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RESEARCH ARTICLE

IN-HOUSE TRAINING AS AN EFFORT TO IMPROVE KNOWLEDGE OF SPECIAL SCHOOL TEACHERS FOR THE DEAF ABOUT AUDIOVISUAL LEARNING MEDIA DEVELOPMENT.

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Abstract

The understanding of teachers in special schools for the deaf about developing audiovisual learning media for deaf students are still minimal, causing the need for a training to overcome these problems. The purpose of this study was to determine whether the implementation of in-house training provided can improve teachers' understanding of the development of audiovisual learning media for deaf and hard-of-hearing students in special school. The design of audiovisual learning media is based on previous study. There are eight elements considered in the design: subtitle, legibility, font, colour, text speed, animation, window positioning and focus. This research is carried out in three specialized school for the deaf. We choose mathematics and science, for instance biology, as sample learning audiovisual media. The participants for this research are teachers from three special schools: SLB.B Tabanan, SLB.B Denpasar and SLB.B Jimbaran. Statistical analysis using Wilcoxon signed rank test strongly suggests improvement in understanding in developing audiovisual learning media for the deaf and hard-of-hearing students.

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Introduction:-

The deaf, as well as other disabled people who are citizens of Indonesia are entitled to education in accordance with the mandate of the Constitution of 1945 section 31 subsection (1) and (2). In addition, the right of deaf people in education also written in the Law of the Republic of Indonesia Number 4 Year 1997 concerning the disabled article 11 and article 12. As the embodiment of the legislation above established the Special School (Sekolah Luar Biasa/SLB). SLB is one type of school which is responsible for implementing education for children with special needs (Hansen, 1980). According to Government Regulation No. 72 Year 1991 SLB is a special school that is organized for learners who bears a physical disorder or mental disability.

In general, children with hearing impaired need educational facilities are relatively the same as a normal child. However, because the deaf have obstacles in listening and speaking it would require specialized tools such as the audiometer, hearing aids, audiovisual (in the form of film, video tape, and television), tape recorder, spatel, mirrors and pictures. Through audiovisual media deaf students can pay attention to something that is shown, although in a limited hearing ability. Due to the limitations of deaf students in hearing, an outstanding school teachers in the delivery of teaching materials they must be clear and consistent in the use of vocabulary.

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Preliminary studies in the form of interviews and observations to the Special School part B (Sekolah Luar Biasa Bagian B/SLB.B) as the object of this study were obtained following four issues. First, most of the teachers are still lacking in the use of audiovisual media in the learning process because of lack of knowledge and skills in the developing of the audiovisual learning media. Second, the learning method used for this is an oral-aural method, the students are guided to the extent possible to communicate by talking and capture the speech of others, not with gestures/wear both (total communication). Third, teachers have difficulty in explaining the material from textbooks used from verbal language into a visual form. Lack of audiovisual teaching aids, make teachers take other initiatives, for example by pointing to objects in the classroom as it is, so that learning become not optimal. Fourth, the use of Indonesian Sign Language System (Sistem Isyarat Bahasa Indonesia/SIBI) used over this for the learning process in the classroom can not be applied entirely on student SLB.B because in general these students are already carrying a sign language himself or sign language local spontaneous that can only be understood by the students of each other. In addition, differences in the ability of students caused by differences in the degree of disability is also an obstacle in the delivery of the subject matter, so that the teacher can not apply the methods of classical learning, but rather an individual approach.

Based on some of the obstacles above, the method of teaching by utilizing the audiovisual media is a good and proper solution, particularly for mathematics and science, because with the right method the deaf can be expected to obtain the same learning outcomes with normal students. It required an effort to handle by introducing ways to develop mathematics and science teaching media in the form of audiovisual media for mathematics and science teachers in SLB.B which is the object of this study. One alternative solution is to provide in-house training.

Through provision of training on the development of audiovisual instructional media for teachers in SLB.B is expected obstacles or problems related to the learning process can be overcome. The purpose of this study was to determine whether the implementation of in-house training provided can improve teachers' understanding regarding the development of audiovisual learning media for deaf students.

Review of Literature:-

This section will discuss the literature and empirical studies support the concept of audiovisual media for deaf and hard of hearing children.

