

# Scaffolding Strategies to Increase Children Science Interest

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**Abstract**—Basically, children like all things related to the experiment, exploration, and experience that is manifested in the child's interest in science. In supporting and promoting the interests of science in children, teachers and parents are the main facilitator of the most children need. However, the teacher considers the practice of science in learning as something complicated, boring, costly, and require a long time. It effects too much misunderstanding in the practice of children science learning. Finally, the teacher only using classical methods in the teaching of science to the children such as drawing, coloring, or mix colors. Therefore, the aim of this study is to determine the effectiveness of the scaffolding as a strategy to increase children's interest in science. This study uses quantitative methods were performed on 15 children and 8 teachers kindergarten class B in Yogyakarta. The data is obtained by using observations of teachers in introducing the strategy of science to the children. This study used pre-test and posttest that will analyzed by using quantitative descriptive. The results of this study showed that the scaffolding effectively improve children's interest in science of 41.6%. Scaffolding is done in the form of strategy such as making authentic connections, providing new exposure, motivating children to be responsible, and supervise children. However, all the scaffolding must be used continuously to keep the child's interest in science until the child has the initiative way to solve their problem without the others.

**Keywords**—scaffolding, science interests, early childhood.

## I. INTRODUCTION

Interest is defined as the relationship of the individual with the topic or personally meaningful event [1] and occurs when a particular object, action, or experience trigger curiosity or a sense of enjoyment. A research has shown that children's interest can be identified by the spending in time and the level of involvement in a particular activity relative to others[2]. The children tend to invest in or withdraw from the study, depending on their interests [3]. The interest has been found to promote a variety of desired outcomes in children including persistence [4], task finishing [5] and science achievement [6]. The interest has been also found to affect the educational opportunities in the future and career options. Two more recent studies show an interest in science in the early lives of children influenced their decision to pursue a career related to science. The interest of the children are considered as arising from everyday experiences and activities in the family and community [7].

Introducing to the children of the sciences and related applications during or before high school is important. In

addition, the young people whose parents are professionals of science tend to develop early interest in science and choosing a career related to the science due to early exposure. Starting from that condition, it will grow the parents wants to introduce the children to the science world in order to help children in the growing process. One of the way to help children's development beside at home with their parents is in choosing the children's school. Improving the standards of achievement in education, especially in science, technology, engineering, and mathematics (STEM), is considered as an important step to achieve the goal. One of the many recommendations to improve the quality of education is to recruit, train, and retain qualified teachers with strong content knowledge and background of science[8,9], Basically, the children like all the things that related to the experiment, exploration, and experience.

Nevertheless, in supporting and promoting the interests of science in the child, of course, it was taken a facilitator very close for the child. Teachers and parents are the main facilitators that help children develop an interest in science. But in reality, the teacher considers the practice of science in learning as something complicated, boring, costly, and require a long time. It'll be led to frequent misunderstandings in the practice of science learning for the children. Finally the teacher only using classical methods in the teaching of science to children such as drawing, coloring, or mix colors. Though the science teaching practices rather than improve and develop interest in science but rather to develop the fine motoric skills of children. A research on science education is also often fail simultaneously with the discipline and diversity of children with the particular regard to teaching practices are aligned with the interests of children [5]. This is very disturbing for many minority children often see science as alien, distant, inaccessible, boring, irrelevant and alienating [10] [11],

The phenomenon is certainly hamper the process of stimulus child's interest in science. It is very influential on the development of the child because it was found that the interest in having a strong influence on learning (e.g., attention, perseverance, and deep level learning and career options [4]. Avoiding interest in science because children just mindset of people who think science is too heavy for children here is a step in the process of stimulation of child development. For it is precisely the opposite, from science to know the child will discover new things through exploration accomplishments. Many authors have postulated the regular order of the stages of development from childhood to late adolescence. According to these theories, one can assume a longer period

of development of pre-school age up to the age of elementary school where all the children are interested in all kinds of natural phenomena. Even children who are very young tend systematically observe their environment; they enjoy new experiences and ready to learn more about natural phenomena with which they are confronted [7].

Therefore, to change the bad impression of science teaching practices as well as increasing interest in science in children, researchers provide a solution in the form of research conducted in the form of scaffolding to increase interest in science teacher of children. The purpose of this study was to determine the effectiveness of the scaffolding as a strategy to increase interest in science children study is particularly important because several things: (a) knowledge, strategies, and dispositions that nurtured for activity-based interest in early childhood is important for the behavior of children's academic -child; or the same processes that support the emergence of special interest things at home can support the development of academic self-regulation of children or both and (b) teachers and parents will know to what extent the importance of science to know the child's life. Interest in science in children will also affect how children solve problems in life.

