

Implementation of augmented reality-based digital citizenship learning to improve students' civic communication competence in higher education

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Abstract

Civic education is not limited to contemporary learning through traditional methods. Students are encouraged to actively participate through dialogue, collaboration, contribution, and discussion. Thus, the resulting discussions can stimulate their critical thinking regarding social issues. This study aims to analyse the implementation of augmented reality-based digital citizenship learning to improve the civic communication competence of higher education students. This study uses a qualitative case study approach. The participants in this study were 15 students from communication studies who took civic education courses. In-depth interviews were conducted using semi-structured techniques to collect data. The results of this study indicate that the use of augmented reality in civic education courses can help students identify forms of digital citizenship. Students can practise their civic communication competence through the DC-AR application. In addition, students can use the DC-AR application independently through their smartphones. Thus, the DC-AR application can be an alternative digital citizenship learning technology that can minimise the spread of hoaxes. Students are also encouraged to practise their social and cultural literacy skills through civic communication practices. This study concludes that civic education is not limited to theoretical elements. In higher education, civic education can be integrated with technology and communication science. Students not only understand digital citizenship but are also able to implement it through the DC-AR application by practising



communication. The DC-AR application can also instil citizenship communication competencies in students as a strategy to improve the quality of human resources through education.

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Introduction

Civic education is a compulsory subject in higher education (Febrianti et al., 2024). This is based on Indonesian Law Number 12 of 2012 concerning higher education. The regulation stipulates that the objective of civic education in higher education is for students to understand the concepts and importance of identity, the constitution, citizenship, democracy, law, the archipelago, and national resilience. However, in today's digital era, civic education is not limited to traditional methods (Misan-Ruppee et al., 2024). Civic education must encourage students to actively participate in dialogue, collaboration, contribution and discussion (Maulana & Milanti, 2023). Encouraging students to actively participate is not easy. This is because each student has different learning characteristics (Pospieszna et al., 2023). Therefore, the learning strategies applied must be integrated with students' learning characteristics (Younas & Imran, 2025).

Civic education should not emphasise only conceptual aspects. Students must be able to explain and relate theories to issues in society (Biamba et al., 2021). Thus, dialogue, collaboration, contribution, and discussion must be developed to stimulate students' critical thinking (Kosberg, 2024). To stimulate critical thinking, students must have good analytical and communication skills (Xie et al., 2025; García et al., 2025). These communication skills must also be balanced with digital literacy skills (Govender, 2025). In the learning process, students must be able to process the information they obtain and then convey it through dialogue and discussion. Unfortunately, the implementation of civic education learning outcomes still fails to adequately equip the younger generation to actively participate in good citizenship (Haris & Mufidah, 2025).

On the other hand, the main objective of civic education is to develop citizens who are critical, participatory, responsible, and who understand the values of democracy, law, and social participation. Unfortunately, university students are still unable to internalise democratic values. This is also supported by the lack of innovative learning plans, such as deliberation simulations. In addition, civic education in universities generally focuses on cognitive aspects rather than affective and psychomotor aspects. As a result, students' characters have not been optimally formed. Deimel et al. (2024) show that civic education aims to reduce political violence, encourage the active participation of the younger generation in democracy, and facilitate the flow of political information. In addition, civic education is also required to strengthen students' Pancasila ideology (Jayadiputra et al., 2023). This is because Pancasila is the foundation of the Indonesian state. Therefore, the values of Pancasila must be applied by students in their daily lives. Moreover, in today's digital era, the spread of hoaxes has become a phenomenon that contributes to division. This condition can occur due to low digital literacy skills (Peng & Yu, 2022).

In addition, discrimination and intolerance can still be seen through social media such as Instagram, YouTube and TikTok (Corke et al., 2025; Wang & Metzger, 2024; Velasquez & Montgomery, 2020). Therefore, civic education is encouraged to play an active role in instilling

Pancasila values and awareness in students to become good citizens (Aiyub et al., 2025). Unlike Indonesia, Thailand has civic education integrated into the general education curriculum and extracurricular activities (Boontinand, 2023). As a result, civic education courses are not found in higher education institutions. In the United Kingdom and Hong Kong, civic education is present to encourage students to care about their environment, including the environment of immigrants, and to actively participate in democracy (Zhang & Fagan, 2016). However, civic education is not provided to students in higher education. Civic education in both countries exists only at the secondary level and is integrated with other subjects.