Easterbrooks (2008) renew and re-validate the standards of knowledge and skills for teachers on educating deaf children. There are five proposed standards: the foundation (base), development and learner characteristics, different of individual learning, instructional strategies, learning environment/ social interaction, language, instructional planning, assessment, professional practice and ethics, and collaboration. One of the standard, the learning environment/social interaction is to design a class that allows to use the opportunity for learning using visual and or auditory learning in accordance with the purposes of development and learning.

Studies conducted Gentry et al. (2005) found that the multimedia presentation for the reading material was significantly more effective than the use of printed reading material only. Furthermore, the author says that multimedia may provide an interesting supplement to understanding in reading. Blatto-Vallee et al. (2007) examined visual-spatial representations in mathematical problem solving for deaf children and normal. The study concluded that at the time of deaf students generate and use schematic representation of the visual-spatial to solving mathematical problem, the students will have a greater success rate in solving the problem. Ju (2009) examined the use of multimedia to improve understanding in the reading. According to Cavender et al. (2009), there are some elements that need to be considered in designing the audiovisual media such as subtitle, legibility, letters / fonts, colors, text speed, animation, layout window, and focus.

Subtitle in principle intended that the audiovisual text can be accessed by everyone (Neves 2005). Minimally component placement on the screen is not enough, visual and cognitive resources needed to attend information (language-rich) as a gesture (signing) and caption makes it difficult to see the changes out of the limelight at the moment (Cavender et al.,2009). There are several features that are relevant in the subtitle according to Gambier in Neves (2005). These features form of acceptability, legibility, readability, synchronicity, and relevance.

Legibility associated with the letter, the position of the subtitle, and the subtitle speed. Acceptance of norms related to the language, the style selection, and the pattern of rhetoric. Readability read speed associated circuitry, text complexity, density information, and others. Synchronicity associated with the speed of movement of the lips.

Furthermore, the relevance related to the information submitted, removed or clarified. Furthermore, other relevant features according to Gambier in Neves (2005) is a domestic strategy (how to receive the narrative mode) and the recipient's profile.

Readability is a second essential element in the audiovisual design. Reading the subtitle is a task that is not easy for most readers, especially for people who are not fluent in reading (Neves, 2005). However, the deaf generally do not enjoy reading and generally lacking in reading skills that are basic skills in reading subtitles. In addition, the deaf have not developed an expertise which makes it possible to progress from a simple step in the processing of words towards higher process as conclusions and predictions, planning, monitoring, self-questioning, and summarizing.

Important aspects related to legibility is content and form. The first thing, the contents, relate to how a series of words placed on the monitor screen. Placement of these contents must consider how deaf students to read. Neves (2005) asserts that hearing impaired only rely on visual references to support the reading process. Furthermore, this means that the deaf need to capture all visual messages obtained from facial expressions, body language, and filmik composition. The second thing is related to the legibility is shape. Shape in question is how the technical aspects such as fonts, colors, and placing it on the monitor screen. The third element is the font or font size. One important factor in reading subtitles is the font size and image quality. To ensure the proper legibility of letters selection will help the deaf to read the text. Sample letters can help legibility are *Tiresias Screen font*. According to Silver in Neves (2005), color is an important element to enhance readability. Text with white and black background is preferred by most people, followed by the second position ie white text on a dark blue background.

The next element is the speed of the text. Luyken et al in Neves (2005) explains that the subtitle read speed is between 150-180 words per minute. Research on the read speed has also been done by Jensema (1998) and Jensema et al. (2000). Further Neves (2005) says that the six-second rule is widely accepted as the standard rules for subtitle readability. Implementation of this rule is three seconds per line and five to six seconds for two lines. But D'Ydewalle in Neves (2005) asserts that this six-second rule should be changed to rule nine seconds because deaf people usually/tends to slow reading.

Animation overload can interfere the focus. Cavender et al. (2009) suggest using a particular animation (anchored animation) that only appears at or near the target window to emphasize that the message delivered is essentially only a suggestion and not demand immediate attention.

The seventh element is the window layout. Changing the window layout can be confusing and undermine the atmosphere of the class (see Cavender et al., 2009). Furthermore, exemplified layout changes by rotating the window seems to be a good solution, but is disturb. The last element is the focus. Avoid disturbing the user at the time of focus. Furthermore, the author states that visual masking effect can obscure information on the background or other information on the screen.

