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EFFECTIVENESS OF *TRI PRAMANA*-ORIENTED SCIENCE PLAY ACTIVITY BOOK IN IMPROVING EARLY CHILDHOOD SCIENCE SKILLS

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Abstract

This study aims to investigate the effectiveness of *Tri Pramana*-oriented early childhood science playbooks in improving early childhood science skills. This research is classified as descriptive quantitative research. The research was conducted at the Pratama Widyalaya Kumara Dharma Kerti education institution, Lukluk Village, Badung Regency. The total number of participants in this case was 17 (seventeen) students. The research instrument used was an observation sheet of early childhood science skills, which include the ability to classify, conduct experiments, and communicate the results of experiments. The data was analyzed descriptively. The results of the study state that the *Tri Pramana*-oriented early childhood science play activity book is effective in improving early childhood science skills as evidenced by more than 70% of early childhood science skills in the criteria of developing as expected. This research contributes to the development of science learning for early childhood with local wisdom, namely *Tri Pramana*.

Keywords: Science Book; *Tri Pramana;* Science Literacy; Early Childhood

INTRODUCTION

Early childhood, typically ranging from 0 to 6 years old, is often referred to as the golden age period. This is because, during this phase, children experience rapid cognitive, affective, and psychomotor development, and this period will not recur in subsequent ages (Yusuf, Al Khoeri, Herdiyanti, & Nuraeni, 2023). Therefore, it is crucial for parents and teachers in early childhood education to pay full attention to the development of young children to ensure optimal growth and development (Uce, 2017).

The government and the community have established various early childhood education institutions in order to facilitate the development of children in their golden years. Law No. 20/2003 on the National Education System explains that early childhood education (PAUD) is coaching or education provided to children from birth to 6 (six) years old. The implementation of early childhood education is basically done with the concept of play or often referred to as edutainment (Saripudin & Faujiah, 2018).

PAUD institutions have also begun to incorporate religious education. This is emphasized in Government Regulation of Republic of Indonesia Number 55 of 2007 on Religious Education and Religious Teaching. The regulation states that religious education prepares students to fulfill roles that require mastery of religious teachings and/or to become experts in religious knowledge and practice the teachings of their faith. The term PAUD institution in religious education is adjusted according to each religion. For Hinduism, the PAUD institution is known as *Pratama Widyalaya* (Sueca & Astuti, 2024).

One important concept to teach early childhood is science (Wijaya & Dewi, 2021). In their daily lives, young children constantly interact with scientific phenomena, and even their body and its organs are subjects of scientific study. Science is fundamentally viewed as a process, product, attitude, and application. The products of science include concepts, principles, theories, and laws. The scientific process is the method for discovering the products of science, which is referred to as scientific process skills. Scientific attitude refers to the ethics and norms scientists follow in discovering scientific products. Science application refers to how scientific products are applied in society (Trianto, 2010; Wijaya, Yasa, & Muliani, 2023).

Science play activities for early childhood at the *Pratama Widyalaya* level should be based on the uniqueness of Hindu teachings. However, based on the observation conducted by the researcher, it was found that science education at the *Pratama Widyalaya* level is not yet optimal and has not adopted the distinctive learning processes according to Hindu teachings. Based on this, Aryana, Wijaya, Wiranata, Supadmini, & Hana (2025) developed a science play activity book for early childhood with *Tri Pramana* perspective. The book was developed based on the learning philosophy (discovery of knowledge) according to Hindu teachings known as *Tri Pramana. Tri Pramana* consists of *Sabda Pramana* (listening), *Praktyasa Pramana* (observation), and *Anumana Pramana* (reasoning) (Subagia & Wiratma, 2009). If it is related to science learning, it is very relevant to the concept approach and process skills. For example, the ability to observe which part of the process skill is relevant to *Praktyasa Pramana* and *Sabda Pramana*. Then reasoning ability (*Anumana Pramana*) is related to the concept approach. This book has met the requirements for validity and practicality. However, the study did not reach the stage of effectiveness testing, which is why the researchers are interested in conducting further research to evaluate the effectiveness of this book in improving early childhood science skills.

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METHODOLOGY

This research is classified as quantitative descriptive research. Quantitative descriptive research is a research that explains the results of research descriptively in the form of numbers. (Sugiyono, 2010).The study was conducted at the *Pratama Widyalaya Kumara Dharma Kerti* educational institution, located in Lukluk Village, Mengwi District, Badung Regency. The subjects of the study were the students at this educational institution in the *PW B* level (equivalent to Kindergarten B), totaling 17 (seventeen) children. There are two reasons for choosing the location and subject, firstly this place is a Hindu religious education unit and also based on the results of interviews and

observations with teachers, the school needs a science learning guide based on the peculiarities of Hinduism. The research was conducted over a period of 1 month, from February 2025.

