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THE INFLUENCE OF SEGEHAN MEDIA ON SCIENCE KNOWLEDGE AND CREATIVITY IN EARLY AGED CHILDREN

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Abstract

This study aims to determine the effect of Segehan media on the cognitive abilities and creativity of early childhood education (PAUD) students in learning science. This research employs experimental research methodologies. The population in this study consists of 59 students from group B of the Pemaron village kindergarten. The samples for this study were randomly selected to define the experimental and control classes. The data collection approach was conducted through observation, measured using research tools. The MANOVA test was performed to analyze the data. Based on the results of hypothesis testing, it can be concluded that the Segehan Sanga Warna learning technique has an impact on students' cognitive development and creativity compared to the direct learning method. Based on the findings of this study, it is recommended that PAUD educators consider the use of Segehan media as an alternative method in science learning. By integrating this technique, it is expected that students' cognitive abilities and creativity can be more effectively enhanced. Furthermore, additional research with a larger and more diverse population is necessary to strengthen these findings and ensure the generalization of the results. This implies that learning methods involving cultural and creative elements, such as Segehan, can be an effective approach in early childhood education. Therefore, educators and policymakers in the field of education should consider incorporating this method into the PAUD curriculum to achieve optimal learning outcomes.

Keywords: Science Knowledge, Creativity, Early Childhood Children

INTRODUCTION

A child's early education has a noteworthy role in forming the basis for a child's development as a whole unit. As the initial stage of formal education, Early Childhood Education (PAUD) is responsible for providing the necessary support in building a strong basis in diverse aspects of a child's life, including science knowledge and creativity. PAUD plays a significant role in introducing science concepts to children from an early age (Astuti and Nurhafizah 2023).

All the way through attractive and interactive learning activities, for instance simple

experiments related to colour, nature or the properties of objects, PAUD helps children to comprehend basic scientific principles. By exploring their surroundings, children learn to make observations, ask questions and find solutions to their own questions (Hasibuan and Suryana 2020). For example, simple experiments with everyday materials can educate concepts such as gravity, changes in state or natural patterns.

The prominence on science learning in Early Childhood Education (PAUD) does not only aim to introduce scientific concepts to children, but also to expand their cognitive and social skills, as well as strengthen critical, creative and communicative thinking abilities. By creating a learning environment that facilitates exploration, experimentation and collaboration, children are encouraged to be active in the learning process and self-development. Thus, the integration of science material in the PAUD curriculum does not only provide an initial comprehension of science but also supports the development of essential skills to become proactive and independent individuals towards the learning process in the future (Suherman, Nopembri, and Muktiani 2017). Hence, PAUD is a powerful base in preparing children to be triumphant in formal education and fulfill their full potential, including the development of soft skills, social skills and character in accordance with the Pancasila student profile (Nisfa et al. 2022).

Science is an essential part of the PAUD curriculum because it provides opportunities for children to discover their comprehension of the surrounding environment through exploration and experimental activities. Consciousness of the importance in creating learning methods that stimulate and support children's holistic development is very essential for educators (Gulo 2008). A successful approach to early childhood education does not only focus on cognitive development, but also includes the child's emotional, social and physical aspects. Thus, educators should implement learning strategies that involve a variety of activities to expand cognitive skills; including language mastery, understanding basic mathematical concepts and improving social skills. According to Fitria Reviani, Kholidah, and Insani Setyowati (2023), the value of creating a safe, creative and interactive learning environment to encourage children's holistic growth is necessary. Teachers must act as facilitators who comprehend the distinctiveness of each child and can design learning activities according to their individual development stage. This emphasizes that education in early childhood is not just the initial stage of formal education, but is an important base that helps children develop towards a smarter and better quality future. The importance of providing learning experiences that encourage and support children's holistic growth supports the need to create safe, creative and interactive learning environments. Teachers must act as facilitators who comprehend the distinctiveness of each child and are able to design learning activities that go well with their individual development stage. Thus, early childhood education is not only the initial stage in formal education, but also a solid base for children's growth and development towards a smarter and better quality future. In this case, an emphasis on students' scientific knowledge and creativity is very necessary (Shalehah 2023).

