object vocabulary in deaf

children. The formation that is carried out is to emphasize the formation of vocabularies of objects. There are several overall improvement criteria that the subject can be said to have formed his noun vocabulary as shown in **Table 1**.

2.2. Research Design

The research method used is the experimental method with Single Subject Research (SSR). The single-subject experimental design pattern used is the A1-B-A2 design. This A1-B-A2 design has three phases, namely before the intervention/treatment (A1) is given when the treatment/intervention is given in the form of speech development (B) and after the treatment (A2). Each phase consists of several sessions depending on the level of data stability so that from these stages it can be seen how much influence the application of speech development has on the formation of object vocabulary in deaf children. **Figure 1** shows the A-B-A design used in this study.

2.2.1. Baseline-1 (A1)

At this stage, the implementation of speech development has not been carried out in children. Rather, it is the initial stage in introducing the application of speech development to get initial data about children which are used as a guide for effectiveness in carrying out a treatment. At this stage, four sessions were conducted, by means of an oral test within 25 minutes per day. You do this by showing both pictures and text in the word box. At this stage, the initial ability is known before giving intervention to the child is saying the word for word which is composed of the letter m at the beginning, middle, and end of the word which is then collected to become a vocabulary of objects.

The speech development material used is the material at the intervention stage which is then recorded in the score in each session. The score obtained is in accordance with how many children can pronounce vocabulary correctly both in terms of the sound that comes out, vibrations, and efforts to form words into the vocabulary. As for how to calculate the score by using the following equation [1]:

$$Presentase = \frac{\sum tes\ pembentukan\ kata\ yang\ benar}{\sum skor\ maksimum} \ x\ 100\% \tag{1}$$

Table 1. Criteria for achieving object vocabulary formation.

| Indicator	Criteria		
	Greatly Improved	Improved	Moderately Improved
Formation of consonant noun m	Subjects can pronounce m consonant nouns clearly and as many as 12 nouns.	The subject can pronounce m consonant nouns clearly and as many as 7 nouns.	Subjects can pronounce nouns with the consonant m even though they only sound in the form of words and as many as less than 5 nouns.
Vocabulary formation of objects	Subjects can pronounce nouns and as many as 12 nouns.	Subjects can pronounce nouns and as many as 7 nouns.	The subject can mention the noun vocabulary even though it only sounds in the form of words and as many as less than 5 nouns.
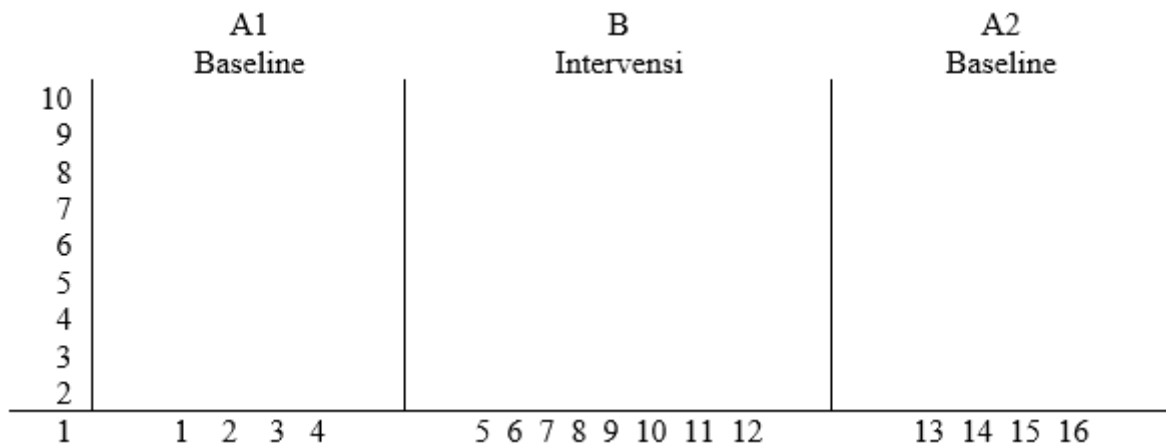
Figure 1. The design pattern of a single subject experiment.

