Development of language, Mathematics and self-independence abilities of a five-year-old with speech delay using educational toys

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ABSTRACT

The objective of this research was to identify the development of language and Mathematics abilities as well as self-independence of a five years old child with speech disorder. The study was conducted in eight weeks period in which playing with educational toys had been the main activity. This is a descriptive qualitative research in which the data were collected using direct interviews, checklist instruments and observations. Based on intensive observations using the four point Likert scale, there were medium increases in the observed variables. For the language ability the average score increased from 1.5 to 2.9 with the N-gain of 0,56, for the Mathematics ability the average score increased from 1.7 to 3.0 with the N-gain of 0,57 and for the self-independence the average score increased from 2.1 to 3.0 with N-gain of 0,47. A longitudinal study on the child for one or two years is needed to arrive at more meaningful and conclusive findings.

Keywords: Speech, Disorder, Educational, Toys, Language, Development, Math, Self-Independence.

INTRODUCTION

This research was based on the delay of language and Mathematics abilities as well as self-independence of a five-year-old child, who had very limited verbal and written language abilities. The language delay of the research subject was clearly seen in the difficulties experienced by the child in communicating with others especially in stating information, producing words, and building simple sentences. The subject had limited vocabulary as she could only produce 20 words and not all words could be pronounced clearly and completely. Those things showed that the child had not achieved the age appropriate language development stage where she should have had around 10,000 words in her vocabulary and was able to master more complex grammar (Berk, 2012, pp. 385-387).

The weakness in this verbal ability had an impact to the lack of written language ability especially in terms of writing, identifying letters as well as basic Mathematics. Moreover, the subject of this research lacked self-independence and has always protected herself from social interactions with people outside her family by covering up her face or avoiding interactions with unfamiliar faces.

The inappropriate parenting style in supporting the language, cognitive and self-independence development of the child and the parents' tardiness in realizing that their child had a communication problem resulted in a long and lengthy process to overcome the disorder. The therapy undergone by the child to help overcoming the disorder had been going on for more than a year, with little improvement.

From the issues stated above, this research was aimed to know the development of the subject in verbal and written language, basic Mathematics, and self-independence abilities through various learning activities by playing activities with a variety of educational toys found at home or at school and would be used by both parents and teachers.

METHODOLOGY

This research was conducted using a case study approach that has been part of qualitative research. Wicks-Nelson dan Israel (2006, 76) stated that a case study is a descriptive method generally used to investigate behaviour disorders. Two main data collection techniques used in this research were (1) in-depth interviews with the parents, the speech therapist and the household assistance of the research subject and (2) recording of events using checklist sheets. The other data collection techniques used as complements to this research were (1) direct observation on the research subject, (2) analysis of written documentation such as the therapy log book and use of a camera and video to record the activities of the subject. The collected data were then validated using source triangulation, analyzed using average calculation and N-gain analysis, and then presented in a descriptive manner.

The research was conducted from January 2015 to May 2015. The subject of this research was a five-year-old girl who suffered from speech disorders and chosen intentionally. In this research, the subject was observed in her regular daily life with the intention to learn about the development of her language abilities in both verbal and written, her basic Mathematics abilities and her self-independence development during the learning process.

RESULTS AND DISCUSSION

Based on the result of the source triangulation, it was found that she has issues in the development of her language, basic Mathematics abilities and self-independence as shown in Table 1. From the table 1, it is evident that based on the Likert Scale of 1-4, her abilities in language had an average score of 1.5 and an average score of 1.7 in her basic Mathematics abilities, which put her in the category of unable. Her self-independence abilities were in the category of less able with an average score of 2.1.

