E-ISSN: 2962-6110
P-ISSN: 2964-7843
JSRET
jsret.knpub.com
Journal of Scientific Research, Education, and Technology

Learning Effectiveness Of STEAM Video Making Fruit Salad In Improving Early Childhood Cognitive Skills.

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ABSTRACT

This study aims to determine the effectiveness of using STEAM learning videos about fruit salad making in improving cognitive skills of children aged 5-6 years at Rising Stars Kindergarten Jakarta. The research type used is experimental research with a one-group pretest-posttest design. The research population comprises all 20 students aged 5-6 years at Rising Stars Kindergarten Jakarta. The sampling technique uses total sampling, so the entire population is used as the research sample. The data collection technique uses structured observation with an instrument in the form of an observation sheet consisting of 10 items to measure children's cognitive skills, including the ability to observe, compare, classify, and solve simple problems. The instrument's validity was tested using construct and content validity, while reliability was tested using Cronbach's Alpha. The data analysis technique uses descriptive and inferential statistics. The prerequisite analysis test includes a normality test with Kolmogorov-Smirnov and a homogeneity test. Hypothesis testing uses a paired sample t-test with a significance level of 0.05. The results show a significant increase in the average score of children's cognitive skills from 42.875 in the pre-test to 83.750 in the post-test. Hypothesis testing yields a Sig. (2-tailed) value of 0.000 < 0.05, indicating a significant difference between pre-test and post-test results. In conclusion, the use of STEAM learning videos about fruit salad making proves effective in improving cognitive skills of children aged 5-6 years at Rising Stars Kindergarten Jakarta, with all children showing positive development and the majority achieving the Very Well Developed (BSB) category..

Keywords: *STEAM, Cognitive, early childhood*

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INTRODUCTION

In the context of 21st century learning, the STEAM (Science, Technology, Engineering, Arts, and Mathematics) approach has become the main focus in education. According to Yakman (2008), the STEAM approach allows children to integrate various disciplines in problem-solving and creativity development. Ideally, STEAM learning in early childhood education can help children develop critical thinking, creativity, collaboration,

and communication skills that are indispensable in this digital era (Perignat & Katz-Buonincontro, 2019).

However, the reality is that the implementation of STEAM learning at the nursery level still faces various challenges. Based on research conducted by Fadillah (2022), many nursery teachers still have difficulty integrating the STEAM concept into the independent curriculum. This is due to a lack of understanding of the STEAM approach, limited resources, and a lack of adequate training (Fadillah & Yusuf, 2022). In addition, research conducted by McWhirter et al. (2022) shows that many early childhood education institutions still focus on conventional learning methods that do not stimulate children's cognitive development optimally (McWhirter et al., 2022).

Pre-observations conducted at Ceria Mandiri Kindergarten show that most of the learning activities are still teacher-centred and do not involve children in exploration and discovery. This can be seen from the dominance of teachers in explaining concepts and giving instructions, while children tend to be passive and only listen. In addition, the use of technology in learning is still very limited, even though children in this digital era are very familiar with technology devices from an early age.

On the other hand, technological developments have opened up new opportunities in the world of education, including the use of learning videos. According to research conducted by Berk (2009), the use of video in learning can increase motivation, concept understanding, and information retention in students (Berk, 2009). However, the use of learning videos at the PAUD level is still not optimal. Research conducted by Papadakis (2018) shows that many learning videos for early childhood are still passive and less interactive, so they are less effective in improving children's cognitive skills (Papadakis, 2018).

Previous research has shown the effectiveness of the use of video in learning in early childhood education. For example, research conducted by Bertrand & Namukasa (2023) shows that the use of animated videos can improve understanding of science concepts in early childhood (Bertrand & Namukasa, 2023). However, most of the existing learning videos are still general in nature and lack a comprehensive integration of the STEAM approach.

Based on this background, this study aims to develop and test the effectiveness of STEAM learning through videos of making fruit salad in improving early childhood cognitive skills. In contrast to existing learning videos, the videos developed in this study will integrate the concept of STEAM holistically in the process of making fruit salads.