The challenge of civic education amid current technological advances is that students must have literacy and communication skills that can motivate them to actively participate in learning activities. Zis et al. (2021) review the communication behaviour model of the younger generation, noting that it has changed in the digital era. The communication behaviour shown has become passive and unfocused due to the dynamics of digital media. The dynamics of digital media pose a challenge for civic education to foster good communication behaviour both in person and in the virtual world. Therefore, the instilling of digital citizenship values is necessary. Japar et al. (2022) review that digital citizenship can be an alternative for fostering constitutional awareness among students. In addition, digital citizenship needs to be instilled as a process of innovation diffusion in learning (Fadhillah et al., 2024). Students in higher education need digital-based civic education learning innovations. The use of digital citizenship in learning is not limited to the devices used (Couldry et al., 2014). This is because, in general, students have smartphones as communication tools. For this reason, the use of digital citizenship must be supported by students' actions in using technology, grounded in digital literacy competencies. A study by Calzada and Bustard (2023) found that digital citizenship, when used in a limited way, can serve as a specific political agenda. Digital citizenship must also be integrated with other media to increase students' understanding of the role of technology in civic education (Peart et al., 2024; Lozano-Díaz & Fernández-Prados, 2020).

One technology that can be developed is augmented reality. Augmented reality is a relatively new technology that allows three-dimensional representations created digitally to be integrated with the real environment (López-Belmonte et al., 2023; Marín et al., 2022). This innovation builds on the research by Fadhillah et al. (2024), which has developed strategies to instil digital citizenship values and foster civic communication in higher education. Therefore, Augmented Reality-based Digital Citizenship (DC-AR) can be a strategy for civic communication practices to shape a younger generation that is more responsible, sensitive to national issues, and ready to face global challenges (Marín et al., 2022).

The urgency of this research lies in higher education's role in strengthening Pancasila ideology by integrating technology and communication practices into the learning process, thereby strengthening students' national identity. Thus, the learning activities carried out can strengthen the role of the younger generation in national development. Various studies have shown the dynamics of civic education in higher education. Wren (2021) points out that, as educators, lecturers must experiment with redesigning the curriculum to better facilitate the development of students' social responsibility. This is because civic education can increase students' understanding of social responsibility, citizenship, and diversity. Peart et al. (2024) explain that the civic education curriculum remains focused on more traditional forms of political participation and that much remains to be done to develop civic education for the digital age.

On the other hand, Zhang and Shen (2024) describe that social media can be a source of learning for civic education. The integration of new media into civic education learning activities has proven effective. Chanda and Sain (2024) review that information technology plays a role in promoting civic education. In contrast, Guzman et al. (2024) developed augmented reality technology into an innovative educational tool that bridges conflicting perspectives and offers potential solutions to promote a comprehensive understanding of citizenship among students. Bello et al. (2024) recommend that universities use hypermedia-integrated instructional resources in the learning process.

Based on the previous studies, it is evident that the civic education curriculum requires the diffusion of innovations integrated with technology. However, the diffusion of innovations developed in this study is novel in its approach to innovating civic education in higher education. This is demonstrated by the lack of studies that integrate AR to foster students' civic communication competence. Therefore, this study aims to analyse civic education by developing an augmented reality-based approach to digital citizenship. This is because education must adapt to technological advances. This development is undertaken to improve the quality of learning in higher education. Higher education institutions are seen as providers of higher education to prepare students to have academic and professional abilities. Thus, they can apply, develop, and create in science, technology, and the arts. This study also aims to explore how AR-based digital citizenship enhances civic communication competence among university students. Therefore, this study seeks to integrate technology to foster students' communication competence and strengthen Pancasila ideology. In addition, it contributes to the body of knowledge in civic education. In practical terms, the development of AR-based digital citizenship is an innovation in civic education that focuses on civic communication competence in higher education.

Method

This study used a qualitative case study approach (Yin, 2014). Case studies were used to provide an overview of students' understanding of digital citizenship and augmented reality. This study utilises a single instrumental case study. This is to gain an in-depth understanding of students' civic communication competence in higher education through the development of augmented reality (Creswell, 2014). In addition, the case studies focused in depth on students' understanding and experience with augmented reality. Therefore, this case study targeted communication science students enrolled in civic education courses. This research was conducted at the Universitas Kebangsaan Republik Indonesia (UKRI) in Bandung, West Java. Participants were selected using purposive sampling, based on criteria tailored to the research's needs. In selecting participants, the criteria used were tailored to the setting, actors, events, and process (Miles et al., 2013). The setting criteria referred to the research location. Meanwhile, the actors were active UKRI students from the 2024 cohort. The events criterion refers to the process of learning civic education courses in higher education. The fourth criterion, process, refers to the researcher's interview process for listening to their opinions and views on their experiences and understanding of the research problem. The selection of participants was also based on their understanding of the research problem and their continued involvement in the subject, including the setting, actors, event, and process. The study included 10 female and 9 male students. To maintain research ethics, participants' names were disguised with codes PK1-PK19.