2.2.2. Intervention (B)

This stage is the stage of giving a treatment, which is carried out in eight sessions. Each session was carried out within 35 minutes in accordance with the learning program for the application of speech development to the formation of nouns for deaf children as a form or guideline for providing intervention. Children are trained from starting to stretch with the letters of the phonemes, both vowels, and consonants. After that, nouns are composed of the letter m at the beginning, middle, and end of the word, which are then collected into a noun vocabulary. Children are asked to do the same thing as the researcher did. Forming a word according to the material which is then spoken by itself. Children can be said to be successful if they can make sounds, their speech organs are formed, there are vibrations, and can do it themselves. Data collection is carried out after carrying out the intervention and calculating the score.

2.2.3. Baseline-2 (A1)

At this stage, it was repeated in four sessions, on different days, given a break of 2 days after the intervention. The estimated time required for this phase is 45 minutes. In this phase, the measurement is done using an oral test. The researcher shows a word contained in the word box then the subject says the word contained in the card. Then, the researcher shows a pattern image, then the subject mentions the image.

2.3. Research Subject

The subject of this study was a deaf student in grade 1 SDLB at SLB Pancaran Iman with an age of 8 years and male gender. Subjects were selected based on the results of observations. The subject is classified as severe deaf who does not use hearing aids (ABM). The subject has difficulty speaking. Receptively the subject does not experience obstacles, he can understand what other people say and command. So, the subject needs to be trained in speaking. Train the muscles of the speech organ to be flexible later, maximizing the abilities already possessed by the subject.

2.4. Research Place

This research was conducted in two places, namely, the Pancaran Iman SLB school located in Arcamanik, Indonesia, and at the subject's house which coincided in Garut, Indonesia.

2.5. Research Instruments

The instrument used is a test. The test is carried out orally or in action. The instrument made consists of syllables and nouns based on the letter m. In making the instrument, we made assessment criteria as a guide in determining the score as shown in **Table 2**. The score given was in accordance with the criteria made based on the vocabulary formation of objects spoken by the subject based on the instrument.

Each instrument that is made is checked for compatibility between each test item by using a content validity test with assessment techniques from experts. The test item is declared valid if the compatibility with the indicator reaches more than 50% with the calculation in equation [2] as follows.

$$Percentage = \frac{f}{\sum f} \times 100\% \tag{2}$$

where, f is the frequency of matches according to the rater and $\sum f$ is the number of raters.

3. RESULT AND DISCUSSION
3.1. The Result of Baseline 1 (A-1)

The baseline phase 1 is the initial stage of data collection in the formation of object vocabulary. The score obtained is in accordance with how many children can pronounce vocabulary correctly both in terms of the sound that comes out, vibrations, and efforts to form words into the vocabulary. From this phase, the results are obtained as shown in **Table 3**.

Based on observations from the table, it is known that the child's ability to form object vocabulary in the first session, obtained a score of 42.5%, then in the second, third, and fourth stages increased by 43.6%. At baseline 1, stable data have been obtained (**Figure 2**), then the next step is to enter the intervention stage or the stage of giving treatment.

Table 2. Instrument assessment criteria.

Ability Aspect	Score
Students can pronounce nouns correctly without the help of a supervisor	3
Students can pronounce nouns incorrectly (Repeated less than 3 times)	2
Students can pronounce nouns with the help of a supervisor	1

Table 3. Baseline data 1 (A-1) Formation of object vocabulary.

