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Leveraging Artificial Intelligence Technology to Enhance Teacher Performance in Secondary Islamic Schools

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ABSTRACT. This study aims to examine how Artificial Intelligence (AI) technology can be utilized to improve teacher performance at MTsN 1 Jombang. This research uses a descriptive qualitative method with the type of field research where the researcher is directly involved in the research location and acts as the primary instrument. Data collection techniques were carried out in observation, documentation, and interviews. There are two data sources in this study, namely primary and secondary. Primary data is generated from interviews with the head of the madrasah, deputy head of curriculum, and six teachers at MTsN 1 Jombang. Simultaneously, secondary data is obtained from books, the internet, and scientific journals. Data analysis in this study went through three stages: data reduction, data presentation, and conclusion drawing. The results of this study show that implementing AI technology to support teacher performance at MTsN 1 Jombang is classified as good. This is reflected in the number of teachers who are helped with administrative tasks, teaching skills, creativity, and learning innovation by utilizing AI technology. Based on the data obtained, at MTsN 1 Jombang, implementing AI technology makes it more accessible. It increases the effectiveness and efficiency in completing various tasks, opening up opportunities for more creative learning innovations.

Keywords: *Artificial intelligence technology, education, teacher performance*

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INTRODUCTION

AI (*Artificial Intelligence*) technology is currently returning to the world at a rapid pace. The convenience offered is one of the allures for its users, although various threats in its development accompany it (Deng et al., 2024). The world of education is one of the targets that must keep up with the flow of technological advances (Mustafa & Suryadi, 2022). Professor John Mc Carthy, in 1956, first tested AI to see how computer systems could mimic human intelligence (Singla, 2024). In the future, one of the developmental threats of AI advancements will be the loss of jobs (Soueidan & Shoghari, 2024). AI technology is indeed conceived to do human-like work (Abas & Auliya, 2023). Such as the ability to imitate, learn, reason, respond, and various kinds of programs that can compete with human intelligence in general (Afandi & Kurnia, 2023).

Currently, there are various programs brought by AI in the world of education. AI technology is indeed very helpful in getting the job done quickly (Fitriyani et al., 2021). Teachers create question sets, teaching modules, learning creativity, and various easy access obtained using AI (Zahra Salsabilla et al., 2023). As in MTsN 1 Jombang, teachers often utilize AI technology such as ChatGpt, Canva, Google Bard, and many others. Learning can be quickly and interestingly

through AI features (Rachmayanti & Alatas, 2023). For example, in terms of making learning tools, the time used is more effective and efficient by utilizing the features on ChatGpt and Google Bard (Manongga et al., 2022). This is a point in itself because by utilizing the convenience features of AI, teachers can focus on educating without being bothered by time cut off from administrative tasks. Not only that, AI also makes it easy for teachers to provide feedback to students, considering that there are many students in one class (Aulia Gusli et al., 2023).

The convenience that AI brings is only maximized if the ability and skills of teachers do not accompany it. Teachers' performance will be greatly helped if they can utilize AI features to the fullest (Lin, 2022). However, at MTsN 1 Jombang, teachers still need to upgrade themselves with technological developments due to age. This aligns with research by Turrohmah and Suryanto (2023), which states that, indeed, one of the inhibiting factors of digital transformation for teachers is age. However, the quality of performance must still be prioritized regardless of age. One of the critical points of improvement in the human resources department of madrasas is teacher performance (Asyari, 2020). Not all teachers are competent in implementing AI technology (Polak et al., 2022). The madrasah head has also answered the obstacles some teachers face due to the need for more skills in utilizing AI, namely by providing training or workshops on using AI technology in education. The workshop is one of the solutions so that teachers can use digital technology to improve the quality of their performance (ElSayary, 2023). The obstacles here are a challenge for teachers in facing digital transformation. However, the corridor of the existence of the value and role of teachers remains something basic and cannot be replaced by AI technology (Felix, 2020).