The Science aspect will be reflected in the introduction of various types of fruit, its nutritional content, and the process of changing the colour of the fruit when cut. Technology will be introduced through the use of simple equipment such as plastic knives and fruit cutting tools that are safe for children. The Engineering aspect will be reflected in the process of designing and arranging fruit salads to be attractive and stable. Arts will be integrated through creativity in arranging and decorating fruit salads. Meanwhile, Mathematics will be applied in calculating the number of fruits, measuring portions, and introducing geometric shapes from fruit pieces.

These learning videos will also be designed with the characteristics of early childhood learning in mind. According to Howard Gardner's theory of multiple intelligences (1983), every child has a variety of intelligences. Therefore, the video will include various elements such as music, movement, narration, and interesting visualizations to accommodate different learning styles of the child (Cicalò, 2020).

The research will also consider sustainability aspects and practical applications. After watching the video, children will be encouraged to make their own fruit salad at home with parental guidance. This is in line with the concept of project-based learning which according to research by Helm & Katz (2016) is very effective in improving cognitive and social-emotional skills in early childhood (Helm, J. H., & Katz, 2016).

METHOD

The research method used in this study is an experimental research method, because this study tests the validity of a learning medium. In this case, what was tested was the STEAM learning video media about making fruit salad. Experimental research is research that is used to find the effect of certain treatments on others under controlled conditions (Sugiyono, 2017). This experiment aims to involve the consequences of the treatment. In the experimental group, the application of learning uses STEAM learning video media about making fruit salad. The population in this study is all students aged 5-6 years at Rising Stars Kindergarten Jakarta totalling 20 children. This study took the sampling technique in this study is total sampling. Total sampling is a sampling technique where the number of samples is equal to the population. The reason for taking the total sampling is because the number of population is less than 100. The sample taken was 20 students of Rising Stars Kindergarten Jakarta. In this study, the techniques to be used are observation, tests and questionnaires. In this research, the data collection instrument is in the form of an observation sheet. The data collection technique used to see the achievement of children's cognitive ability results uses a likert scale with a value of 1-4. Levels 1-4 are explained as follows: not yet developed (1), starting to develop (2), developing as expected (3), developing very well (4). If the percentage obtained exceeds 75%, then the child's cognitive ability is classified as "very well developed". However, on the other hand, if the percentage is below 44%, then the child's cognitive ability can be said to be "undeveloped" to be used in learning activities (Maslich, 2016). The paired sample t test is part of the comparative hypothesis test or comparative test. The data used in the paired sample t test is generally in the form of interval or ratio scale data (quantitative data). The paired sample t test aims to find out whether there is an average difference between two samples (two groups) that are paired or related.

FINDING AND DISCUSSION

RESEARCH RESULT

Table 1: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	42.875	20	9.005	2.0137
	Postest	83.750	20	14.083	3.1492

In the output of table 1 above, we are shown a summary of the descriptive statistical results of the two samples studied, namely the Pre Test and Post Test values. For the Pre Test score, the average cognitive ability of the child or Mean was obtained of 42,875. As for the Post Test score, the average score of children's cognitive ability was 83,750. The number of respondents or students used as a research sample was as many as 20 students. For the Std. Deviation value (standard deviation) in the Pre Test of 9,005 and the Post Test of 14,083. The last is the Std. Error Mean value for the Pre Test of 2.0137 and for the Post Test of 3.1492.

Because the average score of cognitive ability in the Pre Test is 42,875 < 83,750 in the Post Test, it means that descriptively there is a difference in the average cognitive ability of children between the Pre Test and the results of the Post Test. Furthermore, to prove whether the difference is really real (significant) or not, we need to interpret the results of the paired sample t test contained in the output table "Paired Samples Test".

Based on table 2 "Paired Samples Test" above, it is known that the value of Sig. (2-tailed) is 0.000 < 0.05, then H0 is rejected and Ha is accepted. So it can be concluded that there is an average difference between the cognitive skills of Pre Test and Post Test children, which means that the use of STEAM learning videos about making fruit salad significantly improves the cognitive skills of children aged 5-6 years at Rising Stars Kindergarten Jakarta.