The instrument used in this study was an observation sheet for assessing early childhood science skills, which included observing, classifying, and drawing conclusions. The instrument has been tested for validity and reliability. The validity test results is scored as 0.705 and above 0.300 so it is declared valid. In addition, the reliability score is 0.813 which is classified as very high (Sugiyono, 2010). The instrument blueprint can be seen in Table 1.

Table 1 Blueprint of Early Childhood Science Ability Observation Sheet

No	Aspect	Question Item
1	Observing	1, 2
2	Communicating	3, 4
3	Classifying	5,6

Each item in the instrument will later be scored within a range of 0 to 1. A score of 1 is given if the child is able to perform the task, and a score of 0 is given if the child is not able to perform the task.

The effectiveness of the guidebook was analyzed descriptively. The first step was to calculate the early childhood science skills. The scoring process was carried out using the following formula:

$$\text{Science skill score} = \frac{\text{total score from the observation sheet}}{\text{maximum score}} \times 100\%$$

The score for each student was then converted based on the science skill conversion table presented in Table 2.

Table 2 Table of Criteria for Early Childhood Science Skills

No	Score	Criteria
1	4	Developing Very Well (DVW)
2	3	Developing as Expected (DAE)
3	2	Developing (D)
4	1	Start to Develop (STD)

(Septyaningsih, 2016)

The guidebook is considered effective if at least 70% of the early childhood children observed in *Pratama Widyalaya* B are able to achieve the criteria of Developing as Expected (DAE). The determination of this indicator is based on the science concepts that are embedded varying levels of complexity and also early childhood has diverse interests and learning styles in science.

RESULTS AND DISCUSSION

RESULTS

Early childhood science play activities were carried out in 8 (eight) activities corresponding to the topics presented in the book. Students were invited to do science play activities twice a month. After playing science, the teachers immediately filled in the observation sheet or research instrument. The results of the research regarding early childhood science skills are presented in Table 3 as follows:

Table 3. Early Childhood Science Play Skills

No	Students	K1	K2	K3	K4	K5	K6	K7	K8
1	Student 1	DAE	DAE	DAE	DAE	DAE	STD	DAE	DAE
2	Student 2	STD	DAE	STD	STD	STD	STD	DAE	STD
3	Student 3	DAE	DAE	STD	DAE	STD	STD	DAE	DAE
4	Student 4	STD	STD	STD	DAE	STD	STD	DAE	STD
5	Student 5	DAE	DAE	DAE	DAE	DAE	STD	DAE	STD
6	Student 6	DAE	DAE	DAE	DAE	STD	STD	DAE	DAE
7	Student 7	DAE	DAE	STD	DAE	DAE	STD	STD	STD
8	Student 8	DAE	DAE	DAE	DAE	DAE	STD	DAE	STD
9	Student 9	DAE	DAE	DAE	DAE	DAE	DAE	DAE	DAE
10	Student 10	DAE	STD	DAE	STD	DAE	DAE	STD	STD
11	Student 11	STD	DAE	DAE	STD	DAE	DAE	DAE	STD
12	Student 12	DAE	DAE	DAE	DAE	DAE	STD	DAE	DAE
13	Student 13	DAE	DAE	DAE	DAE	DAE	DAE	DAE	DAE
14	Student 14	DAE	DAE	DAE	DAE	DAE	DAE	DAE	DAE
15	Student 15	DAE	DAE	DAE	DAE	DAE	DAE	DAE	STD
16	Student 16	DAE	DAE	DAE	DAE	DAE	DAE	DAE	DAE
17	Student 17	DAE	STD	DAE	DAE	DAE	DAE	DAE	STD

Based on the data in Table 3, it can be concluded that the science skills of early childhood students at *Pratama Widyalaya Kumara Dharma Kerti Lukluk* fall within the criteria of *Start to Develop* (STD) and *Develop as Expected* (DAE). An analysis of the early childhood science skills was also conducted based on the activities. The results of this analysis are presented in Table 4.

Table 4 Analysis of Early Childhood Science Skills in Every Activity

No	Activity	% D	% STD	% DAE	% DVW
1	1	0 %	17,6 %	82,4 %	0 %
2	2	0 %	17,6 %	82,4 %	0 %
3	3	0 %	23,5 %	76,5 %	0 %
4	4	0 %	17,6 %	82,4 %	0 %
5	5	0 %	23,5 %	76,5 %	0 %
6	6	0 %	52,9 %	47,1 %	0 %
7	7	0 %	11,8%	88,2%	0 %
8	8	0 %	52,9 %	47,1 %	0 %
Average		0 %	27,2%	72,8 %	0 %

Based on the data in Table 4, it can be seen that more than 70% of the students demonstrated science skills at the Developing as Expected (DAE) level after engaging in science play activities, guided by the *Tri Pramana*-oriented early childhood science play book.

