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Instrument to Assess the Perception of Sound and Rhythm for Children with Hearing Impairment

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Abstract: Children with hearing impairments experience hearing loss from mild to profound, which is grouped into hard of hearing and deafness. The direct impact of hearing loss is the inability/difficulty to catch various sounds, including the sound of the language. Those with hearing impairments must be made aware of sound, especially children classified as hard of hearing, whose remaining hearing must be stimulated to train their sensitivity so that their hearing function can be optimized. Therefore, they are given special services in the form Development of Communication, Perception of Sound and Rhythm. The program provided must be under their learning conditions and needs; therefore, an assessment is needed. This study aimed to formulate an assessment instrument for sound and rhythm perception for children with hearing impairments at Special Education Elementary School. This study used a qualitative approach with a descriptive method. This study was designed in three stages: (1) preliminary stage with literature study and documentation study on the curriculum for developing sound and rhythm perception communication,f (2) drafting stage of the assessment instrument for Sound and Rhythm Perception, and (3) validation stage of assessment instrument by measurement & education experts for children with hearing impairment and practitioners (teachers at Special Education School). The result was a hypothetical sound and rhythm perception assessment instrument that needed to be implemented at the next research stage. This instrument for assessing the perception of sound and rhythm covered the aspects of sound detection, sound discrimination, and sound comprehension. This study result can be used as a reference for teachers in carrying out a sound perception assessment before conducting a special program for Developing Communication for the Perception of Sound and Rhythm.

Keywords: assessment instrument; perception of sound and rhythm; children with hearing impairments

INTRODUCTION

Hearing impairment children experience a loss of hearing acuity, so they are unable / difficult to catch and perceive sounds, which in turn can hinder the process of mastering language. The degree of hearing loss can occur in the range of mild to profound, which is broadly grouped into hard of hearing and deaf. This is in accordance with the opinion of Hallahan, Kauffman &Pullen (2014,p. 347-348) that "Hearing impairment is a broad term that covers individuals with impairments ranging from mild to profound; it includes those who are deaf or hard of hearing. Likewise Heward (2001, p.292) said that "Children who are deaf and hard of hearing receive special education and related services under the federal disability category of hearing impairments". Hard of hearing includes hearing loss in the mild to moderately severe range, while the deaf group is usually in the severe and profound range. In children who are deaf, the residual hearing can vary, and it is important to be stimulated with various sounds to train the sensitivity of the residual hearing. Likewise, children with hearing impairments who are classified as deaf, even though their hearing is difficult to pick up on sound, but their sense of vibration or appreciation of sound vibrations need to be stimulated to train their sensitivity. These efforts are steps to optimize the function of the remaining hearing and the feeling of

vibration. In order for the training provided to run effectively and efficiently, the training program must be in accordance with the abilities and needs of students obtained through assessment activities.

Assessment is a systematic process of collecting information data about a child that serves to see the abilities and difficulties he is currently facing, as material to determine what is really needed (McLoughlin & Lewis, 1986). The information as a result of the assessment can be used as a basis in the preparation of learning programs for these children. Thus, based on this information, teachers can arrange learning or training programs according to the abilities and needs of students. For children with special needs, especially children with hearing impairment, the potential and abilities are very diverse, so this assessment is very important so that the learning provided is in accordance with their learning needs, including the development of sound and rhythm perception.

Perception of sound and rhythm is an integral part of a special program for children with hearing impairments, namely Development of Sound and Rhythm Perception Communication. This program is very important given to children with hearing impairments to stimulate the sensitivity of the remaining hearing they still have. Besides that, there are many benefits by developing this ability, such as the results of research by Susilowati, E., Fanani, M., & Herawati, E. (2013) showing that the learning of Sound and Rhythm Perception Development has an effect on the development of communication independence of hearing impairment children. The results of other research conducted by Alhumaira, T.N.(2018) show that the Development of Sound and Rhythm Perception Communications can be implemented in learning to dance using music. In addition, other research results show that the rhythmic movement of deaf students increases through the Development of Sound and Rhythm Perception Communication. (Maulana, M.J., Suntoda, A. & Slamet, S. 2019). The results of the research that have been carried out are more directed to the benefits of developing sound and rhythm perception and have not found anything that leads to an assessment instrument.