Table 1 Language, Mathematics and self-independence abilities before the learning process

Indicators	R	P	T	Average
Language Development				
Ability to listen, distinguishes, produces sounds and communicates verbally.	1.7	2.0	1.8	**1.8**
Ability to enrich vocabularies needed during daily conversation.	1.3	1.5	1.5	**1.4**
Pre-Reading	1.0	1.4	1.2	**1.2**
Pre- Writing	1.0	1.0	2.0	**1.3**
Average	**1.3**	**1.5**	**1.6**	**1.5**
Math Development				
Ability to make a simple classification	2.0	2.0	2.0	**2.0**
Identify numbers	1.3	1.8	1.8	**1.6**
Identify geometrical shapes	1.6	2.0	1.6	**1.9**
Ability to measure	1.5	2.1	1.1	**1.6**
Ability to create a pattern	1.0	2.0	1.0	**1.3**
Identify spaces and positions	1.0	2.0	1.0	**1.3**
Average	**1.4**	**2.0**	**1.5**	**1.7**
Self-Independence Development				
Ability to wear clothes	2.0	2.6	1.8	**2.1**
Ability to put on and take off own shoes	2.3	2.8	2.5	**2.5**
Ability to maintain self-cleanliness	1.7	2.2	1.4	**1.7**
Ability to eat/drink	2.3	2.8	2.5	**2.5**
Ability to do activities independently	2.3	2.8	2.1	**2.4**
Average	**2.0**	**2.5**	**1.9**	**2.1**

Notes: Based on Likert Scale (1-4): Sources of data: R = Researcher, P = Parent, T=Therapist

Looking into the issues experienced by the subject, then learning through playing activities using the ET were conducted to help her development. The primary reason for using the ET is that the toys used can help her explore, practice problem solving by repeating activities, interact physically and use her sensory capacities in doing the playing tasks, see the connection of a Mathematics concept with her own real life, realise the mistakes done and correct them while learning and develop her self-confidence.

During the learning process, the playing activities with the ET were proven to be effective in developing her limited abilities. Moreover, she also felt comfortable, relaxed and happy in doing the playing tasks given so that she dared to try and learn new things. This kind of emotional condition and learning environment were very conducive for her to help absorb many things from the learning activities provided.

Language development
The results of her learning activities for her language abilities are shown in Table 2 and Table 3.

Table 2. Language development before and during the learning process - (W.1-W.8)

Indicators	Before	During the Learning Process							
		W.1	W.2	W.3	W.4	W.5	W.6	W.7	W.8
Vocabulary	20	+ 17	+ 22	+ 41	+24	+30	+15	+16	+ 50
Building Sentences	Unable	Copy	Copy	Able to create a simple sentence using 2-3 words.	Able to create a sentence using 2-4 words				Able to create a sentence automati-cally
Pre-reading	Unable to identify any letters	Identify letter A and I	Identify A, I, U, E, O	Identify letter A, I, U, E, O	Identify vocal and some consonant letters such as B, F, H, K, M, S, Y				
Pre-writing	Unable to write letters	Able to write with help	Able to trace letters and cut them		Able to copy letters		Able to write her own name and write familiar letters		

Notes: W.1-W.8: result from week 1 until week 8 throughout the learning process.

From Table 2 above, it is shown that at the end of the learning process, (1) she could say and understand 215 new words, although with some faulty pronunciation, (2) she could make simple sentences (comprising of: subject + verb, subject + noun, subject + pronoun + verb + noun, subject + predicate + object by combining 2 – 4 words), (3) she could identify and write 12 letters and (4) she started to be able to draw shapes. Table 3 below also showed her improvement from the category of unable to almost able with an average score of 2.9 (scale 1-4).

Table 3. Average scores of subject's language development before and after the learning process

Indicators	Before		After	
	Score	Category	Score	Category
Ability to listen, distinguishes, produces sounds and communicates verbally.	1.8	Unable	3.1	Able
Ability to enrich vocabularies needed during daily conversation.	1.4	Unable	2.8	Almost able
Pre-Reading	1.2	Unable	2.7	Almost able
Pre- Writing	1.3	Unable	2.8	Almost able
Average	**1.5**	**Unable**	**2.9**	**Almost able**

Notes: Score is based on Likert Scale 1-4.

