

Science Learning for Early Childhood Students with Science Games Play

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Abstract: From an early age children must be equipped with various sciences knowledge, including science. This research aims to review various sources about the science play as a form of learning method at the PAUD level as well as knowing the effectiveness of the science play method in learning science learning in early childhood. Science learning is a process that emphasizes skills of acquiring knowledge and developing scientific attitudes. Science learning is a process of understanding the nature of science itself, namely curiosity, process, product and application/attitude. The literature that was collected in the form of journals, articles and books relevant to the topic, then interpret and analyzed the sources, interpretation of the sources and compiled them in a systematically and structured. Early childhood is a period of child development that is interesting to observe. This is because it involves complex processes, both those that occur inside (physiological and psychological) and outside (environment). The science play method is effective in learning science in early childhood, including; it can improve science abilities and science learning outcomes, introduce and improve basic science process skills and improve children's science concepts.

Keywords: Childhood; Games play; Media; Science learning

Introduction

Early childhood education plays a very important and decisive role in history because early childhood education is the foundation for the basis of a child's personality. The importance of education for early childhood is written in Law No.20 of 2003 concerning the National Education System article 1 paragraph 14 which states that: early childhood education is a coaching effort aimed at children from birth to 6 years of age which is carried out through providing stimulation, education to help children grow and develop growth physical, and spiritual development so that children have readiness to enter further education (Amalia et al., 2018).

Childhood Education programe (PAUD) is an important level of education for children at an early age (Nurhayati, 2021; Watini & Efendy, 2018). This is cause by starting point for child to grow and develop

optimally according to their age range. Early childhood is the golden age because 90% of the brain development of the Little One is achieved at the age of 5 years. Optimal brain development is an important foundation to support the learning ability of the little one (Yeager & Dweck, 2020).

Children who receive adequate education services such as PAUD from the age of 0-6 years have a greater chance of achieving success in the future (Berridge et al., 2020; Padayachee, 2022). Because in addition to providing opportunities for children to get to know school, activities in PAUD also instil honesty, discipline, and various other positive things that help form the basic foundation of the Little One's personality.

Children who previously received education in PAUD on average have better socialization and communication skills at school (Mulat & Siregar, 2022; Noor & Riinawati, 2021). This is because they are used to playing, learning, and eating together with friends of the

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same age. Children who can grow and develop well from an early age will be better prepared to learn at the basic education level, which will have an impact on their adult life later on.

Education for early childhood is specifically provided through Early Childhood Education program (PAUD) PROGRAMME. The existence of PAUD is starting to becoming a trend and increasingly shows its existence when society has realized the importance of education in the early human life (Setiawati & Ekayanti, 2021). Early Childhood Education explains the task of early childhood education must be able to develop the field of development namely the field of development and basic skills development. In the field of self-habituation development includes spiritual attitudes, social attitudes, knowledge and skills, while in the field of basic ability development develops six development which includes religious and moral values, physical-motor, cognitive, language, social-emotional, and art.

Method

The Systematic Literature Review (SLR) method was used to answer this research question. SLR is the process of compiling, evaluating, and synthesizing all relevant research related to a particular topic. The purpose of SLR is to provide a comprehensive overview of the research and identify gaps that require further research (Xiao & Watson, 2019).

The literature that was collected in the form of journals, articles and books relevant to the topic, then interpret and analyzed the sources, interpretation of the source and compiled them in a systematically and structured.

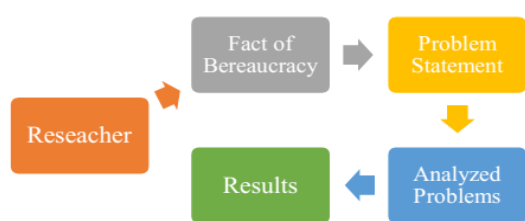


Figure 1. Research flow logic

In this section of the article, we review some of the research in areas which are closely related to the topic of this article and need to be tied in more closely (Stone et al., 2020).

Result and Discussion

Science for Early Childhood

Early childhood is a child whose age is limited to a maximum of 8 years. And in addition they have not yet received basic education. They are children who are still

in the family environment and pre-school education such as PAUD, RA, TK, TPA, KB and the like (Rifa'i et al., 2022; Saidah et al., 2021; Sembiring et al., 2023). Science is the study of the natural world. Science learning in early childhood is a learning activity that begins with finding out about the universe systematically and not just a collection of facts, concepts, principles, but also a discovery process that emphasizes on direct experience.

