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Original research

The Effect Of Picture Memory Training On Children's Language Skills

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ABSTRACT

Background: *Information on how students' academic performance is also determined by their language profile is limited. The use of picture memory exercises has never been provided by teachers in schools. This study aims to determine the effect of picture memory training on improving children's language skills.*

Methods*: This study used an experimental design by giving treatment to children over a period of time and then measuring their language proficiency profile. The intervention was conducted using the picture-memory approach. The study design involved a single-group intervention with assessments conducted before and after the intervention. The target of the intervention is children with language impairment.*

Results: *From the results of the Wilcoxon test, it was found that receptive language skills, especially receptive vocabulary, showed a p-value of 0.002. These results indicate that the picture memory intervention is able to improve receptive vocabulary skills. For expressive vocabulary, a p-value of 0.034 was found. The result also showed that the picture memory intervention was able to improve expressive vocabulary. Picture memory intervention resulted in changes in receptive vocabulary with an r-value of 0.44. Picture memory intervention resulted in changes in expressive vocabulary with an r-value of 0.29.*

Conclusion: *The results of the analysis showed a difference in impact where the receptive vocabulary component was the component that changed more than the expressive vocabulary. However, the provision of a picture memory training intervention can be said to be able to improve language skills in general.*

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INTRODUCTION

The case of language impairment in children is of particular concern in various countries because it has an impact on the child's learning process in the future. It is estimated that 9.92% of children have language impairment, which is caused by various factors (Norbury et al., 2016). Tchoungui Oyono et al., (2018), in their research in

Cameroon, found that 4.3% of children had language impairment and 3% of children had receptive language impairment. Meanwhile, Smith et al., (2021), in their research in Australia, found that the proportion of children with language problems reached 24.9%.

Matte-Landry et al., (2020) stated that children with persistent language delays continue to show language difficulties throughout elementary school. Furthermore, they experience academic difficulties in counting and psychosocial difficulties (attention-deficit/hyperactivity disorder behavior, externalizing behavior, peer difficulties) from Grade 1 to Grade 6. So it can be said that the preschool period is a critical phase for a child to be able to know for sure whether there are language problems and the need for immediate intervention.

On the other hand, memory ability is one of the executive function abilities that a child needs to develop his language skills. Dabrowska et al., (2020) found that literacy helps in the acquisition of some aspects of grammar. This could be partly due to differences in IQ, metalinguistic awareness, memory, and/or executive function. What this means is that memory ability plays a vital role in a child's language formation.

So far, information on how the academic ability of students is also determined by how the profile of children's language skills is still very minimal in Surakarta. The use of picture memory exercises is never given by teachers in schools either. Speech therapists carry a great responsibility in the prevention and treatment of developmental language disorders in children, both in assessment instrumentation, training instrumentation, provision of therapeutic facilities, and variants of effective forms of activities or exercises to assist in clinical action.

This study offers a form of exercise that focuses on involving children's memory function, especially in pictures, to improve their receptive language skills and to find out whether the provision of picture memory exercises has an effect on improving children's receptive language skills in Surakarta.

MATERIALS AND METHODS

This study has an experimental design by giving treatment to children within a certain period of time, and then measuring the profile of receptive language skills. Descriptive statistics were used to determine the demographic variations of the research data to be collected. Hypothesis testing used descriptive statistics and t-tests to see the impact of treatment on the components of the research variables.

The study design used was experimental. The intervention was conducted using the picture memory method to improve language skills. The intervention was performed on one group to test the effectiveness of using pictures in speech therapy intervention. Respondents are children with language impairments. Data collection was conducted from May to August 2023. The number of respondents involved was 25 children with language impairment.

RESULTS

The following are the results of the characteristics of the respondents who have been studied.

Table 1. Research Descriptive Data

Variables	N	%
Gender		
Male	22	88

Variables	N	%
Female	3	12
Diagnosis		
ADHD	1	4
ASD	1	4
DLD	21	84
ID	1	4
SSD	1	4
Child Speech Level		
Non Verbal	9	36
Word	10	40
Word Combination	3	12
Sentence	3	12

Description: ADHD: Attention Deficit Hyperactive Disorder; ASD: Autism Spectrum Disorder; Developmental Language Disorder: ID: Intellectual Disability; SSD: Speech Sound Disorder. Based on Table 1, it can be seen that male respondents dominate with a percentage of 88%. Judging from the diagnosis experienced by the child, Developmental Language Disorder has the highest percentage of 84%. In terms of children's speech levels, it can be seen that the word level is the most common level of speech owned by children.

Table 2. Age Characteristics of Children

Mean	SD	Median	Minimum	Maximum	95% CI
48.64	15.54	44	27	99	42.22 – 55.06

Table 2 shows that the ages of the children involved in the study varied. The mean age of the children was 48.64 months.

