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EARLY CHILDHOOD LANGUAGE TRANSFORMATION: IS STEAM (SCIENCE, TECHNOLOGY, ENGINEERING, ART, AND MATHEMATICS) LEARNING THE KEY TO IMPROVING LANGUAGE SKILLS?

Fitria Ramadani[1], Titin Faridatun Nisa'[2], Fajar Luqman Tri Ariyanto[3], Mardiyana Faridhatul Anawaty[4]
Universitas Trunojoyo Madura[1,2,3,4]
e-mail: fitriaramadani1130@gmail.com[1], titinfaridatunnisa@trunojoyo.ac.id[2], fajar.ariyanto@trunojoyo.ac.id[3], mardiyana.anawaty@trunojoyo.ac.id[4]

Abstract
This study is motivated by some children who experience barriers in language skills so it needs to be stimulated. This study aims to determine the effect of the STEAM (Science, Technology, Engineering, Art, and Mathematics) approach on the language skills of group B children. Language skills in this study include receptive and expressive abilities of children. This research was conducted with a quantitative approach through the experimental method of pre-Experimental design (One- Group Pretest-Posttest Design) with a research sample of 30 children in group B TKIT YAKHOLQI. For data collection, researchers used interview, observation, and documentation techniques. In data analysis, researchers used the paired sample T-test analysis technique to test the hypothesis with the prerequisites of normality test and homogeneity test. Based on the results of the study, it shows that the results of the paired sample T-test hypothesis test Sig. (2-tailed) 0.000 <0.05, which can be concluded that H0 is rejected and Ha is accepted, which means that the application of the STEAM approach has a significant effect on the language skills of children in group B TKIT YAKHOLQI. The STEAM approach in stimulating children's language skills by mentioning, asking, understanding, and communicating the activities that have been carried out.
Keywords: STEAM Learning, Language Ability

INTRODUCTION

Early childhood is said to be the next generation of the nation, so it is important for children to have the skills needed in the 21st century. This is a reminder for educators that education must be prepared, delivered, and adjusted to the current level of performance (Usman, Nisa', Prastyo, & Virdyna, 2020). In 21st century skills, one of them is communication skills. Communication is a process in conveying information that contains meaning from one to another. Therefore, communication involves humans in both interpersonal and group contexts (Bahri, 2018). In communicating language becomes a tool to communicate (Robingatin & Ulfah, 2019: 31). So it is necessary for

educators to stimulate language skills from an early age to optimize these communication skills.

The development of language skills has the aim that children can express thoughts conveyed using language appropriately, and be able to communicate well (Isjoni, 2010: 63). Language development is important for children, language is a way for children to communicate or interact with the environment around children in conveying their thoughts, ideas, feelings and desires (Wahidah & Latipah, 2021). It is important for educators to understand that to ensure children's effectiveness in communicating in various situations, children need extensive language skills. However, the reality is that not all children experience language expansion or development easily. There are about 10 percent of children experiencing various types of communication disorders such as problems in receiving language and problems in producing problems (Kartikowati & Zubaedi, 2020: 213). It is quantitatively proven that 40 percent to 60 percent of children who experience problems in language skills in preschool have the potential to be constrained in learning written language and academic lessons (Kartikowati & Zubaedi, 2020: 221).

Based on observations and interviews conducted by researchers at TKIT YAKHOLQI, various problems were still found in group B children related to their language skills. There are children who experience obstacles in their language development, especially receptive and expressive language skills have not been able to maximize. This is indicated by some children who are still unable to understand the commands or instructions given, they cannot ask or answer during learning, they have not been able to express their ideas verbally, have not been able to mention the concept of basic shapes and sizes such as half etc. During the learning process, children are less enthusiastic about learning and even tend to get bored which causes children not to be actively involved in learning. In addition, there are also children who do not know the name of the object being used. This shows the lack of children's vocabulary about the things around them. This is because the learning activities implemented at TKIT YAKHOLQI do not attract children's interest and active involvement.