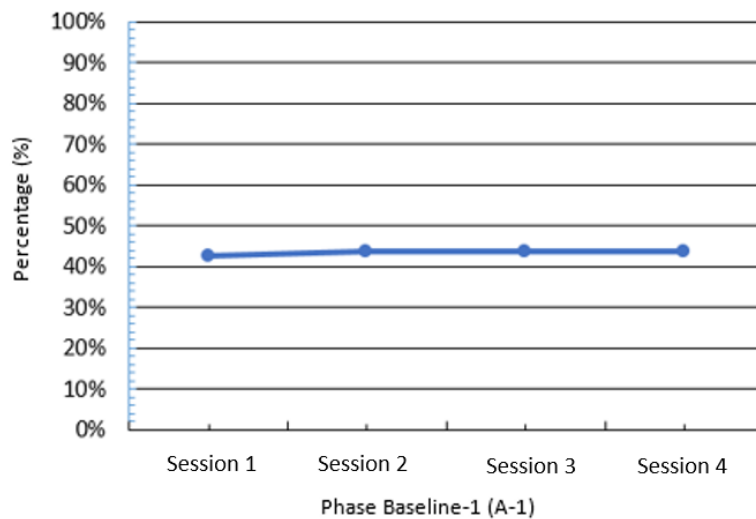| Session	Number of Questions	Maximum Score	Score	Percentage (%)
1	29	87	37	42.5%
2	29	87	38	43.6%
3	29	87	38	43.6%
4	29	87	38	43.6%

Figure 2. Results of baseline 1 (A-1) vocabulary formation.

3.2. Intervention Results (B)

After the intervention stage, the results are as shown in **Figure 3** where the highest score is 49.4% and the lowest score is 44.8% with an average score of 47.075%. The percentage was obtained from 29 questions in eight research sessions. The maximum score that can be obtained is 87, but the scores obtained by students only reach the range of 39-43. In this phase, there is an increase from the previous phase which has an average value of 43.325%.

3.3. The Result of *Baseline-2* (A-2)

Baseline 2 phase is the stage to see how much influence the intervention through speech development has on the formation of object vocabulary in deaf children. **Table 4** shows the acquisition data at baseline-2 in the formation of noun vocabulary where students' scores increase in each session. Students experienced an increase in scores from session 1 to session 2, from 50 to 51. Meanwhile, in sessions 2,3, and 4, they tended to get a constant score of 51 points.
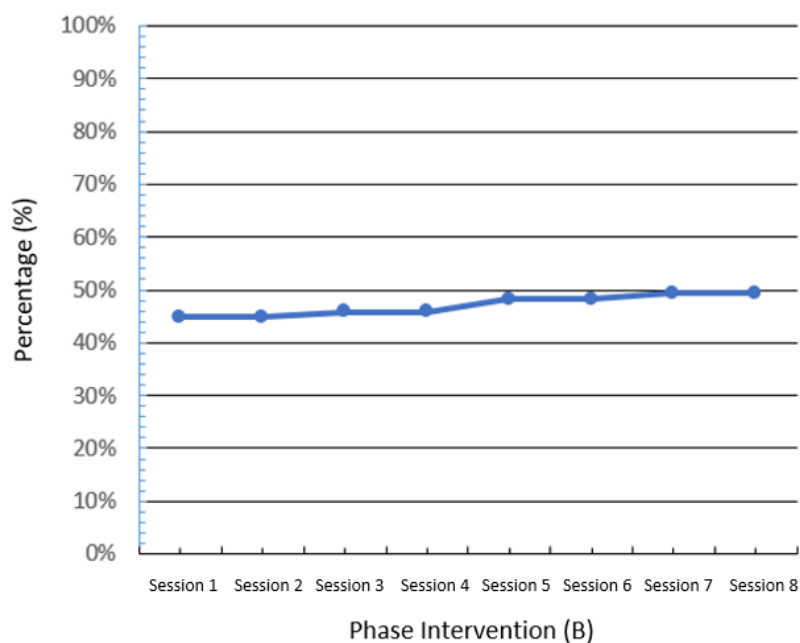

Figure 3. Intervention data (B) formation of noun vocabulary.