Neves (2005) asserts that the presentation of the text plays an important role in the quality of subtitle. This text presentation includes font, color, and layout. Select fonts for subtitles usually is sans serif type letters. Further subtitle using block letters tend to be difficult to read and the people who like the subtitle capitals do not like subtitled with a combination of capital and small letters. The next important thing is the color selection. The white on black text box is the most legible color of all color combinations followed by yellow, cyan, and green. Baker in Neves (2005) suggest that the color magenta, red, and blue should be avoided. The layout involves a lot of lines, position, and alignment. Many lines for example two to three lines. Furthermore, the position could be in the middle, left aligned, or right justified.

Empirical studies on the use of audiovisual media for the deaf children in Indonesia have been carried out by Effendi et al. (2006) describes the use of pictorial stories media through total communication in improving the language skills of deaf children. Khaer (2008) stated that the teaching is more effective when teaching objects can be visualized realistically resemble to the real situation. Nugroho (2009) describes how student learning outcomes after using teaching aids in math.

Research Methods:-

The working procedure to support the realization of in-house training program undertaken are as follows: (1) The activities were implemented in schools that are partners of this training program (SLB.B Tabanan, SLB.B

Denpasar, and SLB.B Jimbaran) which will develop mathematics and science learning program using audiovisual instructional media for the deaf students; (2) The timing of the visit to the school arranged between the school and the trainer (lecturer) adjusted to the schedule of learning mathematics and science in each school. The frequency of mentoring in general carried out two times a week for 3 hours of meetings (3×40 minutes), for 4 weeks \times 6 months for one semester. If there are specific things such as school requested more than twice a week can be arranged according to the needs at each school; (3) Participants of in-house training for the early stages of precedence were teachers of mathematics and science. However, do not rule out the possibility of participants from teachers of other subjects such as social studies to get involved.

Implementation of in-house training can generally be divided into two phases each week. The first phase is the preparation of learning and a second phase is the stage of observation and discussion. Phase of lesson preparation consists of: (1) Implementation of training held at each school to discuss the problems that may arise regarding the audiovisual learning media development program for mathematics and science teaching deaf students in three special schools; (2) Prepare, develop, and operationalize lesson plan and existing learning tools adapted to the conditions of each school so that it becomes a scenario that can be easily implemented by the teacher in the classroom; (3) Equalizing the basic concepts of mathematics and science that will be used in learning (related to student worksheet and student book); (4) Perform simulation/peer teaching with teachers before the implementation (real teaching) in the classroom. Implementing a training program serves as a model to simulate the learning to be carried out; (5) Discuss and reflection of result of real teaching; and (6) Following up on the discussions and reflections.

The next stage is the observation and discussion. At this stage the trainer to observe the learning with audiovisual media conducted by the teacher of SLB.B. The scope of the directives and advisory are as follows: (1) Helping to prepare, develop and operationalize lesson plans and learning media that already exist, according to the conditions of each school; (2) Companion provide positive and constructive feedback to teachers in relation to the optimization of the utilization of audiovisual media in teaching in the classroom; (3) Overcoming difficulties of teachers relating to substance field of mathematics and science; (4) To help improve the competence of teachers in the use of Information Technology (IT) to develop a more innovative learning media, especially in the audiovisual media for mathematics and science; (5) Assisting teachers in designing audiovisual learning media with utilization software Microsoft Office Power Point, Macromedia Flash, and other software; (6) Assist teachers in optimizing the existing multimedia devices in each school; (7) Assist in directing matters related with necessary needs in the future for program development of audiovisual learning media.

Results and Discussion:-

Implementation of in-house training:-

Materials provided for the implementation of the in-house training of audiovisual learning media development, covers the following materials: (1) Principles of design of audiovisual for the deaf students, (2) Development of audiovisual media for learning mathematics and science in special school SLB.B, and (3) Sample of audiovisual media, namely equivalent fractions. Material about the design principles of audiovisual media for deaf students, the material covering the principles of total communication and audiovisual media design principles. Audiovisual design follows the provisions of Neves (2005) and Cavender et al. (2009). Figure 1 is an example of geometrical material. Blue background, with sans serif type lettered text is white.

