Effectiveness of Tpack-Based Learning on Student Learning Outcomes in Elementary Schools

Linatus Shofiyah

Universitas Muhammadiyah Purwokerto, Banyumas, Central Java, Indonesia

Email: linatusshofiyah5555@gmail.com

ABSTRACT

21st-century learning demands that teachers integrate communication and collaboration skills, along with the use of information technology, into a framework known as TPACK. The research method used is descriptive qualitative, and the data collection technique employed is interviews. The subjects of this research are teachers and sixth-grade students of SD Negeri Kalisabuk 03 Kesugihan, Cilacap Regency. There are seven components to TPACK that need to be understood: Technological Knowledge, Pedagogical Knowledge, Content Knowledge, Technological Pedagogical Knowledge, Technological Content Knowledge, Pedagogical Content Knowledge, and Technological Pedagogical Content Knowledge. This article aims to determine the effectiveness of TPACK-based learning on student learning outcomes in elementary schools. The results of this study indicate that TPACK-based learning is effective for elementary school education and can enhance student learning outcomes. Additionally, the implementation of TPACK-based learning in elementary schools for sixth-grade students shows that all students are enthusiastic and actively participate in the learning process.

Keywords: Leadership TPACK, Learning Outcomes, Student, Elementary School.

INTRODUCTION

Education is one of the crucial factors for the advancement of a country (Rachmadtullah et al., 2020). Quality education is needed to train future generations to be competitive on the international stage. Various efforts to improve the quality of education in Indonesia are always up-to-date, based on empowering factors that support the success of education, which are always measurable and sustainable (Aliyyah et al., 2020; Rasmitadila et al., 2021). Education is the most important factor that can advance a country. Through education, a country will experience significant development, especially in the field of knowledge imparted, which will help its society progress towards advancement.

There is a shift from the present state to the desired future state. In this context, major and minor changes continuously occur, and the change process is always present in society. Change is also a process of improving something for the better. It is important to understand that change is a process that takes time and does not happen instantly. Technological development has varying impacts on different areas of life, including the social and cultural fields. Indonesian society's socio-cultural life has undergone many changes with technology development, particularly in terms of technology utilization (Adhari et al., 2024).

The development of digital technology in the 21st century has significantly impacted human life in various fields, including education. This is due to technology-infused education's efficiency, effectiveness, and appeal. Advanced technology is essential for teachers to master

The Role of Digital Technology in Improving the Efficiency
and Quality of HR Management and Education in the Industrial Era 4.0

p-ISSN: 2962-276X | e-ISSN: 2962-3499

and use as a classroom teaching and learning medium. Quality education can be a main supporter in achieving better human development goals in Indonesia (Hanik et al., 2022).

Suyamto et al. (2020) explain that the development of educational technology is directed at solving learning problems, with its models adapted to depict educational technology as an effort to solve learning problems in a planned manner. Technological Pedagogical Content Knowledge (TPACK) is a new blueprint that can serve as a framework for utilizing technology in learning. TPACK is the integration of knowledge and skills about hardware and pedagogy combined with technological advancements. Integration itself is a system that undergoes a process of mixing or merging until it becomes a unified whole. By integrating TPACK, they collaborate by combining three main parts: technology, pedagogy, and content knowledge (Hanik et al., 2022).

The ability to apply technology is a mandatory requirement for teachers (Fahrman et al., 2020; Yeung et al., 2012). With the emergence of digital technology, it has become an inseparable part of the lives of teachers and students, changing how they interact and learn in a technology-rich environment. Early efforts in technology integration treated technology as an entity to be learned separately from pedagogy and content. This idea is reflected in pre-service and in-service teacher training programs, which offer separate courses or workshops focused on technology, independent of the teaching context. However, recently, recognizing the need for teacher knowledge required for effective technology integration, researchers have begun using TPACK as a framework to design and develop programs to equip teachers with more focused and connected knowledge for student learning across various content areas.