Based on **Table 4** and clarified by the data presented in **Figure 4**, it can be seen that the lowest score is 51.7% and the highest score is 56.3%. In this phase, there was an increase with an average of 56.4%, which means that speech development affects the formation of object vocabulary in students with hearing impairment, although it is not significant.

3.4. Analysis Under Conditions

In this study, several condition analyzes were carried out including the length of the condition, the estimation of the direction of the trend, the trend of the stability of the data, the estimation of the data trail, the level of stability and range as well as the changes in the data as shown in **Table 5**.

Table 4. Data baseline 2 (A-2) formation of noun vocabulary.

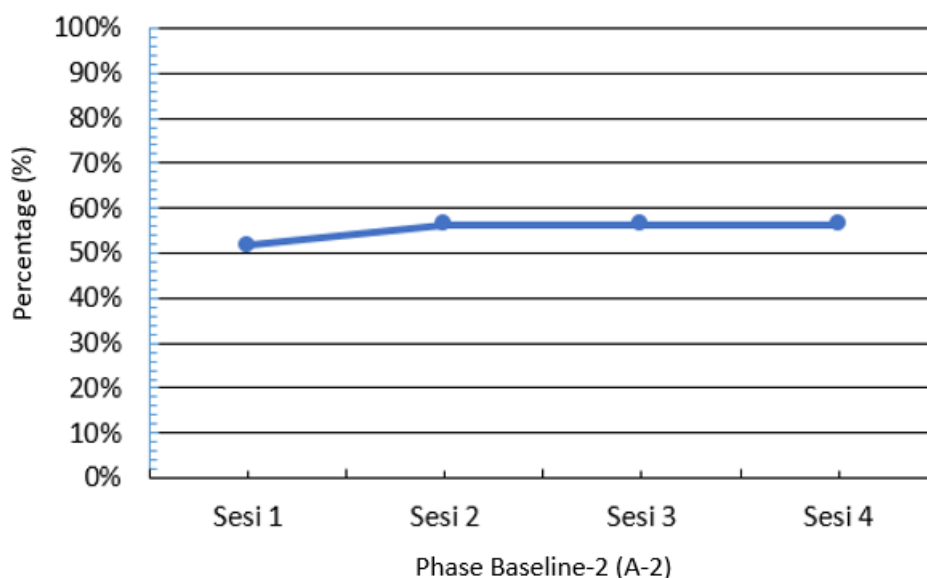| Session	Number of Questions	Maximum Score	Score	Percentage (%)
1	29	87	50	51.7%
2	29	87	51	56.3%
3	29	87	51	56.3%
4	29	87	51	56.3%

Figure 4. Results of baseline 2 (A-2) formation of noun vocabulary.

Table 5. The result of analysis under conditions.

Conditions	A-1	B	A-2
Condition Length	4	8	4
Estimation of Directional Tendency	(Increase)	(Increase)	(Increase)
Trends in Data Stability	Stable (100%)	Stable (100%)	Stable (100%)
Estimated Trace Data	(Increase)	(Increase)	(Increase)
Stability Level and Range	Stable 40.47-46.17%	Stable 43.85-50.29%	Stable 51.48-58.82%
Level Change	43.60-42.50% (+1,1)	49.40-44.80% (+4,6%)	56.30-51.70% (=4,6)

