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E-Learning 2025: Personalizing Children's Learning through AI and Virtual Reality

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Abstract

This research discusses the transformation of children's learning through the integration of Artificial Intelligence (AI) and Virtual Reality (VR) in the e-learning system towards 2025. The main focus of the research is how these technologies can facilitate adaptive and fun learning personalization for children. Through qualitative methods in the form of observations and interviews with teachers and platform developers, it was found that AI is able to adapt teaching materials to individual student characteristics based on their interaction data. On the other hand, VR provides an immersive and contextual learning experience, thereby increasing student motivation and engagement. Although its implementation promises many benefits, there are also challenges such as limited infrastructure, digital divide, and the need for technology literacy for teachers and parents. This research emphasizes the importance of collaboration between education stakeholders in creating an inclusive and sustainable learning ecosystem. The results of this study are expected to be a reference in the development of future digital learning policies and strategies.

Keywords: *E-learning, Artificial Intelligence, Virtual Reality, Learning Personalization, Children's Education Technology.*

INTRODUCTION

The rapid development of digital technology has brought significant transformation in the world of education, especially in the implementation of online learning or *e-learning*. Entering 2025, innovations based on artificial intelligence (*AI)* and virtual reality (*Virtual Reality/VR)* further strengthen the potential for personalization of learning, especially for children of young age. This personalization not only allows the material to be tailored to individual abilities and interests, but also creates a more immersive, interactive, and enjoyable learning experience.[1]

AI technology plays an important role in analyzing students' learning styles, comprehension speed, and emotional responses, so that the learning system can adjust its approach in real-time. Meanwhile, virtual reality provides an opportunity for students to explore a rich and dynamic learning environment, bridging space and time limitations in the teaching and learning process.[2]

The presence of AI and VR-based e-learning is a breath of fresh air in answering the challenges of 21st century education, especially in creating inclusive and child-centered learning. Therefore, this study aims to explore how the integration of AI and VR in e-learning by 2025 will be able to revolutionize children's learning approaches, as well as its implications for the quality and effectiveness of education as a whole.[3]

Digital transformation in the world of education has started since the beginning of the 21st century, but the global pandemic that hit in 2020 accelerated the massive adoption of digital technology in the teaching and learning process. Since then, the educational paradigm has begun to shift from conventional methods to technology-based learning models.[4] The year 2025 is projected to be an important milestone in the evolution of e-learning, where the integration between artificial intelligence and virtual reality is beginning to become a key component in an adaptive and responsive learning system to the needs of learners, especially children.[5]

Children as learning subjects have unique characteristics that demand a flexible, creative, and personal approach. The one-way learning model with uniform materials is no longer effective in improving motivation and learning outcomes. This is where technology comes into play: AI allows learning systems to recognize each student's strengths and weaknesses and automatically adjust materials and methods, while VR delivers a more engaging and contextual multisensory learning experience. For example,

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[1] Metris, Diksi, Ahmad Rasyiddin, and Caesar Rismanto. *A New Era of Human Resource Management: Transformation and Innovation in the Digital World*. Tri Scientific Education Foundation, 2025.
[2] Maryani, I. (2025). *Artificial intelligence in education: a potpourri.* K-Media.
[3] Siddik Romadhan, "Project-Based Education: Building 21st Century Creative and Collaborative Skills for Future Generations," n.d.
[4] Nasution, M. D. (2024). *Technology Development and Digital Transformation in the World of Education*. UMSU Press.
[5] Mahmudi, M. A., Fitri, D. M., Lase, D. C., Saptiany, S. G., Nur, M. D. M., & Raini, Y. (2025). *EDUCATIONAL TECHNOLOGY: THEORY AND APPLICATION*. Azzia Karya Bersama.

history lessons can be packaged in simulations of the past world, and science materials can be presented in the form of virtual laboratory explorations.[6]

Furthermore, personalization of learning through AI and VR is not only related to improving academic quality, but also supporting the development of children's affective and social-emotional aspects. With technology that is able to respond empathically, children are not only recipients of information, but also active actors in the learning process. Therefore, the use of AI-based and VR-based e-learning is expected to be able to create a more equitable, fun, and empowering future education ecosystem.[7]

Through this study, it is hoped that a comprehensive picture can be obtained of the potential and challenges of AI and VR integration in e-learning 2025, especially in the context of personalizing children's learning. This study is also expected to be able to be a reference for educators, educational technology developers, and policymakers in designing adaptive and sustainable digital education strategies.