Science knowledge and creativity in students are important aspects of education because both have a significant positive impact (Utama 2010). Cognitive development assists students to comprehend, analyze and solve problems more effectively, while creativity such as critical thinking assists them to evaluate information and make decisions based on rational considerations. This ability is not only beneficial in an academic context but

also in preparing students for the demanding world of work. This skill encourages creativity, strengthens memory, and improves students' ability to comprehend and retain information (Hasibuan and Suryana, 2020). Additionally, students with excellent science knowledge tend to be more competitive globally, adapt more easily to change and have better personal quality of life. Hence, cognitive development and creativity become essential investments in forming individuals who are ready to face challenges, are creative and are able to compete in diverse aspects of life.

According to (Damayanti 2020), a lot of research on learning in PAUD has become a reference in developing the cognitive abilities and creativity of early childhood in formal schools. One activity that is functional in early childhood education is science learning, which does not only aim to educate children the knowledge about physical world but also as a concrete effort to develop scientific knowledge and creativity. When children engage in science learning, they are encouraged to scrutinize, investigate and create their own understanding of the phenomena around them. (Gulo 2008) stated that this activity stimulates their science knowledge by triggering the ability to comprehend, retain information and apply scientific concepts.

Conversely, in implementing the science curriculum in PAUD, there are often challenges. Curriculum that only relies on standard material without considering the local context is often inappropriate and thorny for children to comprehend (Thejahanjaya and Yulianto 2022). Apart from that, limited resources and teachers' comprehension of science approaches that are appropriate to children's development are also obstacles. Hence, innovation in the science curriculum in PAUD is crucial (Safitri et al. 2023). One approach that can maintain children's development of their culture is integrating local wisdom in science learning. Local wisdom includes knowledge, values and practices that expand in local communities, which can provide relevant context and motivate children to learn (Anggreni et al. 2019). By adopting local wisdom in science learning, it is hoped that children will more easily comprehend scientific concepts because they are related to their daily experiences and environment (Suttrisno 2023). Apart from that, this approach can also increase the sense of belonging to the culture and environment.

Through integrating local wisdom such as Segehan Panca Warna in science experiments, children do not only learn scientific concepts, but also enrich their comprehension of the culture and environment in which they live. By utilizing local wisdom in science experiments, children can also improve their cognitive abilities by designing experimental questions that suit their cultural context. In addition, they can expand scientific creativity such as thinking critically about the correlation between local traditions and scientific concepts, as well as improving their skills in observation, measurement and making arguments based on evidence (Sari, Asmawati, and Atikah 2022). Generally, by linking science experiments with local wisdom such as the Segehan Panca Warna in Bali does not only assist in learning science concepts but also enriches children's experiences, provides cultural relevance to learning and encourages the whole advance of their cognitive abilities and scientific creativity.

Interview results at Pemaron Village PAUD show that teachers hardly ever implement activities that involve student exploration and some teachers may have limitations in teaching skills, comprehension of child development or knowledge of effective learning

methods for early childhood (Majebi and Akin 2023). Lack of sufficient training in this area can be a barrier. In addition, the results of observations at the Pemaron Village PAUD school show that there are several students who have low learning motivation which can own a negative impact on the learning process; hampering children's ability to understand the material, reducing active participation and ultimately affecting overall learning outcomes. Research also highlights that teachers have not fully explored students' creativity (Suharjana, 2019). Science learning in PAUD Pemaron Village tends to be limited to theory, rarely involves experiments and has not yet apply Segehan Panca Warna as an experimental medium. Albeit Segehan Panca Warna is a significant religious tradition in Bali involving the five basic colours, it does not appear to have been utilized as an experimental medium in science learning. These findings demonstrate the untapped potential of combining local wisdom with science experiments, which can improve children's comprehension of the links between their cultural traditions and scientific concepts. Recommendations to augment learning methods by including Segehan Panca Warna as a colour experiment medium can herald new opportunities to increase the attractiveness and relevance of science subject matter in PAUD (Sativa and Buahana 2024).