Table 5 shows that the length of conditions that have been recorded and carried out in the baseline-1 phase (A-1) is 4 sessions, in the intervention phase (B) 8 sessions, and in the baseline-2 phase (A-2) 4 sessions. Based on the trend line, it can be concluded that in each session, both at baseline-1 (A-1), intervention (B), and baseline-2 (A-2) experienced an increase. This shows an increase in the formation of object vocabulary in deaf children. although the increase depicted is not significant as shown in **Figure 5**. The trend of stability in the data that has been calculated according to the 15% criterion states that the data in each session is both baseline-1 (A-1), intervention (B) and baseline-2 (A -2) is 100% stable because the data are in the stability range. The description of the data trail is the same as the indicated directional trend. The level of stability and range in the baseline-1 phase (A-1) ranged from 40.47%-46.17%, in the intervention phase 43.85%-50.29% while in the baseline-2 phase (A-2) 51, 48%-58.82%. Meanwhile, the change in level that occurred in the baseline-1 phase (A-1) increased by 1.1 (+) then, in the intervention phase (B) is increased by 4.6 (+) but at baseline-2 (A-2) there was no change as was the case with the previous phase i.e. 4,6 (=).

3.5. Analysis Between Conditions

Table 6 shows the results of the analysis between conditions. In this study, there are five types of conditions used in the analysis between conditions, namely the number of variables that are changed, changes in the direction of the trend and its effects, changes in stability, changes in data levels, and the percentage of overlap.

From the table of analysis results between conditions, it is known that only one variable is changed. The change in the direction of the trend from baseline-1 (A-1) to intervention (B) has increased even though no treatment has been given. Then, in the intervention phase (B) to baseline-2 (A-2), there was an increase. From these results, it can be said that there is an increase after the treatment with the speech development method. Changes in stability that occur in each phase are stable to stable both between the intervention phase (B) to baseline-1 (A-1) and from the baseline-2 phase (A-2) to the intervention phase (B). Changes in the data level in each phase have increased even though they are not significant. As in the intervention phase (B) with baseline-1 (A-1) an increase of 1.2%, then the baseline-2 (A-2) phase with intervention also experienced an increase of 2.3%.
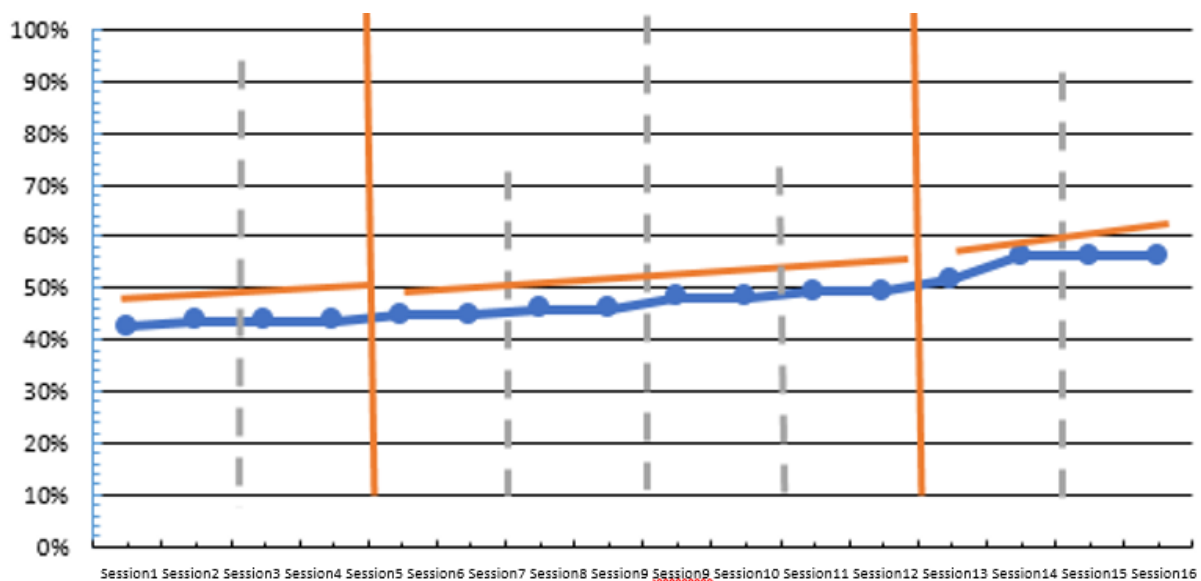

Figure 5. Estimation of the trend towards the formation of noun vocabulary.