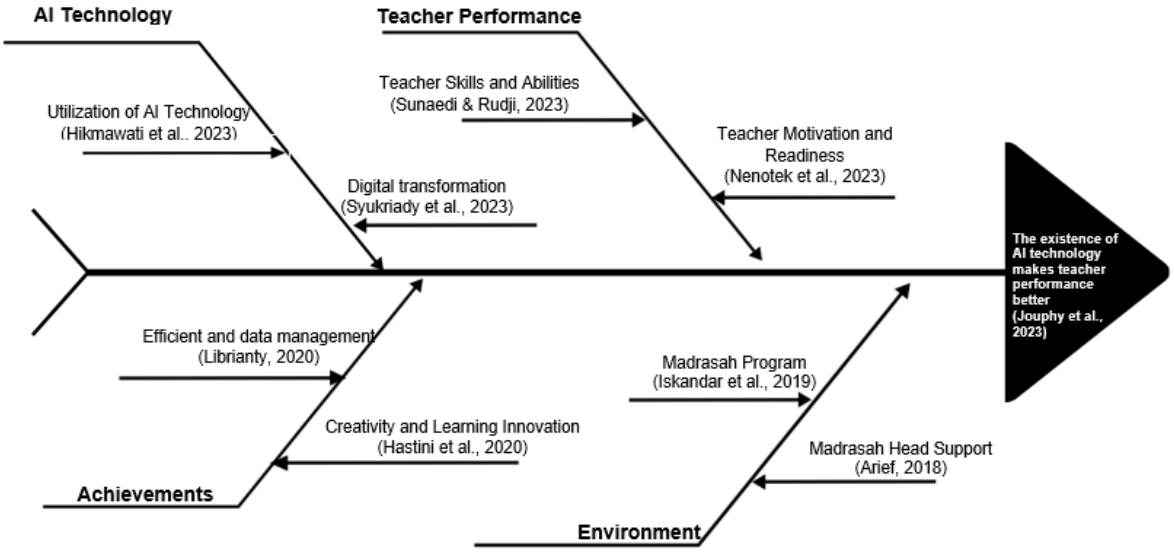
This research is essential to conduct even though previous studies have shown the potential of AI technology in education that can encourage more effective teacher performance, such as the research conducted by Tan et al. (2023), Sun & Song (2023), Kamalov et al. (2023), Salas-Pilco et al. (2022) dan Chan & Tsi (2023). However, researchers still need to find gaps in the literature on AI technology utilization. Hence, the novelty of this research is to explore how AI can help teachers accurately identify students' individual needs and provide appropriate support. This research presents a new perspective on AI technology utilization in education management. The results of this study are relevant not only for academics in the field of education management but also for education practitioners to improve the quality of their performance in the digital era (Ulyanov & Petrishchev, 2020). Specifically, this research reveals how AI can assist teachers in identifying students with learning difficulties, designing materials according to students' learning styles, and completing educational administration. Through an in-depth understanding of AI's potential, this research is expected to encourage the development of more innovative technological solutions for future education sustainability.

Based on previous studies, such as Lin (2022) and Liu et al. (2022), have consistently shown that AI can be a catalyst for improving teacher performance. According to Lin, leveraging AI in personalizing learning can improve student motivation and learning outcomes. Meanwhile, Liu et al. emphasized the role of AI in providing instant feedback, allowing teachers to focus more on more complex pedagogical aspects. Referring to these findings, implementing AI technology in MTsN 1 Jombang can improve learning quality, reduce teacher workload, and improve the efficiency and effectiveness of teacher performance. However, the main challenge in achieving this is the lack of digital skills in 21st-century development (Fernández-Batanero et al., 2022). In addition, the quality of teaching has also declined because it is too preoccupied with education administration, so the focus of teaching is divided (Rohiat, 2020). As detailed above, it can be seen that researchers are interested in examining how AI technology can be utilized to improve teacher performance at MTsN 1 Jombang.

METHOD

This type of research is field research. Field Research is conducted directly in the field to obtain the latest data (Herman & Anhusadar, 2022). The approach used in this research is a qualitative descriptive approach. This research was conducted at MTsN 1 Jombang for four months. The research subjects asked for information in this study were the head of the madrasah, the deputy head of curriculum, and six teachers at MTsN 1 Jombang. Data collection techniques were carried out using three methods, namely observation, documentation, and interviews. Two types of data are generated: primary and secondary data. Primary data was generated from interviews with the head of the madrasah, the deputy head of curriculum, and 6 teachers at MTsN 1 Jombang. At the same time, secondary data is obtained from books, the internet, and scientific journals.

The presence of the researcher here is a participant as an observer; that is, the researcher is active in the scope of the research and is realized by the participants (Sujaya & Kusuma Negara, 2024). Here, the researcher observes the overall role of AI technology in supporting teacher performance. Researchers see the completeness of technological infrastructure, the curriculum vice principal's program for teacher performance, and teacher skills in utilizing AI technology. There are two research instruments here, namely primary and secondary instruments. The primary instrument is the researcher, who collects data directly from the source. Secondary instruments are supporting instruments in the form of observation, documentation, and interview guidelines. The data analysis technique used in this research refers to the theory of Miles and Huberman (Purnamasari & Afriansyah, 2021) through three stages: data reduction, data presentation, and conclusion drawing. To solve the above problems, researchers modeled the conceptual framework of the fishbone diagram as below:



Picture 1: Fishbone diagram

Based on the fishbone diagram above, this research analyzes the implementation of AI technology to support more effective teacher performance. The indicators of teacher performance studied include the ability and skills of teachers in managing the classroom, professional development, utilization of technology, evaluation, and assessment as researched (Apostol et al., 2023) and Zlatkin-Troitschanskaia et al. (2019). The indicators of AI technology are the use of technology (Li et al., 2019), data management efficiency, and learning innovation (Bhatt & Muduli, 2023). From external factors, the utilization of AI technology is supported by the head of the madrassa as research shows Umah et al. (2023) and madrasah supervision programs that are used to see the extent to which technology contributes to teacher performance (Iskandar et al., 2019). The expected result is that by utilizing AI technology as performance support, teachers can increase

learning creativity and innovation (Hastini et al., 2020), efficiency, and data management (Librianty, 2020).

