

ANALYSIS OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)-BASED LEARNING AT MUHAMMADIYAH KARANGBENDO ELEMENTARY SCHOOL

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Abstract

This study aims to analyze the implementation of information and communication technology (ICT)-based learning at Muhammadiyah Karangbendo Elementary School. A descriptive qualitative approach was employed, involving second- and fifth-grade teachers as research subjects. Data were collected through interviews, observations, and documentation, and analyzed using the Miles and Huberman model, which includes data reduction, data display, and conclusion drawing. The findings indicate that ICT-based learning has been implemented through the use of digital learning media, supported by teachers' adequate ICT competencies and relatively complete facilities and infrastructure. However, several obstacles remain, particularly in terms of limited optimization of ICT use and varying teacher readiness. Overall, ICT-based learning has a positive impact on supporting more engaging and relevant learning processes, indicating the need for a shift in teachers' perceptions toward utilizing learning resources that align with students' contemporary characteristics.

Keywords: learning analysis, ICT, information technology



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INTRODUCTION

Education is the learning of knowledge, skills, and habits of a group that is passed on from one generation to another and implemented through teaching, training, and research in the form of mentoring others or self-study. A person's experiences shape their mindset, feelings, and actions, which is called life education. Education is an important aspect that plays a major role in advancing thinking and behavior, which is a positive impact of a well-organized education system (Izza, 2020).

According to Pertiwi et al. (2022), current developments in education have led to a shift toward student-centered learning, which enables students to actively construct their own knowledge, whereas teacher-centered learning models tend to hinder students' learning processes.

The 21st century has seen rapid developments in digital information. In education, the curriculum must produce a generation that understands material quickly, not just memorizes it. Teachers and students need to utilize technology in learning, so the younger generation needs to be prepared to understand technology. Technology plays an important role in education, such as electronic media and Blended Learning (Samala, 2020). Information and Communication Technology (ICT) education in elementary schools includes the use of technology such as electronic media, computers, and telecommunications used to process information data in digital form.

According to the ITTA (Information Technology Association of America), ICT is the design of studies and development supported by information system management. This is the basis of computers, namely hardware and software. The learning process continues to evolve, such as student-centered learning models, which are the ability to think critically using the Problem-Based Learning (PBL) model. Critical thinking can be defined as a form of organized learning that involves mental activities, such as problem solving, decision making, analyzing assumptions, and scientific inquiry (Krulik & Rudnik, 2019).

Problem-Based Learning (PBL) is a problem-based learning model that helps students develop skills and solve problems with the aim of equipping them with the necessary knowledge and skills (Putri et al., 2020). Information and Communication Technology (ICT) is a subject related to the development of information and communication technology in everyday life, which plays an important role in helping to meet human needs through solutions to identifiable problems (Trianto, 2022).

The learning model is a very important aspect that teachers must apply in the learning process to facilitate the achievement of learning objectives. The utility of the Problem-Based Learning (PBL) model is that it can strengthen student initiative through knowledge development and attitude development so that the learning process can be improved. Information and communication technology has a major impact, especially for humans who will experience the 4.0 industrial revolution because it is easily accessible and is developing rapidly in the field of education (Melenia & Wulandari, 2022). Learning from home during the prevention of the spread of coronavirus disease (Covid-19) has had a major impact on education. Therefore, the government has issued a policy of learning from home, especially at the elementary school level, and has implemented a distance learning policy (PJJ) (Tedja, 2020).

According to research (Miftah, 2023), the benefits of ICT have been widely used by the community for technological purposes in everyday life because telecommunications are easy to use and have a significant impact on education (Memah et al., 2020). Teachers have greatly benefited from ICT in delivering material and creating teaching materials because it makes it easier for them to deliver material more effectively. In addition, it can have an effective impact on teachers in face-to-face learning and distance learning (PJJ).

The results of a KPAI survey on the use of distance learning systems in April 2020 found that 76.7% of participants experienced difficulties with distance learning, while 26.8% did not

experience difficulties, based on a survey of 246 KPAI complainants as the main respondents and comparison of 20 provinces and 54 districts/cities in Indonesia. A survey by KPAI in April 2020 found that only 8% of teachers understood and used technology for online learning, while 82.4% used technology for learning only to a limited extent because they only used WhatsApp, and 9.6% did not use technology at all (Damayanti et al., 2020).