According to researchers, there must be innovation in selecting appropriate learning approaches to enhance students' understanding and learning outcomes. One example of a suitable learning approach for 21st-century education is the TPACK approach. According to Schmidt et al. (Farikah & Al Firdaus, 2020), Technological Pedagogical Knowledge involves knowledge of how technology can be used in teaching and learning, and it is about understanding how various technologies can change how teachers teach. Meanwhile, Mishra & Koehler (Rahmadi, 2019) describe TPACK as new knowledge educators must master to effectively apply technology in learning according to their needs. Based on the explanations of several experts, it can be concluded that the TPACK approach is a learning approach used to teach knowledge on how to teach and master learning materials in the field to be taught using technology.

Based on initial observations at SD Negeri Kalisabuk 03, Technological Pedagogical Content Knowledge (TPACK) has been implemented in the school but is rarely used in the classroom and is not applied to all subjects, only specific ones. After conducting initial observations in sixth grade and interviews with an interview guide, it was found that the teacher had not fully implemented technology (TPACK) in the learning process, applying it only to certain subjects, resulting in low student learning outcomes. By applying TPACK in learning, students will be more interested and better able to understand the material.

The reason for conducting research at SD Negeri Kalisabuk 03 is that the facilities used in the learning process are adequate to support the implementation of TPACK in the classroom,

371

The Role of Digital Technology in Improving the Efficiency
and Quality of HR Management and Education in the Industrial Era 4.0

p-ISSN: 2962-276X | e-ISSN: 2962-3499

making it easier for teachers to apply it. Based on the explanations provided, the researcher is interested in researching "The Effectiveness of TPACK-Based Learning on Student Learning Outcomes in Elementary Schools" to improve student learning outcomes using the TPACK approach.

RESEARCH METHODS

The research design or approach used in this study is a descriptive qualitative approach. This research was conducted at SD Negeri Kalisabuk 03, Kesugihan District, Cilacap Regency, during the even semester of the 2023/2024 academic year for sixth-grade students at SD Negeri Kalisabuk 03.

The subjects of this study are the class teacher and 25 sixth-grade students at SD Negeri Kalisabuk 03. The object of this research is the effectiveness of TPACK-based learning on student learning outcomes. The data collection technique used in this study is unstructured interviews. The data analysis technique employed in this research is a descriptive qualitative analysis using the data analysis model of Miles and Huberman (Assyifa et al., 2023). The Miles and Huberman data analysis model consists of three stages: data reduction, data display, and conclusion drawing. Meanwhile, data validity testing uses source triangulation. The comparison sources in this study are teachers and students.

RESULTS AND DISCUSSION

TPACK stands for Technological Pedagogical Content Knowledge. TPACK can be understood as a form of knowledge that synthesizes three types of knowledge: technological knowledge, pedagogical knowledge, and content knowledge (Hasanah et al., 2022). TPACK was first introduced by Koehler and Mishra (2006) as a framework integrating technological knowledge, pedagogical knowledge, and content knowledge in the context of learning. This framework illustrates how teachers' understanding of educational technology is related to their pedagogy and content knowledge, enabling them to create effective learning (Putri et al., 2023). TPACK, as stated by experts Harrington, Driskell, Johnston, Browning, and Niess, focuses on how to combine technological, pedagogical, and content knowledge in teaching, which helps achieve effective and successful learning in a context that includes technology as a learning tool, and how teachers teach using appropriate and creative models and methods along with the content to be learned (Mouza et al., 2014).

Based on the definitions from several experts, it can be concluded that Technological Pedagogical Content Knowledge (TPACK) is the combination of three crucial elements in learning: technology (technological knowledge) used to support the provision of teaching materials, pedagogy (pedagogical knowledge) including the methods and models to be applied, and content knowledge (content awareness) encompassing the learning material. These three elements can be organized into a lesson plan (Suharyat, 2023).