Beside calculating the increase in average scores, an analysis of the N-gain was also carried out to know how much her language abilities have improved. Her N-gain score was 0.56, which means that the improvement achieved was at the medium level.

It was evident from the learning with the ET that the continuous input given in the form of new words has improved her speech response and helped the muscles of her organs of speech to accommodate the new words structure. More intensive treatment in a much longer period of learning is required in order to achieve better improvement in the future, considering that her condition is somewhat far behind as compared to the normal condition of the children at her age.

Mathematics development

Various ET have been proven very effective in providing stimuli to help her basic Mathematics abilities development. The forms of the ET used were jigsaw, cards, blocks, household appliances and utensils, and worksheets which focused on hands-on learning. The result of her basic Mathematics abilities development from the learning activities are shown in Table 4.

Table 4. Basic Mathematics abilities development before and during the learning process

Indicators	Before	During the Learning Process							
		W.1	W.2	W.3	W.4	W.5	W.6	W.7	W.8
Ability to make a simple classification	Unable	Unable				Able to classify based on shapes and colors.		Able to classify based on shape, colors, and sizes.	
Identify numbers	Able to say 1-3, unable to count and to identify numbers.	No significant changes			Began to count 1-4	Began to count 1-5, and to identify number 1,2,3	Began to count 1-6, and to identify number 1,2,3,4 and 5	Able to count 1-6, and to identify number 1,2,3,4,5	
Identify geometrical shapes	Unable to identify any shapes	No significant changes			Able to identify △○□	Able to identify △ ○ □ ♡			Able to identify △○□☆♡
	Able to complete ≤6 pieces puzzle	No significant changes	Able to complete ≤9 pieces puzzle with help		Able to complete > 9 pieces puzzle without any help				
Ability to measure	Unable to understand any measurement concept	Learned to distinguish big and small			Able to put objects in order from the biggest to the smallest	Understand the concept of big-small, high-low, long-short, empty-full.			
Ability to create a pattern	Less able	No significant changes				Able to create pattern using two different colors/shapes with help		Able to create pattern without any help	
Identify spaces and positions	Less able	No significant changes				Identified the concept of top-bottom and here-there		Identified the concept of in-out, front-back, forward-backward.	

Note: W.1-W.8: result from Week 1 until Week 8.

The result of the source triangulation using the checklist (Table 5) showed an increase in the average scores from 1.7 to 3.0. Using the Likert scale 1-4, it means that her basic Mathematics abilities development improved from the unable category to the able category with an average score of 3.0. Her N-gain score achieved was 0.57 which was at the medium level.

Table 5. Average scores of subject's basic Mathematics abilities development before and after the learning process

Indicator	Before		After	
	Score	Category	Score	Category
Ability to make a simple classification	2,0	Less able	3,3	Able
Identify numbers	1,6	Unable	2,7	Almost able
Identify geometrical shapes	1,9	Unable	3,1	Able
Ability to measure	1,8	Unable	2,9	Almost able
Ability to create a pattern	1,3	Unable	3,3	Able
Identify spaces and positions	1,3	Unable	3,0	Able
Average	**1,7**	**Unable**	**3,0**	**Able**

Note: Score is based on Likert Scale 1-4.

Self-independence development

The results of the learning activities of the research subject in self independence development are shown in Table 6.

Table 6. Subject's self-independence development before and after the learning process

Indicator	Before	After
Ability to wear clothes	She was able to take off her own clothes, but she still needed help to put on clothes.	She was able to wear clothes, diaper and underwear without any help.
Ability to put on and take off own shoes	She was able to put on her shoes with help from an adult.	She was able to put on her shoes without any help.
Ability to maintain self-cleanliness	She still needed help in doing toilet/bathroom activities.	1. She was able to take a bath, put on soap with little assistance. 2. She was able to change the diaper by herself and to clean herself. 3. She was able to wash her hands properly without being told.
Ability to eat/drink	She was fed by others.	1. She was able to serve and feed herself 2. She was able to clean up and wash the dishes by herself.
Ability to do activities independently	1. She made excuses to avoid tidying up the toys. 2. She constantly needed someone to accompany her to play in order to keep her focus. 3. She rarely initiated others to play with her.	1. She was able to choose her own activities and to tidy up the toys. 2. She could play independently. 3. She didn't cry when her parents leave her. 4. She initiated a play 5. She was able to complete her tasks with ease and on time.