It is important to carry out assessment activities in order to adapt the learning program to their conditions and abilities. Ideally, in carrying out the assessment using standardized instruments, but standard instruments, especially for assessing the ability to perceive sound and rhythm, are still difficult to find. Conditions in the field, the teacher has difficulty in revealing a real picture of the communication skills of sound and rhythm perception. Teachers tend to assess children's abilities based on the results of initial observations or data that are not stable (valid) or do not carry out an assessment before learning/training Development of sound and rhythm perception communication. Therefore, in order to help teachers reveal the real conditions of deaf children in communication skills of sound and rhythm perception, and to encourage teachers to carry out informal assessments, it is necessary to develop appropriate assessment instruments. This research is a new thing, because in previous studies it was more directed to the benefits of developing sound and rhythm perception itself, while those who conducted research on the assessment instrument had not been found. Therefore this research focused on the preparation of assessment instruments for the Development of Sound and Rhythm Perception, which consists of sound detection, sound discrimination, sound identification and sound comprehension. This assessment of sound and rhythm perception is an integral part of the Special Program for the Development of Sound and Rhythm Perception Communication. Based on these focuse the purpose of this research is to formulate a hypothetical assessment instrument for the development of sound and rhythm perception for children with hearing impairment based on curriculum studies and literature analysis

METHOD

In line with the purpose of this research, namely to formulate an assessment instrument for sound and rhythm perception, the research approach used was a qualitative approach with a

descriptive method. The data collection technique was carried out through literature studies and documentation studies on the curriculum for developing sound and rhythm perception communication. This research was conducted at the State Special School Cicendo, Bandung.

This article is the result of the first of two research designs: the first design, the formulation of the assessment instrument, and the second design for its implementation. The first research design includes: (1) the preliminary stage by conducting curriculum analysis and literature study; (2) The stage of drafting the assessment instrument for Sound and Rhythm Perception; and (3) the validation stage of the assessment instrument by experts and practitioners.

At the stage of curriculum analysis and literature study, the researcher examines the relevant theories and the program curriculum, especially the Development of Communication, Perception of Sound and Rhythm, and determines the aspects to be assessed. At the design stage of the assessment instrument, the researcher compiled an assessment instrument grid consisting of: Aspects, sub-aspects, indicators, and number of questions. Furthermore, based on the grid, the instrument items for the assessment of sound and rhythm perception (consisting of component- sub component - indicators) are arranged, then develop questions based on the grid that has been made. The instrument validation stage is carried out through expert validation (experts in assessment and Education of Children with Hearing impairment) as well as practitioner validation (teachers who teach children with hearing impairments).

RESULT AND DISCUSSION

Result(S)

The result of this research is a hypothetical assessment instrument for the development of sound and rhythm perception for children with hearing impairment. The instrument has been validated by measurement and education experts for children with hearing impairments and education practitioners The assessment instrument consists of a grid and the details of the instrument, which can be seen in the Table 1 and Table 2.

Table 1. Assessment Instruments Grid of Sound and Rhythm Perception for Children with Hearing Impairment at Elementary School Level

Aspect	Sub Aspect	Indicator	Expected Response	Question Point Number
Sound Detection	Object Sound Detection	Detect the sound of a musical instrument	Raising the thumb of the right hand up while saying “there is a sound”	1,3,
		Detect no object sound	Raise your right hand with open fingers and shake it left-to-right while saying “no sound”	2,5
		Detect the sound of the blower	Raising the thumb of the right hand up while saying “there is a sound”	4
	Detection of animal sounds through recording	Detect animal sounds	Raising the thumb of the right hand up while saying “there is a sound”.	6,7
		Detect no animal sounds.	Raise your right hand with open fingers and shake it left-to-right while saying “no sound”	8
	Sounds of nature through recording	Detects sounds of nature /lightning	Raising the thumb of the right hand up while saying “there is a sound”.	9
		Detects no sounds of nature.	Raise your right hand with open fingers and shake it left-to-right while saying “no sound”	10
Sound Discrimination	Discrimination of long-short	Discriminates long and short sounds	Stretch your arms when you hear a long sound and put your hands on	11, 12