According to Mishra and Koehler, educators must possess three essential knowledge components: mastery of subject matter according to the curriculum, mastery of pedagogy, and technology depicted as an interrelated unity (Osuji & Suleh, 2017). In the TPACK scheme,

372

The Role of Digital Technology in Improving the Efficiency and Quality of HR Management and Education in the Industrial Era 4.0

p-ISSN: 2962-276X | e-ISSN: 2962-3499

there are interrelationships between the main components: technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK), which influence learning. These three main components' interrelation creates four new components: Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK). From this explanation, it can be concluded that there are seven components in Technological Pedagogical Content Knowledge (TPACK). These seven components are explained as follows:

1. Technological Knowledge (TK): Knowledge for prospective teachers and/or teachers to understand technology, software, or applications that can be used for learning.
2. Pedagogical Knowledge (PK): Knowledge about teaching and learning theories, including processes, goals, strategies, methods, and models of learning, assessment, classroom management, recognizing student characteristics, and developing lesson plans.
3. Content Knowledge (CK): Knowledge of the subject matter that will be taught to students, which teachers must master extensively and deeply to convey and receive it correctly by students.
4. Technological Pedagogical Knowledge (TPK): Knowledge about various technologies that can be used in teaching and how technology can transform teaching methods.
5. Technological Content Knowledge (TCK): Knowledge about the relationship between technology and content. Good knowledge of technology impacts the ability to convey content effectively, making it easier for students to understand and for teachers to choose the appropriate media for delivering the material.
6. Pedagogical Content Knowledge (PCK): Knowledge of how teachers can determine the appropriate methods and strategies for teaching content, creating meaningful learning experiences for students.
7. Technological Pedagogical Content Knowledge (TPACK): Knowledge required by teachers to appropriately utilize technology in teaching activities across various content areas and to teach content using relevant technology and pedagogical methods.

Implementing TPACK in learning involves integrating technological, pedagogical, and content knowledge into a unified whole, reflected in lesson plans (RPP). Applying TPACK in learning aims to provide solutions for teachers to address learning problems using digital technology or IT in classroom activities, creating more meaningful learning practices for students. The application of TPACK also represents a form of teacher capacity development, particularly in classroom management and adapting to rapid technological advancements.

The implementation process of the TPACK learning model begins with preliminary activities such as opening (greetings), praying, checking student attendance, ice-breaking, apperception, and explaining the learning objectives for the day. It continues with core activities based on the TPACK model, a holistic approach that combines technological, pedagogical, and content knowledge to enhance students' understanding of the subject matter.

When using the TPACK approach in learning, students are more motivated and active in learning activities. With TPACK, students can use technology such as laptops, LCD projectors, Microsoft PowerPoint, videos, YouTube, smartphones, and the internet to enhance their

The Role of Digital Technology in Improving the Efficiency
and Quality of HR Management and Education in the Industrial Era 4.0

p-ISSN: 2962-276X | e-ISSN: 2962-3499

learning experience. Teachers use TPACK to integrate technology with teaching strategies, such as class presentations and group activities, making students more engaged in learning. This approach also allows teachers to directly monitor student activities and control the classroom environment, ensuring order and discipline. Thus, the TPACK approach can improve student learning outcomes and their ability to understand the subject matter.

CONCLUSION

Based on the research data and discussion, it can be concluded that TPACK-based learning is effective for elementary education and can improve student learning outcomes. Additionally, implementing TPACK-based learning in sixth-grade students at elementary school shows that all students are enthusiastic and actively participate in the learning process. This is evidenced by the classroom always being busy with student questions and opinions. Moreover, most groups accurately and correctly solve problems. Based on this, it can be said that implementing the TPACK learning model helps students understand the taught material more easily and quickly.

REFERENCES

Adhari, F. N., Amalia, G., & Rustini, T. (2024). Analisis Dampak Modernisasi Terhadap Perilaku Siswa Sekolah Dasar pada Aspek Sosial Budaya. *Jurnal Bintang Pendidikan Indonesia*, *2*(1), 143–154.

Aliyyah, R. R., Rasmitadila, R., Humaira, M. A., Mujahidin, E., Suryadi, S., Widyasari, W., & Rachmadtullah, R. (2020). Are the Assessment Criteria and the Role of Educational Stakeholders Able to Make Outstanding Teacher. *International Journal of Psychosocial Rehabilitation*.

