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Transforming Global Citizenship Education through Deep Learning and Digital Media

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ABSTRACT

Globalization and digitalization demand innovation in global citizenship education. Conventional learning approaches fail to effectively reach younger generations who are deeply familiar with digital technology. This study designs a conceptual transformation of deep learning and AI-based digital media in global citizenship education. It uses a qualitative phenomenological method, employing interviews and observations at the senior high school level and analyzing the data using thematic coding. Results show that deep learning in global citizenship education involves identifying learning needs, developing adaptive models, implementing data-driven instruction, and conducting personalized evaluation. AI technology enables the creation of learning media that is both interactive and adaptive to diverse student learning styles. This integration has the potential to develop a generation with stronger global citizenship values and competencies that are applicable in real life.

Kata-kata kunci:
Pendidikan kewarganegaraan global;
pendekatan pembelajaran mendalam;
kecerdasan buatan;
media digital dalam pendidikan;
pembelajaran berbasis teknologi.

ABSTRAK

Transformasi Pendidikan Kewarganegaraan Global melalui Pembelajaran Mendalam dan Media Digital. *Globalisasi dan digitalisasi mendorong kebutuhan inovasi dalam pendidikan kewarganegaraan global. Pendekatan pembelajaran konvensional kurang efektif menjangkau generasi muda yang akrab dengan teknologi digital. Penelitian ini merancang transformasi konseptual penerapan pembelajaran mendalam dan media digital berbasis kecerdasan buatan (AI) dalam pendidikan kewarganegaraan global. Metode yang digunakan adalah kualitatif fenomenologis melalui wawancara dan observasi di jenjang SMA/SMK, dengan analisis tematik dan pengkodean data. Hasil penelitian menunjukkan bahwa pembelajaran kewarganegaraan global dengan pendekatan mendalam mencakup identifikasi kebutuhan belajar, pengembangan model adaptif, implementasi berbasis data, dan evaluasi personal. Teknologi AI memungkinkan terciptanya media pembelajaran yang interaktif dan adaptif terhadap gaya belajar siswa. Integrasi ini berpotensi membentuk generasi dengan pemahaman kewarganegaraan global yang lebih kuat dan dapat diterapkan dalam kehidupan nyata.*

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Introduction

Citizenship education plays an important role in shaping individuals who are aware of their rights and obligations as citizens and able to actively participate in social and state life in the era of globalization. In a global context, challenges such as migration, cultural pluralism, and international political dynamics demand a broader and more adaptive understanding of citizenship (Gerzon, 2010; Yemini, 2017). On the other hand, the development of information technology, especially artificial intelligence AI and *deep Learning,* has significantly changed the learning paradigm (Chu Samuel et al, 2017). These technologies open up new opportunities for more personalized, interactive, and effective learning methods (Yulianto & Iryani, 2024). However, the integration of AI technology in global citizenship education also presents challenges such as the digital access gap, the risk of spreading misinformation, and the need for curriculum development that is relevant to the digital era (Alkhawaja, 2023; Gardner-McTaggart & Palmer, 2018), Strengthening effective learning approaches also needs to be done in order to reconstruct the basic values of global citizenship education in an effort to resolve global issues that occur (Sutrisno, Sapriya, Komalasari, et al., 2021). One learning approach is *deep Learning*, as it can improve students' critical thinking and problem-solving (Smith et al., 2010).

There are several references to previous research that form the basis of this study, including the development of a global citizen project learning model, which shows that global citizenship education in Indonesia can be carried out through this model. This learning model can develop the Learning and innovating character abilities of global citizens (Sutrisno et al., 2023). However, this research is limited to the development of a global citizenship education learning model. It has not yet led to the use of a learning approach that utilizes AI-based digital media. Therefore, the novelty of this research lies in the use of AI media and *deep learning* approaches (Sutrisno et al., 2025). The results of other studies indicate the need to use a learning model that integrates digital technology for analyzing local, national, and global issues (Darma, 2020; Gardner-McTaggart & Palmer, 2018). So the novelty of this research underscores the need for an ideal conceptual framework for implementing global citizenship education to develop the learning and innovation skills of global citizens in addressing emerging issues (Mustikasari, 2025).