RESULT AND DISCUSSION

Result

MTsN 1 Jombang is one of the madrasahs where some teachers have begun to utilize AI technology to support their performance. Based on field data, some teachers find it challenging to utilize technology due to age and lack of technological skills or gasket. However, for for most junior teachers, the emergence of AI technology is a breakthrough in the world of education that facilitates all needs with fast access. This is by the statement of resource person 3, namely:

> *"Saya sendiri AI sekarang itu memang sudah jadi semacam alat utama untuk menunjang pendidikan yang ada di MTS terutama. Jadi dengan AI, guru-guru juga lebih mudah dalam menyampaikan ilmu atau hal-hal yang terkait dengan keilmuannya ke anak-anak. Adanya AI terutama untuk guru-guru sekarang, kalau membuat presentasi itu gak selama dulu, sekarang dengan ada AI itu cepet bahkan pada saat hari H mau pelajaran kok belum siap dengan bahan presentasinya itu dengan beberapa menit pun langsung bisa jadi dengan AI".*

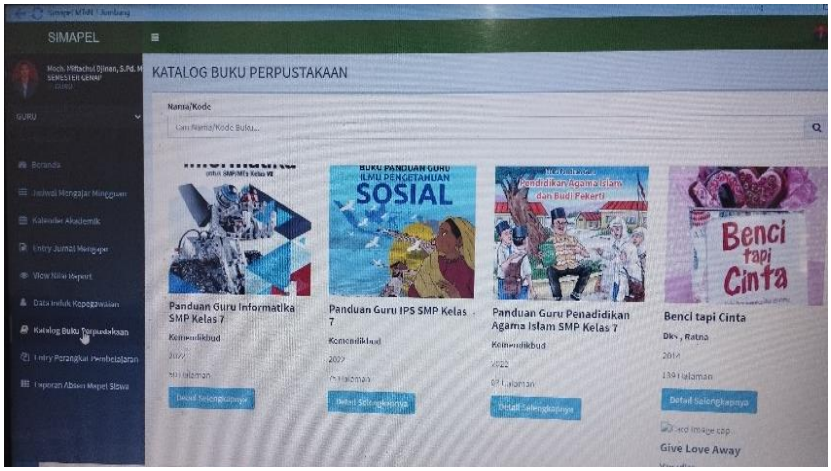
In line with Informant 3's statement, Informant Four also expressed his enthusiasm for using AI technology. As stated below, namely:

> *"Sangat minat dan terbantu dengan adanya AI. Tapi tetap harus kita ubah bahasanya itu disesuaikan dengan bahasa yang lebih mudah dimengerti. Kalau saya pake ChatGpt sebagai referensi. Seperti buat naskah skenario. Ketika saya lomba, biasanya ada lomba pembuatan video, PMR apa gitu, cerita atau apa itu. Carinya disitu, tapi tetap disesuaikan dengan mau kita".*

Based on the statements of informants 3 and 4 above, it can be understood that the ease of AI technology emphasizes the efficiency aspect in supporting teachers' tasks. So that teachers are no longer burdened with administrative tasks but can focus on improving their competence. AI technology offers various significant benefits for teachers and students: (1) AI technology can facilitate the delivery of exciting and interactive learning materials. Teachers can utilize AI technology platforms to design rich educational content in multimedia, simulation, and gamification, thus generating students' enthusiasm for learning; (2) AI technology can help ease teachers' administrative burden, freeing them from repetitive tasks such as grading and correction. Third, the application of AI technology has innovative potential that aligns with the goals of education to form a young generation that is smart, characterized, and ready to face the challenges of the 21st century. So, AI technology is proven to improve the quality of learning at MTsN 1 Jombang. From learning to be more attractive and teacher-focused, madrasah continues to innovate in technological developments. Therefore, the maximum utilization of AI technology can be one of the supports for the quality of teacher performance.

Regarding facilities and infrastructure, technology transformation at MTsN 1 Jombang is quite adequate. With a computer lab, Si Mapel application, E-exams, and an IT team formed of teachers. One of the innovations made by the madrasah head to increase digitization is the Si Mapel application system. Si Mapel (management information system and electronic services) at MTsN 1 Jombang is designed to improve the digital quality of madrasah services. This Si Mapel application is directly connected to the head of the madrasa, deputy head of curriculum, counseling guidance, TU staff, and mulid guardians. One of the goals is for teachers to improve the quality of their performance without being preoccupied with educational administration. In addition, the existence of Si Mapel can make it easier for student guardians, the deputy head of curriculum, and all those connected to supervise each other. Si Mapel is said to make it easier for teachers because the application contains the contents of teacher attendance, student attendance, teacher journals, subjects, learning materials, teacher schedules, learning tools, report cards, academic calendars,

library book catalogs, and course each teacher has their account. The following is an illustration of the Si Mapel application for MTsN 1 Jombang, as shown in picture 2 below:



Picture 2: Si Mapel application at MTsN 1 Jombang

In addition to the Si Mapel application, the principal also made innovations to facilitate teacher performance through E-exams. This E-exam application is used for students during exams so they cannot browse. In addition, E-exams for teachers also provide easy access to correcting when exams, so automatically, it is not complicated by manual paper correction. Therefore, the madrasah hoped that with increasingly sophisticated technology, teachers could focus on improving the quality of their performance.