In essence, science is an attitude, process and product. Science as an attitude is a human behaviour such as curiosity, encouraging investigation (Jirout, 2020). While human activities in conducting investigations by observing and trying are a process to gain knowledge, the results obtained through a series of experiments are in the form of products (Rahmi, 2019). Social development of social skills is characterized by the ability to cooperate. In science learning, children will be given the opportunity to work together, for example working together in processing and using tools and materials that will be treated to investigate a fact or conduct experimental activities.

Emotionally, learning science in groups can not only develop children's social skills, but also train children to respect each other, express feelings verbally and nonverbally, for example when children succeed in doing an activity. Children will feel happy, proud and excited about their achievements. Creativity, investigation activities and science experiments will train children's imagination. Children will think and keep trying to find out the reactions that will be caused by various objects. For example, trying materials that dissolve in water and how to dissolve objects (stirring and shaking).

Cognitive, cognitive abilities include the ability to remember and understand. To classify objects based on their functions and uses, the first step children take is to record the names of objects and understand their uses. Physics, science experiments and games will provide opportunities for children to develop their motor skills. For example, the child's fine motor skills will develop when the child conducts experiments, throwing objects to determine the force of gravity, blowing up balloons, pouring water into a container, putting objects into a container of water to determine the position of objects in water, stirring substances that are soluble and insoluble in water, etc.

Teacher professionalism is closely related to the ability to realize or to actualize the competencies required of every teacher. Competence is defined as knowledge, skills, and basic values that are reflected in habits of thought and action (Sum & Taran, 2020). The environment, the place of life and the place of play influence children's play. The environment affects the availability of tools and types of games. For example,

children living in urban environments will tend to like modern games and are supported by modern game tools as well such as gadgets, swimming in waterparks, lego etc. Whereas children living in rural areas use traditional and simple games such as: swimming in rivers or streams, snail races in rice fields, congkak, patok lele etc. The child's interaction with the environment is important. Ecology is the science of the interrelationship between living things and their natural surroundings (Yaswinda & Mayar, 2018).

Social and economic status, children who live and grow up in a family environment whose social and economic status is in the upper middle class will be facilitated with complete and modern games compared to children who live in an environment with a lower middleclass economic status. Social status also affects the books that children read and the films they watch. Effective science learning for young children requires supporting media that is appropriate to their critical thinking level. That suits their critical thinking level. Interactive games are one of the media that can be used. Digital educational games can be an effective learning method for early childhood. In addition, Dewi et al. (2015) research shows that the use of interactive videos as a learning tool can improve early childhood critical thinking skills. Interactive media games are a type of computer-based educational media that can respond to user actions and provide feedback (Rahmawati et al., 2024). The respond to user actions and provide feedback. This media allows users to interact with the content presented, not only through sight and hearing, but also through active interaction (Wati & Hotimah, 2022). In line with this, according to Tarigan et al. (2015) interactive media can include various elements such as text, graphics, photos, videos, animations, and sound.

Science-based Games in Early Childhood Science Education

Developing children's talents and great talents from an early age, by doing so, we can optimize children's potential to become a superior generation from a young age. That way, we can optimize children's potential to become a superior generation that is educated from a young age. Childhood is golden, where their potential & character are easily formed, which of course in the right way according to their natural growth and development. No coercion, no pressure, but nurturing & coaching by providing the best services as programmed in PAUD (Kutsiyyah, 2018).

Play can be useful for children to investigate something. Children who are playing cookery, will usually use the leaves around them to make vegetables that will be cooked. For cooking, the child will look for different types of seeds that he/she finds to be ground, as if they were spices for cooking. Children will encounter different types of seeds. Some are soft and

easy to pound, while others are hard and difficult to pound. When they encounter seeds that are difficult to pound, they will find out why they are hard and difficult to pound. The child's curiosity and desire to investigate everything about the seed arises. This curiosity and desire to investigate will increase the child's knowledge about plants and seeds (Yuniarni, 2016).

This game is very suitable for early childhood, especially in learning science. this game can involve all basic science process skills (Adipat et al., 2021; Behnamnia et al., 2020; Liu et al., 2020; Tsai & Tsai, 2020; Wang & Zheng, 2021). Children's basic science process skills include: observing skills; comparing skills; classifying skills; and communicating skills. Starting with observing and recording as many objects or objects around as possible, followed by comparing one with another between objects that have been observed by looking at similarities and differences in objects that have been observed, then classifying objects or objects either based on function, similarity in shape, similarity in size etc. and ending with communicating or conveying information that has been obtained based on the investigation. Real conditions show that early childhood education teachers, especially in non-formal education channels, vary in qualifications and competencies (Anggraini, 2022).