Luluk (2014) states that indicators of children's language ability are divided into receptive and expressive abilities (Asmawati, 2014: 122). Receptive language is the ability to understand words and language related to the acquisition of information and

meaning from daily activities. Difficulties in this receptive language will cause difficulties in attention and listening even in behavior, such as in learning activities and other children's activities. This is because children have not been able to respond to requests and questions properly and appropriately (Khosibah & Dimyati, 2021). Meanwhile, children's expressive ability is the ability of children's language to express their feelings, thoughts, and ideas using spoken language (Setiawati, Chandra, & Karmila, 2022). Luluk (2014) further details that receptive abilities include children being able to listen with an understanding of language, give appropriate reactions to information conveyed orally, recognize common oral texts. Meanwhile, expressive includes speaking in a clear words to the listener, using language to communicate ideas and feelings, experimenting with words and sounds, and understanding the concepts of perception (Asmawati, 2014: 122).

To improve language skills in children, the educators need to understand the causes of disorders in language development. Faizin et al. stated that there are causes of children experiencing problems in their language development, including a lack of environmental stimulus to children's vocabulary, children need time to have intense interactions with both teachers and peers and the methods and media used in learning activities are less appropriate and less interesting which causes children to be bored in receiving learning in the classroom (Faizin, Masruhim, & Palenewen, 2022). Boring learning activities, monotonous and lack of use of play tools that can hone children's abilities can hinder children's development (Susanti, 2024).

One solution that can be used by educators to stimulate language development is to implement learning with an approach that invites children to be actively involved in it. Like the STEAM approach (Science, Technology, Engineering, Art, and Mathematics). The STEAM approach is an approach that can be used as interesting and meaningful learning (Atiaturrahmaniah, Bagus, Aryana, & Suastra, 2022). The STEAM approach can be an effort to develop children's abilities (Agusniatih & R., 2022). One of these abilities is language skills.

Based on the above problems, researchers are interested in examining the impact of learning through the STEAM approach on children's language skills. STEAM not only emphasizes providing theory but also real-world skills (Putri, Wulandari, & Febriastuti, 2021) which are where this STEAM approach emphasizes hands-on practice (Rahmawati,

2021). And when viewed from the STEAM learning objectives, namely providing fun experiences and good interactions between peers and adults. The STEAM approach provides opportunities for children to optimize their ability to communicate their knowledge creatively (Anizal & Hartati, 2022) and create an active learning environment (Maharani & Zulminiati, 2021). The STEAM approach is also related to children's real life. In addition, in the STEAM approach, children learn the concept of literacy, both math literacy and science literacy (Wahyuningsih et al., 2019). Several studies on learning through the STEAM approach to language development have been conducted.

Based on Nahowi's research, augmented reality technology can be integrated with the STEAM approach to stimulate children's language development. The study also explains that the STEAM approach through the help of augmented reality is effective for developing children's language skills (Nahowi, 2020). This is in line with Tinarti's research which states that the STEAM method can improve children's expressive language skills. This is because through the STEAM approach children gain experience continuously and increase the effectiveness of learning outcomes and are able to describe the learning they get directly (Tinarti, Purnamasari, 2022). Research related to STEAM was also conducted by Agusniatih in this study, one of the developmental aspects that can be stimulated through STEAM learning is language development (Agusniatih & R., 2022).

The purpose of this study is to investigate the effect of the STEAM approach on early childhood language skills. The STEAM approach makes an important contribution to early childhood education by providing a diverse learning environment and encouraging children to develop language skills such as increasing STEAM-related vocabulary, improving communication through collaborative activities and projects, and being fun learning that attracts children to participate.

RESEARCH METHOD

The research method is a series of activities that aim to obtain data with specific objectives. In this study using quantitative research methods with experimental research type pre-experimental design with (one group pre-test and post-test design) to test hypotheses regarding the relationship of the variables that researchers use (Sugiyono, 2019). In this study there is a pretest (before treatment) and posttest (after treatment).

