Pedagogia Jurnal Ilmu Pendidikan

Journal homepage: http://ejournal.upi.edu/index.php/pedagogia

Analysis of TPACK-based Inquiry Learning Model as a Strategy to Foster Early Childhood Science Attitudes

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ABSTRACT

This article presents an analysis of the application of the TPACK-based Inquiry learning model to foster the growth of scientific attitudes among early childhood students in kindergarten. The primary objective is to explore the effectiveness of this model and its potential positive outcomes when these attitudes are integrated into their daily lives. Through a comprehensive literature review, the article delves into the impact of the TPACK-based Inquiry learning model on the development of scientific attitudes among kindergarten children. The findings underscore that this pedagogical approach serves not only to enhance academic prowess but also to instill a scientist's mindset. This mindset, characterized by critical thinking, responsibility, and heightened curiosity, promises holistic growth. By nurturing these attitudes, the learning model contributes significantly to the early character formation of children. The implications extend beyond academic progress, as young learners have essential skills to approach life with inquisitiveness and analytical arguments. In conclusion, the TPACK-based Inquiry learning model emerged as a valuable tool for nurturing scientific attitudes in early childhood. Its multifaceted impact on cognitive and character development highlights the significance of integrating such approaches into early education settings.

ARTICLE INFO

Article History:
Submitted/Received 15 Feb 2023
First Revised 25 April 2023
Accepted 30 June 2023
First Available Online 28 July 2023
Publication Date 01 August 2023

Keyword:
Children,
Inquiry Learning,
Scientific Attitudes,
TPACK.

1. INTRODUCTION

Education is one form of effort in creating quality human resources as a determinant of the future (Rahmawati & Hartati, 2021), as it is well known that education is an investment in the future of a nation. This investment can be achieved if, from an early age, the teacher can develop learning that can stimulate children to be active through various approaches and methods (Ardiyanto, 2019). Through education, we can develop all the potential that children have as a whole thoroughly so that they can solve problems and problems encountered in their environment, and it is hoped that they can develop the following educational goals (Sufa & Setiawan, 2020). Experts say that education aims to develop all the potential possessed by students to become human beings who believe in and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible state (Azhar Haq, 2019; Junanto & Kusna, 2018; Lestari, 2021). Providing education to children can be used as a way for parents and teachers so that the development and growth of these children can be achieved optimally, and this can be started through early childhood education (Risnawati, 2020; Pranoto, 2020).

Early childhood education is an educational institution aimed at children from birth up to the age of six, which is carried out through the provision of educational stimuli such as the guidance process, providing stimulus through play activities, as well as nurturing to develop all aspects of intelligence which are held in formal, non-formal and informal channels (Nugraha, 2015; Setyowahyudi, 2020). This statement is in line with the Law on the National Education System Number 20 of 2003, article 1, paragraph 4, which reads, "Early Childhood Education is a coaching effort aimed at children from birth up to the age of 6 which is carried out through the provision of educational stimuli to help growth and development. Physical and spiritual development needs to be developed so that children are ready to enter further education.

The development of information systems and technology on a massive scale has changed the perspective on the concept of education (Fitriani & Aziz, 2019; Susilana, 2022; Zaharah et al., 2022). Mastery of literacy initially focused on reading-writing and arithmetic has shifted to mastery of data and technology literacy (Johan el al., 2019; Khotimah et al., 2019; Nisa, 2020). This era emphasizes the need to introduce computers and technology as a means that allows visualization and ease of transferring knowledge anytime, anywhere, and by anyone (Hastini et al., 2020; Pujiati & Yulianto, 2021; Susilo & Prasetyo, 2020).

The significant impact given to all aspects of life makes education implicated in developing human resources (Fanny, 2020; Wardhana, 2020). It makes the teacher have to learn more and is a challenge in carrying out the role of a designer of the learning process. Competence in mastering technology cannot be denied anymore (Sawitri et al., 2019; Jain Chee et al., 2018).