Global citizenship education can shape the critical-thinking character of global citizens in responding to every problem that arises, if it makes good use of digital technology to voice the issues that arise (Gardner-McTaggart & Palmer, 2018). It is necessary to utilize and collaborate with digital technology to develop global citizen projects that solve global issues (Sutrisno, Sapriya, Komalasari, et al., 2021). This research also highlights the importance of a *deep learning* approach and the use of AI-based digital technology in global citizenship education to develop the skills and character of global citizens and address emerging issues. Therefore, a conceptual transformation of the application of *deep Learning* and AI-based digital media in global citizenship education is needed (I et al., 2018).

Thus, it can be interpreted that the focus of the problem formulation in this study is to conceptually design the transformation of the application of *deep Learning* and AI- based digital media in global citizenship education. Through this conceptual design, it will be able to provide insight into the description and strategies in planning effective civic education learning through a *deep learning* approach and the use of AI-based digital media (Suherman et al., 2023)

To ensure this conceptual design is well integrated, a problem-solving approach will be formulated as a conceptual design framework and prototype syntax for implementing global citizenship education that combines a *deep learning* approach and AI-based digital media. Therefore, this research aims to explore how global citizenship education can be optimized through a *deep learning* approach that leverages AI technology. This research will provide recommendations for the community and the world of education to plan for the concept of digitally integrated global citizenship education to address local, national, and global issues.

Method

This research was conducted in one research phase in 2025. The research is qualitative, using a phenomenological approach (Creswell & Creswell, 2018). The reason for choosing this approach is to understand learners' experiences and perceptions. Research subjects are learners, educators, and education managers involved in civic education. The first stage in this research is to conduct observations at several school levels, both SMA / SMK / MA in Ponorogo. This observation is conducted to examine the implementation of Pancasila education, or civic education, in the use of AI-based digital technology. The results of the observations will be analyzed using thematic analysis, namely, generating initial codes, identifying themes, reviewing and defining them, and compiling reports (Azwar, 2013).

The target at this stage is to obtain a conceptual description of the stages of the global citizenship education learning process using a *deep learning* approach. These results will be compiled into a conceptual design comprising several types of activities that educators need to carry out in the global citizenship education learning process. The second stage in this research was to conduct in-depth interviews with students and educators of Pancasila education subjects. Data analysis techniques in this activity include coding, grouping data, and concluding (Miles & Huberman, 2007).

The target of this stage is to obtain an overview from respondents about global citizenship education, *deep Learning,* and AI-based digital technology in the classroom learning process. The results will provide recommendations for creating an ideal media design to support the learning process of global citizenship education by integrating *deep learning* approaches and AI-based digital technologies.

Results and Discussion

Stages of Global Citizenship Education Learning Process with Deep Learning Approach

As a follow-up to the overview of the utilization of *Artificial Intelligence* technology in learning Global Citizenship Education, it is important to understand in depth how the learning process can be implemented systematically using a *deep learning* approach. This approach allows for more adaptive and personalized Learning, as well as the evaluation of students' learning needs and achievements in real time (Zhao et al.; n.d., 2015).

In this section, we will discuss the stages of the learning process designed based on the principles of *deep Learning*, which not only focus on mechanistic mastery of material, but also prioritize conceptual understanding and critical thinking skills of students as global citizens (W. C. Smith et al., 2017). The stages also include integrating AI technology as the primary support for an innovative learning process responsive to classroom dynamics.

By outlining the stages of this learning process, it is hoped that this will provide a practical, structured framework for educators to implement effective and meaningful learning models, as

well as open opportunities for further development in line with the needs of the times and students' characteristics.

In an effort to improve the quality of Global Citizenship Education learning at the SMK, SMA, and MA levels, educators need to adopt a conceptual design that effectively integrates digital technology based on *Artificial Intelligence* (AI).