	sound	through the whistle Discriminates long and short sounds through the piano.	your waist when you hear a short sound.	13, 14
	Discrimination of high – low sound	Discriminates high and low sounds/tones through the piano.	Lift the ball above your head when you hear a high sound, and hold the ball when you hear a low sound.	15,16
		Discriminates high and low sounds/tones through tambourines, bells and pianos.		17,18
	Discrimination of Quick-Slow Sound	Discriminates fast and slow sounds through drums.	Walk in place quickly when you hear a fast sound and walk in place slowly	19,20, 21,22
	Discrimination of Loud - weak sound	Discriminates loud and weak sounds through drums	The child hits the drum hard or weakly/slowly.	23,24
	Discrimination of 2/4 and 4/4 Time Bar	Discriminates drum sounds with 2/4 and 4/4 time bar.	Children clap their hands according to the time bar that is heard	25, 26 ,27, 28,29.
	Discrimination of Pop (slow) – dangdut music	Discriminates the pop (slow) and dangdut music	The child shakes his body to the rhythm of the music	30
Sound Identification	Sound Direction	Identify the sound direction.	The child points to the source of the sound.	31,32
	Sound Source	Identify the source of the sound.	The child shows a picture card of the sound-producing device that is heard.	33,34,35
	Sound names	Identify animal sounds.	The child demonstrates movement and/or imitates the sound of an animal whose voice is heard.	36.37.38
	Counting sounds	Identify countable sounds.	The child moves the straw on the student's left to the student's right, a number of sounds count.	39.40
Sound comprehension with/without the use of hearing aids is limited to the child's residual hearing	Background Sound	Understanding background sounds	The child demonstrates / says according to the meaning of the sound.	41,42,43
	Language Sound	Imitating the assessor	Imitating the assessor	44,45,46
		Answering questions asked by assessors verbally.	Answering questions asked by assessors verbally.	47,48,49
		Doing what the assessor assigned	Doing what the assessor assigned	50

Table 2. Assessment Instruments Points of Rhythm and Sound Perception for Children with Hearing Impairment at Elementary School Levels

No	Stages	Test Instrument	Instruction	Score			Explanation
				0	1	2	
A	Sounds Detection						
1	Sounds of Things	There is a drum sound around	The position of the child is standing with his back to the sound source at a distance of two m. The child is told that "the test is about to start" so that the child concentrates.				The sound that is heard for about five seconds
2		No Sound					
3		There is a piano sound					
4	Sounds of Things	There is a whistle sound	The assessor plays the sound of objects/records of animal sounds/nature sounds. The child is asked to raise the thumb of his right hand up while saying "there is a sound" if he can detect/live the sound.				The sound that is heard for about five seconds
5		No Sound					
6	Animal Sound Recording	Detects the sound of a dog barking.					
7		Detects the sound of a cat meowing.					
8		No Sound	After the assessor informed that the next test was about to start, the assessor returned to the position when sounding objects or playing recorded animal sounds/nature sounds, but did not make any sound. The child is asked to raise his right hand with an open finger and shake it left and right, if he does not hear/live the sound.				
9	Nature Sound Recording	Sound of heavy rain.					
10		No Sound					
B	Sound Discrimination						
11	Long Sound (± three seconds)- short sound (± one second)	Discrimination of long – short sound through the whistle	The position of the child is standing with his back to the assessor who makes the sound. The child is told that "the test is about to start" so that the child concentrates. The assessor makes a sound Children are asked to: - Spreading his arms when he heard a long sound - Puts both hands on the waist when he hears a short sound.				
12		Discrimination of short - long sound through the whistle					
13		Discrimination of long – short – long sound through piano					
14		Discrimination of short – long – short sound through piano					
15	High – low sound	Discrimination of high-low piano sound	The position of the child sitting cross-legged with his back to the source of the sound, and in front of him there is a ball. The assessor plays the sound according to the instrument. The child is asked to lift the ball above his head when he hears a high-pitched sound The child is asked to place the ball on his lap, if he hears a low pitched sound. The child is asked to put the ball on the floor when there is no				The sound is heard for about five seconds
16		Discrimination of low-high piano sound					
17		Discrimination of tambourine sound (low sound) and bell sound (high sound)					
18		Discrimination of Bell (high sound) and low sound of piano					