The rest of this paper is organized as follow: Section II describes the literature review. Section III describes the material and proposed methodology. Section IV presents the obtained results and following by discussion. Finally, Section V concludes this work.

## II. LITERATURE REVIEW

A discussion of early childhood interest in becoming a very important topic and lively discussion among educators and parents. In accordance with its characteristics, the child is a unique creature with all kind of imagination never predictable by adults thinking. All potential and existing interest in the child does not just appear from birth. There should be a stimulus and precise handling in accordance with the conditions, needs, and the environment in which children grow and develop. In the 0-6 year age range is, of course parents should not be mistaken in taking the steps associated with the development of the child because it will determine the child's development in the following years in a child's life. In the present study, scaffolding and scientific interests of children be interesting material for discussion. This is important because language stage of development and needs of each child is different. Like what is the way parents and educators in providing stimulus greatly influences the formation of a child's interest in science activities. Many science activities directly integrated in the activities of children and have great benefits in helping children solve problems in life.

### A. Scaffolding for Children

Scaffolding is a term in the world of education is the development of modern constructivism learning theory. In early childhood education, scaffolding took a very important role in the learning process in every aspect towards the attainment of developmental stages of children (child development). Every time a child reaches the stage of development characterized by the fulfilment of indicators in certain aspects, the children require scaffolding.

Scaffolding is a form of timely assistance should also be withdrawn in time for the learning interaction is happening when the children were doing the puzzles, build a miniature building, matching images and other learning tasks [12], When studying the interaction takes place, scaffolding sometimes need simultaneously and integrated in the physical, intellectual, artistic and emotional. The opposite of scaffolding is interference. Often direct the willingness of adults both teachers and parents to come help children accomplish the development task. As a result, aid even interfere with the learning process of children. Desire is actually a legitimate and natural, because in addition to an expression of love, is also an expression of concern of adults against children. However, with the right portion, there will be interference and will not usurp the role of scaffolding is needed more children.

### B. Interest in Science of Children

Interest in science can be defined at a more general level, or more concretely. In the first case, the content area of interest in science will consist of a whole body of subjects related to science and to realize one's topic. In the second case, someone will take into account that the interest in science of individuals can be restricted to a school subject (e.g. biology, but not physics or chemistry) or special topics and activities in the subject domains (e.g., gain knowledge about the structure of the human brain; play a musical instrument), a discipline (e.g. physiology) or area of study (e.g., marine research). To distinguish between the various types of scientific interest, obviously referring to the structure of school subjects because it mainly gives an opportunity to connect with a systematic science. In fact, there are children who were very interested in the subject (e.g. biology) but not in other science subjects such as chemistry or physics.

The responsibility to produce children who are interested in science does not depend on the school or the teachers themselves. Both anecdotal and empiric evidence suggests that early interest in science begins long before high school [13], Since children spend significant time with their parents and their families during childhood, it expands the importance of support and encouragement from home in guiding young children towards learning science and developing science-related career interests.

Some theorists posit that teachers play an important role in promoting the interests of children through their ongoing support and guidance [4], For example, Schraw in [14] identifies three general strategies to increase interest in the class: (a) offer meaningful choices for children, especially those who show low interest in the task at hand; (B) carefully choose the text is well organized; and (c) to help children access the appropriate background knowledge. In a particular condition, [3]. It's called on to provide more information about the science subjects children and their future use to stimulate their interest in science. They are urged to bring a more positive attitude (including interest) for science by promoting a better classroom practices and more positive experiences in science learning.

This calls according to the findings of the case studies that show that children can be encouraged to develop an interest in science and wanted to work for it, even when they initially

showed little or no interest [4]. Using data from the National Education Longitudinal Study found that the reported interest in science career in the eighth grade is three times more likely to earn a degree in science than those who do not show interest in it. In another study, [13] examines the experiences reported by 116 scientists and graduate children about their early interest in science. The majority (65%) of the participants reported that the roots of their interest in science occur before their high school years.

### *C. Interested In Science Learning and Children's Interests*

For the teachers, teaching of science was originally a requirement and then become something they like. For the others, it is something they are always interested. Indeed, Mr. Farr could not hide passionate spirit: "I love science. I like to use my hands. I like to experiment and work with a variety of things." For the teachers in triggering the child's interest in science, they must be interested in the science first. To some extent, the following comments by Ms. Baker concluded sentiment teachers about the role of passion and interest of teachers in the teaching of science.