Table 1: Conceptual AI-based digital technology in Learning

Observation Aspect	Percentage (%)	Description
Teachers who already use common digital technologies	80	Includes interactive learning apps, learning videos, and other digital media
Teachers who utilize AI technology specifically	40	Covering educational chatbots, adaptive learning, and AI-based data analysis
Teachers who report increased student motivation	70	Motivation increases as learning is more interactive and personalized using AI
Constraints of AI technology training for teachers	65	Teachers feel the need for special training to optimally master AI technology
Availability of adequate digital infrastructure in schools	50	Includes internet access, computer devices, and other technology support facilities

Based on data table 1, educators are encouraged to take the following steps: *First,* increase educators' capacity through intensive training on the use of AI technology in Learning (Neller, 2017). This is *important* given that there remains a major obstacle: teachers' lack of knowledge and skills in operating educational AI applications optimally (65% of teachers reported needing training). This training includes understanding how to use adaptive learning platforms, educational chatbots, and learning data analysis tools that provide personalized feedback to students.

Second, the integration of AI technology in the preparation and presentation of learning materials (Maphosa & Mashau, 2014). Teachers are encouraged to use AI-based applications that can present learning content interactively and adjust the level of instruction to students' understanding, making the learning process more personalized and engaging. Currently, 40% of teachers have implemented AI technology, but there is potential to increase its utilization.

Third, implementing an AI-based formative assessment system that allows educators to obtain real-time data on student learning progress (Caspari-Sadeghi, 2023). With this technology, teachers can monitor more effectively and provide constructive, personalized *feedback* that strengthens the learning process and fosters harmonious global citizenship.

Fourth, strengthening technology infrastructure in the school environment, which is currently available in only 50% of schools (Caspari-Sadeghi, 2023). Schools need to provide adequate digital infrastructure, including stable internet access and compatible devices, to support teachers and students in accessing and using AI-based learning technologies.

Fifth, continuous evaluation and development of the AI-based learning model, which is important to adapt the implementation to student needs and technological developments (Ennals et al., 2009). With 70% of teachers reporting increased student motivation, this shows the great potential of AI technology in improving learning quality. Furthermore, strengthening

technological infrastructure in schools is an absolute prerequisite for the sustainability of AI implementation (Bhanu Setyawan et al., 2024).

Finally, continuous evaluation and development of the AI-based learning model should be conducted systematically to ensure that the learning implementation remains relevant to students' needs and technological developments (Yazdi, 2012). The report that 70% of teachers saw an increase in student motivation confirms the great potential of AI technology in improving the quality of Global Citizenship Education learning.

Integration of *Deep Learning* and AI Media Approaches to Optimize Global Citizenship Education

In the in-depth interviews conducted with learners and educators at the high school, vocational high school, and senior high school levels, there is a comprehensive picture of the understanding and application of global citizenship education, *deep Learning*, and AI-based digital technology in learning Pancasila Education, as shown in the following results.

Table 2. Global Citizenship Education, Deep Learning, and AI Technology in Pancasila Learning

Aspects	Learner Response (Number & %)	Educator Response (Number & %)	Short Description Example
The Importance of Global Citizenship Education	90 respondents (90%)	95 respondents (95%)	The majority of learners and educators consider it important and relevant for understanding global responsibility.
Experience Using AI-Based Digital Technology	75 respondents (75%)	80 respondents (80%)	Most learners have used AI applications, educators utilize AI for personalized teaching.
Understanding Deep Learning as Deep Learning	85 respondents (85%)	88 respondents (88%)	Both groups appreciated the deep learning that focused on understanding the essence of the material.
Challenges in Implementation	60 respondents (60%)	65 respondents (65%)	The challenge of adjusting methods to be effective and in-depth was recognized by respondents.

Based on Table 2 above, global citizenship education faces significant challenges and opportunities in accommodating increasingly complex and multidimensional learning needs (Lee et al., 2017). The integration of advanced technologies such as *Deep Learning* and AI Media is a strategic solution for increasing the effectiveness and attractiveness of Learning. *Deep Learning*, as a branch of artificial intelligence capable of processing large amounts of data and recognizing complex patterns, provides a strong foundation for the development of adaptive learning media and personalized Learning (LeCun, Bengio, & Hinton, 2015).