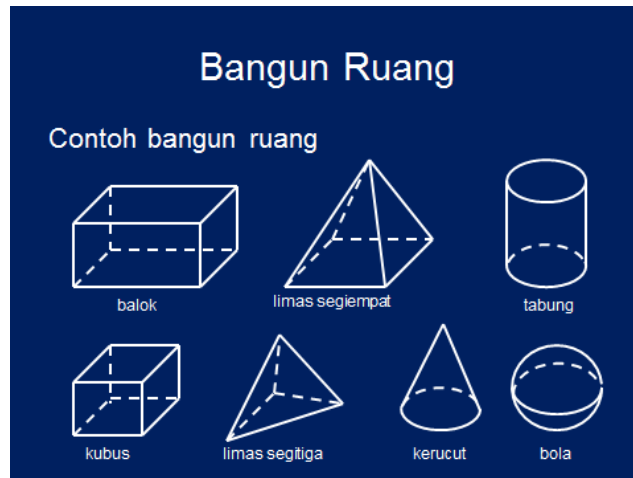


Figure 1:- Example of Mathematical Content: Geometry

The audiovisual media for training, taking subjects of mathematics and science for elementary school of special school (Sekolah Dasar Luar Biasa Bagian B/SDLB.B). The subject for the mathematics is equivalent fractions (Figure 2) and for science using sample materials: Animal classification based on types of food (Figure 3). For each audiovisual material with video of instructor using the Indonesian Sign Language System (Sistem Isyarat Bahasa Indonesia/SIBI).



Figure 2:- Example of Mathematical Content: Equivalen Fractions.



Figure 3:- Example of Science Content: Animal Classification Based on Types of Food.

The Results of the Evaluation of In-house Training:-

Prior knowledge of trainees on audiovisual media based on the answers of trainees on pre-test were given. Prior knowledge of trainees about the need to develop innovative learning methods to optimize learning in the classroom, especially SLB.B. All participants answered "necessary" to the following reasons: (1) because the students experience a shortage of audio so it needs an innovative method of learning; (2) because the student learning outcomes will be better and more optimal if done innovative teaching methods; (3) for children with special needs is more rapidly absorbed with innovative learning methods; (4) innovative teaching methods need for the improve the understanding of the students who have limitations; (5) In order for the students do not get bored with learning methods by teachers and because science was evolving as technology advances; (6) It is necessary, because an innovative method of learning easier for students and teachers in learning activities; (7) because the students will be more enthusiasm for learning if innovative methods, and also the students will not get bored; (8) with an innovative method of learning will facilitate the achievement of learning, according to the specificity characteristics of the students.

The answer of trainees at pre-test on the question "whether an innovative method of learning by using audiovisual media can overcome the problems of learning in the classroom, so that learning outcomes can be optimally? ". All participants answered "yes", with reasons stated as follows: (1) because with a visual, the students can remember some of the knowledge; (2) for the audiovisual teaching model could be made more attractive so that students can concentrate and better understand the intent of learning materials submitted; (3) audiovisual really help students understand the concepts of learning; (4) because the students could not understand the material abstractly; (5) with audiovisual media students will more quickly understand the material presented by the teacher; (6) the students, especially the deaf or hard of hearing are not able to imagine, so urgently needed audiovisual media, in addition to train hearing and seeing the material; (7) audiovisual media help students receive information through the senses are functioning normally; and (8) for the cases where students are totally lost his hearing more optimal use of visual media only.

The participants' answers for the the question "if ever utilize audiovisual media for the learning in the classroom and in learning what is given?". The majority (79.2%) of the 72 of trainees expressed "no" and a small proportion (20.8%) answered "yes". Among the of trainees who answered never utilize the audiovisual media, they use the picture cards media for the learning Indonesian and mathematics, images media, and software paint in learning. As for the small proportion of participants who said that they had to use audiovisual media, they utilize Microsoft PowerPoint for the: (1) a description of the materials recognize letters, objects, and numbers; (2) describes the body parts of animals and humans.