Picture Memory Intervention

A picture memory intervention is an intervention provided to strengthen cognitive and language processes simultaneously by using picture stimuli presented. This intervention is carried out on children with communication enhancement needs. The main target of the intervention is children with language problems or disorders. The picture memory intervention consists of 12 sessions, with the number of pictures targeted in each session being 50 pictures. Details of the intervention results in each session are described in the table below.

Table 3. Outcome Distribution of Each Intervention

Intervention	Mean	SD	Median	Min	Max	95% CI
1	4.32	4.42	3	0	15	2.49 – 6.15
2	4.48	4.85	4	0	16	2.48 – 6.48
3	4.32	4.47	3	0	15	2.47 – 6.17
4	4.24	4.52	3	0	14	2.37 – 6.11
5	4.68	5.14	3	0	17	2.56 – 6.80
6	4.92	5.35	4	0	18	2.71 – 7.13
7	5.12	5.31	4	0	18	2.93 – 7.31
8	5	5.49	4	0	19	2.73 – 7.27

Intervention	Mean	SD	Median	Min	Max	95% CI
9	4.88	5.41	3	0	20	2.65 – 7.11
10	5.08	5.93	4	0	21	2.63 – 7.53
11	5.52	5.86	5	0	21	3.10 – 7.94
12	5.48	5.59	4	0	18	3.17 – 7.79

Pre-Test Assessment

The pretest assessment was conducted to see the language ability before the intervention. Pre-intervention assessment was conducted by measuring receptive language and expressive language skills. Measurements were carried out systematically on vocabulary aspects. Measurement of vocabulary comprehension ability using the Receptive Verbal Vocabulary Test (TKV-R) and for expressive vocabulary ability using the Expressive Verbal Vocabulary Test (TKV-E) made by Setiawan.

Table 4. Pre-test Data Characteristics

Component	Mean	SD	Median	Min	Max	95% CI
TKV-R	9.56	5.67	9	3	25	7.22 – 11.90
TKV-E	5.76	5.85	5	0	20	3.34 – 8.19

When viewed from the table above, it can be seen from the mean value that receptive vocabulary ability has a higher value. This is directly proportional to each test component.

Post Test Assessment

The post-test assessment was conducted to see the language ability after the intervention. Assessment after intervention is done by measuring receptive language and expressive language skills. Measurement of intervention results was carried out systematically on the aspect of children's vocabulary. Measurement of vocabulary comprehension ability using TKV-R. For expressive vocabulary ability using TKV-E.

Table 5. Post-test Data Characteristics

Component	Mean	SD	Median	Min	Max	95% CI
TKV-R	10.60	5.15	9	4	26	8.32 – 12.88
TKV-E	6.16	6.39	5	0	22	3.52 – 8.80

When viewed from table 5, it can be seen from the mean value that receptive vocabulary ability has a higher value. This is directly proportional to each test component.

Intervention Outcome Difference Test

To find out the difference before and after the memory intervention, it is necessary to conduct a t-test. The results of the normality test using the Shapiro-Wilk test found that all data had an abnormal data distribution. To conduct a difference test, it is necessary to use the Wilcoxon test. The specific results are described in the table below.

Table 6. Descriptive Statistics of Wilcoxon Test Analysis

	N	Mean	Standar Deviation
TKV-R Pre-Test	25	9.56	5.67

	N	Mean	Standar Deviation
TKV-E Pre-Test	25	5.76	5.85
TKV-R Post-Test	25	10.60	5.15
TKV-E Post-Test	25	6.16	6.39

Table 6 shows that the distribution of measurement respondents between before and after the intervention did not differ. Furthermore, to see whether there is a change in each data item, it is explained in the table below.

Table 7. Wilcoxon Test Analysis Ranks

		N	Mean Ranks	Sum of Ranks
TKV-R Post Test – TKV-R Pre-Test	*Negative Ranks*	3[a]	9.00	27.00
	Positive Ranks	18[b]	11.33	204.00
	Ties	4[c]		
	Total	25		
TKV-E Post Test – TKV-E Pre-Test	*Negative Ranks*	1[d]	3.50	3.50
	Positive Ranks	7[e]	4.64	32.50
	Ties	17[f]		
	Total	25		

Description:
TKV-R Post Test < TKV-R Pre Test
TKV-R Post Test > TKV-R Pre Test
TKV-R Post Test = TKV-R Pre Test
TKV-E Post Test < TKV-E Pre Test
TKV-E Post Test > TKV-E Pre Test
TKV-E Post Test = TKV-E Pre Test

Table 8. Test Statistics of Wilcoxon Test Analysis

	TKV-R PostTest – TKV-R PreTest	TKV-E PostTest < TKV-E PreTest
Z	-3.14	-2.12
Asymp. Sig. (2-tailed)	0.002	0.034

Wilcoxon test results found that in receptive language skills, especially receptive vocabulary, the test results showed a p-value of 0.002. This result shows that the picture memory intervention is able to improve receptive vocabulary skills. For expressive vocabulary, it was found that the p-value was 0.034. The result also showed that the picture memory intervention was able to improve expressive vocabulary.