The percentage of overlap that occurs from baseline-1 (A-1) to intervention (B) of 50% is shown in **Figure 6**, while in the intervention phase (B) to baseline-2 (A-2) 0% is shown in **Figure 7**. Although, in the baseline-1 phase to the intervention (B) experiencing overlap, it can still be said that the intervention given still has a fairly good effect on vocabulary formation in the target behavior.

Figure 8 shows the Mean levels in the baseline-1 (A-1), intervention (B), and also baseline-2 (A-2) phases. From the figure, it can be concluded that there is an increase in the mean level in each phase of the formation of object vocabulary for deaf children. In the baseline-1 phase (A-1) the percentage showed 43.32%, the intervention phase (B) showed a percentage of 47.07%, then the baseline-2 phase (A-2) showed a percentage of 55.15%.

Table 6. The result of analysis between conditions.

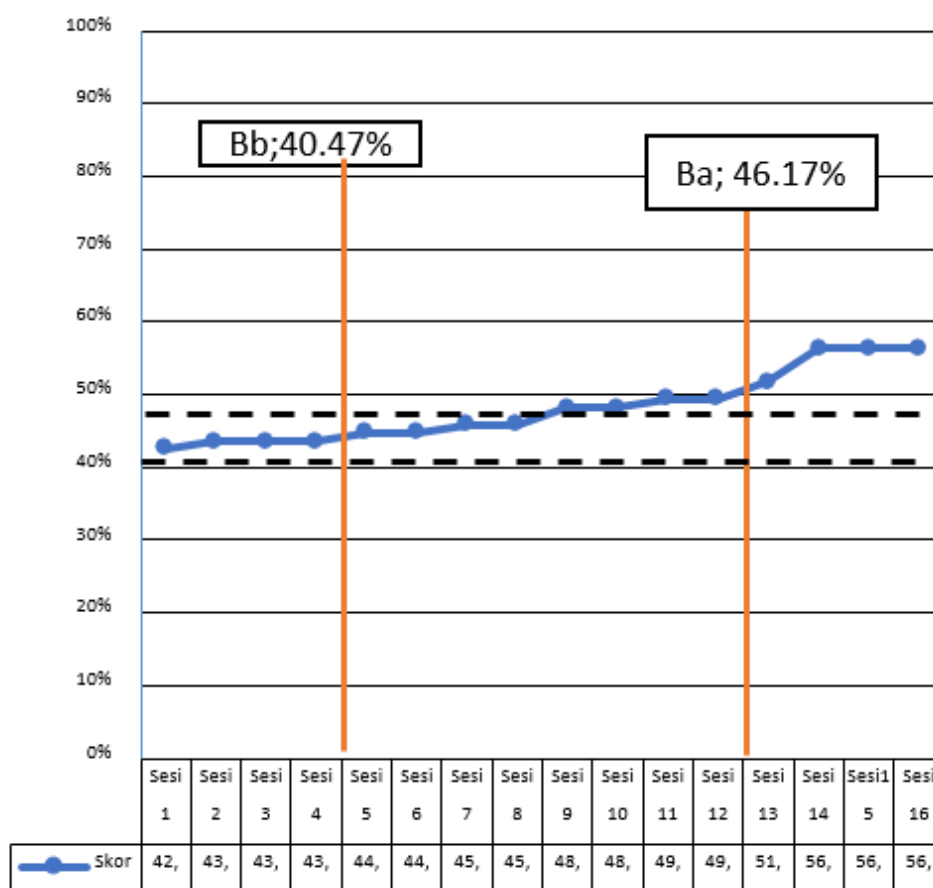| Conditions	$\dfrac{B}{A-1}$	$\dfrac{A-2}{B}$
Number of Variables Changed	1	1
Changes in Direction and Effects		
Stability Change	Stable to Stable	Stable to Stable
Data Level Change	44.8 - 43,6%	51.7 - 49,4%
	(+) 1.2%	(+) 2.3%
Ovelap Percentage	50%	0%