Many teachers at MTsN 1 Jombang already utilize AI technology to support their performance. Apart from the innovation of the madrasah head, who wants to improve the quality of human resources, teacher awareness at MTsN 1 Jombang can be said to be quite good. This is reflected in fellow teachers discussing and teaching each other new things, especially about technology. However, some teachers still lack self-improvement related to technology due to age. This is not more than teachers who want to upgrade themselves even though they are approaching retirement. In line with the above statement, informant five also stated that:

> *"Penggunaan AI sangat membantu mempercepat pekerjaan guru. Misalnya memanfaatkan banyaknya fitur dan template Canva yang gratis untuk membuat pembelajaran yang menarik dan adaptif. Selain itu juga memanfaatkan ChatGpt dalam pembuatan soal, dalam hal ini ChatGpt digunakan sebagai pembanding ketika membuat soal ujian atau ulangan yang disesuaikan dengan keadaan dan gaya belajar siswa".*

In line with Informant 5's statement, Informant Six also said:

> *"Pembelajaran yang menggunakan teknologi membuat minat semangat siswa menjadi bertambah. Teknologi AI yang sering digunakan juga sangat bermacam, mulai dari Youtube sebagai inovasi video, Canva untuk desain yang menarik, ChatGpt sebagai pembanding soal, Google Drive untuk menyimpan segala data, Google Sheets, Wordwall untuk game interaktif, Google Bard dan Quizizz".*

Overall, the application of AI platforms in learning has the potential to maximize the improvement of both teachers' and students' performance quality. This platform supports the goal of education to create a young generation that is smart, creative, and adaptive to technological developments. With this convenience, teachers and students can maximize the improvement of the quality of their performance.

Using AI technology at MTsN 1 Jombang is one of the madrasah's missions to achieve the vision. The madrasah vision is the realization of a madrasah with character, superior in Imtaq and science and technology, innovative, environmentally cultured, and child-friendly. In other words, supporting science and technology is contained in the madrasah mission, namely increasing

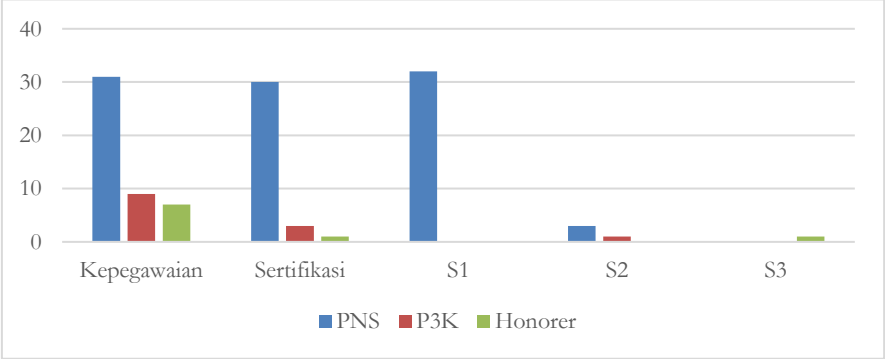
information technology-based learning. This is used to achieve the madrasah's goal of following the development of science and technology with faith and piety. Therefore, utilizing the AI platform wisely and responsibly is expected to produce optimal outcomes according to the madrasah's vision and mission. The following is a picture of a classroom that compares technology to learning, as shown in Picture 3. MTsN 1 Jombang also has adequate technology facilities. The picture above shows learning done in the classroom using an LCD Projector. Not only that, MTsN 1 Jombang also has a computer lab, which is quite adequate, as shown in Picture 4. Improving teacher performance using AI technology certainly provides excellent convenience and time efficiency. Although most teachers at MTsN 1 Jombang can utilize AI technology, there are still obstacles, namely the lack of ability and skills of some teachers in using AI technology. The madrasah followed this up by holding a workshop on AI technology. As an illustration of the workshop on the utilization of AI technology is shown in Picture 5.

Picture 3: Technology Utilization in Learning

Picture 4: Learning in the Computer Lab

Picture 5: Workshop on Utilization of AI Technology

In line with the explanation above, resource person 2, the deputy head of curriculum and a teacher at MTsN 1 Jombang, acknowledged that AI technology has made teachers' tasks much more accessible. Young teachers very enthusiastically welcome the existence of AI, and it turns out that competence is faster to adapt and blend in with AI technology than elderly teachers. Not only that, the deputy head of curriculum also said that young teachers were given lessons in the seventh grade, which had just started the independent curriculum. Because of the demands between the independent curriculum and the 2013 curriculum, there is more digitization in the independent curriculum. The performance of young teachers at MTsN 1 Jombang has more significant potential for learning new things. When viewed from the qualifications of teachers, MTsN 1 Jombang is in a category that is quite adequate because out of 47 teachers, 35 teachers have been certified, including 30 civil servants, 3 P3K, and one honorer. In addition, at the academic level, there are 42 teachers with S1 education, four with S2 education, and 1 with S3 education. This can be seen from the Picture 6.