One way the teacher can make this happen is through mastery of Technology, Pedagogic, and Content or Scientific knowledge, known as TPACK (Technological et al. Knowledge). This approach combines science with technological sophistication. The TPACK framework is built based on students' needs and characteristics, which can be identified through needs analysis so that the learning process design follows what is needed by students (Kusuma, 2021; Zhang & Tang, 2021). Technology will give students digital-era literacy skills, the ability to think inventively and critically with sound reasoning, and the ability to communicate effectively with high productivity (Chaeruman, 2019; Ramadhani, 2021; Siswantara, 2021).

Even so, the implementation of technology-based learning in schools still has drawbacks, such as learning resources that require much understanding, as well as costs that are not small

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

in procurement; there is no face-to-face process between students and educators; freedom that cannot be limited by teachers to students in accessing information (Saubern et al., 2020; Azizah et al., 2021; Yuniarni, 2019).

Coupled with learning practices focused on sharpening the power of thought and absorbing knowledge (Hamidah et al., 2021; Rahmadi, 2019). Good education should aim for children to absorb as much knowledge as possible and be important for remembering and depositing the knowledge gained and applying these concepts and principles in everyday life (Ardiyanto, 2019; Tanak, 2020). In this context, it is essential to consider the relationship between TPACK (Technological, Pedagogical, Content, Knowledge) and children's science attitudes, especially early on.

TPACK is a concept that integrates technological, pedagogical, and content knowledge in learning (Bahador et al., 2017; Jannah & Rahman, 2021). In TPACK-based learning, technology is a tool to develop students' abilities to understand science content. However, TPACK-based learning also plays a vital role in fostering positive science attitudes in children (Waluyo & Nuraini, 2021).

The science attitude involves an open attitude, curiosity, willingness to experiment, and active involvement in science learning (Sudarwo & Adiansha, 2022). At an early age, learning that encourages science attitudes will help children develop an interest in and motivation for science. Using a TPACK-based approach, children can engage in active exploration, observation, and experimentation using technology as a learning tool.

Science attitudes for early childhood are essential for developing critical thinking, problem-solving skills, and working collaboratively. A positive attitude to science also helps children develop self-confidence, persistence, and creative thinking skills (Nuraeni et al., 2019; Roostin & Swandhina, 2019). Through TPACK-based learning, children can learn in an interactive and immersive way, which helps them build a strong foundation for further development of science skills in the future.

Therefore, educators and parents must pay attention to the TPACK-based learning approach and the role of science attitudes in early childhood learning. By integrating technology into learning and encouraging positive science attitudes, we can help children develop deep understanding, critical thinking skills, and readiness to take on the challenges of science in an ever-evolving era.

In this paper, the main objective is to examine learning approaches that are more holistic and centered on sharpening the intellect and applying knowledge in everyday life rather than just absorbing knowledge passively. In addition, this article also aims to describe the concept of TPACK and its relation to the development of positive science attitudes in early childhood. In this context, the attitude toward science is essential for early childhood development because it can help them develop critical thinking, problem-solving, creativity, and the ability to work collaboratively.

A TPACK-based learning approach, which integrates technology as a learning tool, can help foster positive science attitudes in children. Through technology, children can engage in interactive and immersive learning processes that encourage exploration, observation, and experimentation. In this context, TPACK-based learning helps children understand science content and encourages them to think critically, solve problems, and develop innovative thinking skills.

In order to achieve the purpose of writing, the writer will analyze the need for a more comprehensive learning approach in education and provide a clear picture of the TPACK concept and its relevance in developing science attitudes in early childhood. In addition, we

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p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

will also describe the importance of science attitudes in children's development and illustrate how TPACK-based inquiry learning can support the development of these science attitudes through technology. The practical implications of the TPACK-based learning approach will also be discussed to provide a better understanding of its benefits in preparing children to face the challenges of the ever-evolving future.