Through this study, it is hoped that a comprehensive picture can be obtained of the potential and challenges of AI and VR integration in e-learning 2025, especially in the context of personalizing children's learning. This study is also expected to be able to be a reference for educators, educational technology developers, and policymakers in designing adaptive and sustainable digital education strategies, which not only emphasizes academic achievements, but also prioritizes the development of children's character, creativity, and learning independence in facing the dynamics of the ever-evolving digital era.

METHOD

This study uses a descriptive qualitative approach with the aim of describing in depth how to personalize children's learning through the integration of Artificial Intelligence (AI) and Virtual Reality (VR) technology in the e-learning system in 2025. This approach was chosen because it is able to capture phenomena holistically, especially related to the experiences, perceptions, and practices of technology users in the context of children's education.[8]

1. Data Source

The main data sources in this study consisted of:[9]

a. Primary data, obtained through in-depth interviews with educational technology experts, elementary school teachers, and developers of AI and VR-based e-learning platforms.

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[6] Erison, Y., Surur, M., Ahmad Sholikin, E., Rohmah, N. L., Anas, F., Rosyid, H., ... & Sholikin, A. Transforming Public Services with Artificial Intelligence (AI): Innovative Theories and Concepts for the Future.

[7] Nurulli Fathurrahmah, Moh Amin, and M Shinwanudin, "Assistance in Standardization of Al-Qur'an Education Park Teachers through Asset-Based Tilawati Method Training," *Janaka, Journal of Community Service* 2, no. 2 (May 31, 2020): 65–72, https://doi.org/10.29062/janaka.v2i2.210.

[8] Sholikhah, A. (2016). Descriptive statistics in qualitative research. *COMMUNICATION: Journal of Da'wah and Communication*, *10*(2), 342-362.

[9] Sulistiyo, U. (2023). *Qualitative research methods*. PT Salim Media Indonesia.

b. Secondary data, collected from literature studies, scientific articles, education policy reports, and documentation of cutting-edge e-learning implementations from 2020 to 2025.

2. Data Collection Techniques

Data collection is carried out through the following techniques:[10]

a. Semi-structured interviews with key informants to explore the understanding and implementation of personalized learning through AI and VR.
b. A documentation study on e-learning platforms that have implemented AI and VR technology.
c. Participatory observation (if possible), in simulation sessions or online classes that use VR and AI in children's learning.

3. Data Analysis

The data obtained was analyzed using thematic analysis techniques, namely by identifying, grouping, and interpreting the main themes that emerged from the results of interviews and documents. This process is carried out through the stages of data reduction, data presentation, and conclusion drawn/verification.[11]

4. Data Validity

To ensure the validity and validity of the data, this study uses source triangulation and peer debriefing techniques, as well as member checking the sources to ensure the researcher's interpretation is in accordance with the informant's intentions.

RESULTS AND DISCUSSION

1. Results of the Integration of AI and VR in Children's Learning

Based on the results of observations and interviews with teachers and e-learning platform developers, it was found that the use of AI in learning allows the system to adjust teaching materials according to children's learning style and pace. In practice, AI is able to analyze student interaction data, such as the time it takes to complete an assignment, the error rate, and the types of questions that students frequently ask. As such, AI can provide faster and more detailed feedback, as well as suggest additional materials or exercises that suit each student's needs. This allows for automatic adaptation of the given curriculum, so that each child can learn in the most effective way for them, optimizing the individual's potential without being burdened by a uniform class pace.[12]

A real example of the application of AI is the use of platforms that can adjust the difficulty level of math or language problems based on students' abilities. If a student shows difficulty understanding a concept, the system can automatically provide additional explanations or examples of simpler questions to aid their

[10] Sujarweni, V. W. (2014). Research methodology. *Yogyakarta: Pustaka Baru Perss*, *74*.
[11] Sari, I. N., Lestari, L. P., Kusuma, D. W., Mafulah, S., Brata, D. P. N., Iffah, J. D. N., ... & Sulistiana, D. (2022). *Qualitative research methods*. Unisma Press.
[12] Istian, A. (2024). Integration of technology in Islamic educational learning. *Indonesian Research Journal on Education*, *4*(1), 302-310.

understanding. On the other hand, for students who have mastered the material, AI can provide additional challenges to keep them stimulated to continue learning.