This research has revolutionary potential to enrich learning methods by using local wisdom as a medium for colour experiments, which can herald new opportunities to increase the attractiveness and relevance of science subject matter at the PAUD level. This approach is expected to contribute towards children's holistic understanding of science concepts and creativity, as well as stimulate the development of children's cognitive capacity and scientific creativity. This initiative is also seen as a significant step in linking local culture with science learning, enabling enhanced learning experiences, creation of cultural meaning and strengthening connections between local traditions and scientific aspects in the early stages of formal education. Hence, this research provides a new, innovative and relevant perspective in exploring the potential of local wisdom-based learning approaches to develop comprehension of science and creativity in young children.

RESEARCH METHODS

This research was carried out at Dewi Kumara Kindergarten and Sintha Kumara Kindergarten to get a representative picture of the implementation of science learning in rural areas of Bali. Choosing two different PAUDs has relevant comparisons in educational practices and early childhood creativity. In addition, the affordable location makes the data collection and observation process easier. Thus, it is hoped that this research can offer valuable insights for the development of science learning and creativity at the PAUD level. The two PAUDs are located on Jalan Raya Pemaron, Buleleng District, Buleleng Regency, Bali. This research was conducted over six months using a quantitative approach and quasi-experimental methods. The research method involves a Non-Equivalent Control Group Design which consists of two groups of subjects: an experimental group and a control group (Sugiyono 2015). The research population consisted of 59 students from group B at the Pemaron Village Kindergarten, with the sample was selected randomly. Random sampling ensures each student has an equal opportunity of being selected as part of the sample. Thus, it is hoped that the research results will be more reliable and representative of the entire population of group B students in the Pemaron Village Kindergarten. Data was collected by using observation

techniques in checklist format (√). The instrument grid of this research is the cognitive ability variable, the instrument indicators used include (1) curiosity, (2) comprehension of basic concepts, (3) capability to observe, (4) capability to classify, (5) capability to draw conclusion, (6) use of segehan panca warna. In the student creativity variable, the instrument indicators used include (1) generating new ideas, (2) being able to modify tools or materials, (3) expressing self through art and games, (4) demonstrating flexibility in thinking. Next, the data obtained were analyzed using the MANOVA method to calculate differences in science knowledge and science creativity between student groups (Candiasa 2010).

RESULTS AND DISCUSSION

RESULTS

This research reveals that the use of science experimental approach based on local wisdom, such as Segehan Panca Warna, as a medium in science learning for early childhood shows great potential in increasing the effectiveness of learning in PAUD. The below is the photo of the Segehan Panca Warna media used in this research.

Figure 1. *Segehan Panca Warna*

The integration of local wisdom does not only provide a relevant context for children but also encourages them to be more actively involved in the learning process (Suttrisno 2023). By utilizing children's experiences and knowledge about their environment and culture, learning becomes more evocative and pleasant for children.

The following is documentation of PAUD students' activities in science experiments through the media Segehan Panca Warna.

Figure 2. Child Mixing Colors

Figure 3. Children and the results of their experiments

Validity test results data for instruments measuring students' science knowledge can be seen in the following table.

Table 1. Validity Test of Scientific Knowledge Instruments

No	r_{table}	r_{count}	Conclusion
1	0,252	0,765	Valid
2	0,252	0,531	Valid
3	0,252	0,605	Valid
4	0,252	0,635	Valid
5	0,252	0,541	Valid
6	0,252	0,320	Valid
7	0,252	0,348	Valid
8	0,252	0,676	Valid
9	0,252	0,686	Valid
10	0,252	0,750	Valid
11	0,252	0,440	Valid
12	0,252	0,531	Valid
13	0,252	0,460	Valid
14	0,252	0,356	Valid
15	0,252	0,731	Valid

Based on the software output results for validity testing on 15 instrument items for 59 students, it can be concluded that all instrument items measuring indicators of scientific knowledge are valid. This is indicated by the rtable value which is smaller than the rcount for each item of the instrument. Next, a validity test was carried out on the scientific creativity indicator which consists of 15 indicator items. This trial was also carried out on 59 students. The following is data from the validity test results for the scientific creativity instrument.