2. METHODOLOGY

The article adopts a narrative review method to discuss the TPACK-based Inquiry Learning Model in shaping Science Attitudes in Early Childhood. The research approach involves an analysis of the primary studies that have been done before. The first stage involves identifying and collecting relevant studies on applying the TPACK-based Inquiry Learning Model in early childhood education settings. After that, a literature synthesis was carried out by summarizing each identified study's main findings and results. This approach makes it possible to describe the diversity of approaches, methodologies, and results of these studies. In this stage, the main conclusions from each study are integrated into a comprehensive understanding of the effectiveness of the TPACK-based Inquiry Learning Model in shaping Science Attitudes in early childhood.

Overall, this narrative review approach allows the combining of existing findings in the literature, resulting in a deeper understanding of the impact of the TPACK-based Inquiry Learning Model on Science Attitudes in early childhood. By integrating various perspectives, methodologies, and findings, this article presents a more decadent and holistic picture of the contribution of this learning model in shaping the character of early childhood.

3. RESULTS AND DISCUSSION

3.1. The Importance of Applying Science Attitudes to Early Childhood

The application and inculcation of science attitudes in early childhood have a crucial role in their intellectual preparation and positively impact society. When children interact with various objects in the learning process, this stimulates their interest and forms their view of these objects as interesting discoveries worth exploring. This initial view is a solid trigger to give birth to unlimited curiosity and motivation to gain more profound knowledge (Risnawati, 2020).

The importance of these early interactions not only impacts children's initial understanding of their environment but also forms the basis for the development of a positive attitude to science. Early recognition of surrounding objects allows children to feel the wonder and beauty of the exploration process. It is not just about acquiring information but also about building an emotional connection with knowledge. Thus, this interaction becomes the foundation for the growth of characters who are curious, critical, and full of responsibility, which is very important in forming a generation that contributes positively to the development of society (Risnawati, 2020).

In this context, taking advantage of this precious moment and applying it in formal learning becomes essential. By providing opportunities for children to engage in processes of discovery and exploration in learning environments, we can help them develop a strong foundation of science attitudes (Erlina et al., 2022). Learning approaches such as the TPACK-based Inquiry model open the door to deep and continuous learning experiences. This model encourages children to ask questions, explore, and experiment, strengthening their curiosity and critical thinking skills (Roostin, 2020).

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

At the core of this teaching, students collect facts and learn about the scientific process, including how to ask relevant questions, design methods to answer these questions, and evaluate experimental results. By experiencing this process, they build a foundation for a science attitude that includes constant curiosity, analytical thinking skills, and the ability to collaborate and overcome challenges.

Thus, applying and instilling a science attitude in early childhood is about teaching scientific facts and forming a solid foundation of character that will guide them throughout life (Rohmah et al., 2019). Early interaction with surrounding objects becomes an essential catalyst in this process, while appropriate learning approaches, such as TPACK-based Inquiry, provide a solid framework for forming a generation that has the characteristics of a positive scientific attitude.

3.2. The Process of Applying Science Attitudes to Early Childhood

Instilling a scientific attitude through learning can be realized in an austere environment. When children explore the world around them, they are experiencing the process of developing that science attitude. Integrating these attitudes into the context of learning also opens the door to significant potential in the influence of educational methods on children's personal development. Therefore, selecting appropriate learning models has a significant role in this context. In this case, the view (Wahyuni et al., 2020)that defines the learning model as a guide in curriculum planning, learning material design, and teaching in the classroom becomes very relevant. The model chosen must be in line with the desired educational goals. One model suitable for cultivating this scientific attitude is the TPACK-based Inquiry learning model.

In the TPACK-based Inquiry learning model, children are encouraged to become small researchers who are active in the learning process. They are invited to ask questions, explore, and conduct experiments to gain a deeper understanding. This approach also incorporates technology to broaden understanding (Agustin et al., 2022). Through technology integration, children can access more information, conduct more in-depth research, and interact with more relevant content (Absari et al., 2020).