Virtual Reality (VR), on the other hand, provides a new dimension to learning that traditional methods cannot offer. With VR technology, students don't just read about a concept or see an image in a textbook, but they can experience it directly in an immersive simulation. Learning experiences become more engaging, interactive, and fun, which eliminates the sense of boredom often found in conventional classrooms.[13]

For example, in history learning, VR allows students to "visit" important historical locations, such as exploring the Egyptian pyramids or observing battles in world wars. Additionally, in science learning, VR allows students to participate in laboratory experiments that may be difficult to do in person in the classroom. They can observe chemical reactions, study the anatomy of the human body, or even explore space to understand astronomical concepts more deeply. This experience not only enriches students' knowledge, but also increases their engagement and understanding of the subject matter, as they can experience firsthand the situation or object being studied.[14]

The integration of AI and VR in learning also provides advantages when it comes to teaching practical skills. For example, students can practice engineering skills or social skills in a completely safe simulation, without worrying about the risk of errors. In the context of children's learning, it gives them the freedom to experiment and learn from their mistakes without fear of failure.[15]

With the merging of AI and VR, learning becomes more personalized and more relevant to students' needs and interests. This technology offers the opportunity to create a learning environment that is not only effective, but also enjoyable, which in turn can improve children's motivation and learning outcomes.

2. Challenges in AI and VR Implementation

While the benefits offered by AI and VR technologies are significant, the study also found a number of challenges in the implementation of these technologies in children's learning. Some of the main obstacles found include:[16]

a. Limitations of Technology Access:

One of the biggest obstacles faced in the implementation of AI and VR is limited access to technology, especially in areas with inadequate infrastructure. Many schools, particularly those in rural or underdeveloped areas, do not have the necessary hardware to run VR-based applications or platforms that require AI. In

[13] Wijaya, K. (2023, April). Integration of Information Technology (ICT) in PAI Learning Based on the Multiple Intelligence Paradigm in Elementary Schools. In *National Seminar LPPM Ummat* (Vol. 2, pp. 431-446).

[14] Redhana, I. W. (2024). *Digital Literacy: A Guide to Facing Society 5.0*. Blue Ocean.

[15] Lase, D., Waruwu, E., Zebua, H. P., & Ndraha, A. B. (2024). The role of innovation in economic development and education towards the vision of Advanced Indonesia 2045. *Tuhenori: Multidisciplinary Scientific Journal*, *2*(2), 114-129.

[16] Aji, G. S., & Mala, I. K. (2024). Improving the quality of human resources to achieve a company's competitive advantage in the digital era: Trends, innovations, and challenges. *Journal of Management and Creative Economy*, *2*(3), 01-17.

addition, the availability of a stable and fast internet connection is also an important factor that determines the smooth use of this technology in learning.

These limitations result in gaps in access to quality education, where students in areas with limited access are left behind compared to those in areas with more complete facilities. Therefore, it is important for the government and educational institutions to develop policies that can ensure equal access to this advanced educational technology. Not all schools have adequate infrastructure to support advanced technologies such as VR and AI. In certain areas, hardware limitations and internet connectivity are the main obstacles.

b. Teacher and Parent Readiness

One of the significant challenges in the application of AI and VR is the readiness of teachers to adopt and integrate these technologies into their learning methods. Most teachers still find it difficult to use advanced technologies such as AI and VR due to limitations in training and technical understanding. Teacher education in this regard is very important to ensure they have enough skills and understanding to make optimal use of this technology.

The lack of adequate training also leads to resistance to change, where some teachers feel more comfortable with traditional teaching methods and are unsure about the effectiveness or benefits of using AI and VR. For this reason, the provision of continuous training for teachers and adequate technical support is the main key to ensuring the successful implementation of this technology in the learning process. Many teachers still find it difficult to adopt this technology due to a lack of training and understanding on how to integrate AI and VR into their curriculum. The same goes for parents, who are sometimes worried about the negative impact of excessive technology use on children's development.[17]

c. High Costs

The development and maintenance of AI and VR-based e-learning systems requires considerable costs, both for hardware (such as VR headsets, advanced computers or servers) and for the development of software that supports these technologies. This high cost is a major obstacle for many schools, especially those with limited budgets, to be able to implement this technology thoroughly.