Figure 2. An inflated balloon
(Source: <https://www.penakehidupan.com>)

The second criterion in choosing intellectual play equipment is safety. Safe in the sense that it does not harm the child physically or psychologically. The raw materials to make the playground equipment are the main factor in whether or not a playground equipment is safe to use. Especially for children aged 0-3 years, the selection of game tools must be soft, without sharp and soft sides. This is where parents' attention is needed to adjust the types of children's play. If possible, keep children at an early age away from sharp objects. If the play is in the field or outdoors, then the safety factor is

determined by poisonous plants and venomous animals (Yuniarni, 2016).

H5P is a stage of creating HTML5-based intuitive substance that can be utilized to create various types of intelligent learning media, such as intuitive sight- and sound-based learning recordings, images, sounds, visuals, guides, globes, and others (Madina, 2023). H5P allows users to create interactive content easily and quickly, and can be accessed through direct links, embedded, or incorporated into any learning management system that supports LTI (Learning Tools Interoperability) integration. H5P also supports adaptively, which allows users to jump to another part of the video based on user input (Rahmawati et al., 2024).



Figure 3. Simple physics game
(Source: idtimes.com)

Before using a field or the outdoors as a play area for children, make sure it is free of deadly creepy-crawlies or dangerous wild insects. This is important to note because children's creativity in the outdoors is very difficult to control. They will grab anything they think is new, even squeeze and put it in their mouths. From the description above, it can be concluded that safe factors in children's play include two things, namely material safety and essential safety. Materially safe is a safety factor such as not hurting, not poisoning, not polluting and so on. While intrinsically safe is the source of the toy material itself, such as being made from good materials and in giving it is filled with love and attention (Yuniarni, 2016).

The lava lamp experiment is one of the most popular experiments because it is interesting and easy to do, curious how to do it, see the explanation below. Oil and vinegar do not mix. When you put vinegar in a bottle with oil, the vinegar sinks to the bottom and the oil floats to the top. The oil floats on the surface because vinegar is heavier than oil. Vinegar is denser than oil. As the vinegar drops fall through the oil to the bottom of the bottle, it reacts with baking soda to produce carbon dioxide gas. These bubbles attach to the colored vinegar and cause it to float to the surface. When the bubbles pop, the colour sinks back to the bottom of the bottle.



Figure 4. Lava lamp
(Source: <https://www.penakehidupan.com>)

Science is knowledge that is systematic and regularly arranged, universally applicable in the form of a collection of data from observations and experiments. By looking at the way children develop and receive learning, science learning can actually be applied in early childhood. However, science learning applied in early childhood is still simple and introductory. Science learning important It is important to science learning from an early age with goals that are in accordance with the nature of science, namely curiosity, process, product and application/attitude (Dewi Setiawati & Ekayanti, 2021). Because learning that is fun, interactive and varied will be interesting for children and it will be very beneficial in supporting children's development and making the learning atmosphere better and more enjoyable (Khairunnisa, 2023).

Conclusion

Science learning for children aims to introduce the natural environment and develop all aspects of the child. Along with the principle of learning in kindergarten, namely learning while playing and singing. So the introduction of children's science is carried out on the basis of games while still paying attention to the aspects of development that must be owned by children. Games with the foundation of science process skills make children participate in the process of knowledge formation. Children do not only receive knowledge provided by the teacher but children who try to do a series of activities to obtain or prove, knowledge that begins with activities to observe, compare, classify, measure and communicate so that children are enthusiastic and realise the integration of each science.

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Conflicts of Interest

There is no interest conflict in this research this research.