Figure 6. Overlap of the baseline-1 phase (A-1) to the intervention phase (B).
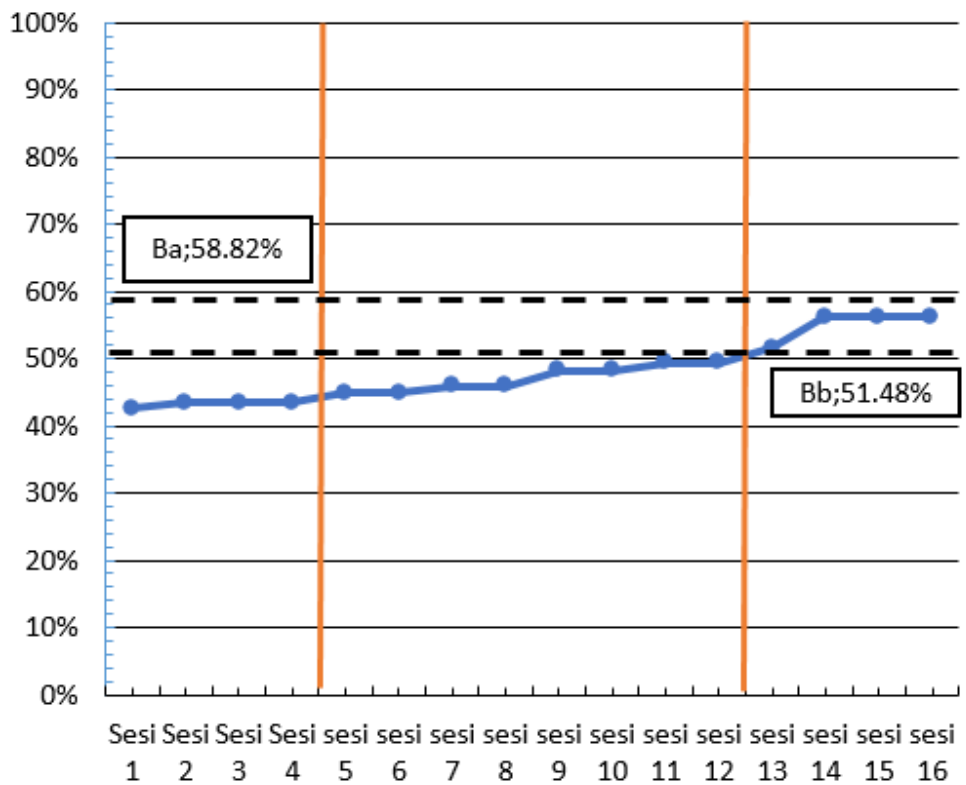
Figure 7. The overlap of the intervention phase (B) to the baseline-2 phase (A-2).
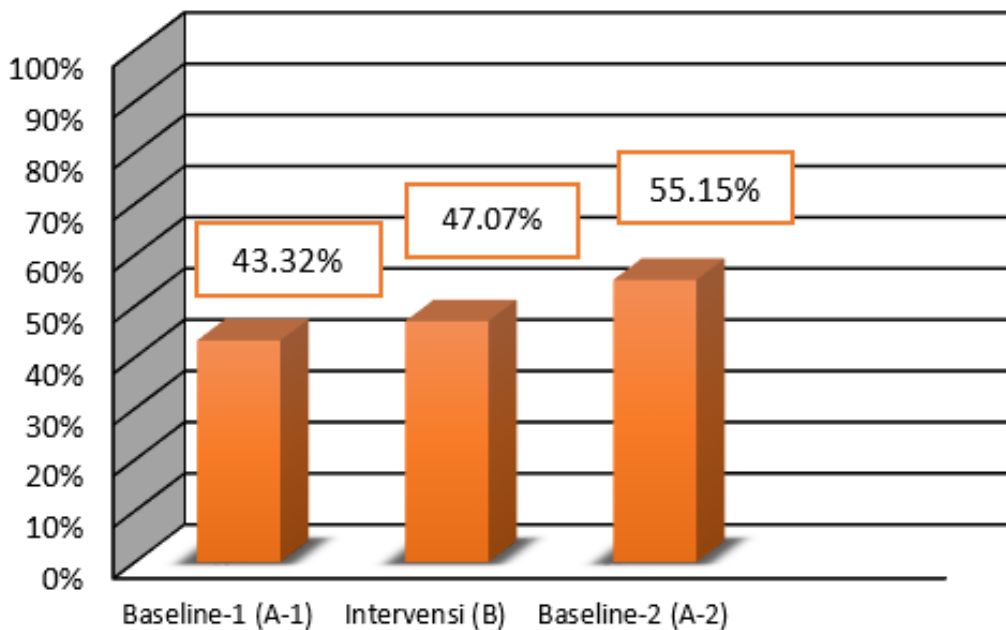