Improving science education is one of the better training for teachers and improve children's understanding of scientific principles. This is based on the assumption that increasing instruction and performance will lead to more number of scientists in the field of science. The results of this analysis indicate that there are other factors which play a more significant role in making children's considering a career in science. From the perspective of teaching, content and activities to engage children with different interests, provide the class with an attractive environment, and allows children to feel comfortable asking questions about are all important factors that can increase the child's interest in science.

The teachers made a note that it is important to be interested in the child's interest in science and learn from children about their interests. Teachers should be interested in what happens outside the classroom as well as what is in the classroom. One way that can be used by teachers to make a conscious effort to be interested in what happens outside the classroom is to visit a place of worship and a community as much as possible, to see what kind of things are exposed. Teachers also have to try to connect the experience they have with what happens in the classroom. In addition, the teachers tried to take an interest in the child's interest in science more directly by empowering them to voice their interests and ideas.

### *D. Scaffolding of Children Science Interests*

In the process of increasing interest science in the children, teachers must have an interest in science first. It is an important step in building the teachers realized by an understanding that the teacher is a model that all behavior will be imitated by the children. In addition to interest, the next step is the teacher should have some strategy or specific ways that can be used to enhance the child's interest in science. Here are some strategies in the form of scaffolding to increase the child's interest in science:

#### *a) Creating Authentic Connection*

As mentioned in the previous section, to create an atmosphere of acceptance, care and trust, it is important that teachers should be involved in science activities. Such involvement allows them to build knowledge of children,

particularly in relation to children's interest in science. This knowledge then allows teachers to connect science with everyday life better for children to spark their interest in science. In addition, the teachers noted the importance of making an authentic connection to maintain the child's interest in science. When children begin to make a connection means such as responding to speech teacher, the child begins to want to continue the conversation and learn more about science.

#### *b) Provides New Exposure*

The teachers found that some children have the time to learn about science are limited so that the child does not show much interest at first, and it provides an important role in stimulating the desire to learn science. Thus, the teachers try to give new exposure to awaken the child's interest in science by using direct activity, physical or virtual trips, guest speakers, and popular science magazines. Another important aspect of the new exposure associated with the vocabulary of science. During the observation in the classroom, teachers stick vocabulary of science were posted on nearly every square inch even use the back door of the classroom. The vocabulary of science displays three columns consisting of words in the life sciences, including invertebrates, food chain, photosynthesis, and habitat. Moreover, to make the vocabulary new science known as children become more meaningful, relevant, and interesting, the teachers will use these words in a language that is child-friendly, so as to encourage a child's desire to have the words to their liking.

#### *c) Encourage the child to Action*

The next strategy to improve the children interest in science is the teachers encourage children to take responsibility in the learning process. It aims to make children want to act and perform activities in accordance with what has been learned. Teachers also compiled a list of topics that can be children or allow them to do a bit of variety in the activities they will be doing science. These activities require important role of teachers as provide some input in what they choose and supervise the activities so that children learn some extra things on the outside than what was done in the classroom. Based on the needs and abilities of children, the activities carried out during the process of scientific interest makes children do not contain elements of coercion. Therefore, the form of encouragement that teachers do not only in the form of a process carried out during the science, but teachers should encourage children to use this form of expression in which they feel comfortable. Through it, teachers will know what activities or materials of the most liked and not liked children. This is very useful in stimulating the development of children.

#### *d) Supervise Children*

While encouraging the child to take responsibility in the learning process, teachers will also supervise children to encourage interest in science and to fill them. Child's interest in science has come out and an impact on children's behavior changes to science must be maintained. On the other hand, some children can switch from having a high interest in science and the productive instantly changed as just want to sit in a corner of the classroom and do not do anything. Of course many factors that can affect the productivity of children in activities and interests. This is what really must be maintained. Given one child characteristics that have a low concentration, so the teacher must try to keep the child's

interest and attention remained fixed on science activities undertaken. Thus, teachers supervise the child to protect and maintain their interest in science.

Based on the study of the problems occurred on the implementation of science learning in children, the researchers conducted a scaffolding in the form of strategies used by teachers in introducing science to the children. From the literature review found some strategies that could be done to spark a child science both within and outside the classroom. This strategy could be done to assist teachers in delivering science learning in accordance with the needs and development of the child thus increasing scientific interest in children. Thus it can be formulated provisional estimates that scaffolding in the practice of science teaching science effectively increase interest in children. Associated with the procedure and methodology of the implementation of the research will be discussed in the next section.