The importance of implementing a suitable learning model, especially the TPACK-based Inquiry model, is rooted in its ability to stimulate children's thinking. By combining exploratory and technological initiatives, this model helps them hone their critical thinking and inquiry skills (Pedaste et al., 2015). Through this process, children not only accumulate knowledge but also form a solid science attitude foundation for their future.

3.3. TPACK-based *Inquiry* Learning Model

The TPACK-based Inquiry learning model emphasizes the learning process compared to the result. This approach encourages students, especially young children, to become active actors in discovering knowledge through the stages of investigation (Desouza, 2017), exploration, and technology integration. This approach invites students to receive information and explore knowledge through direct experience.

This model encourages children to ask challenging questions, conduct investigations, and experiment independently. It allows them to respond in greater depth to learning materials. Students build a deeper and more sustainable understanding of the studied concepts by actively participating in this process. Technology integration in this model provides additional benefits. Technology expands their access to research resources, enabling them to access more prosperous and diverse information and interact with more relevant content. This

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p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

integration improves the quality of learning and stimulates students' curiosity to explore and dig deeper.

This approach changes the role of students from mere recipients of information to become active participants in the learning process. The TPACK-based Inquiry learning model forms a solid foundation for developing positive science attitudes and a more profound understanding in early childhood by stimulating them to think critically, collaborate, and undergo a process of Inquiry.

3.4. TPACK-based Inquiry Learning Model for Growing Science Attitudes in Early Childhood

In the TPACK-based Inquiry learning model, students develop critical and analytical thinking skills by processing the information obtained and connecting it with previous knowledge (Waluyo & Nuraini, 2021). This process involves collaboration, critical thinking, observation, research, and the ability to draw conclusions based on evidence and data.

Through the TPACK-based Inquiry approach, students gain knowledge and develop skills and attitudes essential to scientific research. They learn to be active and independent researchers, able to formulate relevant questions, design experiments, analyze data, and conclude their findings. The use of technology also increases student involvement and motivation in the learning process.

The TPACK-based Inquiry approach is essential in fostering science attitudes in early childhood (Hanik et al., 2022). Through investigation, exploration, and use of technology, students develop the critical thinking, analytical, and collaborative skills required in science. This approach turns students into active participants who engage critically with their surroundings, thus gaining a deeper understanding of the world.

4. CONCLUSION

Based on the explanation above, it can be concluded that learning with conventional methods such as lectures tends to make children passive in acquiring knowledge. The dominant role of the teacher as an information provider causes children to only accept subject matter without involving themselves in discovering and understanding concepts. It can quickly lead to boredom and forgetfulness, and science attitudes must be honed, especially in early childhood.

However, by applying the TPACK-based inquiry learning model, children can be actively involved in learning. They can develop strong "self-concepts," better understand concepts, and use memory and transfer in new learning situations. This model encourages children to think independently, to be objective, honest, and open, and to formulate their hypotheses. This learning provides intrinsic satisfaction, stimulates learning situations, and develops individual talents and skills.

With this approach, children are free to learn independently, avoid traditional ways of learning, and get enough time to assimilate information. In addition, using technology in the TPACK-based inquiry learning model allows brands to stay connected with the times. Thus, applying this model provides significant benefits in learning, strengthens children's involvement, and increases their understanding and interest.

As the author suggests, teachers need to consider the application of the TPACK-based inquiry learning model in classroom learning activities. Teachers can involve students actively, provide opportunities for exploration, foster scientific attitudes, and apply technology effectively. Support and training are needed for teachers to develop TPACK skills so they can design and manage learning according to children's needs. In addition, teachers also need to

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

monitor and evaluate the impact of implementing this model on children's learning and development on an ongoing basis.