Picture 6: Teacher Data Chart of MTsN 1 Jombang

Based on the data exposure of the research results above, it can be concluded that AI technology plays a good role in supporting teacher performance. This is also related to efficient data management, personalization of learning, providing effective, fast, and accurate feedback, increasing creativity and learning innovation, and improving teacher skills and abilities. Therefore, it can be seen that AI technology can help teachers improve their performance and adapt to the digital transformation era.

Discussion

The results confirm that technological novelty can facilitate daily work that must be learned by teachers in order to improve their skills. The implementation of technology utilization at MTsN 1 Jombang has been classified as good. The teachers welcomed the existence of AI technology. In addition to making work more accessible, it offers innovative solutions for overcoming the education gap (Adiguzel et al., 2023). The ease teachers feel in making learning media more practical and creative supports independent learning (Zawacki-Richter et al., 2019). Improving teacher performance through technology also aligns with research by Altınay-Gazi & Altınay-Aksal (2017), that learning quality is essential in achieving student learning outcomes (Wardany & Rigianti, 2023).

In line with research by Ahmadillah et al. (2023), Shaikh Zikra Riyaz, and Shaikh Suvaid Salim (2023), The utilization of AI technology at MTsN 1 Jombang, which is often used starting from Canva, Google Bard, ChatGpt, Quizizz, and Wordwall help increase teacher creativity as will also utilize Canva to create engaging, adaptive learning media that can be tailored to students' learning styles (Purba & Harahap, 2022). ChatGpt and Google Bard are the teacher's reference sources in completing educational administration tasks (Fiialka et al., 2023). Quizizz is also used by teachers as a learning media and a model for engaging formative assessments to create a comfortable learning environment (Halimah et al., 2023). Wordwall is one of the alternative learning media with a play-while learning model; in this study Zulfah (2023), wordwall can increase students' interest in learning (Nurchasanah & Fahmi, 2024).

The novelty of AI technology dramatically affects the ability and competence of teachers to create learning media and educational administration that is all digital. Therefore, the competence of teachers becomes more comprehensive with technology development (Starkey, 2020). Teachers at MTsN 1 Jombang are transforming with the digital world to explore what facilities can be accessed for future performance progress (Yustiasari Liriwati et al., 2024). Such as learning the utilization of Canva AI, namely magic studio, magic design, magic write magic media, murf AI features, voice-over, text to pictures, text to video, and various other exciting things that require teacher skills in implementing them (Saputra et al., 2022). Based on UNESCO observations in the study by Espejo Villar et al. (2022), many teachers are still constrained in AI technology due to the lack of training and knowledge of using AI in learning. This theory is inversely proportional to the field conditions at MTsN 1 Jombang. Young teachers at MTsN 1 Jombang are enthusiastic about various changes, from AI technology (Taghizadeh & Hasani Yourdshahi., 2020) to changing the 2013 curriculum to the independent curriculum. This is in line with research by Bunayar (2022) and Amelia (2023), which states that the younger generation is used as a pioneer to change the education system in Indonesia to be more qualified.

This study's findings show that the implementation of AI technology at MTsN 1 Jombang is very effective and efficient in supporting teacher performance. This study's findings are consistent with previous research findings (Felix, 2020). In addition, AI technology positively impacts teacher performance in the digital era. This statement is in line with research by Tambuskar (2022), Chounta et al. (2022), and Hasibuan & Andina Azizah (2023) about the benefits of AI for teachers as a source of educational information that has the potential to change thinking skills and increase readiness for innovations.

CONCLUSION

Based on the analysis of the research findings, the implementation of AI technology at MTsN 1 Jombang has a positive impact and shows significant potential to improve teacher performance. The results of this study indicate that the use of AI contributes to optimizing the learning process and increasing the efficiency of teachers' administrative tasks. However, it is still constrained by some teachers who need more self-improvement related to technological developments due to age and gender factors. This is overcome by cooperation between teachers and solutions from the madrasah head, namely increasing training or digitization workshops. Therefore, teachers need the ability and skills to use technology in a digital era. Overall, this study contributes to the initial understanding of the quality of education combined with technology and can add to the study of academic insights as a reference in improving teacher competence. The findings can be the basis for developing more comprehensive policies and programs using AI technology. Through further research, it is expected to provide more practical recommendations for the development of AI technology implementation in other educational institutions.