Figure 8. Mean level results in the baseline-1 (A-1), intervention (B), and also baseline-2 (A-2) phases.

3.6. Discussion of The Results

Based on the results of data analysis and looking at the graphs on the overall A-B-A design, it can be concluded that the application of speech development can help in the formation of object vocabulary in the research subject. This is in line with the results of research conducted by Hermanto which states that the implementation of speech development learning can

support the communication skills of deaf children (Hermanto, 2008). However, in this case, there was no significant increase. This is known by comparing the results between before being given treatment to after being given treatment.

Through speech development, children can form word for word which is then collected into vocabulary, especially object vocabulary. Speech development is done by practicing pronunciation that contains the letter m both at the beginning, middle and end. Judging from the graph in each session, the subject experienced progress and seen from the percentage of the mean level results that in the baseline-1 phase the subject obtained 43.32%, the intervention phase got 47.07% and the baseline-2 phase got 55.15%. This proves that speech development can help the development of speech abilities of deaf children (Bouchard *et al.,* 2009).

Based on the results of the analysis under conditions and between conditions, the results of the research tend to increase in each phase. The data obtained showed that after the intervention the subject experienced development. The data obtained in each phase also experienced stability. A stable data shows a positive level change, which is an increase from the initial ability to after the intervention is given (Insani, 2014).

The effect of the intervention is also seen in the overlapping data between phases. Here in the intervention phase (B) with baseline-1 (A-1), there is an overlap of 50%, because it can also be seen that the development in vocabulary formation is not so significant but in the intervention phase (B) with baseline-2 (A-2), there is no significant improvement. overlap which indicates that no intervention data points (B) are included in the baseline-2 data points (A-2). So, it can be said that the application of speech development in this research subject is quite good because the smaller the overlap percentage, the better the influence of the intervention on the research target (Khairunnisa *et al.,* 2016).

The data obtained experienced developments in each session both in the baseline and intervention phases, so it can be concluded that the application of speech development is sufficient to increase the formation of object vocabulary in deaf children.

4. CONCLUSION

Speech development can help in the formation and improvement of the speech organs of deaf children so that deaf children can communicate with other people. This study uses a quantitative approach with the Single Subject Research (SSR) experimental method in the A-B-A design. Based on research data that has been obtained from three phases where each phase consists of several sessions. Baseline-1 (A-1) consisted of four sessions, intervention (B) consisted of eight sessions, and baseline-2 (A-2) consisted of four sessions. Through these several phases, the development that occurred before and after being given a treatment with speech development on the formation of vocabularies of objects in deaf children has been measured. The results of this analysis indicate that the application of speech development can increase the formation of object vocabulary in deaf children but, it does not increase significantly.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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