In addition, the purchase of VR devices and the necessary infrastructure to support AI requires a significant investment. This requires serious attention from related parties, be it the government, educational institutions, or technology companies to work together to create financing solutions that can reduce the burden of costs borne by schools. The development and maintenance of AI and VR-based learning platforms requires considerable costs, both for hardware and advanced software development. This is a challenge in itself, especially for educational institutions with limited budgets.

[17] Kennedy, P. S. J. (2023). Digitalization of Education: Artificial Intelligence in Higher Education. In *Proceedings of the National Seminar of Abdurachman Saleh Situbondo University* (Vol. 2, No. 1, pp. 205-215). LPPM Abdurachman Saleh Situbondo University.

d. Dependence on Technology and Health Issues

With the increasing use of VR in education, concerns have arisen regarding its long-term impact on students' physical and mental health. Excessive use of VR can lead to health problems such as eye fatigue, nausea, or dizziness due to overly strong immersive effects. Additionally, there is the potential that students become overly dependent on technology, which can reduce social interaction and the ability to learn independently.

For this reason, there needs to be clear regulations and guidelines on the use of VR in learning so that these negative impacts can be minimized. The use of VR needs to be done wisely by paying attention to the duration and intensity of use so that the learning experience remains optimal without causing adverse side effects.

e. Concerns About Data Security and Privacy

AI requires the collection and analysis of enormous amounts of data related to students' learning behavior, which raises questions about data security and privacy. Many AI systems in learning collect students' personal data, such as their learning patterns, preferences, and academic performance. If this data is not managed properly, there may be a risk of misuse or data leakage that violates students' privacy rights.

In addition, with the increasing complexity of technology used in e-learning, there are also threats related to cyberattacks that can threaten the integrity of data and learning systems. Therefore, the protection of student data must be a top priority in the implementation of AI and VR-based educational technologies.

f. Limitations in Aligning with Existing Curriculum

While AI and VR can improve the quality of learning, they must be aligned with existing curricula in order to be implemented effectively. Not all subjects or materials can be integrated with this technology directly. Some concepts may be more difficult to convert into a VR format or require a complex type of AI analysis that is not yet widely available.[18]

It's important to design a curriculum that can accommodate these new technologies in a systematic way, as well as ensure that AI and VR don't disrupt basic learning that already exists. This integration needs to be carried out in stages and taking into account the readiness of school infrastructure.

Facing these challenges, it is important for various parties involved in education to work together in finding creative and innovative solutions. With the right policy support, ongoing training, and investment in adequate infrastructure, AI and VR technologies can be a highly effective tool in improving the quality of children's learning in the future.

3. Advantages of Personalizing Learning with AI and VR

[18] Nurcahyono, N. A., & Putra, J. D. (2022). Obstacles for mathematics teachers in implementing the independent curriculum in elementary schools. *Academic Discourse: Scientific Magazine of Education*, *6*(3), 377-384.

The main advantage of implementing personalized learning through AI and VR is the creation of a learning experience that is more focused on individual needs. In traditional systems, learning often takes place in one common pattern for all students, which risks leaving some students feeling left behind while others feel bored. With AI technology, teaching materials can be customized based on an in-depth analysis of student performance, while VR provides a visual experience that stimulates children's interest in learning more actively.[19]

In addition, these two technologies also facilitate more experiential learning. Students not only listen to explanations, but can also be directly involved in situations that simulate real life. For example, learning about ecosystems can be done by "visiting" tropical forests in VR, or math lessons can be understood through interactive simulations tailored to the student's ability level.

4. The Role of Parents and Communities in Supporting Learning with AI and VR

The use of Artificial Intelligence (AI) and Virtual Reality (VR) in education is not only the responsibility of teachers or educational institutions, but also involves the important role of parents and communities. Their support is needed so that the implementation of this technology can run optimally, and so that children can feel the benefits to the maximum. Here are some of the roles parents and communities play in supporting AI and VR-based learning:[20]

a. The Role of Parents in Supporting AI and VR-Based Learning

1. Facilitator of the Use of Technology at Home

Parents play the role of facilitators who ensure their children can access the technology necessary for AI and VR-based learning at home. This includes providing adequate devices, such as computers, tablets, or VR headsets, as well as ensuring a stable internet connection to support access to these technology-based e-learning platforms.