Post-test given at the end of the activity, after the completion of the training materials given. Some of the questions are given almost the same as the pre-test, and added with new questions regarding the interest of teachers in the future to use audiovisual learning media for students at SLB.B. Score the participants' answers on the pre-test and post-test are presented in Table 1.

Table 1:- Scores pre-test and post-test of trainees at SLB.B Tabanan.

Participants's number	Pre-test Score	Post-test Score
1	50	75
2	50	75
3	50	75
4	50	75
5	100	100
6	50	75
7	75	100
8	75	100
9	50	75
10	50	75
11	50	75
12	75	100
13	50	75
14	50	75
15	75	100

Improvement of Theachers Knowledge After Being Given an in-house Training:-

Inferential statistical analysis to the data pre-test and post-test of trainees SLB.B Tabanan aims to see whether the training of audiovisual media effectively improve the understanding of teachers in developing audiovisual learning media. Suppose $\mu_{\text{pre test}}$ is the average score of teachers before training (pre-test score) and $\mu_{\text{post test}}$ is the average score of teachers after training (post-test score). Formally hypothesis in the form:

$$\begin{aligned} H_0 : \mu_{\text{pre test}} &\geq \mu_{\text{post test}} \\ H_1 : \mu_{\text{pre test}} &< \mu_{\text{post test}} \end{aligned} \quad (1)$$

Statistical test to be used is the t test statistic for the data pairs (paired samples). The assumption must be filled in using statistical paired t test for the data is the data value of the pre-test and post-test normal distribution. Test normality using the Shapiro-Wilk test, p-value obtained for the score pre-test and post-test 0.0001137 respectively and 2.38×10^{-5} .

This indicates not enough evidence to accept the null hypothesis of normality. In other words, the data is not a normal distribution. Next will be testing with nonparametric methods. Nonparametric test analogous to the t-test is the Wilcoxon signed rank test. To perform the Wilcoxon signed rank test assumed symmetric difference, or the difference of data and the data measured on an ordinal scale, interval, or ratio. Wilcoxon signed rank test to test the median difference data. To see whether the training positively affect (increase) the understanding of teachers hypothesis is as follows:

$$\begin{aligned} H_0 : M_D &\geq 0, \\ H_1 : M_D &< 0, \end{aligned} \quad (2)$$

by D stating the difference between the value before training and after training. The alternate hypothesis means that training will be successful if the difference in value before training (pre-test) and after training (post-test) negative. In other words the difference between the post-test and pre-test is greater than zero. Results of testing with Wilcoxon signed rank test was obtained p-value = 0.0001053. At the level of significance $\alpha = 0.05$ was obtained p-value < 0.05.

Following is a output R for Wilcoxon signed rank test for SLB.B Tabanan.

```
>wilcox.test(tbn$pre.tbn,tbn$pos.tbn,paired=TRUE,alternative="less")
Wilcoxon signed rank test with continuity correction
data: tbn$pre.tbn and tbn$pos.tbn
V = 0, p-value = 0.0001053
alternative hypothesis: true location shift is less than 0
```

So we can conclude at a significance level of $\alpha = 0.05$ the null hypothesis is accepted. In other words, effective training teachers improve understanding SLB. B Tabanan in developing audiovisual media.

Further data analysis is conducted on data SLB.B Denpasar (Table 2). Hypotheses for data SLB.B Denpasar as well as in equation (1). However, the first test will be conducted normality. Test normality using the Shapiro-Wilk test p-value obtained for the score pre-test and post-test each 3.601×10^{-8} and 1.203×10^{-5} . This indicates not enough evidence to accept the null hypothesis of normality. In other words, the data is not a normal distribution. Next will be testing with nonparametric method that is Wilcoxon signed ranks test. To perform the Wilcoxon signed rank test assumed symmetric difference, or the difference of data and the data measured on an ordinal scale, interval, or ratio. Wilcoxon signed rank test to test the median difference data. To see whether the training positively affect (increase) the understanding of teachers hypothesis is as follows as in equation (2). Results of testing with Wilcoxon signed rank test was obtained p-value = 2.552×10^{-7} .