References

- Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). Engaging Students in the Learning Process with Game-Based Learning: The Fundamental Concepts. *International Journal of Technology in Education*, 4(3), 542-552. Retrieved from <https://eric.ed.gov/?id=EJ1311472>
- Amalia, K., Saparahayuningsih, S., & Suprpti, A. (2018). Meningkatkan Kemampuan Sains Mengenal Benda Cair Melalui Metode Eksperimen. *Jurnal Ilmiah POTENSIA*, 3(2), 1-10. <https://doi.org/10.33369/jip.3.2>
- Anggraini, E. S. (2022). Peningkatan Kompetensi Keprofesionalan Guru PAUD. *Jurnal Usia Dini*, 8(2), 110. <https://doi.org/10.24114/jud.v8i2.41474>
- Behnamnia, N., Kamsin, A., Ismail, M. A. B., & Hayati, A. (2020). The effective components of creativity in digital game-based learning among young children: A case study. *Children and Youth Services Review*, 116, 105227. <https://doi.org/10.1016/j.childyouth.2020.105227>
- Berridge, D., Luke, N., Sebba, J., Strand, S., Cartwright, M., Staples, E., McGrath-Lone, L., Ward, J., & O'Higgins, A. (2020). Children in need and children in care: Educational attainment and progress. *University of Bristol, University of Oxford*, 2005-2020. Retrieved from <https://www.nuffieldfoundation.org/wp-content/uploads/2020/04/Main-report-children-in-need-and-children-in-care.pdf>
- Dewi, L. M. I., & Rimpiati, N. L. (2015). Efektivitas Penggunaan Media Pembelajaran Video Interaktif Dengan Seting Diskusi Kelompok Kecil Untuk Meningkatkan Keterampilan Berpikir Kritis Pada Anak Usia Dini. *JEPUN: Jurnal Pendidikan Universitas Dhyana Pura*, 1(1). Retrieved from <https://jurnal.undhirabali.ac.id/index.php/Jepun/article/view/78>
- Dewi-Setiawati, G. A., & Ekayanti, N. W. (2021). Bermain Sains Sebagai Metode Yang Efektif Dalam Pembelajaran Sains Untuk Anak Usia Dini. *Pratama Widya: Jurnal Pendidikan Anak Usia Dini*, 6(2), 126. <https://doi.org/10.25078/pw.v6i2.2391>
- Jirout, J. J. (2020). Supporting early scientific thinking through curiosity. *Frontiers in Psychology*, 11, 1717. <https://doi.org/10.3389/fpsyg.2020.01717>
- Khairunnisa, N. (2023). SIF (Science is Fun) Games untuk Meningkatkan Kepercayaan Diri Anak Usia Dini di RA Ansorulloh. *JECIE (Journal of Early Childhood and Inclusive Education)*, 7(1), 136-142. <https://doi.org/10.31537/jecie.v7i1.1278>
- Kutsiyyah. (2018). Peran Lembaga PAUD Bagi Kesiapan Siswa Untuk Memasuki Sekolah Dasar. *Kariman: Jurnal Pendidikan Keislaman*, 6(1), 85-98. <https://doi.org/10.52185/kariman.v6i1.12>
- Liu, Z.-Y., Shaikh, Z. A., & Gazizova, F. (2020). Using the Concept of Game-Based Learning in Education. *International Journal of Emerging Technologies in Learning*. Retrieved from <https://www.learntechlib.org/d/217589/artic/>
- Mulat, T., & Siregar, M. (2022). Character Education Approach and Actualization at Early Childhood Education Programs: A Study on Inclusive PAUD Organizers in Yogyakarta City. *Journal of World Englishes and Educational Practices*, 4(2), 18-27. <https://doi.org/10.32996/jweep.2022.4.2.3>
- Noor, H., & Riinawati, R. (2021). Improving management of early childhood education (PAUD) through identification of institutional problems. *Berajah Journal*, 1(3), 117-124. <https://doi.org/10.47353/bj.v1i3.30>
- Nurhayati, S. (2021). Parental involvement in early childhood education for family empowerment in the digital age. *Empowerment: Jurnal Ilmiah Program Studi Pendidikan Luar Sekolah*, 10(1), 54-62. <https://doi.org/10.22460/empowerment.v10i1p54-62.2185>
- Padayachee, K. (2022). *Integral education for early childhood development: Building values through indigenous knowledge*. Retrieved from https://openscholar.dut.ac.za/bitstream/10321/4753/3/Final%20thesis%2007%20Sept%202022_R%20edacted.pdf
- Rahmawati, A., Setoresmi, A. S., Malau, B., Novitasari, D. A., & Munawaroh, F. R. S. (2024). Pengaruh Penggunaan Media Games Interaktif dalam Pembelajaran Sains untuk Meningkatkan Kemampuan Berpikir Kritis Anak. *Jurnal PG-PAUD Trunojoyo: Jurnal Pendidikan Dan Pembelajaran Anak Usia Dini*, 11(1), 49-61. <https://doi.org/10.21107/pgpaustrunojoyo.v11i1.24671>
- Rahmi, P. (2019). Pengenalan Sains Anak Melalui Permainan Berbasis Keterampilan Proses Sains Dasar. *Jurnal Pendidikan*, 5(2), 43-55. Retrieved from <https://jurnal.ar-raniry.ac.id/index.php/bunayya/article/view/6389>