In addition, parents also need to create a conducive home environment for children to learn using this technology. They can set the time of use of the device to ensure that children are not exposed to screens for too long, while also ensuring that technology is used with clear learning objectives.

2. Assistance in the Learning Process

While AI technology can provide a personalized learning experience, the role of parents remains important in accompanying children in the learning process. Parents can help children to better understand the material delivered by the AI system, provide feedback on their learning progress, as well as address difficulties that children may face during the VR-based learning process.

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[19] Rochmawati, D. R., Arya, I., & Zakariyya, A. (2023). Benefits of Artificial Intelligence for Education. *Journal of Computer Technology and Informatics*, *2*(1), 124-134.

[20] Kholifah, K., Pradita, N., Prasetyo, A., Mahyuzar, H., & Hidayat, R. (2024). Training on the use of digital media based on artificial intelligence (AI) and virtual reality (VR) for teachers of economics subjects in Kebumen. *Journal of Community Service of the Archipelago*, *5*(3), 3678-3685.

By accompanying children as they learn through VR, parents can also monitor whether the immersive experience is appropriate for the child's needs and ensure that children do not feel confused or uncomfortable with the experience. Parents who are actively involved in their children's learning will increase the effectiveness of the use of technology in learning.

3. Fostering Interest and Curiosity

   Parents can play a role in building children's interest in learning through AI and VR by talking about the benefits of these technologies and encouraging children to use them in a positive way. They can motivate children to explore new interesting topics through VR or help children find AI-based learning apps that match their interests.

   By providing encouragement and praise for children's achievements in using technology, parents can strengthen their motivation to continue learning and interacting with more varied and challenging materials.

b. The Role of Communities in Supporting Learning with AI and VR

1. Provision of Technology and Infrastructure Access

   Local communities, whether through educational institutions, local governments, or non-governmental organizations, can play a critical role in providing access to the technologies needed for AI and VR-based learning. This could include the construction of technology labs in schools, the provision of necessary hardware, as well as the opening of public facilities that provide access to VR or AI-based learning devices.[21]

   Several communities have collaborated with technology providers to build digital learning centers where children can learn using AI and VR in a supportive setting. This not only provides wider access to children, but also creates awareness among the community about the importance of technology in education.

2. Training and Upskilling

   Communities can also support parents and teachers through training programs that teach how to leverage AI and VR technologies in education. This kind of training program can help parents understand the ways they can support their children in using learning technology, as well as help teachers to master new skills in integrating technology into their teaching.

   In addition, communities can hold seminars or workshops that provide more information about the benefits and challenges of this technology, as well as share best practices for integrating it into children's daily lives.

3. Collaboration with the Technology Industry

   Communities can strengthen relationships with the tech industry to bring AI- and VR-based educational innovations into children's schools and homes.

[21] Gusteti, M. U., Rahmalina, W., Azmi, K., Mulyati, A., Wulandari, S., Hayati, R., & Fajriah, N. A. (2025). Uncovering the potential for self-efficacy through literature analysis in mathematics learning. *Dharmas Education Journal (DE_Journal)*, *5*(1), 168-179.

This collaboration could take the form of partnerships with tech companies to provide AI and VR-based devices or applications, or holding events that promote educational technology to students and parents.

Through this collaboration, communities can reduce the digital divide that may exist in society and ensure that all children, regardless of their economic background, have an equal opportunity to access advanced learning technologies.

4. Developing Supportive Education Policies

   Communities, primarily through educational organizations and local governments, play a role in designing policies that support the implementation of AI and VR in school curricula. These policies can include providing funding for the procurement of devices, training for educators, as well as strategies to ensure that these technologies are used ethically and benefiting students.

c. Parent and Community Synergy in AI and VR-Based Learning

It is important to note that the successful use of AI and VR technologies in learning does not only depend on parents or teachers, but also on the synergy between the two. When parents and communities work together to create an environment that supports the use of technology in education, children can experience the full benefits of AI and VR-based learning.[22]

For example, parents who have a good understanding of this technology can work with the school to select an appropriate app or device, as well as share their experiences with other parents through educational communities or forums. With this collaborative network, children can learn in a richer and more supportive environment.

Overall, parents and communities play a very important role in the successful implementation of AI and VR technologies in education. With the right support, whether in terms of materials, training, and policies, they can help create a more personalized, interactive, and enjoyable learning experience for children.