			sound.	
19	Fast – Slow Sound	Discrimination of fast – slow sound of drums	The position of the child is standing with his back to the sound source. The assessor plays the sound according to the instrument.	The drum sound that is heard on each item is about six seconds
20		Discrimination of slow – fast sound of drums	Children are asked to walk in place quickly if they hear a fast sound.	
21		Discrimination of fast – slow - fast sound of drums	Children are asked to walk in place slowly if they hear a slow sound.	
22		Discrimination of slow – fast - slow sound of drums		
23	Loud – weak sound	Discrimination of loud - weak music sound	The assessor played the recorded music loudly and weakly alternately according to the test instrument.	The music playing on each item is about six seconds.
24		Discrimination of weak - loud music sound	Children are asked to hit the drum loudly if they hear music loudly. Children are asked to hit the drum weakly if they hear music weakly.	
25	2/4 –3/4-4/4 Time Bar	Discriminates drum sound with a 2/4 - 4/4 time bar	The assessor plays the sound of a drum with a 2/4 time bar and the child is asked to clap according to a 2/4 time bar. Next, the assessor plays the sound of the drum in 4/4 time bar and the child is asked to clap according to the 4/4 time bar.	
26		Discriminates drum sound with a time bar of 4/4 -2/4.	The assessor plays the sound of a drum with a time bar of 4/4 and the child is asked to clap according to the time bar of 4/4. Next, the assessor plays the sound of the drum in the 2/4 time bar and the child is asked to clap according to the 2/4 time bar.	
27		Discriminates the sound of drums with a 2/4 – 3/4 time bar.	The assessor plays the sound of the drum with the 2/4 time bar and the child is asked to clap according to the 2/4 time bar. Next, the assessor plays the sound of the drum with the 3/4 time bar and the child is asked to clap according to the 3/4 time bar.	
28	2/4 –3/4-4/4 Time Bar	Clap your hands according to the 2/4 time bar.	The assessor assigns the child to make a sound through clapping according to the 2/4 or 4/4 time bar (according to the instrument).	The music playing on each item is about six seconds.
29		Clap your hands according to the 4/4 time bar.		
30	Pop (slow) – dangdut music	Distinguish between pop and dangdut music that is played for one minute each.	The assessor played pop music for one minute, the child was asked to shake his body according to the rhythm of the	

			music. Next, the assessor plays dangdut music for one minute, the child is asked to shake his body to the rhythm of the music.	
C	Sound Identification			
31	Sound Direction	Identify the direction of the sound to the right	The assessor assigned three children to sit in a row on the floor with a distance of about 1 meter. The child being tested (testee) sits in the middle wearing a blindfold. The child sitting on the left and right of the testee holds the gong. After the assessor signaled that the test was about to start, the child on the right side of the testee was asked to hit the gong for about 5 seconds and the testee was asked to point to the direction of the sound source. Next, the child on the testee's left, hits the gong for about 5 seconds and the testee is asked to point to the direction of the sound source.	
32		Identify the direction of the sound to the left		
33	Sound Source	Identify the source of the drum sound.	The assessor makes the sound by hitting the drum at medium speed for about six seconds. Children are asked to choose one picture according to the sound of the instrument that is heard by the assessor, from three sound source picture cards (whistle, drum, and organ).	The sound that is played on each item is about six seconds.
34		Identifying the source of the whistle	The instructions are the same as in point 33, but with a choice of pictures: drums, trumpets and whistles.	
35		Identify the source of organ sound	The instructions are the same as in point 33, but with a choice of pictures: drums, organ and whistle.	
36	Sound Name	Identify the recorded sound of a tiger roaring.	The assessor plays a recording of the sound of a tiger roaring/dog barking/rooster crowing, and the child is asked to demonstrate movements and/or imitate animal sounds when the sound is heard.	
37		Identify recorded sounds of dogs barking.		
38		Identifying the sound of a rooster crowing		
39	Counting Sounds	Whistle twice.	The child sits cross-legged with his back to the assessor, and in front of the child's left there are 6 straws. The assessor plays a whistle according to the instrument. The child is asked to move the straw from the child's left to the child's right as many sounds are heard.	
40		Whistle four times.		
D	Sound Understanding			