Through the results of this pretest-posttest, the treatment that has been given can be known more accurately because there will be a comparison between the pre-test and post-test. The depiction pattern of one group pretest-posttest design can be described as follows:

$$O_1 \; X \; O_2$$

Figure 1 One group pretest-posttest design

Description:

O1: Pretest results (Language ability before treatment)

X: Treatment given (STEAM learning)

O2: Posttest results (Language ability after treatment)

The location or place of this research was conducted at TKIT YAKHOLQI Socah sub-district in the 2024-2025 school year, group B with 30 children. Sampling in this study used a non-probability sampling technique, namely total sampling or a technique in which all members of the population are used as samples (Sugiyono, 2019). This is because the population is less than 30 people. The data collection techniques used are interviews, observation and documentation. In analyzing the data, researchers used validity and reliability tests for data quality tests, normality tests (Shapiro-Wilk) and homogeneity tests for classical assumption tests, and paired-sample t-tests as hypothesis tests. There are two indicators of language ability in this study that are used as a measure of language development. These indicators have been developed into 9 instruments that have been validated by expert validators in their fields. Instrument validity and reliability tests were conducted at PGRI Banyuajuh Kindergarten for 36 children. The number of statements is 9 observation instrument items with 4 (four) answer choices. The results of the statements tested on teachers / educators were 9 valid statements, therefore all questions could be used for research materials.

Tabel 1 Uji Reliabilitas

Reliability Statistics

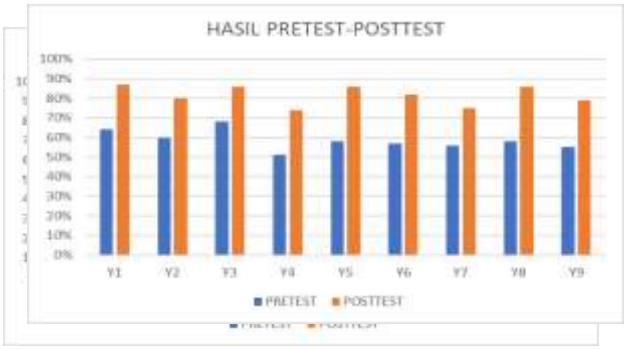
Cronbach's Alpha	N of Items
.788	10

Table 1 shows that the α value (0.788) ≥ 0.7. So it can be concluded that all statement items are said to be reliable and can be used for further research.

RESULTS AND DISCUSSION

Results

The data presented in Figure 2 are the results of the analysis of the pretest and posttest that has been carried out



There are 9 indicators that have increased in the pretest and posttest results, including mentioning all the materials used in the activity (Y1) experiencing an increase in initial ability of 64% to 87%, mentioning the tools used in the activity (Y2) having an initial ability increase of 60% to 80%, expressing verbally ideas about the colors used (Y3) having an initial ability increase of 68% to 86%, using words clearly to ask questions (Y4) increased from 51% to 74%, mentioning the concept of basic shapes in activities (Y5) increased from 58% to 86%, following instructions in activities (Y6) increased from 57% to 82%, understanding several orders or instructions simultaneously (Y7) increased from 56% to 75%, understanding the concept of size when doing activities (Y8) increased from 58% to 86%. However, in language skills literacy is also part of the indicators in language skills, so researchers also added a sub-indicator of arranging letters into a word (Y9) to increase the initial ability of 55% to 79%.

In order to draw the right conclusions from the research that had been carried out at TKIT YAKHOLQI, data analysis was carried out using the paired sample T-tests

statistical test. Before conducting this paired sample T-tests, researchers must test the normality (shapiro-wilk) and homogeneity of the data as requirements that must be fulfilled. This study used the help of SPSS 21 software, the selection of this test was because this study amounted to less than 50, namely 30 samples. In this study, the normality test used was Shapiro-Wilk using the help of SPSS 21 software.

H0: Data on language skills of children in group B TKIT YAKHOLQI is normally distributed

Ha: Data on language skills of children in group B TKIT YAKHOLQI is not normally distributed.

The significance level in this study is 5% or 0.05. With the basis for decision making

If Sig. > 0.05 then the data is considered normally distributed

If Sig. ≤ 0.05 then the data is not normally distributed

Based on the Shapiro-Wilk Method Normality Test, the following output results are obtained:

Tabel 2

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PRETEST	.093	30	.200*	.973	30	.618
POSTTEST	.129	30	.200*	.955	30	.229

Table 2 shows that the pretest significance result is 0.618> 0.05. The posttest significance result is 0.229> 0.05. Therefore, it can be concluded that Ha is rejected and H0 is accepted. This means that the pretest and posttest data for group B children at TKIT YAKHOLQI are normally distributed. As both data are normally distributed, it can be continued with other parametric statistical tests, namely the Homogeneity Test.