The importance of the role of parents in supporting AI and VR-based learning also emerged in this study. The interaction between children and parents in the use of technology has a positive impact on children's learning motivation. Parents who are actively involved in children's digital learning can provide direction, emotional support, and monitoring to ensure that technology use remains productive and balanced.[23]

In addition, the education community, including technology developers and educational institutions, also plays a key role in ensuring the adoption of this technology runs smoothly. Collaboration between these parties can overcome existing barriers and create a more inclusive and sustainable education ecosystem.

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[22] Amalia, A., Fahmy, A. F. R., Sari, N. H. M., Nugroho, D. A., Prabowo, D. S., Pujiono, I. P., ... & Syukron, A. A. (2024). *Utilization of Artificial Intelligence (AI)-Based Learning Media in Schools*. NEM Publishers.
[23] Amalia, A., Fahmy, A. F. R., Sari, N. H. M., Nugroho, D. A., Prabowo, D. S., Pujiono, I. P., ... & Syukron, A. A. (2024). *Utilization of Artificial Intelligence (AI)-Based Learning Media in Schools*. NEM Publishers.

5. Projecting the Future of Learning with AI and VR

Looking at these findings, it is predictable that by 2025, the integration of AI and VR in children's learning will be even more widespread, with increased access to technology and training for educators. A more flexible and adaptive learning model, which is able to answer the needs of each student, will become the new standard in the world of education. With these technological advancements, it is hoped that children can be better prepared to face the challenges of the ever-evolving world, while enjoying a more fun and meaningful learning process.[24]

Looking to the future, the integration of Artificial Intelligence (AI) and Virtual Reality (VR) in the world of education is expected to bring major changes to the way children learn. AI technology will allow for more in-depth learning personalization, where the system can adjust learning materials and methods based on each child's unique needs, speed, and learning style. Meanwhile, VR will make the learning process much more immersive, interactive, and fun by presenting real-world simulations that can be accessed without space and time limits. Kids can explore historical sites, conduct scientific experiments, or even take virtual international classes. On the other hand, the role of teachers will also change significantly. Teachers will no longer only be material presenters, but will play the role of facilitators, mentors, and designers of technology-based learning experiences. Learning will also be more flexible, accessible anytime and anywhere, thus supporting the concept of lifelong learning. However, these developments also pose challenges, such as the need for ethical regulation of student data privacy, the risk of dependence on technology, and the digital access gap between regions. Therefore, collaboration between the government, educational institutions, technology developers, and the community is key in creating an adaptive, safe, and inclusive learning ecosystem. If managed properly, AI and VR will not only be learning aids, but will also be the foundation for a more humanistic, intelligent, and future-oriented educational transformation.[25]

CONCLUSION

The use of Artificial Intelligence (AI) and Virtual Reality (VR) in children's learning has opened a new era in the world of digital education that is more personalized, interactive, and adaptive. AI allows learning systems to tailor material to each student's characteristics and needs, while VR provides an immersive and enjoyable learning experience. Although this technology has a positive impact on student motivation and understanding, its implementation is inseparable from various challenges, ranging from limited infrastructure to human resource readiness. Therefore, support from parents, teachers, and the community is crucial in creating a collaborative and inclusive learning ecosystem. Going forward, with the development of increasingly advanced technology

[24] Barlian, U. C., & Ismelani, N. (2022). Metaverse as an effort to face educational challenges in the future. *JOEL: Journal of Educational and Language Research*, *1*(12), 2133-2140.

[25] Endarto, I. A., & Martadi, M. (2022). Analyze the potential implementation of the metaverse in interactive educational media. *BARIK-Journal of S1 Visual Communication Design*, *4*(1), 37-51.

and responsive education regulations and policies, AI and VR have the potential to be the main foundation in shaping a generation of learners who are independent, creative, and ready to face the challenges of the 21st century.

BIBLIOGRAPHY

Aji, G. S., & Mala, I. K. (2024). Improving the quality of human resources to achieve a company's competitive advantage in the digital era: Trends, innovations, and challenges. *Journal of Management and Creative Economy*, *2*(3), 01-17.

Amalia, A., Fahmy, A. F. R., Sari, N. H. M., Nugroho, D. A., Prabowo, D. S., Pujiono, I. P., ... & Syukron, A. A. (2024). *Utilization of Artificial Intelligence (AI)-Based Learning Media in Schools*. NEM Publishers.