Table 2. Validity Test of the Scientific Creativity Instrument

No	r_{table}	r_{count}	Conclusion
1	0,252	0,445	Valid
2	0,252	0,479	Valid
3	0,252	0,545	Valid
4	0,252	0,682	Valid
5	0,252	0,344	Valid
6	0,252	0,460	Valid
7	0,252	0,523	Valid
8	0,252	0,492	Valid
9	0,252	0,726	Valid
10	0,252	0,587	Valid
11	0,252	0,573	Valid
12	0,252	0,562	Valid
13	0,252	0,683	Valid
14	0,252	0,590	Valid
15	0,252	0,425	Valid

Based on the results of the software output for validity testing on 15 instrument items applied to 59 students, it can be concluded that all instrument items that measure indicators of the development of science skills are declared valid. This validity is reflected in the rtable value which is smaller than the rcount for each instrument item. After all

indicator items on the variables of scientific knowledge and scientific creativity are declared valid, the next step is to carry out a reliability test. This reliability test aims to assess the consistency of indicator items from the questionnaire instrument. The following are the output results from SPSS software using the Cronbach's Alpha method.

Table 3. Variable Reliability Test

Variable	Cronbach's Alpha
Pengetahuan sains	0,709
Kreativitas Sains	0,700

The Alpha coefficient for the Science Knowledge variable was recorded at 0.709, which exceeds the minimum limit set at 0.60. Thus, it can be concluded that the 15 indicator items used to measure students' science knowledge have shown a good level of reliability. Likewise, for the Science Creativity variable, the Cronbach's Alpha value obtained was 0.700, which is also greater than the minimum limit of 0.600. This shows that the 15 indicator items used to measure scientific creativity are reliable.

This study conducted a normality test to evaluate the distribution of the data used. The normality test was carried out using the Shapiro-Wilk method at a significance level of 5% ($\alpha = 0.05$). According to the rules used for normality testing, data is considered not normally distributed if the significance value is less than 0.05, while if the value exceeds 0.05, the data is considered normally distributed. The following is the normality test output from SPSS software for the variables scientific knowledge and scientific creativity.

Table 4. Normality Test

Variable	Statistics	P-value
Pengetahuan sains	0,980	0,560
Kreativitas Sains	0,982	0,456

Based on the table above, the normality test results for the variables scientific knowledge and scientific creativity show that the P-Value is 0.560 and 0.456 respectively. This value is greater than the specified significance level, namely 0.05. Therefore, it can be concluded that the variables of scientific knowledge and scientific creativity are normally distributed.

The homogeneity test in this study aims to determine whether the data used is homogeneous or not. The homogeneity test was carried out using the Levene Test method at a significance level of 5% ($\alpha = 0.05$). Based on the homogeneity test provisions, data is considered inhomogeneous if the significance value is less than 0.05, whereas if the significance value is more than 0.05, the data is considered homogeneous. The following are the output results from the variance homogeneity test using SPSS software for the variables of scientific knowledge and scientific creativity.

Table 5. Homogeneity of Variants Test

Variabel	**F**	**P-value**
Science Knowledge	0,380	0,439
Science Creativity	0,148	0,523

Based on the table above, the results of the variance homogeneity test for the

variables scientific knowledge and scientific creativity show a P-Value of 0.439 and 0.523 respectively. These values are greater than the specified significance level, namely 0.05. This indicates that the variance covariance matrix for the individual scientific knowledge and scientific creativity variables is standardized for the treatment variable. Thus, the analysis can be continued using the MANOVA test.
The following is the SPSS software output for MANOVA hypothesis testing.