Effect Size
To demonstrate the impact or significance of the intervention, an effect test analysis was conducted. The results of the effect test are described in the table below.

Table 9. Intervention Effect

	Receptive Language Ability	Expressive language Ability
Z	3.14	2.12
N	50	50
N Root	7.07	7.07
r Value	0.44	0.29
Description	Medium intervention impact	Low intervention impact

Table 9 shows that there is a difference in scores between receptive vocabulary and expressive vocabulary. In the receptive vocabulary component, the result shows an r value of 0.44. This indicates that the picture memory intervention has a moderate effect on the receptive vocabulary component.

On the expressive vocabulary component, the result shows an r value of 0.29. The figure shows that the picture memory intervention has a low effect on the receptive vocabulary component. These results indicate that the picture memory intervention is able to improve children's vocabulary. The results of the analysis also showed a difference in impact where the receptive vocabulary component was the component that changed more than the expressive vocabulary.

DISCUSSION

The results of statistical tests show that the picture memory intervention has an impact on children's language skills, especially on vocabulary. In the receptive vocabulary component, the results showed an r value of 0.44. The figure shows that the picture memory intervention has a moderate effect on the receptive vocabulary component. On the expressive vocabulary component, the result obtained on the r value of 0.29.

The figure shows that the picture memory intervention has a low effect on the receptive vocabulary component. These results indicate that the picture memory intervention is able to improve children's vocabulary. The results of the analysis also showed a difference in impact where the receptive vocabulary component was the component that changed more than the expressive vocabulary. This is in line with the research of Henry et al., (2022), who found that intervention programmes have the potential to improve working memory and language comprehension in DLD children.

Memory intervention is a cognitive-based intervention. The intervention is carried out by providing stimulus in the form of images with the target of children's working memory. Cognitive and language are two components that have interdependence. The relationship between cognition and language is positively linear (Allotey et al., 2018; Carruthers, 2003; Casby, 1997; D'mello & Gabrieli, 2018; Loeb et al., 2020; Weiner, 1969). This means that better cognitive function will have a positive impact on the child's language component. Working memory is one of the indicators that is capable of seeing children's capabilities in processing information.

The study also found that there was a difference in impact where the receptive vocabulary component was the component that changed more than the expressive vocabulary after the picture memory intervention, where the pictures presented were mostly objects that were familiar to the children in general. In their research, Starr et al., (2020) found a mnemonic benefit for familiar objects in adults and children between 4 and 9 years of age, with the possibility that familiar objects can be more easily labelled or that there are low-level visual feature differences between the two types of objects.

Thus, semantic knowledge affects visual working memory, which suggests that visual working memory capacity is not fixed but instead fluctuates depending on what is to be remembered.

Another explanation related to memory function is explained by Jackson et al., (2020). They revealed variations in three types of memory, namely working memory, declarative memory, and procedural memory. This study involved 104 children, consisting of 50 children with developmental language disorders and 54 children with normal language skills. The average age of the children was 6 years and 11 months. The study revealed that memory function in children with developmental language impairment and normal children had differences with higher scores in children without language problems or disorders.

Although this study was able to reveal that picture memory intervention has a positive impact on improving children's language skills, especially children's vocabulary. Shvartsman et al., (2023) stated in their research that there is a significant correlation between all memory components and mathematical ability and language knowledge. Complex working memory is centred in early literacy processes at kindergarten age, while simpler working memory processes in early numeracy skills in children.

Some further exploration is needed. In this study, the intervention was only conducted on children with neurodevelopmental issues. Exploration in other groups or populations is needed to reveal the relationship of picture memory intervention on improving language skills. The study did not specifically provide age restrictions for children, so age restrictions are needed in future studies. There needs to be a control group to see the effectiveness of significant interventions.

CONCLUSION

The picture memory intervention resulted in changes in receptive vocabulary with an r-value of 0.44. The figure shows that the picture memory intervention has a moderate influence on the receptive vocabulary component. Meanwhile, the picture memory intervention produced changes in expressive vocabulary with an r-value of 0.29. The figure shows that the picture memory intervention has a low effect on the receptive vocabulary component. The results of the analysis also showed a difference in impact where the receptive vocabulary component was the component that changed more than the expressive vocabulary.

Suggestions that need to be conveyed are the need for exploration in other groups or populations to reveal the relationship of picture memory interventions on improving language skills, the need for age restrictions in future studies, and the need for additional control groups to see the effectiveness of significant interventions. Research to reveal the effectiveness of using picture memory is needed to explore its impact on improving children's language skills. Studies involving controls in a wider generalisation area are necessary for future research.

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