BIBLIOGRAPHY

Abas, A., & Auliya, H. (2023). Romantisme Pendidikan pesantren di era milenial dan revolusi industri 4.0. *Setyaki : Jurnal Studi Keagamaan Islam*, *1*(2), 25–34. https://doi.org/10.59966/setyaki.v1i2.253

Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. *Contemporary Educational Technology*, *15*(3), ep429. https://doi.org/10.30935/cedtech/13152

Afandi, A. R., & Kurnia, H. (2023). Revolusi teknologi: Masa depan kecerdasan buatan (AI) dan dampaknya terhadap masyarakat. *Academy of Social Science and Global Citizenship Journal*, *3*(1), 9–13. https://doi.org/10.47200/aossagcj.v3i1.1837

Ahmadillah, A. N. A., Thohir, M., Jamil, A. N., & Li'umah, K. (2023). Towards digital creativity: The effect of canva application on the creativity of prospective teacher leaders. *Edcomtech: Jurnal Kajian Teknologi Pendidikan*, *8*(2), 72. https://doi.org/10.17977/um039v8i22023p72

Altınay-Gazi, Z., & Altınay-Aksal, F. (2017). Technology as mediation tool for improving teaching profession in higher education practices. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(3). https://doi.org/10.12973/eurasia.2017.00644a

Amelia, U. (2023). Tantangan pembelajaran era society 5.0 dalam perspektif manajemen pendidikan. *Al-Marsus : Jurnal Manajemen Pendidikan Islam*, *1*(1), 68. https://doi.org/10.30983/al-marsus.v1i1.6415

Apostol, E. L., Reponte-Sereño, R. R., Cuevas, G. C., Sumicad, R., & Pinatil, M. (2023). Evaluating educators: A comprehensive study of teachers' assessment skills and practices. *Journal of World Englishes and Educational Practices*, *5*(3), 56–69. https://doi.org/10.32996/jweep.2023.5.3.5

Asyari, S. (2020). Supervisi kepala madrasah berbasis penilaian kinerja sebagai upaya peningkatan profesionalitas guru. *JIEMAN: Journal of Islamic Educational Management*, *2*(1), 27–40. https://doi.org/10.35719/jieman.v2i1.14

Aulia Gusli, R., Zakir, S., & Akhyar, M. (2023). Tantangan guru terhadap perkembangan teknologi agar memanfaatkan artificial intelligence dalam meningkatkan kemampuan siswa. *Idarah Tarbawiyah: Journal of Management in Islamic Education*, *4*(3), 229–240. https://doi.org/10.32832/itjmie.v4i3.15418

Bhatt, P., & Muduli, A. (2023). Artificial intelligence in learning and development: A systematic literature review. *European Journal of Training and Development*, *47*(7/8), 677–694. https://doi.org/10.1108/EJTD-09-2021-0143

Bunayar. (2022). Pendidikan jasmani dan olahraga: Dalam hadis-hadis tentang olahraga. *Dimar: Jurnal Pendidikan Islam*, *3*(2), 252–275. https://doi.org/10.58577/dimar.v3i2.59

Chan, C. K. Y., & Tsi, L. H. Y. (2023). *The AI revolution in education: Will ai replace or assist teachers in higher education?* (Version 1). arXiv. https://doi.org/10.48550/ARXIV.2305.01185

Chounta, I.-A., Bardone, E., Raudsep, A., & Pedaste, M. (2022). Exploring teachers' perceptions of artificial intelligence as a tool to support their practice in Estonian k-12 education. *International Journal of Artificial Intelligence in Education*, *32*(3), 725–755. https://doi.org/10.1007/s40593-021-00243-5

Deng, Z., Guo, Y., Han, C., Ma, W., Xiong, J., Wen, S., & Xiang, Y. (2024). *AI agents under threat: a survey of key security challenges and future pathways* (Version 1). arXiv. https://doi.org/10.48550/ARXIV.2406.02630

ElSayary, A. (2023). The impact of a professional upskilling training programme on developing teachers' digital competence. *Journal of Computer Assisted Learning*, *39*(4), 1154–1166. https://doi.org/10.1111/jcal.12788

Espejo Villar, L. B., Lázaro Herrero, L., & Álvarez-López, G. (2022). UNESCO strategy and digital policies for teacher training: The deconstruction of innovation in Spain. *Journal of New Approaches in Educational Research*, *11*(1), 15–30. https://doi.org/10.7821/naer.2022.1.812

Felix, C. V. (2020). The role of the teacher and AI in education. In E. Sengupta, P. Blessinger, & M. S. Makhanya (Eds.), *Innovations in Higher Education Teaching and Learning* (pp. 33–48). Emerald Publishing Limited. https://doi.org/10.1108/S2055-364120200000033003

Fernández-Batanero, J. M., Montenegro-Rueda, M., Fernández-Cerero, J., & García-Martínez, I. (2022). Digital competences for teacher professional development. Systematic review. *European Journal of Teacher Education*, *45*(4), 513–531. https://doi.org/10.1080/02619768.2020.1827389

Fiialka, S., Kornieva, Z., & Honcharuk, T. (2023). ChatGPT in Ukrainian education: Problems and prospects. *International Journal of Emerging Technologies in Learning (iJET)*, *18*(17), 236–250. https://doi.org/10.3991/ijet.v18i17.42215

Fitriyani, R. A., Putri, L. T., & Adawiyah, R. (2021). Tren teknologi artificial intelligence pengganti model iklan di masa depan. *Jurnal Sosial-Politika*, *2*(2), 118–129. https://doi.org/10.54144/jsp.v2i2.39