Table 6. Multivariate Test

	Effect	Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power[c]
Intercept	Pillai's Trace	.978	4676.170[b]	2.000	125.000	.000	9434.360	1.000
	Wilks' Lambda	.022	4676.170[b]	2.000	125.000	.000	9434.360	1.000
	Hotelling's Trace	83.907	4676.170[b]	2.000	125.000	.000	9434.360	1.000
	Roy's Largest Root	83.907	4676.170[b]	2.000	125.000	.000	9434.360	1.000
Kelas	Pillai's Trace	.380	21.306[b]	2.000	125.000	.000	43.611	1.000
	Wilks' Lambda	.730	21.306[b]	2.000	125.000	.000	43.611	1.000
	Hotelling's Trace	.378	21.306[b]	2.000	125.000	.000	43.611	1.000
	Roy's Largest Root	.378	21.306[b]	2.000	125.000	.000	43.611	1.000

The table above displays the results of the multivariate significance test. In the class section, using the Wilks' Lambda method, a significance value of 0.000 was obtained, which is smaller than the significance level of 0.05. This shows that there is a significant influence of the independent variables on all dependent variables. Next, to observe whether there is a difference between scientific knowledge and scientific creativity in the control and experimental classes, an analysis was carried out using the Test of Between-Subjects Effects.

Table 7. Test Between Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter
Corrected Model	Science Knowledge	3344.026[a]	1	3554.026	39.016	.000	39.016
	Science Creativity	3335.266[b]	1	3535.266	37.052	.000	37.052
Intercept	Science Knowledge	755627.329	1	735627.329	8308.532	.000	8308.532
	Science Creativity	757218.003	1	737218.003	8049.240	.000	8049.240
Kelas	Science Knowledge	3344.026	1	3344.026	38.016	.000	38.016
	Science Creativity	3335.266	1	3335.266	36.052	.000	36.052

Error	Science Knowledge	10436.935	115	89.836
	Science Creativity	10655.020	115	91.716
Total	Science Knowledge	749708.289	117	
	Science Creativity	751408.289	117	
Corrected Total	Science Knowledge	12080.960	116	
	Science Creativity	12190.286	116	

The table above shows the results of multivariate ANOVA. This research tests two dependent variables, namely scientific knowledge and scientific creativity, which shows the test results of the influence of one independent variable on each dependent variable. From these results, a significance value of 0.000 was obtained, which is smaller than 0.05. From the table above it can be concluded that:

1. Media makes a significant difference to the science knowledge of students who utilize Segehan Panca Warna as a media for science experiments compared to students who take part in conventional learning
2. Media makes a significant difference to the scientific creativity of students who utilize Segehan Panca Warna as a media for science experiments compared to students who take part in conventional learning.

DISCUSSION

This research aims to determine the influence of Segehan Panca Warna media on science knowledge and scientific creativity among students in Pemaron village kindergarten. Aspects of scientific knowledge measured in this research include a fundamental understanding of scientific principles, the ability to identify natural phenomena and the ability to explain simple scientific processes. The forms of scientific creativity studied include the ability to think divergently, the ability to generate new ideas and the ability to solve problems resourcefully. Segehan media was chosen as an intervention in this research because it has the potential to stimulate children's curiosity and encourage their active involvement in exploring natural phenomena. By implementing activities designed using segehan media, it is hoped that children can develop a deeper comprehension of scientific concepts, as well as improve their creative thinking skills in overcoming the challenges they face. This research was carried out at Pemaron Village PAUD, including Dewi Kumara Kindergarten and Sintha Kumara Kindergarten. In the experimental class, science learning was implemented using Segehan Panca Warna, while the control class used the direct learning method. A total of 59 students were the sample for this research, with science material taught in both classes. The success of this method is measured by a question instrument based on cognitive criteria and scientific creativity. The instruments for cognitive variables and scientific creativity were tested for validity and reliability using 15 items tested on 59 students, 30 students in the experimental class and 29 students in the control class. The results show that all items are valid and reliable. Hypothesis testing using MANOVA analysis shows that the Segehan Panca Warna learning method has a positive impact on students' scientific knowledge and scientific creativity compared to the direct learning method. The Segehan Panca Warna learning media supports the views of experts that this method involves children in experiencing and proving for