Here is the output R to Wilcoxon signed rank test for SLB.B Denpasar:

```
>wilcox.test(sdk$pre.sid,sdk$pos.sid,paired=TRUE,alternative="less")
Wilcoxon signed rank test with continuity correction
data: sdk$pre.sid and sdk$pos.sid
V = 0, p-value = 2.522e-07
Alternative hypothesis: true location shift is less than 0
```

At the level of significance $\alpha = 0.05$ obtained p-value < 0.05 . So we can conclude at a significance level the null hypothesis is accepted. In other words, the training effectively improve the understanding of teachers of SLB.B Denpasar in developing audiovisual media.

Table 2:- Scores Pre-test and Post-test of Trainees at SLB.B Denpasar.

Participants's number	Pre-test Score	Post-test Score
1	75	100
2	50	75
3	50	75
4	50	50
5	75	100
6	75	100
7	75	100
8	50	100
9	50	100
10	75	100
11	50	75
12	50	50
13	75	100
14	50	75
15	75	100
16	50	75
17	50	75
18	50	75
19	50	75
20	50	75
21	50	75
22	75	100
23	50	75
24	50	75
25	50	75
26	50	75
27	50	75
28	50	75
29	50	75

Further data analysis is conducted on data SLB.B Jimbaran (Table 3). Hypotheses for data SLB.B Denpasar as well as in equation (1). However, the first test will be conducted normality. Test normality using the Shapiro-Wilk test, p-value obtained for the score pre-test and post-test each 1.622×10^{-8} and 5.66×10^{-8} .

As well as on the data SLB.B Tabanan and SLB.B Denpasar, indicating not enough evidence to accept the null hypothesis of normality. In other words, the data is not a normal distribution. Next will be testing with nonparametric method that Wilcoxon signed rank test. To perform the Wilcoxon signed rank test assumed symmetric difference, or the difference of data and the data measured on an ordinal scale, interval, or ratio. Wilcoxon signed rank test to test the median difference data. To see whether the training positively affect the understanding of teachers hypothesis is as follows as in equation (2). Results of testing with Wilcoxon signed rank test was obtained p-value = 1.02×10^{-7} .

```
Here is the output R to Wilcoxon signed rank test for SLB.B Jimbaran:
>wilcox.test(jim$pre.jim,jim$pos.jim,paired=TRUE,alternative="less")
Wilcoxon signed rank test with continuity correction
data: jim$pre.jim and jim$pos.jim
V = 0, p-value = 1.02e-07
alternative hypothesis: true location shift is less than 0
```


At the level of significance $\alpha = 0.05$ obtained p-value < 0.05 . So we can conclude at a significance level $\alpha = 0.05$ the null hypothesis is accepted. In other words, the training effectively improve the understanding of teachers of SLB.B Jimbaran in developing audiovisual media.

Table 3:- Scores pre-test and post-test of trainees at SLB.B Jimbaran.

Participants's number	Pre-test Score	Post-test Score
1	50	100
2	75	100
3	50	75
4	50	75
5	50	75
6	50	75
7	50	75
8	50	75
9	50	75
10	50	75
11	50	75
12	50	75
13	75	100
14	50	75
15	50	75
16	50	75
17	75	100
18	50	75
19	50	75
20	50	75
21	25	50
22	50	75
23	50	75
24	50	75
25	50	75
26	50	75
27	50	75
28	50	75

Conclusion:-

In general, the methods of teaching with audiovisual media effectively and in accordance with the needs of students with hearing impaired should consider: subtitle, readability (letter/ font, color, speed of text, animation, layout window, and focus), the presentation of the text, the verbal component, and nonverbal components.

Results of the evaluation of training, based on the analysis of the data pre-test and post-test score can be explained that the training provided benefits for improved understanding of teachers in all three partner schools (SLB.B Tabanan, SLB.B Denpasar, and SLB.B Jimbaran) about how to develop IT-based audiovisual learning media for teaching mathematics and science for the deaf and hard-of-hearing in the Special School SLB.B. In-house training of Audiovisual Learning Media Development which has been given, has been able to increase the knowledge of the teachers at the school who are partners of this program (SLB.B Tabanan, SLB.B Denpasar, and SLB.B Jimbaran) significantly.

Based on the low utilization of IT-based media by teachers to support the learning process in SLB.B it is very important for the future conduct similar training in special schools for the deaf and hard-of-hearing that have not been touched by this type of program, as a pilot program.

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