Halimah, N., Nofitri, F., & Fitria, Y. (2023). Pengaruh penilaian formatif berbasis quizizz terhadap hasil belajar siswa. *Jurnal Basicedu*, *7*(1), 376–382. https://doi.org/10.31004/basicedu.v7i1.4571

Hasibuan, R. & Andina Azizah. (2023). Analyzing the potential of Artificial Intelligence (AI) in personalizing learning to foster creativity in students. *Enigma in Education*, *1*(1), 6–10. https://doi.org/10.61996/edu.v1i1.2

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. https://doi.org/10.34010/jamika.v10i1.2678

Herman, H., & Anhusadar, L. (2022). Pendidikan Islam anak suku Bajo: Penelitian lapangan pada suku Bajo. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(4), 2665–2676. https://doi.org/10.31004/obsesi.v6i4.2266

Iskandar, W., Yusuf, M., & Annisa, A. (2019). Prototipe supervisi pendidikan dan kinerja kepala sekolah/madrasah dalam rangka peningkatan mutu pendidikan. *Jurnal Isema : Islamic Educational Management*, *4*(2), 163–180. https://doi.org/10.15575/isema.v4i2.6195

Kamalov, F., Santandreu Calonge, D., & Gurrib, I. (2023). New era of Artificial Intelligence in education: Towards a sustainable multifaceted revolution. *Sustainability*, *15*(16), 12451. https://doi.org/10.3390/su151612451

Li, Y., Garza, V., Keicher, A., & Popov, V. (2019). Predicting high school teacher use of technology: pedagogical beliefs, technological beliefs and attitudes, and teacher training. *Technology, Knowledge and Learning*, *24*(3), 501–518. https://doi.org/10.1007/s10758-018-9355-2

Librianty, N. (2020). Analisis kemampuan guru dalam pengelolaan kelas pada mata pelajaran penjaskes di sekolah dasar. *Jurnal Basicedu*, *4*(1), 141–148. https://doi.org/10.31004/basicedu.v4i1.341

Lin, H. (2022). Influences of Artificial Intelligence in education on teaching effectiveness: The mediating effect of teachers' perceptions of educational technology. *International Journal of Emerging Technologies in Learning (iJET)*, *17*(24), 144–156. https://doi.org/10.3991/ijet.v17i24.36037

Liu, Y., Chen, L., & Yao, Z. (2022). The application of artificial intelligence assistant to deep learning in teachers' teaching and students' learning processes. *Frontiers in Psychology*, *13*, 929175. https://doi.org/10.3389/fpsyg.2022.929175

Manongga, D., Rahardja, U., Sembiring, I., Lutfiani, N., & Yadila, A. B. (2022). Dampak kecerdasan buatan bagi pendidikan. *ADI Bisnis Digital Interdisiplin Jurnal*, *3*(2), 41–55. https://doi.org/10.34306/abdi.v3i2.792

Mustafa, P. S., & Suryadi, M. (2022). Landasan teknologis sebagai peningkatan mutu dalam pendidikan dan pembelajaran: kajian pustaka. *Fondatia*, *6*(3), 767–793. https://doi.org/10.36088/fondatia.v6i3.2130

Nurchasanah, M., & Fahmi, A. K. (2024). Pengaruh wordwall dalam meningkatkan minat belajar kosakata bahasa Arab pada siswa kelas VIII di MTs Al-Muddatsiriyah Jakarta. *Al-Fusha : Arabic Language Education Journal*, *6*(1), 37–43. https://doi.org/10.62097/alfusha.v6i1.1528

Polak, S., Schiavo, G., & Zancanaro, M. (2022). Teachers' perspective on artificial intelligence education: An initial investigation. *CHI Conference on Human Factors in Computing Systems Extended Abstracts*, 1–7. https://doi.org/10.1145/3491101.3519866

Purba, Y. A., & Harahap, A. (2022). Pemanfaatan aplikasi canva sebagai media pembelajaran matematika di SMPN 1 NA IX-X Aek Kota Batu. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(2), 1325–1334. https://doi.org/10.31004/cendekia.v6i2.1335

Purnamasari, A., & Afriansyah, E. A. (2021). Kemampuan komunikasi matematis siswa SMP pada topik penyajian data di pondok pesantren. *Plusminus: Jurnal Pendidikan Matematika*, *1*(2), 207–222. https://doi.org/10.31980/plusminus.v1i2.896

Rachmayanti, I., & Alatas, M. A. (2023). Pemanfaatan AI sebagai media pembelajaran digital dalam Foreign Language Development Program (FLDP) IAIN Madura. *GHANCARAN: Jurnal Pendidikan Bahasa Dan Sastra Indonesia*. https://doi.org/10.19105/ghancaran.vi.11752

Rohiat, R. (2020). Teaching and learning quality (Descriptive study on Administration Magister program, Faculty of education, University of Bengkulu, Indonesia). *International Journal of Educational Management and Innovation*, *1*(2), 173. https://doi.org/10.12928/ijemi.v1i2.1820