H0: The variance of the pretest and posttest scores of children's language skills in group B TKIT YAKHOLQI is homogeneous.

Ha: The variance of the pretest and posttest scores of children's language skills in group B TKIT YAKHOLQI is not homogeneous.

The significance level in this study is 5% or 0.05. The results are as follows:

Tabel 3

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
PRETEST	Based on Mean	.310	1	58	.580
	Based on Median	.313	1	58	.578
	Based on Median and with adjusted df	.313	1	54.470	.578
	Based on trimmed mean	.280	1	58	.599

With the decision-making guidelines for the homogeneity test, namely:

If the sign based on Mean > 0.05 then the data variance is homogeneous

If the sign based on Mean <0.05 then the data variance is not homogeneous

Based on the output above, it is known that the significance (sig.) Based on Mean is 0.580> 0.05. So, the conclusion obtained is that Ha is rejected and H0 is accepted, which means that the variance of the pretest and posttest values of children's language skills in group B TKIT YAKHOLQI is homogeneous. Hence, it can be said that one of the non-absolute requirements of the paired sample T-test has been met. In this study, the Paired Sample T-test was used to test the hypothesis, using the SPSS 21 program and a significance level of 0.05. The results of statistical calculations with SPPS 21 provide the following results:

Tabel 4

Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRETEST – POSTTEST	-7.45867	1.34649	.24583	-7.96145	-6.95588	-30.340	29	.000

H0: There is no significant difference between the average score of children's language skills before and after the application of the STEAM approach at TKIT YAKHOLQI.

Ha: The average score of children's language skills after the application of the STEAM approach at TKIT YAKHOLQI is higher than before the application of the STEAM approach

The significance level in this study is 5% or 0.05. Based on the significance (sig) the basis for decision making in the paired sample T-test is;

If the significance value ≤ 0.05 then H0 is rejected and Ha is accepted

If the Sig value (2-tailed) > 0.05 then H0 is accepted and Ha is rejected

Based on table 4, it can be explained that the value of Sig. (2-tailed) is 0.000 ≤ 0.05, then H0 is rejected and Ha is accepted. It can be concluded that the average score of children's language skills after the application of the STEAM approach at TKIT YAKHOLQI is higher than before the application of the STEAM approach. This shows that the application of the STEAM approach has an influence on the language skills of children in group B TKIT YAKHOLQI.

Discussion

From the results of the calculation of the hypothesis test, the Sig value has been obtained. (2-tailed) 0.000 <0.05 which indicates that H0 is rejected and Ha is accepted, which means that the application of the STEAM approach has an influence on the language skills of children in group B TKIT YAKHOLQI. There are differences in pretest and posttest results. The pretest results showed a value of 18.7 while the results of the posttest value were 26.2. In this study, children were formed into a group in order to create interaction between peers when discussing the activities carried out, and the activities were made as interesting as possible. The application of the STEAM approach in early childhood can be done by designing a learning environment that is conducive, fun, and provides space for children to create, explore, predict, and connect knowledge with experience (Novitasari., 2022).

In addition, in this research activity there are activities to make ships and filter water which refers to the indicator (Y4) children are able to use words clearly to ask questions so that it can stimulate children to ask about the steps or methods that must be done so that this can stimulate children to interact with the teacher by asking questions. This is in accordance with Pitaloka & Sinaga who state that with the STEAM approach educators can stimulate children's language skills to be more active in asking about new things encountered during learning (Pitaloka & Sinaga, 2023). One of the basics of STEAM skills according to (Imamah & Muqowim, 2020) is stimulating children to ask questions. In this indicator, children experience an increase in a passive child in learning has increased by starting to show their interest which is shown by their enthusiasm for asking questions during learning. It is also shown in the average of the pretest scores of all children shows 1.81 while the average posttest score shows 5.08.

The learning begins with showing animated videos related to the learning theme that will be carried out, namely the theme of water. This is to attract children's attention and interest before doing activities. This is evident when showing animated videos, children are very enthusiastic in watching and listening and even children can answer simple questions about the videos that have been shown. This is in accordance with research (Habibah & Nafiqoh, 2022) which states that in the results of their observations animated videos can be used in improving language skills in children, especially children's speech, this can be seen in the child's ability to answer simple questions and retell the contents of the video that has been shown.