41	Background Sound	Lightning sound.	The position of the child facing the sound system. The assessor plays a recording of the sound of lightning. Children are asked to demonstrate the movement of rain falling while saying rain
42		The sound of the bell	The child's position is the same as point 41, and the child demonstrates and/or says "enter/rest/go home" (according to the situation/through role-playing) when hearing the sound of the bell.
43		Assessors play a recorded car horn sound through a simulation of walking on the highway.	Children are asked to demonstrate "step aside" to the side of the road, when they hear the sound of a car horn, through simulation activities.
44	Language Sound	Saying "mother"	The child stands/sits in front of the assessor and is asked to
45		Saying "hat"	imitate/signify the assessor's speech.
46		Saying "ball"	When speaking, the assessor covered his mouth with his five fingers or paper in a straight (not curved) position. Likewise for the next point.
47		Saying "what is your name?"	The child stands / sits in front of the assessor and is asked to
48		Saying "What grade are you in?"	answer the assessor's questions, orally and / with gestures, or in
49		Saying "What day is today?"	writing.
50		Saying "Open the door!"	The child stands / sits in front of the assessor and is asked to do the assessor's orders.
			Total score

TEST RESULT ANALYSIS

- The calculation formula for the percentage of assessment:
  Acquisition score/Maximum score x 100%
- Assessment criteria:
  Very Good : 90% - 100%
  Good : 70 % - 89%
  Good Enough : 55 % - 69 %
  Not good : ≤54%

Assessment Description:

Very Good : Children are able to perceive sound very well.
Good : Children are able to perceive sound well

Not good : Children are less able to perceive sound

Not good : The child has not been able to perceive sound

Discussion(s)

Development of Sound and Rhythm Perception is part of the Sound and Rhythm Perception Communication Development service, which is a special program in educational services for children with hearing impairment. Sound and rhythm perception development service is a service to train the sensitivity/appreciation of children with hearing impairment to sound and rhythm. These services must be in accordance with the needs of children with hearing impairments identified through assessment. Therefore assessment activities are a must for teachers to carry out. This is in accordance with the opinion of Soendari, Abdurahman, & Mahmud (2008, p.1) that The assessment data can be used as material in the preparation of individual learning programs. In this regard, assessment becomes a competency for all teachers, especially in dealing with children with special needs. Based on the results of the assessment, the teacher can arrange a program according to the conditions and learning needs, so that learning is expected to run effectively and efficiently. Thus, the child can optimize the function of the remaining hearing he still has. This is in accordance with the results of the research that "Effective Sound and Rhythm Perception Communication Development Materials really help deaf children in optimizing their remaining hearing (Khalilurrahman and M. Afdhal, 2011).

The assessment instrument for sound and rhythm perception consists of aspects of sound detection, sound discrimination, sound identification, and sound comprehension. This is in accordance with the curriculum of special programs for children with hearing impairments as well as with various literatures, as stated by Sadjaah & Sukardja (1996); Hernawati & Supriatna (2018) that the development program for sound and rhythm perception includes sound detection, sound discrimination, sound identification, and sound comprehension.

The assessment instrument produced through this research has only reached the stage of conceptual validation or content validation by experts who are competent in the field of measurement and children with hearing impairments as well as practitioners/teachers of Extraordinary Schools/ State Special Schools Cicendo, Bandung.

CONCLUSSION

The preparation of the instrument was carried out based on curriculum analysis and literature analysis. The preparation is carried out through three stages, namely the first stage, conducting curriculum analysis and literature study; the second stage, the design of the assessment instrument; the third stage, validation of the assessment instrument by experts and practitioners. The design of the assessment instrument was validated by measurement and education experts for children with hearing impairments as well as by teachers at the Special School/State Special School of Cicendo Bandung, which is a special school for children with hearing impairments. The scope of assessment instrument of sound and rhythm perception includes aspects of sound detection, sound discrimination (with sub-aspects of long-short sound; high-low sound; fast-slow sound; loud - weak sound; music time bar 2/4, 3/4 and 4/4; pop and dangdut music); Sound identification (with sub-aspects of sound direction, sound source, sound names, and counting sounds); and sound comprehension with/without using hearing aids to the extent of residual hearing (with sub-aspects of background sounds and language sounds).

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