Salas-Pilco, S., Xiao, K., & Hu, X. (2022). Artificial intelligence and learning analytics in teacher education: A systematic review. *Education Sciences*, *12*(8), 569. https://doi.org/10.3390/educsci12080569

Saputra, A. G., Rahmawati, T., Andrew, B., & Amri, Y. (2022). Using canva application for elementary school learning media. *Scientechno: Journal of Science and Technology*, *1*(1), 46–57. https://doi.org/10.55849/scientechno.v1i1.4

Shaikh Zikra Riyaz & Shaikh Suvaid Salim. (2023). Google's Bard and Open AI's ChatGPT: revolutionary AI technologies and their impact on education. *International Journal of Advanced Research in Science, Communication and Technology*, 195–202. https://doi.org/10.48175/IJARSCT-12127

Singla, A. (2024). Cognitive computing emulating human intelligence in AI systems. *Journal of Artificial Intelligence General Science (JAIGS) ISSN:3006-4023*, *1*(1). https://doi.org/10.60087/jaigs.v1i1.38

Soueidan, M. H., & Shoghari, R. (2024). The Impact of artificial intelligence on job loss: Risks for governments. *Technium Social Sciences Journal*, *57*, 206–223. https://doi.org/10.47577/tssj.v57i1.10917

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, *50*(1), 37–56. https://doi.org/10.1080/0305764X.2019.1625867

Sujaya, K. B. W., & Kusuma Negara, I. S. (2024). Strategi digital marketing melalui instagram oleh CV. Electra Diamond. *Waisya : Jurnal Ekonomi Hindu*, *3*(1), 68–75. https://doi.org/10.53977/jw.v3i1.1622

Sun, X., & Song, Y. (2023). The impact of big data and ai on teacher performance reviews: A study of private higher vocational colleges. *Journal of Information Systems Engineering and Management*, *8*(4), 23228. https://doi.org/10.55267/iadt.07.14050

Taghizadeh, M., & Hasani Yourdshahi, Z. (2020). Integrating technology into young learners' classes: Language teachers' perceptions. *Computer Assisted Language Learning*, *33*(8), 982–1006. https://doi.org/10.1080/09588221.2019.1618876

Tambuskar, S. (2022). Challenges and benefits of 7 ways Artificial Intelligence in education sector. *Review of Artificial Intelligence in Education*, *3*(00), e03. https://doi.org/10.37497/rev.artif.intell.education.v3i00.3

Tan, K., Pang, T., Fan, C., & Yu, S. (2023). *Towards applying powerful large AI models in classroom teaching: opportunities, challenges and prospects* (Version 2). arXiv. https://doi.org/10.48550/ARXIV.2305.03433

Turrohmah, H., & Suryanto, S. (2023). Teacher readiness for digital transformation. *Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, *9*(2), 942. https://doi.org/10.29210/1202323284

Ulyanov, & Petrishchev, I. O. (2020). Creating a digital environment is a way to improve the quality of education. *Yaroslavl Pedagogical Bulletin*, *117*(6), 8–13. https://doi.org/10.20323/1813-145X-2020-6-117-8-13

Umah, E. C., Imron, A., Hadi, S., & Praherdhiono, H. (2023). Madrasah principal digital leadership innovation in digital learning transformation. *Revista de Gestão Social e Ambiental*, *17*(3), e03365. https://doi.org/10.24857/rgsa.v17n3-025

Wardany, E. P. K., & Rigianti, H. A. (2023). Pengaruh kinerja guru terhadap hasil belajar siswa di sekolah dasar. *Attadrib: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *6*(2), 250–261. https://doi.org/10.54069/attadrib.v6i2.541

Yustiasari Liriwati, F., Marpuah, S., Wasehudin, & Zulhimma. (2024). Transformasi kurikulum merdeka di madrasah; menyongsong era pendidikan digital. *Jurnal IHSAN Jurnal Pendidikan Islam*, *2*(1), 1–10. https://doi.org/10.61104/ihsan.v2i1.103

Zahra Salsabilla, K. A., Tasya Diva Fortuna Hadi, Widya Pratiwi, & Siti Mukaromah. (2023). Pengaruh penggunaan kecerdasan buatan terhadap mahasiswa di perguruan tinggi. *Prosiding Seminar Nasional Teknologi Dan Sistem Informasi*, *3*(1), 168–175. https://doi.org/10.33005/sitasi.v3i1.371

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, *16*(1), 39. https://doi.org/10.1186/s41239-019-0171-0

Zlatkin-Troitschanskaia, O., Kuhn, C., Brückner, S., & Leighton, J. P. (2019). Evaluating a Technology-Based Assessment (TBA) to measure teachers' action-related and reflective skills. *International Journal of Testing*, *19*(2), 148–171. https://doi.org/10.1080/15305058.2019.1586377

Zulfah, N. (2023). Pemanfaatan media game edukasi wordwall untuk meningkatkan minat belajar siswa. *Pubmedia Jurnal Penelitian Tindakan Kelas Indonesia*, *1*(1), 11. https://doi.org/10.47134/ptk.v1i1.