In the learning that will be done, children are first introduced to the materials and tools that will be used in the activity. At this stage the indicators achieved are (Y1 and Y2) the child is able to mention the materials and tools used in the activity. In this study, the materials used partly used natural materials to increase children's science knowledge such as rocks, sand and water, partly using production materials such as cotton, tissue, food coloring, soap, oil and paper. In this case, children add vocabulary by mentioning the materials used.

In activities for early childhood in the science field, activities that can be applied according to child development, for example, mentioning and identifying various earth materials such as rocks, water, and soil (Alghamdi, 2022). According to Asmawati in (Mukaromah & Irmawati, 2023) natural materials such as sand, water and other natural materials. Natural materials can explore and improve all aspects of ability in children. The introduction of materials and tools in activities has increased by adding to the knowledge of children who previously did not know the kinds of natural materials that can be used in daily activities and the name of a tool and how to use it. The increase is also shown in the average of the pretest scores of all children showing 2.27 in indicator Y1 and 2.13 in indicator Y2 while the average posttest score shows 5.99 in indicator Y1 and 5.54 in indicator Y2.

This STEAM approach is an approach that can invite children to recognize mathematical concepts such as geometry and size concepts. This indicator (Y5 & Y8) is the most significant in this study. the Children are introduced to the shapes of triangles, squares, rectangles, and circles during boat building activities. Introducing the concept of size during water filter activities, where children are invited to measure cloudy water and filtered water using measuring instruments. According to Jamaris in (Robingatin & Ulfah, 2020) the children aged 5-6 years can already pronounce vocabulary which includes shape and size. In this STEAM activity, children are very enthusiastic and interested in doing boat making activities and water filtering activities and recognizing the concept of shape and size. The STEAM approach is able to develop understanding of geometry concepts in early childhood (Sa'ida, 2021). The increase is shown in the average of the pretest scores of all children showing 2.07 on indicator Y5 and 2.07 on indicator Y8 while the average posttest score shows 5.93 on indicator Y5 and 5.93 on indicator Y8.

In the mixing colors activity, the children are creative by creating colors. At this stage, the indicator developed is (Y3) children use language to communicate their ideas by being able to express verbally their ideas about the colors used. This is in accordance with Hidayati's research, one of the indicators developed in her research is children's ability to recognize colors such as the ability to mention classify and communicate the results of color mixing activities (Hidayati, 2020). Color mixing activities are carried out because the children basically like to play, do activities, and create new things. The increasing in this indicator can be seen when children try to mix colors themselves which can lead to the creation of new colors and children can communicate with the teacher about the colors they create. The increasing is also shown in the average of the pretest score of all children shows 2.42 while the average posttest score shows 5.93.

One aspect of language development is literacy. The introduction of literacy aims to improve children's language and thinking skills so that they can understand the basic concepts of reading, writing and counting. This will be a strong foundation for their future learning development (Fahmi, Syabrina, Sulistyowati, & Saudah, 2020). Children aged 5-6 years have been able to string letters into words. In the study, children were asked to arrange letters at the end of activities such as arranging letters to form the words boat, gravel, etc. The increasing is also shown in the average of the pretest score of all children shows 1.95 while the average posttest score shows 5.42.

CONCLUSIONS

Based on the results of research conducted on language skills with indicators of receptive and expressive language skills through STEAM activities at TKIT YAKHOLQI, it is concluded that the STEAM approach is able to stimulate children's language skills. This is evidenced by the results of the paired sample T-test hypothesis test which shows the results of Sig. (2-tailed) <0.05 which states that H0 is rejected and Ha is accepted. it means that the application of the STEAM approach has an influence on the language skills of children in group B TKIT YAKHOLQI. The STEAM approach in stimulating children's language skills in this study is by mentioning, asking, understanding, and communicating the activities that have been carried out. In addition, STEAM can increase children's vocabulary through the exploration of various concepts of science, technology and art, children will be affected with new vocabulary that is more specific and complex. However, although it can increase vocabulary, the STEAM approach may not specifically target certain aspects of language development such as

phonology. The STEAM approach creates fun and hands-on learning activities that stimulate children to be active in learning activities.

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