III. MATERIALS & METHODOLOGY

This study used a quantitative methodology that was defined as a form of research based on data from a systematic empirical facts that can be measured with the numbers. Participants in this study were 8 teachers and 15 children kindergarten class B in the city of Yogyakarta. Of the participants, six were women and two men. Experience taught them varies between 6 and 10 years old and experienced to teach children aged 4-6 years. To determine the effectiveness of strategies to increase the interest of science teachers in the child, then the observations of science learning activities for several weeks. Data collected in the form of relevant documents such as curriculum materials science, science supplies, teacher lesson plans, and child science activities. The data were also obtained through observation of the classroom, including the setting of a classroom, science projects children, as well as models and artefacts made by children. Data analysis was performed using quantitative descriptive design pre-test and post-test. Measuring instrument used in this study a measured observation is based on indicators of scientific interests of children in Table I.

TABLE I. INITIAL STRATEGY IMPROVING CHILDREN'S INTEREST IN SCIENCE

Teacher	Component				%
	make authentic connections	providing new exposure	encourage children to be responsible	supervise children	
A	-	-	√	√	6.25%
B	√	-	√	-	6.25%
C	-	-	-	√	3.12%
D	√	-	-	√	6.25%
E	-	-	-	√	3.12%
F	√	-	√	-	6.25%
G	-	-	√	-	3.12%
H	-	-	√	√	6.25%
<b>Total</b>					<b>40.6%</b>

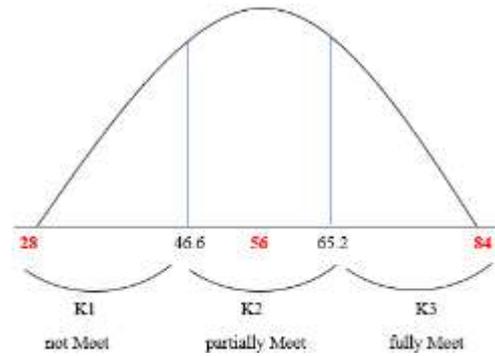


Figure 1. Normality curve

The data above is the result of an initial observation of the strategies that teachers do to improve children's interest in science. It was found that of the eight teachers who studied, teachers who undertake strategies to enhance the scientific interest of children is only 40.6%. More teachers are conducting in introducing science to children such as drawing, coloring, matching objects, stamp of fruits and finger painting in Table II.

IV. RESULT AND DISCUSSION

After it has known that how the methodology and procedures carried out on participants in research to improve interest of science, it was found a variety of results and discussion of theories related to scaffolding to improve interest of science kid. The results and discussion in this study are presented as follows.

A. Result

In the previous section, the research has made observations on the application of scaffolding conducted by the teacher to the child. The data were obtained using a pre-test and post-test observation and then it will be analyzed by using simple formula, which is based on the normal curve (see Figure I). The researcher found the data such as the value of scientific interests of children before and after scaffolding that is presented in the Table III below.

TABLE III. EARNED VALUE SCIENCE CHILDREN'S INTERESTS

Child	pre Test	Post Test
AB	40	70
CD	35	70
EF	35	77
GH	42	75
IJ	45	75
KL	40	80
M N	40	75
OP	45	70
QR	42	75
ST	35	75
UV	35	70
WX	40	77
YZ	45	80
AD	42	80
FA	42	77
$\Sigma X$	<b>603</b>	<b>1126</b>
$\bar{x}$	<b>40.2</b>	<b>75.1</b>
<i>n</i>	<b>15</b>	<b>15</b>

Based on the data from the results of observations about the strategies of teachers in improving children's interest in

science, it was known that there are 28 indicators on the instrument scientific interest in the children. It was found values of interest of science before the scaffolding is a child who is in the category not meet (low). From the 8 teachers who become participants, teachers who undertake strategies to enhance the scientific interest of children was only 40.6%. More teachers are conducting classical method in introducing science to the children. Then do the scaffolding to increase

interest in science kid with some strategies that make authentic connections, providing new exposure, encourage children to be responsible, and supervise children. After the scaffolding, it was found that the value of scientific interest children who are at increased to meet fully category (high). Child science interest initially at 47.8% increased to 89.4%.