Table 2: Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pre Assessment - Post Assessment	-40.87	17.4581	3.90376	-49.045	-32.704	-10.4	19	.000

DISCUSSION

Based on the results of the research that has been presented, it can be seen that the use of STEAM learning videos about making fruit salad has a significant positive impact on improving the cognitive skills of 5-6 year old children at Rising Stars Kindergarten

Jakarta. This can be seen from the increase in the average score of children's cognitive ability from 42,875 in the pre-test to 83,750 in the post-test.

This significant increase is in line with Piaget's theory of constructivism which emphasises that children learn through active interaction with their environment. STEAM learning videos on making fruit salads provide a concrete and interactive learning experience, allowing children to construct their own knowledge through observation, experimentation, and reflection. This is in accordance with the research of Rahmatunnisa et al. (2018) which found that the STEAM approach is effective in improving creative thinking skills in early childhood.

The science aspects of making fruit salad, such as the introduction of the types of fruit and their colour changes, help children develop observation and classification skills. This can be seen from the increase in children's scores in the aspect of observing and classifying on the post-test. These findings are reinforced by research by Katz (2017) which shows that science-based activities can improve early childhood observation and classification skills (Katz, 2017). The integration of technology aspects through the use of simple tools in making fruit salads helps children understand the function and how things around them work. This is in line with the research of Bers et al. (2018) which found that the introduction of simple technology concepts in early childhood can improve their understanding of the world around them and develop problem-solving skills (Bers, 2018).

The Engineering aspect of designing the composition of fruit salad encourages children to think critically and creatively. An increase in scores in the problem-solving aspect of the post-test shows that children are beginning to develop the ability to plan, test, and modify their ideas. This is in accordance with the findings of Lippard et al. (2020) which show that engineering activities in early childhood can improve higher-order thinking skills (Lippard & Nemeroff, 2020).

The art of arranging and decorating fruit salads not only develops children's creativity, but also helps them in understanding the concept of aesthetics and proportions. The increase in scores in the aspect of comparing on the post-test showed that children began to develop the ability to assess and compare their work. This is in line with Eckhoff's (2023) research which found that the integration of art in STEM learning can improve early childhood observation and evaluation skills (Eckhoff, 2023).

The mathematical aspect of calculating, measuring, and recognising the geometric shapes of fruit pieces helps children develop an understanding of basic mathematical concepts. The improvement in scores in the aspects of comparing and classifying on the post-test shows that children are beginning to develop logical and mathematical thinking skills. These findings are reinforced by the research of Clements and Sarama (2016) which shows that mathematics learning integrated with daily activities can improve early childhood mathematical understanding (Clements et al., 2016).

The results of the paired sample t-test which showed a p-value of $0.000 < 0.05$ confirmed that the difference in pre-test and post-test scores was statistically significant. This means that the improvement of children's cognitive skills is not a result of chance, but is the result of a learning intervention using STEAM videos on making fruit salads. These

findings are in line with a meta-analysis conducted by Thibaut et al. (2018) which shows that the STEAM approach consistently has a positive impact on early childhood learning outcomes (Thibaut et al., 2018).

Although the results of the study showed a significant positive impact, it is important to note that there is still variation in the rate of improvement between children. Some children achieved the maximum score, whilst others showed moderate improvement. This reminds us that every child has a different learning pace and may need additional support tailored to their individual needs. This is in line with the research of Lindeman et al. (2013) which emphasises the importance of a personalised approach in the implementation of STEAM in early childhood education (Lindeman et al., 2013).

CONCLUSION

The results of the paired sample T-test produced a Sig. (2-tailed) value of 0.000 < 0.05, which confirmed that the difference in pre-test and post-test scores was statistically significant. This proves that the improvement of children's cognitive skills is not a coincidence, but the result of learning interventions carried out. Overall, the results of this study reinforce the argument that the STEAM approach, when implemented through developmentally appropriate media such as interactive videos, can be an effective tool for improving early childhood cognitive skills. These findings have important implications for early childhood education practices, encouraging the development of more integrated and project-based curricula, as well as the appropriate use of technology in learning.

However, this study also has limitations, such as a relatively small sample size and a short duration of the intervention. Further research with larger samples and longer intervention periods is needed to confirm and expand these findings. In addition, future research may also explore the long-term impact of this learning approach on holistic child development, not only on cognitive aspects but also on social-emotional and physical-motor aspects.

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