Another study (Wardiyan, 2020) states that information and communication technology (ICT)-based learning can vary student learning so that they do not feel bored or tired. Students can follow lessons in class well and will obtain more optimal learning outcomes. ICT-based education will change the behavior of teachers and students in conducting the teaching and learning process. Teachers and students must master the information technology tools used in learning so that the teaching and learning process can take place.

The Regulation of the Minister of National Education Number 16 of 2007 concerning Academic Qualification and Competency Standards states: "Teachers must be able to utilize ICT for learning materials, communication, and self-development" (Molecules, 2020). ICT equipment is an important part of Science and Technology (S&T) because, in general, it is related to the presentation, storage, and distribution of all hardware. Software has influenced all fields of information technology, and there is nothing that does not use equipment that is the result of technology that does not utilize ICT (Molecules, 2020). In addition, another study mentions that teachers who are unable to develop ICT-based learning media in their teaching are very limited (Wardiyan, 2020). Students prefer concrete learning, such as science, to abstract learning. Therefore, appropriate learning media are needed to overcome this problem.

Information and communication technology in learning is very important for students to adjust their learning styles, and teachers are required to be innovative in adjusting learning media to make it interesting. Teachers must innovate to create learning media that is not boring, especially in the post-COVID-19 pandemic period. Learning based on information and communication technology attracts students' interest in following the learning process in the classroom well. Teachers are involved in this by innovating to create learning media that is not monotonous, meaning that it must be interesting because it can foster students' interest in learning (Muhammad et al., 2021).

The integration of ICT in learning is a component of 21st-century learning. Science and technology are constantly evolving over time. This technology connects the world without boundaries, even when separated by vast geographical distances. Therefore, teachers must prepare their students for life in the digital age, one of which is by using their knowledge of subject matter, learning, and technology to facilitate advanced learning experiences, creativity, and innovation in both face-to-face and virtual situations. One innovation that teachers can implement to improve services in face-to-face and virtual (online) situations is through the Blended Learning Model, hereafter abbreviated as MBL (Notanubun, 2020).

Therefore, educators must have the necessary competencies to carry out these professional functions, which can be explained in several parts, namely: 1) Pedagogical Competence, which is the ability that teachers must have in relation to the characteristics of students from various aspects, such as physical, moral, social, cultural, emotional, and intellectual; 2) Personality Competence, which is the ability related to the stability and integrity of a teacher's personality, whereby teachers as educators must be able to influence the process in accordance with the values that are considered good and applicable in society. Values, including norms, morals, aesthetics, and science, influence the ethical behavior of students as individuals and as members of society; 3) Social Competence, namely the ability of teachers to communicate and interact effectively with students, fellow educators, educational staff, parents/guardians of students, and the surrounding community; 4) Professional Competence, namely the abilities that teachers must have in planning and implementing the learning process. Teachers have the task of directing student learning activities to achieve learning objectives.

RESEARCH METHOD

Research Design

This study uses a qualitative approach with a descriptive qualitative research type. This approach was chosen to obtain an in-depth and comprehensive picture of the implementation of information and communication technology (ICT)-based learning in Mathematics and Indonesian Language subjects. The research was conducted at Muhammadiyah Karangbendo Elementary School with a focus on the learning context that took place naturally in the school environment.

Research Target/Subject

The research subjects consisted of the 5A and 2A class teachers, 23 students from the 5A class as representatives of the upper class, 24 students from the 2A class as representatives of the lower class, and the Principal of Muhammadiyah Karangbendo Elementary School. Grade 5A implemented the Merdeka Curriculum in Phase C, while grade 2A implemented the Merdeka Curriculum in Phase A. The object of this study was the implementation of information and communication technology-based learning in mathematics and Indonesian language subjects.