DISCUSSION

The results of the research indicate that the *Tri Pramana*-based early childhood science play guidebook is effective in enhancing early childhood science skills, particularly at the *PW B* level. This is proven through descriptive effectiveness testing, which shows that

72.8% of the children demonstrated science skills within the Developing as Expected (DAE) criteria. This is above the target set by the researcher, which was 70%. In this study, the science skills assessed include three aspects: observing, communicating, and classifying.

The effectiveness of the *Tri Pramana*-oriented science play guidebook in improving early childhood science skills is attributed to various factors. First, each activity designed in the guidebook stimulates children to develop the science skills measured in this study. For instance, in the activity "Fun with Dropping Objects into Water," children engage in science play through three stages of *Tri Pramana — Praktyasa Pramana* (observation), where children are facilitated to drop various objects into water and observe their positions. Then, the teacher provides explanations about which objects sink, float, or remain suspended (*Sabda Pramana*). Subsequently, the teacher encourages children to communicate or conclude the conditions of the objects (floating, sinking, or suspended) and also guides them in classifying the objects accordingly (Wijaya, 2019).

From the perspective of learning theories, several theories can be used to analyze the effectiveness of the *Tri Pramana* science play guidebook. First, Piaget's cognitive development theory is applicable. Children at the Kindergarten B level are in the preoperational stage of thinking. One characteristic of this stage is perceptually bound thinking, where children assess things based on what they see and hear. This is stimulated in the science play stages in the guidebook, where children are encouraged to observe during the *Praktyasa Pramana* stage and listen to the teacher's explanations during the *Sabda Pramana* stage. Additionally, children also exhibit *Centration* thinking, focusing on interesting objects (Marinda, 2020). In science play, teachers use various attractive objects, such as plasticine balls, toy cars, and other familiar play items, which engage children's interest in participating in science activities designed with *Tri Pramana*.

Second, Thorndike's behaviorism learning theory also supports the results of this study. In Thorndike's learning theory, the *Law of Exercise* states that an individual's abilities or personality are formed through repeated practice (Amsari, 2018). In the *Tri Pramana*-based science guidebook, there are eight science play activities provided to children. These activities consistently train children in classifying, observing, and communicating, thus developing early childhood science skills. This theory aligns with Skinner's behaviorism theory and his concept of *law of operant conditioning*, which suggests that when children are provided with reinforcing stimuli, their abilities will increase (Arofah, 2019). This was implemented by the teacher when engaging children in science play. For example, when children were encouraged to explore the concept of floating, sinking, and suspended objects, the teacher demonstrated by dipping various objects into the water and repeatedly explaining the position of the objects. In this way, children's science skills will become stronger.

Tri Pramana-oriented science learning is a process-oriented learning approach. During the learning process, children are guided to discover science concepts that match their developmental stage through fun inquiry or experimentation activities. In this process, children are stimulated to develop science process skills such as observing, classifying, communicating, and designing experiments. This approach will certainly help enhance early childhood science skills (Dewi, 2011).

This study is in line with research conducted by Azizah, Koesmadi, & Widyaningsih (2021), which states that an experiment-based method with realia media is effective in

improving early childhood science skills. The *Tri Pramana* concept in science learning already accommodates demonstrative experiments supported by real objects, enhancing early childhood science skills. This is also supported by the research of Sari (2012), which states that demonstrative experiments are effective in improving early childhood science skills.

The science play activities for early childhood using the *Tri Pramana* concept not only affect children's science skills cognitively and psychomotorically but also contribute to the development of early childhood character. The character traits developed include self-control, demonstrated by children's willingness to wait for their turn to observe and experiment, and responsibility, shown by their willingness to tidy up and clean the experimental tools after the science play activity is completed.

The implication of this research is that *Tri Pramana*-oriented science play activities can serve as an alternative for developing and improving early childhood science skills, particularly for children at the Kindergarten B level. To implement this, the first step is for teachers to understand both the concept of early childhood science learning and *Tri Pramana*-based learning. When conducting science play activities, teachers should use various objects available in the classroom and ensure that these objects are safe for children. Additionally, during the experiment, teachers should first demonstrate the activity, as young children are not yet capable of fully conducting inquiries independently.

Limitation of this study is that the population used as research subjects was not large-scale, so further studies are needed to test the effectiveness of the developed guidebook on a larger scale. Moreover, additional topics and science skills should be incorporated to improve the guidebook developed by the researcher.

CONCLUSION

Based on the discussion, it can be concluded that the *Tri Pramana*-oriented early childhood science play book is effective in enhancing early childhood science skills. This is evidenced by the results of the descriptive analysis, which show that after engaging in science play activities guided by the book, more than 70% of the students demonstrated science skills within the *Developing as Expected* (DAE) criteria.

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