TABLE II. INSTRUMENT OF CHILDREN SCIENCE INTERESTS

No	Aspect	Indicators / Item	The development of science Children's Interests		
			(1) not meet	(2) partially meet	(3) fully meet
1	Curiosity	Attention to the observed object			
		Be enthusiastic about the process of science			
		Asking every step of activities			
2	Respect for the data / facts	Objective / honest			
		Not prejudice			
		Take decisions in accordance facts			
		Not mixing fact and opinion			
	Critical thinking	Doubted the findings of others			
		Asking any changes / novelties			
		Repeating the activities carried out			
		Do not ignore the data			
4	The attitude of discovery and creativity	Using facts to draw conclusions			
		Show different reports with others			
		Changing the opinion in response to the fact			
		Suggest new experiments			
		Parse the new conclusions on observations			
	Open-minded and cooperation	Appreciating the findings of others			
		Changing the opinion if the data is less			
		Receiving advice from others			
		Do not feel always right			
		Considers the conclusion is tentative			
	The attitude of perseverance	Active exploration			
		Repeating the experiment though result in failure			
		Continuing something even though everyone else is finished early			
7.	Sensitive to the surrounding environment	The attention to the events around			
		Participation of social activities			
		Maintain cleanliness and environmental sustainability			

So it can be concluded that the scaffolding proven effective strategies to increase interest in science in the implementation of children's science learning with an increase of 41.6%.  $\bar{x} = 40,2\bar{x} = 75,1$ .

Where Minimum Score = 28 and Maximum score = 84,

$$\begin{aligned} \bar{x} &= (\text{Score min} + \text{score max}) / 2 \\ &= (28 + 84) / 2 \\ &= 56 \end{aligned}$$

$$\begin{aligned} SD &= (\text{Max score} - \text{score min}) / 6 \\ &= 84/6 \\ &= 14 \end{aligned}$$

Category: Not meet (Low) > 11.6; Partially meet (Average) 11.6-16.2; Fully meet (High) = 16.3 < .

**B. Discussion**

The biggest reason scaffolding is used as a strategy to improve child science is because scaffolding is believed to have been able to stimulate the growth and development of children of various aspects of development. Krapp and Prenzel [15] has proposed to reconstruct this developmental shift on the basis of a model which represents three

prototypical stages of interest development: (1) an emerging situational interest awakened or triggered by external stimuli for the first time; (2) a stabilised situational interest that lasts during a certain (limited) learning phase; and (3) an individual interest that represents a relatively enduring predisposition to engage in a certain object area of interest.

Based on research that has been done in stages increase interest in science kid, it was found that all the results of the pre-test interest in science in the category of children is low (not meet). This is evident from the average score of only children's interest in science 40,5. These scores are very low in terms of the development of children's early interest in the activities that are close to the child's life. Should have 5-6 years old children are already able to show enough interest and enthusiasm both to activities such as exploring the natural environment, perform simple experiments, to realize the imagination in the real world. Students' interest was further differentiated into three different learning environments: school, leisure time, and enrichment. The results revealed significant differences of students' interest in relation to different environments [16]. Various factors affect the way

the child to improve his scientific interests ranging from internal to external factors.

After looking for the principal of the matter, it was found that the low science children came from teachers who lack a specific strategy in stimulating children. Then the researchers create a research design in the form of scaffolding as a strategy that aims to improve children's interest in science. 8 kindergarten teachers involved in this study had to use strategy fourth child in the form of scaffolding interchangeably science interests within 4 weeks as a form of change from the previous practice of science. After 4 weeks of post-test to prove that the strategies are effective and there is increasing interest in science results in scores of children. It was found that scores of children interest in science was significantly increased to an average of 75.1 were categorized as high (fully meet). In the 4-week study period, the research was successful because it can increase children's interest in science significantly.

## V. CONCLUSION

The efforts to stimulate the development of a child's interest can be done in various ways. One of the effective way to increase the interest of science used in children is scaffolding in the form of strategies in science teaching practices by teachers. Scaffolding can be done, among others create authentic connections, providing new exposure, encourage children to be responsible, and supervise children. However, it was noted that all scaffolding used must be done continuously to keep the child's interest in science until the child has the initiative way to solve the problem on their own without the help of others.

Nonetheless, scaffolding is only one of the various strategies that can be used to enhance the child's interest in science. It is important to remember that during the investigation is still in the stage of early age, stimulus in all aspects of child development should be carried out starting from the cognitive, language, physical, motor, NAM, social, emotional and art. There are many other ways that can be used in accordance with the needs and development of children. Here are some recommendations can be given by researchers:

- Expected for parents and educators was not focus on just one of the way to stimulate children's interest in science
- Stimulate children's interest in science be continued.
- Make every stage of progress in the development of children as a motivation to further explore the potential and interest in the child.

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