Research Procedure

The research subjects consisted of the 5A and 2A class teachers, 23 students from the 5A class as representatives of the upper class, 24 students from the 2A class as representatives of the lower class, and the Principal of Muhammadiyah Karangbendo Elementary School. Grade 5A implemented the Merdeka Curriculum in Phase C, while grade 2A implemented the Merdeka Curriculum in Phase A. The object of this study was the implementation of information and communication technology-based learning in mathematics and Indonesian language subjects.

Instruments, and Data Collection Techniques

The research instruments used included interview guidelines, observation sheets, and documentation sheets. Data collection techniques were carried out through interviews to explore information in depth, observations to directly observe the implementation of ICT-based learning, and documentation to reinforce the data from interviews and observations.

Data Analysis Technique

Data analysis in this study used the Miles and Huberman model, which consists of four stages: data collection, data reduction, data presentation, and conclusion drawing. Through these stages, the data was analyzed systematically to obtain valid findings that accurately describe the conditions of ICT-based learning at Muhammadiyah Karangbendo Elementary School.

RESULTS AND DISCUSSION

The Application of ICT by Teachers at Karangbendo Muhammadiyah Elementary School

The findings indicate that ICT-based learning has been implemented at Muhammadiyah Karangbendo Elementary School through the use of handbooks and digital media aligned with competency standards and basic competencies. The learning process begins with structured preliminary activities, including greetings, attendance checking, motivation, apercception, and introduction of learning objectives. These activities function as initial learning activities aimed

at preparing students cognitively and affectively before entering the core learning stage. This practice is consistent with previous research emphasizing that effective ICT integration requires careful lesson preparation and structured learning stages. According to Hennessy, Ruthven, and Brindley (2005), the success of ICT-based learning is strongly influenced by teachers' ability to integrate digital media into pedagogical routines, particularly during the introduction and explanation phases. Similarly, research by Tondeur et al. (2017) shows that ICT use becomes meaningful when it is embedded within clear instructional designs rather than used as an add-on. The statement from the homeroom teacher (Ri) highlights that preparation of computer laboratories and learning media is essential for ensuring effective ICT-based instruction. This aligns with findings by Law, Pelgrum, and Plomp (2008), who reported that adequate infrastructure and classroom management significantly affect the efficiency of ICT-supported learning. The observation that students show increased interest due to visual elements also supports Mayer's (2009) multimedia learning theory, which posits that visual representations enhance students' understanding and engagement.

Teachers' Competencies in ICT-Based Learning at Muhammadiyah Karangbendo Elementary School

Teachers at Muhammadiyah Karangbendo Elementary School demonstrate key pedagogical competencies, including explaining content, questioning techniques, classroom management, and reinforcement strategies, within ICT-based learning environments. These competencies are crucial, as ICT integration does not automatically improve learning outcomes without adequate teacher skills. This finding is supported by Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes that effective ICT-based learning requires teachers to integrate technological knowledge with pedagogical and content knowledge. Research by Scherer, Tondeur, Siddiq, and Baran (2018) further confirms that teachers' confidence and competence in using ICT significantly influence students' engagement and learning effectiveness. The observed use of apperception activities, interactive questioning, and enthusiastic student responses indicates that ICT was used to support active learning. This is consistent with findings by Voogt et al. (2015), who found that ICT-enhanced lessons encourage student participation when teachers actively facilitate interaction rather than relying solely on technology.

Completeness of School Facilities and Infrastructure to Support ICT-Based Learning at Muhammadiyah Karangbendo Elementary School

The availability of ICT facilities at Muhammadiyah Karangbendo Elementary School, such as LCD projectors, speakers, whiteboards, and computer laboratories, provides strong support for ICT-based learning. Adequate infrastructure is widely recognized as a foundational requirement for successful ICT integration in schools (UNESCO, 2018). However, the absence of advanced technologies such as Augmented Reality (AR), Virtual Reality (VR), Extended Reality (XR), Artificial Intelligence (AI), and gamification indicates that ICT use at the school remains at a basic to intermediate level. Previous studies suggest that immersive technologies such as AR and VR can significantly enhance students' conceptual understanding and motivation, particularly in abstract or complex subjects (Radianti et al., 2020; Makransky & Petersen, 2019). Likewise, gamification has been shown to improve learning motivation and engagement by incorporating game elements into instructional design (Deterding et al., 2011). Thus, while the current ICT infrastructure adequately supports conventional digital learning, future development could focus on integrating more advanced technologies to enrich learning experiences. This aligns with global trends in ICT-based education that emphasize not only access to technology but also innovation in its pedagogical use (OECD, 2020).