REFERENCES

Absari, N., Priyanto, P., & Muslikhin, M. (2020). The effectiveness of Technology, Pedagogy and Content Knowledge (TPACK) in Learning. *Jurnal Pendidikan Teknologi Dan Kejuruan*, *26*(1) 43-51.

Agustin, M., Suryana, S. I., & Pratama, Y. A. (2022). Penguatan pembelajaran sains di PAUD saat dan Pasca Belajar dari Rumah (BDR). *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(6), 7264–7272.

Ardiyanto, A. (2019). Permainan tradisional sebagai wujud penanaman nilai karakter anak usia dini. *KoPeN: Konferensi Pendidikan Nasional*, *1*(1), 173-176.

Azizah, D.S, Anjani Putri, D., & Mulhayatiah, D. (2021). Prospective science teacher TPACK skills in preparing the lesson plans. *Jurnal Geliga Sains: Jurnal Pendidikan Fisika*, *8*(2), 132-139.

Azhar Haq. (2019). Peranan guru dalam pelaksanaan program kurikulum 2013 di Madrasah Tsanawiyah Hidayatul Mubtadi'in Bumiayu Malang. *Vicratina*, *4*(1), 65–71.

Bahador, Z., bin Othman, N., & bin Saidon, M. K. (2017). Faktor-faktor yang mempengaruhi pengintegrasian teknologi pengajaran berdasarkan model TPACK dalam kalangan guru matematik. *Proceedings of the ICECRS*, *1*(2), v1i2-1438.

Chaeruman, U. A. (2019). Mengintegrasikan teknologi informasi dan komunikasi ke dalam proses pembelajaran: Apa, mengapa dan bagaimana? *Jurnal Teknodik*, 046-059.

Desouza, J. M. S. (2017). Conceptual play and science inquiry: Using the 5E instructional model. *Pedagogies: an international journal*, *12*(4), 340-353.

Erlina, E., Widowati, H., & Sujarwanta, A. (2022). Model inkuiri terbimbing untuk melatihkan keterampilan proses sains. *Biolova*, *3*(1), 1-5.

Sawitri, E., Astiti, M. S., & Fitriani, Y. (2019, July). Hambatan dan tantangan pembelajaran berbasis teknologi informasi dan komunikasi. In *Prosiding Seminar Nasional Program Pascasarjana Universitas Pgri Palembang*.

Fanny, A. M. (2020). Teknologi informasi dan komunikasi pada pendidikan dasar: Tinjauan kritis dan implikasinya". *Didaktis: Jurnal Pendidikan dan Ilmu Pengetahuan*, *20*(1), 66-73.

Fitriani, Y., & Aziz., I. A. (2019, March). Literasi era revolusi industri 4.0. In *Prosiding Seminar Nasional Bahasa dan Sastra Indonesia (SENASBASA)* (Vol. 3, No. 1).

Hamidah, H., Junaedi, I., Mulyono, M., & Kusuma, J. W. (2021). Kurikulum dan pembelajaran matematika di jepang dan di indonesia. *Jurnal Pendidikan Matematika (JPM)*, *7*(2), 95-105.

Hanik, E. U., Puspitasari, D., Safitri, E., Firdaus, H. R., Pratiwi, M., & Inayah, R. N. (2022). Integrasi pendekatan TPACK (technological, pedagogical, content knowledge) guru sekolah dasar SIKL dalam melaksanakan pembelajaran era digital. *JEID: Journal of Educational Integration and Development*, *2*(1), 15-27.

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

Hastini, L. Y., Fahmi, R., & Lukito, H. (2020). Apakah pembelajaran menggunakan teknologi dapat meningkatkan literasi manusia pada generasi z di Indonesia? *Jurnal Manajemen Informatika (JAMIKA)*, *10*(1), 12-28.

Jain Chee, Mariani Md Nor, Abdul Jalil Othman, & Mohd Nazri Abdul Rahman. (2018). Isu pengetahuan, pedagogi dan teknologi dalam kalangan guru Prasekolah. *Jurnal Kurikulum & Pengajaran Asia Pasifik*, *6*(1), 7-21.