- Rifa'i, M., Muadin, A., Faiz, F., Khomsiyah, L., & Mabruroh, A. (2022). Menciptakan Pembelajaran Efektif melalui Penguatan Komitmen Guru PAUD. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 6(4), 3739–3746. <https://doi.org/10.31004/obsesi.v6i4.2122>
- Saidah, K., Primasatya, N., Mukmin, B. A., & Damayanti, S. (2021). Sosialisasi Peran Apersepsi Untuk Meningkatkan Kesiapan Belajar Anak Di Sanggar Genius Yayasan Yatim Mandiri Cabang Kediri. *Dedikasi Nusantara: Jurnal Pengabdian Masyarakat Pendidikan Dasar*, 1(1), 10–16. <https://doi.org/10.29407/dedikasi.v1i1.16065>
- Sembiring, A. K., Dinata, M., Bastian, A., & others. (2023). Identifikasi Kemampuan Guru PAUD sebagai Guru Penggerak di Pekanbaru. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(5), 1–10. Retrieved from <https://repository.unilak.ac.id/3798/>
- Setiawati, G. A. D., & Ekayanti, N. W. (2021). Bermain Sains Sebagai Metode Yang Efektif Dalam Pembelajaran Sains Untuk Anak Usia Dini. *Pratama Widya : Jurnal Pendidikan Anak Usia Dini*, 6(2), 126. <https://doi.org/10.25078/pw.v6i2.2391>
- Stone, M., Aravopoulou, E., Ekinci, Y., Evans, G., Hobbs, M., Labib, A., Laughlin, P., Machtynger, J., & Machtynger, L. (2020). Artificial intelligence (AI) in strategic marketing decision-making: a research agenda. *The Bottom Line*, 33(2), 183–200. <https://doi.org/10.1108/BL-03-2020-0022>
- Sum, T. A., & Taran, E. G. M. (2020). Kompetensi Pedagogik Guru PAUD dalam Perencanaan dan Pelaksanaan Pembelajaran. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 4(2), 543. <https://doi.org/10.31004/obsesi.v4i2.287>
- Tarigan, D., & Siagian, S. (2015). Pengembangan media pembelajaran interaktif pada pembelajaran ekonomi. *Jurnal Teknologi Informasi & Komunikasi Dalam Pendidikan*, 2(2), 187–200. Retrieved from <https://shorturl.asia/nJD70>
- Tsai, Y.-L., & Tsai, C.-C. (2020). A meta-analysis of research on digital game-based science learning. *Journal of Computer Assisted Learning*, 36(3), 280–294. <https://doi.org/10.1111/jcal.12430>
- Wang, M., & Zheng, X. (2021). Using game-based learning to support learning science: A study with middle school students. *The Asia-Pacific Education Researcher*, 30(2), 167–176. <https://doi.org/10.1007/s40299-020-00523-z>
- Wati, U., & Hotimah, H. (2022). The Multimedia in Creating Smart Classroom Elementary School on Natural Science Learning in The Era of Digitalization. *Excellent Education, Science and Engineering Advances Journal*, 1(1), 57–66. Retrieved from <https://ojs.nubinsmart.id/index.php/eeseaj/article/view/32>
- Watini, S., & Efendy, H. (2018). The playing method “ASYIK” based on multiple intelligence in learning science process at the early childhood education program (PAUD) age 5-6 years. *Journal of Studies in Education*, 8(1), 51. <https://doi.org/10.5296/jse.v8i1.12108>
- Xiao, Y., & Watson, M. (2019). Guidance on Conducting a Systematic Literature Review. *Journal of Planning Education and Research*, 39(1), 93–112. <https://doi.org/10.1177/0739456X17723971>
- Yaswinda, Y., & Mayar, F. (2018). Pengembangan Bahan Pembelajaran Sains Berbasis Multisensori Ekologi Bagi Guru Paud Kecamatan Tilatang Kamang Kabupaten Agam. *Yaa Bunayya: Jurnal Pendidikan Anak Usia Dini*, 2(2), 13–22. <https://doi.org/10.24853/yby.2.2.13-22>
- Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist*, 75(9), 1269. <https://doi.org/10.1037/amp0000794>
- Yuniarni, D. (2016). Peran Paud Dalam Mengoptimalkan Tumbuh Kembang Anak Usia Dini Demi Membangun Masa Depan Bangsa. *Jurnal Visi Ilmu Pendidikan*, 8(1), 1–13. <https://doi.org/10.26418/jvip.v8i1.27370>