Overall, the qualitative findings presented in this discussion demonstrate that the objectives of this study have been successfully achieved. The analysis confirms that ICT-based learning at Muhammadiyah Karangbendo Elementary School has been systematically implemented through appropriate instructional planning, adequate teacher competencies, and sufficient supporting facilities. Teachers were able to integrate ICT into pedagogical practices in ways that foster student engagement, active participation, and meaningful learning experiences. Although the use of ICT remains at a basic to intermediate level, the evidence indicates that ICT integration has positively supported the learning process. Therefore, this study provides clear qualitative proof that ICT-based learning at the school aligns with its intended goals and contributes effectively to improving the quality of teaching and learning.

CONCLUSION

Based on the results of the analysis of information and communication technology (ICT)-based learning at Muhammadiyah Karanbendo Elementary School, several conclusions can be drawn that teachers implement learning in accordance with the correct learning elements when students learn the learning process using a computer lab. Students learn using learning guides, namely textbooks or ICT learning modules. Each of these is used with students in the computer lab. Learning is carried out effectively in accordance with the objectives; teachers teach the material appropriately from the beginning to the end of the activity, and practical and written assessments are conducted.

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AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Investigation; Project administration; Validation; Writing – review and editing; Data curation; Formal analysis; Methodology; Writing – original draft; Resources; Visualization.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

- Ananda, R., Tonyjanto, C., Prawira, A. T. A., & Datya, A. I. (2020). Implementasi Enterprise Application Integration (EAI) Dalam Pemodelan Sistem Informasi Back Office Pada Resto: Warung Pelipur Lara Berbasis Web. *Jurnal Teknologi Informasi dan Komputer*, 6(3).
- Bajuri, S., & Fadly, R. (2023). Meningkatkan Kemampuan Menulis Teks Greeting Card Siswa Melalui Metode Pembelajaran Guiding Questions. 1(1), 25–30.
- Christina, E., Deo Sandeva, S., Trivinita L. B, D., Bayu S, A., & Aldo, D. (2023). Pengembangan Media Pembelajaran Penyakit Langka Berbasis Multimedia Interaktif Dengan Metode Luther. *Jurnal Pendidikan Teknologi Informasi (JUKANTI)*,