themselves the process and results of experiments. With this media, children are more active in exploring their thinking abilities and developing their ideas. In experimental classes, children are more active in understanding the relationship between concrete objects and abstract symbols, which is important for their science knowledge. Children also display a better comprehension of science concepts and their relationship to everyday life.

This research supports the conclusions found by Anggreni et al. (2019), which shows that the application of experimental methods can improve scientific cognitive abilities in colour mixing activities at Titi Dharma Kindergarten Denpasar. The increase in the average percentage of scientific cognitive abilities from 40.85% in the first cycle to 91.07% in the second cycle shows the success of the experimental method in increasing these abilities. The results of this research are also supported by research by Hasibuan and Suryana (2020), which assessed the impact of experimental methods on children's cognitive progress using a quantitative experimental approach. The experimental group showed more significant improvement than the control group, indicating that the experimental method had a positive influence on children's science knowledge. Research Damayanti (2020) also confirms that experimental activities can augment children's creativity. With two cycles, the results showed a significant increase in the scientific creativity of children aged 5-6 years at PAUD Permata Hati Jampang Village.

Science learning for children aged 5-6 years is very important, especially for educators who need to be patient in providing direction and stimulus to take full advantage of their science knowledge through the Segehan Panca Warna method. Scientific knowledge is closely related to brain development, including brain size and function. Simple experiments can increase children's curiosity and contribute to their science knowledge (Rahmah 2019). Data analysis shows that the Segehan Panca Warna method can augment scientific knowledge and scientific creativity in early childhood. This is in line with Jean Piaget's theory, which states that children construct knowledge through active exploration and experimentation, which allows them to discover new things while keeping their imagination alive (Ibda 2015).
The use of Segehan Panca Warna supports the Kurikulum Merdeka (Independent Curriculum) which emphasizes learning that is relevant, meaningful and arouses students' interest and creativity. This media allows students to relate science concepts to their local culture, in accordance with the principles of the Kurikulum Merdeka (Independent Curriculum) which emphasizes the relevance of learning to the cultural context and students' lives (Indarta et al. 2022). This media also encourages students to be actively involved in learning, in accordance with the principles of the Kurikulum Merdeka (Independent Curriculum) which prioritizes students' active, critical and creative roles in building student knowledge (Subhkan and Wahyudin, 2024).

Learning with Segehan Panca Warna pays attention to early childhood science knowledge, in accordance with the principles of the Kurikulum Merdeka (Independent Curriculum) which prioritizes the development of all aspects of individual students, not just academic aspects (Shalehah 2023). The results of this research support the Kurikulum Merdeka (Independent Curriculum) approach, proving that innovations such as the use of Segehan Panca Warna can improve the quality of science learning, the relevance of the material, as well as students' science knowledge and creativity at the PAUD level.

CONCLUSION

The use of Segehan Panca Warna as an experimental medium provides a relevant cultural context in science learning, making the material more consequential and attractive for students. This media stimulates students' active participation in the learning and exploration process, in line with the principles of the Kurikulum Merdeka (Independent Curriculum) which emphasizes that students play an active, critical and creative learning role in constructing their personal knowledge. Science learning using Segehan Panca Warna media also pays attention to early childhood science knowledge, something that is very vital in education. Hence, the use of Segehan Panca Warna media can be an effective strategy to improve the quality of science learning at the PAUD level and support the implementation of the Kurikulum Merdeka (Independent Curriculum) which emphasizes relevant, meaningful learning and arousing student interest and creativity.

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