From Table 7 it is obvious that using Likert scale 1-4, her self-independence development after the learning activities was at the category of able with an average score of 3.0, a significant increase as compared to where the research subject was at the beginning of the learning activities where she was at the category of less able with an average score of 2.1. The N-gain score calculated also for her self-independence development showed a score of 0.47 which meant that the level of improvement of the research subject was at the medium level.

Table 7 average scores of subject's self-independence development before and after the learning process

Indicator	Before		After	
	Score	Category	Score	Category
Ability to wear clothes	2.1	Less able	3.0	Able
Ability to put on and take off own shoes	2.5	Less able	3.1	Able
Ability to maintain self-cleanliness	1.7	Unable	2.8	Almost able
Ability to eat/drink	2.5	Less able	3.3	Able
Ability to do activities independently	2.4	Less able	3.2	Able
Average	**2.1**	**Less able**	**3.0**	**Able**

Note: Score is based on Likert Scale 1-4.

The techniques used during the learning activities period proven to yield good results to her self-independence development were: Giving her opportunities to try doing many things independently, such as taking her own meals and feeding herself, letting her do her own toilet things like changing her own diapers, washing herself, and changing her clothes. Using positive and non judgemental words in soft tone, which managed to encourage her to keep on trying things even when she did a mistake or failed to complete the tasks. And using educational toys can stimulate and challenge her to play and do activities on her own eventually creating her own plays.

CONCLUSIONS

The initial condition of her language development was in the "unable" category with an average score of 1.5. At the end of the learning process, it is shown that the average score increased to 2.9, which showed that she was in the "almost able" category. Her language development stage was at the medium level (N-gain of 0.56). Her basic Mathematics abilities development condition at the beginning of the research was in the "unable" category with an average score of 1.7. At the end of the learning process the average score increased to 3.0 which meant that she reached the "able" category, with an N-gain of 0.57 (the medium level). The initial condition of her self-independence was in the "almost able" category with an average score of 2.1. At the end of the learning process, she managed to get an average score of 3.0, which meant that she was in "able" category, with an N-gain of 0.47 (the medium level)

To sum up, the learning through playing with the educational toys (TE) was proven to give positive impacts to the development of language, Mathematics and self-independence of the research subject because playing gave a pleasant condition for her to avoid pressure and stress in learning and even made her love the activities conducted. Subconsciously the research subject learned about new things and managed to absorb her new learning's in a better way. However, playing would not be enough if it was not supported by the right and appropriate educational toys that suit the child development stage. Particularly for the research subject that has speech disorder, the education toys used during playing could also be the means to communicate and to interact with others, to demonstrate her ability that could not be expressed verbally and to help the researcher to observe the improvement of the research subject.

RECOMMENDATIONS

Several recommendations that could be implemented by the parents and the teachers to help the research subject to develop her language, Mathematics and self-independence abilities are as follows: Give good examples and models while speaking. The simple words and sentences used must be clearly pronounced and said repetitively using the correct grammar. Improve the parenting style applied at home by giving her opportunities to speak to express her thoughts and emotions, providing a specific time to learn and to play, giving various stimuli and avoiding too much assistance. Invite peers or adults who can encourage her to be more open and willing to communicate with others. And

The parents must be able to work together with the therapist or the teacher so that the process of learning provided by them can be reinforced at home.

Conduct further qualitative research using *single subject research* design method or a full experimental design in which there will be a control subject or group. Study also other variables such as the aspects of parenting, self-autonomy, self-confidence, learning situation, and effectiveness of the therapy given to her and conduct more comprehensive analysis of the findings. Carry out longitudinal research in order to measure the development of the research subject in a long term framework.

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