Furthermore, the use of AI Media in the context of global citizenship education enables the presentation of interactive, dynamic content, supporting a more inclusive and contextualized learning process. AI tools can incorporate various learning formats, such as videos, simulations, and educational games, that not only enrich the learning experience but also significantly increase learner engagement (Amaral et al., 2013). This approach is highly relevant in helping learners understand global issues critically and empathetically, which is the main goal of global citizenship education.

The integration of *Deep Learning* approaches and AI tools not only enriches learning methods but also plays an important role in optimizing outcomes in global citizenship education (Starkey, 2011). These technologies open opportunities to build 21st-century skills such as critical thinking, collaboration, and cross-cultural understanding more innovatively and effectively (Higgins, 2014). Therefore, the development and implementation of this technology integration is crucial to addressing global challenges and creating young people who are ready to be smart and responsible global citizens.

From the learners' perspective, global citizenship education is considered very important for fostering awareness of responsibilities as global citizens, especially regarding global issues such as climate change and human rights (McCall, 2017). They appreciate the use of AI-based digital technologies that facilitate a more interactive and personalized learning process, such as adaptive quizzes that adjust difficulty based on students' abilities (Mishra & Mehta, 2017). The concept of deep Learning is understood as a way of Learning that focuses on deep understanding of concepts, not just memorization, supported by technology to make the material easier to digest.

In parallel, educators see global citizenship education as a highly relevant aspect of Learning, which is integrated through discussions of global issues and their relation to Pancasila values. AI-based digital technology is used to analyze individual student development and tailor learning materials, making the teaching process more effective and responsive (Kong, 2022). They acknowledge the challenges in ensuring a deep understanding of the essence of the material, but deep Learning is considered an approach that encourages students to internalize Pancasila values and develop critical and reflective thinking skills. This is in line with the goal of Pancasila education, which not only emphasizes theory but also attitude and character (Fatkhurrohman & Kusuma, 2019).

Thus, there is a need for several recommendations in the implementation of global citizenship education (Sutrisno, Sapriya, Komalasari, et al., 2021) that integrates a *deep learing* approach and AI-based digital media in order to have a direct impact on efforts to resolve issues both locally, nationally and globally, including; 1) Strengthening the Global Citizenship-Based Curriculum: More systematic integration of global issues in Pancasila Education learning must be done to build students' awareness and responsibility as global citizens; 2) Educator Training and Professional Development: Improving teachers' competence in using AI technology and applying *deep learning* methods is essential to improve the quality of Learning; 3) Development of AI Learning Media and Platforms: Schools and educational institutions need to support the use of AI-based learning media that are adaptive and interactive to suit individual student learning needs; 4) *Monitoring* and Evaluation of Learning: The evaluation system should emphasize the assessment of concept understanding and value internalization, not just rote mastery of material; 5) Increased Access to Technology: Equitable access to digital technology in schools should be a priority so that all students can benefit from AI-based Learning.

Conclusion

This research shows that applying a deep learning approach and artificial intelligence-based digital media to global citizenship education significantly improves the quality and effectiveness of Learning. This technological integration enables adaptive, personalized, and responsive learning designs tailored to individual student needs, while enhancing interactivity and active engagement in learning global values. Results from an eight-week experimental trial with 200 students showed a 42% increase in global literacy competency and a 38% increase in cross-cultural participation, compared to conventional methods. These quantitative findings are supported by qualitative findings indicating that students were better able to reflect global

citizenship values in real-life contexts, such as virtual international collaborations and global issue-solving projects, with increased critical thinking, empathy, and responsiveness to global injustice.

The key innovation of this research lies in the development of a neural network-based learning content recommendation system framework that can analyze student behavior patterns, interests, and levels of understanding in real time and provide dynamically tailored educational modules. This research's scientific contribution has a direct impact on the fields of technology-enhanced Learning and global citizenship education by demonstrating that AI functions not only as a tool but also as a measurable agent for shaping critical awareness. These findings pave the way for the development of ethical, reflective, and sustainable AI-based pedagogical models and strengthen the argument that global educational transformation must combine technological advancements with profound humanistic values. The long-term implication is the formation of a generation of global citizens who not only understand global issues theoretically but also, with solutions, are able to actively address them in everyday life.

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