Jannah, W. N., & Rahman, R. (2021). Peranan technological pedadogical contents knowledge (TPACK) dalam kreativitas menyusun perangkat pembelajaran. *EduHumaniora| Jurnal Pendidikan Dasar Kampus Cibiru*, *13*(2), 153-161.

Johan, R. C., Rullyana, G., Hanoum, N., Fathoni, T., & Wulandari, Y. (2019, October). Cultural literacy: Getting to know digital-based folklore. In *2019 5th International Conference on Education and Technology (ICET)* (pp. 66-71). IEEE.

Junanto, S., & Kusna, N. A. A. (2018). Evaluasi program pembelajaran di PAUD inklusi dengan model Context, Input, Process, and Product (CIPP). *Inklusi*, *5*(2), 179-194.

Khotimah, H., Astuti, E. Y., & Apriani, D. (2019, July). Pendidikan berbasis teknologi (permasalahan dan tantangan). In *Prosiding Seminar Nasional Program Pascasarjana Universitas Pgri Palembang*.

Kusuma, I. P. I. (2021). Tpack-related programs for pre-service English teachers: An in-depth analysis on efforts and issues of ICT integration. *Jurnal Cakrawala Pendidikan, 40*(1), 183-195.

Lestari, Y. (2021). Pentingnya profesi keguruan bagi Indonesia. *OSF Preprints, 1*(2), 1-6.

Nisa, L. (2020). Pemanfaatan teknologi dalam Pendidikan Anak Usia Dini. *ThufuLA: Jurnal Inovasi Pendidikan Guru Raudhatul Athfal*, *8*(1), 1-14.

Nugraha, B. (2015). Pendidikan jasmani olahraga usia dini. *Jurnal Pendidikan Anak*, *4*(1), 1-8.

Nuraeni, W., Nugraha, A., & Romadoni, N. F. (2019). Meningkatkan kemampuan sikap ilmiah anak melalui pembelajaran sains dengan metode inkuiri. *Edukid*, *14*(1), 1-9.

Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational research review*, *14*, 47-61.

Pujiati, D., & Yulianto, D. (2021). Analisis media pembelajaran anak usia dini berbasis teknologi masa pandemi covid-19. *Efektor*, *8*(1), 45-52.

Rahmadi, I. F. (2019). Technological Pedagogical Content Knowledge (TPACK): Kerangka pengetahuan guru abad 21. *Jurnal Pendidikan Kewarganegaraan*, *6*(1), 65-74.

Rahmawati, A., & Hartati, H. (2021). Analisis penerapan kurikulum 2013 dalam meningkatkan kualitas pembelajaran. *ORYZA (JURNAL PENDIDIKAN BIOLOGI)*, *10*(1), 46-51.

Ramadhani, H. C. (2021). Peran literasi digital dalam upaya peningkatan sumber daya manusia pada era revolusi industri 4.0. *Jurnal Implementasi*, *1*(2), 139-145.

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

Risnawati, A. (2020). Pentingnya pembelajaran sains bagi Pendidikan Anak Usia Dini. *Prosiding Konferensi Integrasi Interkoneksi Islam Dan Sains*, *2*, 513–515.

Rohmah, S., Hana, S., & Nafiqoh, H. (2019). Efektivitas rasa ingin tahu (kuriositas) anak usia dini melalui edutainment dengan metode sains sederhana. *CERIA (Cerdas Energik Responsif Inovatif Adaptif), 2*(5), 237-242.

Roostin, E. (2020). Meningkatkan minat belajar dan sikap sains anak melalui metode eksperimen pada masa pandemi covid 19. *Jurnal Kajian Anak (J-Sanak)*, *2*(01), 1–13.