Assyifa, ST. H., Nurhasanah, N., & Tahir, M. (2023). Analisis Kemampuan Kerjasama dalam Metode Diskusi Pada Mata Pelajaran IPS Siswa Kelas IV SDN 37 Cakranegara Tahun Ajaran 2022/2023. *Jurnal Ilmiah Profesi Pendidikan*, *8*(3), 1577–1582. https://doi.org/10.29303/jipp.v8i3.1531

Fahrman, B., Norström, P., Gumaelius, L., & Skogh, I.-B. (2020). Experienced technology teachers' teaching practices. *International Journal of Technology and Design Education*, *30*(1), 163–186. https://doi.org/10.1007/s10798-019-09494-9

Farikah, F., & Al Firdaus, Moch. M. (2020). Technological Pedagogical and Content Knowledge (TPACK): The Students' Perspective on Writing Class. *Jurnal Studi Guru Dan Pembelajaran*, *3*(2), 190–199. https://doi.org/10.30605/jsgp.3.2.2020.303

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. https://doi.org/10.55868/jeid.v2i1.97

Hasanah, H., Ardi, M., Lumu, L., & Malik, M. N. (2022). Teacher competency analysis in applying technological, pedagogical and content knowledge (TPACK) on Productive

The Role of Digital Technology in Improving the Efficiency and Quality of HR Management and Education in the Industrial Era 4.0

p-ISSN: 2962-276X | e-ISSN: 2962-3499

learning in vocational high school (VHS). *International Journal of Social Science Research and Review*, *5*(1), 166–175.

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record: The Voice of Scholarship in Education*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Mouza, C., Karchmer-Klein, R., Nandakumar, R., Yilmaz Ozden, S., & Hu, L. (2014). Investigating the impact of an integrated approach to the development of preservice teachers' technological pedagogical content knowledge (TPACK). *Computers & Education*, *71*, 206–221. https://doi.org/10.1016/j.compedu.2013.09.020

Osuji, G. E., & Suleh, E. O. (2017). *Curriculum and sustainable learning vade mecum for teacher education*. CUEA PRESS The Catholic University of Eastern Africa PO Box 62157, 00200 ….

Putri, A. L. R., Winarno, W., & Murwaningsih, T. (2023). Technology Knowledge (TK) Teacher in Post Online Learning at Surakarta State Elementary School. *Proceedings of the 2nd International Conference of Humanities and Social Science, ICHSS 2022, 17 December 2022, Surakarta, Central Java, Indonesia*.

Rachmadtullah, R., Syofyan, H., & Rasmitadila, R. (2020). The role of civic education teachers in implementing multicultural education in elementary school students. *Universal Journal of Educational Research*.

Rahmadi, I. F. (2019). Technological pedagogical content knowledge (tpack): kerangka pengetahuan guru abad 21. *Jurnal Pendidikan Kewarganegaraan*, *6*(1).

Rasmitadila, R., Humaira, M. A., Aliyyah, R. R., & Rachmadtullah, R. (2021). Perceptions of Student Teachers on Collaborative Relationships Between University and Inclusive Elementary Schools: A Case Study in Indonesia. *International Journal of Learning, Teaching and Educational Research*, *20*(10), 274–290. https://doi.org/10.26803/ijlter.20.10.15

Suharyat, Y. (2023). Implementation of Free Learning Curriculum at The Inclusive School at The Senior High School of Human Bekasi. *International Conference on Education*, 247–252.

Suyamto, J., Masykuri, M., & Sarwanto, S. (2020). ANALISIS KEMAMPUAN TPACK (TECHNOLGICAL, PEDAGOGICAL, AND CONTENT, KNOWLEDGE) GURU BIOLOGI SMA DALAM MENYUSUN PERANGKAT PEMBELAJARAN MATERI SISTEM PEREDARAN DARAH. *INKUIRI: Jurnal Pendidikan IPA*, *9*(1), 46. https://doi.org/10.20961/inkuiri.v9i1.41381

Yeung, A. S., Taylor, P. G., Hui, C., Lam-Chiang, A. C., & Low, E. (2012). Mandatory use of technology in teaching: Who cares and so what? *British Journal of Educational Technology*, *43*(6), 859–870. https://doi.org/10.1111/j.1467-8535.2011.01253.x