- 6(1), 27–40. <https://doi.org/10.37792/jukanti.v6i1.856>
- Damayanti, A., Suradika, A., & Asmas, B. (2020). *Strategi Mengurangi Kejenuhan Anak Dalam Pembelajaran Jarak Jauh (PJJ) melalui Aplikasi ICANDO pada Siswa Kelas I SDN Pondok Pinang 08 Pagi*. Seminar Nasional Penelitian LPPM UMJ, 1–10.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining “gamification.” *Proceedings of the 15th International Academic MindTrek Conference*, 9–15. <https://doi.org/10.1145/2181037.2181040>
- Fahreza, F., Thaariq, S. M. H., & Amiyati. (2022). Analisis Pemanfaatan TIK (Teknologi Informasi Dan Komunikasi) Di SD Negeri 1 Jeuram Kabupaten Nagan Raya. *GENTAMULLIA: Jurnal Ilmiah Pendidikan*, 13(2), 374–380.
- Fitri Marisa, Tubagus Mohammad Akhiriza, Anastasia Lidya Maukar, Arie Restu Wardhani, Syahroni Wahyu Iriananda, & Mardiana Andarwati. (2022). Terakreditasi SINTA Peringkat 4 Gamifikasi (Gamification) Konsep dan Penerapan. *Journal Of Information Technology And Computer Science*, 7(1), 219–228.
- Hamzah, A. R., Mesra, R., Br Karo, K., Alifah, N., Hartini, A., Gita Prima Agusta, H., Maryati Yusuf, F., Endrawati Subroto, D., Lisarani, V., Ihsan Ramadhani, M., Hajar Larekeng, S., Tunnoor, S., Bayu, R. A., & Pinasti, T. (2023). *Strategi Pembelajaran Abad 21*. Penerbit Mifandi Mandiri Digital, 1(01).
- Hanannika, L. K., & Sukartono, S. (2022). Penerapan Media Pembelajaran Berbasis TIK pada Pembelajaran Tematik di Sekolah Dasar. *Jurnal Basicedu*, 6(4), 6379–6386. <https://doi.org/10.31004/basicedu.v6i4.3269>
- Hazwani, F. B. I. (2022). Strategi Pemberdayaan Sumber Daya Manusia di MTs Nurul Huda Sedati Sidoarjo. *Jurnal Kependidikan Islam*, 12(1), 42–50. <https://doi.org/10.15642/jkpi.2022.12.1.42-50>
- Hennessy, S., Ruthven, K., & Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching. *Journal of Curriculum Studies*, 37(2), 155–192. <https://doi.org/10.1080/0022027032000276961>
- Herawati. (2021). Kompetensi Technological Pedagogical Content. 1–85.
- Izza, A. (2020). Kurikulum Merdeka Belajar: Implikasi dan Peluang dalam Mewujudkan Pembelajaran Abad ke-21. *Jurnal Pendidikan*, 4(2).
- Khotimah, E. N., & Nuraida, D. (2018). Penerapan Model Pembelajaran Cooperative Script untuk Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran IPA Biologi. *In Proceeding Biology Education Conference: Biology, Science, Enviromental, and Learning* (Vol. 15, No. 1, pp. 159-164).
- Kurniawan, R. A. (2022). Peran Inovasi Pendidikan dalam Pembelajaran Berbasis Teknologi. *Tugas Mata Kuliah Mahasiswa*, 222-231.
- Kuswanto, J., Walusfa, Y., Artikel, S., Korespondensi, A., Ratu Penghulu No, J., Sari, K., Baru, T., Raja Tim, B., Ogan Komerling Ulu, K., & Selatan, S. (2019). Pengembangan Multimedia Pembelajaran pada Mata Pelajaran Teknologi Informasi dan Komunikasi Kelas VIII. *Innovative Journal of Curriculum and Educational Technology IJ CET*, 6(2), 58–64.

- Law, N., Pelgrum, W. J., & Plomp, T. (2008). *Pedagogy and ICT use in schools around the world*. Springer.
- Lestari, F., Maylita, F., Hidayah, N., & Junitawati, P. D. (2020). *Memahami karakteristik anak*. Bayfa Cendekia Indonesia.
- Lukum, Y. (2021). Kurikulum Berbasis Kompetensi di Abad 21. *Jurnal Pendidikan*, 4(1), 27–38.
- Makransky, G., & Petersen, G. B. (2019). Immersive virtual reality and learning: A meta-analysis. *Educational Psychology Review*, 31(4), 1041–1070. <https://doi.org/10.1007/s10648-019-09478-2>
- Manongga, A. (2022, January). Pentingnya teknologi informasi dalam mendukung proses belajar mengajar di sekolah dasar. *In Prosiding Seminar Nasional Pendidikan Dasar*.
- Mayer, R. E. (2009). *Multimedia learning (2nd ed.)*. Cambridge University Press.
- Maylitha, E., Hikmah, S. N., & Hanifa, S. (2022). Pentingnya Information and Communication Technology bagi Siswa Sekolah Dasar dalam Menghadapi Abad 21. *Jurnal Pendidikan Tambusai*, 6(1), 8051–8062.
- Melenia, C. N., & Wulandari, S. (2022). Strategi Komunikasi Interpersonal Guru dan Siswa dalam Proses Pelaksanaan Asesmen Nasional Berbasis Komputer Di SD Negeri 62 Oku. *Jurnal Massa*, 3(1), 1-11.
- Memah, G. I., Mangantar, M., & Untu, V. N. (2020). Analisis Komparatif Kinerja Keuangan Sebelum Dan Saat Masa Pandemi Covid-19 Pada Sektor Telekomunikasi Yang Tercatat Di Bursa Efek Indonesia (Bei) (2017-2020) Comparative Analysis of Financial Performance Before and During the Covid-19 Pandemic in the Tel. *Jurnal EMBA*, 11(1), 1085–1093.
- Miftah, M. (2023). Studi Kelayakan Pengembangan Layanan Media Pembelajaran Berbasis TIK Terintegrasi untuk PAUD. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(1), 104–118. <https://doi.org/10.31004/obsesi.v7i1.2527>
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Moleong, L. J. (2014). *Metode Penelitian Kualitatif*. PT Remaja Rosdakarya.
- Munir. (2020). Kurikulum Berbasis Teknologi Informasi dan Komunikasi. *In Journal of Chemical Information and Modeling* (Vol. 53, Issue 9).
- Notanubun, Z. (2020). Pengembangan kompetensi profesionalisme guru di era digital (Abad 21). *Jurnal Bimbingan Dan Konseling Terapan*, 3(2).
- OECD. (2020). *Education in the digital age: Healthy and happy children*. OECD Publishing.
- Pertiwi, A. D., Nurfatimah, S. A., & Hasna, S. (2022). Menerapkan metode pembelajaran berorientasi student centered menuju masa transisi kurikulum merdeka. *Jurnal Pendidikan Tambusai*, 6(2), 8839-8848.
- Putra, L. D., & Puspitarini, D. (2020). Manajemen administrasi sekolah di era pendidikan 4.0 menggunakan google for education. *In Seminar Nasional Hasil Pengabdian..., November* (pp. 579-588).

- Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education. *Education and Information Technologies*, 25, 3351–3380. <https://doi.org/10.1007/s10639-019-10074-2>
- Rahayu, A. (2022). Perkembangan Masyarakat Menuju Masyarakat Informatif. *Jurnal Sosial Dan Ekonomi Informatika*, 3(1), 45–58.
- Rusman, Kurniawan, D., & Riyana, C. (2019). *Pembelajaran Berbasis Teknologi Informasi dan Komunikasi : Mengembangkan Profesionalitas Guru (4th ed.)*. PT Rajagrafindo Persada.
- Samala, A. D. (2020). Pemanfaatan Teknologi Digital dalam Pendidikan di Era Society 5.0. *Jurnal Ilmu Pendidikan*, 7(1).
- Scherer, R., Tondeur, J., Siddiq, F., & Baran, E. (2018). The importance of attitudes toward technology for pre-service teachers' technological, pedagogical, and content knowledge. *Computers in Education*, 125, 21–33.
- Sugiono. (2017). *Metode Penelitian Kuantitatif, Kualitatif Dan Kombinasi (Mixed Methods)*. Alfabeta.
- Surya Wuisan, D. S., & Pratiangga, A. (2023). Teknologi Informasi dan Komunikasi di Sekolah Dasar di Jawa Barat Digunakan Sebagai Sarana Pendidikan. *ADI Pengabdian Kepada Masyarakat*, 4(1), 13–17. <https://doi.org/10.34306/adimas.v4i1.1018>
- Susilo, E. H. (2021). Tranformasi Sistem Pemerintahan Berbasis Elektronik Kementerian Energi dan Sumber Daya Mineral melalui Optimalisasi Teknologi Informasi Terintegrasi. *Jurnal Pendidikan Tambusai*, 5(3), 8101–8121.
- Tedja, J. N. (2020). The implementation of distance learning policy during the COVID-19 pandemic. *Indonesian Journal of Digital Society*, 1(2), 18-28.
- Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use. *Computers & Education*, 103, 1–13.
- UNESCO. (2018). *ICT competency framework for teachers*. UNESCO Publishing.
- Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2015). Technological pedagogical content knowledge—A review of the literature. *Journal of Computer Assisted Learning*, 31(3), 181–198.
- Wardiyani, T. N. (2020). Media Pembelajaran Berbasis TIK dan Kompetensi Pedagogik Guru Terhadap Hasil Belajar IPA Kelas V SD se-Dabin II Kecamatan Tegal Barat Kota Tegal. 1–314.

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