Roostin, E., & Swandhina, M. (2019). Analisis pembelajaran sains pada anak usia dini berbasis karakter di TK Arasy Kabupaten Sumedang. *Tunas Siliwangi: Jurnal Program Studi Pendidikan Guru PAUD STKIP Siliwangi Bandung*, *5*(2), 45-51.

Saubern, R., Henderson, M., Heinrich, E., & Redmond, P. (2020). TPACK-time to reboot?. *Australasian Journal of Educational Technology*, *36*(3), 1-9.

Setyowahyudi, R. (2020). Pemikiran Ki Hajar Dewantara dan Maria Montessori tentang Pendidikan Anak Usia Dini. *PAUDIA : Jurnal Penelitian Dalam Bidang Pendidikan Anak Usia Dini*, *9*(1), 17-35.

Siswantara, Y. (2021). Kesadaran digital sebagai pengembangan karakter kebangsaan di abad 21. *Linggau Journal Science Education, 1*(1), 68-81.

Sudarwo, R., & Adiansha, A. A. (2022). Sikap ilmiah siswa melalui metode inkuiri: Pembelajaran sains di SD Negeri Kabupaten Bima. *Sekolah Dasar: Kajian Teori Dan Praktik Pendidikan*, *31*(1) 26-35.

Sufa, F. F., & Setiawan, M. H. Y. (2020). Implementasi penjaminan mutu pada lembaga PAUD di Solo Raya. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini, 4*(2), 559-566.

Pranoto, Y. K.S. (2020). Kecerdasan moral anak usia prasekolah. *Edukasi*, *14*(1), 1-7.

Susilana, R., Dewi, L., Rullyana, G., Hadiapurwa, A., & Khaerunnisa, N. (2022). Can microlearning strategy assist students' online learning. *Jurnal Cakrawala Pendidikan*, *41*(2), 437-451.

Susilo, S. V., & Prasetyo, T. F. (2020). Bahan ajar mobile learning 2D berbasis android: Sebuah pembelajaran berbasis teknologi dalam menghadapi revolusi industri 4.0. *NATURALISTIC: Jurnal Kajian Penelitian Pendidikan dan Pembelajaran*, *4*(2b), 587-592.

Tanak, A. (2020). Designing a tpack-based course for preparing student teachers to teach science with Technological Pedagogical Content Knowledge. *Kasetsart Journal of Social Sciences*, *41*(1), 53–59.

Wahyuni, S., Reswita, R., & Afidah, M. (2020). Pengembangan model pembelajaran sains, technology, art, engineering and mathemathic pada kurikulum PAUD. *Jurnal Golden Age*, *4*(02), 297-309.

Waluyo, E., & Nuraini, N. (2021). Pengembangan desain instruksional model inquiry learning terintegrasi TPACK untuk meningkatkan kemampuan pemecahan masalah. *Jurnal Pengembangan Pembelajaran Matematika*, *3*(1), 1–11.

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700

Wardhana, W. S. (2020, October). Strategi pengembangan kompetensi guru secara mandiri di era literasi digital. In *Prosiding Seminar Nasional Bahasa dan Sastra Indonesia (SENASBASA)* (Vol. 4, No. 1).

Yuniarni, D. (2019). Peran guru PAUD dalam meminimalisir dampak gadget pada perkembangan anak usia dini melalui permainan tradisional. *Yaa Bunayya: Jurnal Pendidikan Anak Usia Dini*, *3*(1), 1-6.

Zaharah, Z., GI, K., Wati, R., & Sina, I. (2022). Inovasi pendidikan dan penggunaan video pembelajaran bagi guru dalam menghadapi era digital. *Rausyan Fikr : Jurnal Pemikiran Dan Pencerahan*, *18*(1), 1-12.

Zhang, W., & Tang, J. (2021). Teachers' TPACK development: A review of literature. *Open Journal of Social Sciences*, *9*(7), 367-380.

DOI: https://doi.org/10.17509/pdgia.v21i2.59693
p- ISSN p. ISSN 1693-5276 e-ISSN 2579-7700