Amalia, A., Fahmy, A. F. R., Sari, N. H. M., Nugroho, D. A., Prabowo, D. S., Pujiono, I. P., ... & Syukron, A. A. (2024). *Utilization of Artificial Intelligence (AI)-Based Learning Media in Schools*. NEM Publishers.

Barlian, U. C., & Ismelani, N. (2022). Metaverse as an effort to face educational challenges in the future. *JOEL: Journal of Educational and Language Research*, *1*(12), 2133-2140.

Endarto, I. A., & Martadi, M. (2022). Analyze the potential implementation of the metaverse in interactive educational media. *BARIK-Journal of S1 Visual Communication Design*, *4*(1), 37-51.

Erison, Y., Surur, M., Ahmad Sholikin, E., Rohmah, N. L., Anas, F., Rosyid, H., ... & Sholikin, A. Transforming Public Services with Artificial Intelligence (AI): Innovative Theories and Concepts for the Future.

Gusteti, M. U., Rahmalina, W., Azmi, K., Mulyati, A., Wulandari, S., Hayati, R., & Fajriah, N. A. (2025). Uncovering the potential for self-efficacy through literature analysis in mathematics learning. *Dharmas Education Journal (DE_Journal)*, *5*(1), 168-179.

Istian, A. (2024). Integration of technology in Islamic educational learning. *Indonesian Research Journal on Education*, *4*(1), 302-310.

Kennedy, P. S. J. (2023). Digitalization of Education: Artificial Intelligence in Higher Education. In *Proceedings of the National Seminar of Abdurachman Saleh Situbondo University* (Vol. 2, No. 1, pp. 205-215). LPPM Abdurachman Saleh Situbondo University.

Kholifah, K., Pradita, N., Prasetyo, A., Mahyuzar, H., & Hidayat, R. (2024). Training on the use of digital media based on artificial intelligence (AI) and virtual reality (VR) for teachers of economics subjects in Kebumen. *Journal of Community Service of the Archipelago*, *5*(3), 3678-3685.

Lase, D., Waruwu, E., Zebua, H. P., & Ndraha, A. B. (2024). The role of innovation in economic development and education towards the vision of Advanced Indonesia 2045. *Tuhenori: Multidisciplinary Scientific Journal*, *2*(2), 114-129.

Mahmudi, M. A., Fitri, D. M., Lase, D. C., Saptiany, S. G., Nur, M. D. M., & Raini, Y. (2025). *EDUCATIONAL TECHNOLOGY: THEORY AND APPLICATION*. Azzia Karya Bersama.

Maryani, I. (2025). *Artificial intelligence in education: a potpourri.* K-Media.

Metris, Diksi, Ahmad Rasyiddin, and Caesar Rismanto. *A New Era of Human Resource Management: Transformation and Innovation in the Digital World*. Tri Scientific Education Foundation, 2025.

Nasution, M. D. (2024). *Technology Development and Digital Transformation in the World of Education*. UMSU Press.

Nurcahyono, N. A., & Putra, J. D. (2022). Obstacles for mathematics teachers in implementing the independent curriculum in elementary schools. *Academic Discourse: Scientific Magazine of Education*, *6*(3), 377-384.

Redhana, I. W. (2024). *Digital Literacy: A Guide to Facing Society 5.0*. Blue Ocean.

Rochmawati, D. R., Arya, I., & Zakariyya, A. (2023). Benefits of Artificial Intelligence for Education. *Journal of Computer Technology and Informatics*, *2*(1), 124-134.

Sari, I. N., Lestari, L. P., Kusuma, D. W., Mafulah, S., Brata, D. P. N., Iffah, J. D. N., ... & Sulistiana, D. (2022). *Qualitative research methods*. Unisma Press.

Sholikhah, A. (2016). Descriptive statistics in qualitative research. *COMMUNICATION: Journal of Da'wah and Communication*, *10*(2), 342-362.

Sujarweni, V. W. (2014). Research methodology. *Yogyakarta: Pustaka Baru Perss*, *74*.

Sulistiyo, U. (2023). *Qualitative research methods*. PT Salim Media Indonesia.

Wijaya, K. (2023, April). Integration of Information Technology (ICT) in PAI Learning Based on the Multiple Intelligence Paradigm in Elementary Schools. In *National Seminar LPPM Ummat* (Vol. 2, pp. 431-446).