Data collection was carried out through interviews, observation, and documentation. The initial research process was conducted by observing civic education learning activities in the second meeting. The observation was carried out by paying attention to learning activities through the researcher's senses. The results of the observation were then used to guide in-depth interviews. These interviews were conducted using a semi-structured method. The semi-structured method was used to openly discover issues related to students' understanding of digital citizenship and augmented reality. Furthermore, interviews were conducted to understand the experience of using augmented reality in the learning process. Data analysis was conducted in parallel using open coding, axial coding, and selective coding. These three stages aimed to produce the main themes of the research findings.

The content of the documents was assessed through participants' notes and the results of their evaluation of learning using augmented reality. Data validity was assessed through source triangulation and validation. Triangulation was conducted by comparing the results of interviews, observations, and learning documents to ensure data consistency. Data validity testing was conducted through triangulation, member checking (credibility), thick description (transferability), and audit trail (dependability and confirmability). Member checking was conducted at the end of the analysis by verifying the data findings with two key informants, namely experts in educational technology and civic education. After collecting the data, Miles et al. (2013) used the data analysis technique. First, data reduction was carried out by transforming the field notes into a format suitable for sorting and grouping. After that, the data was presented in the form of patterns, integrated with a series of information. Finally, conclusions were drawn.

Results and Discussion

The Transformation of Civic Education in the Digital Age

Civic education conceptually leads to governance and citizenship, associated with the obligations, rights, and privileges of citizens. In other words, civic education focuses on shaping citizens who understand and can exercise their rights and obligations in accordance with the Pancasila mandate and the 1945 Constitution.

Generally, participants begin civic education in primary school (Sunarso et al., 2024). Thus, they have been familiar with civic education for more than 10 years. However, the civic education material differs at each level.

"..... I started learning civic education in primary school with simple things such as Pancasila and school rules. As I got older, the material became more in-depth, discussing democracy, the 1945 Constitution, and the rights and obligations of citizens. In college, I saw civic education not only as a course, but also as a reminder of my role as a student and a member of the nation." (PK 9, August 2025).

The results of the interviews illustrate differences in civic education materials across primary and higher education levels. This is because the civic education course is tailored to learners' learning characteristics and age (Febrianti et al., 2024). Civic education at the primary and secondary levels is more focused on the basic values of Pancasila to shape the character of good citizens (Sunarso et al., 2024).

Meanwhile, at the tertiary level, the course becomes more complex, requiring students to think critically about issues in society. The transformation of civic education from primary school to tertiary education can be illustrated by the course taught. At the primary level, civic

education provides lessons on culture and national identity. At that time, it was emphasised that culture is the nation's identity. As Indonesian citizens, learners are guided to understand Pancasila and Bhinneka Tunggal Ika. In addition, learners are given examples of behaviour related to the values of Pancasila and Bhinneka Tunggal Ika. Therefore, in primary school, the words 'tolerance' and 'mutual cooperation' often appear. Meanwhile, at the university level, civic education is no longer primarily about encouraging cooperation and tolerance. Instead, it discusses the essence of tolerance itself, the values we hold and/or hinder us as citizens, and then uses this material to advance progress in accordance with the constitution (to achieve people's sovereignty). In other words, civic education at the primary school level encourages acceptance of differences. In higher education, we are encouraged not only to be tolerant but also to "innovate" intelligently in the face of differences.

On the other hand, civic education at the primary and secondary levels focuses more on basic introductions, such as national symbols, Pancasila values, and simple norms and rules (Febrianti et al., 2024). Meanwhile, at the tertiary level, civic education material is more critical and analytical (Aksinudin et al., 2022). This is because civic education aims to provide students with the competence to improve their critical, rational and creative thinking skills in responding to civic issues. Moreover, in today's digital era, civic issues have become very developed. This condition is underpinned by technological advances and globalisation. Various citizenship issues have then developed into discrimination, intolerance and the misuse of other people's personal data without permission. All three of these things occur in the virtual world. Therefore, the transformation of civic education is carried out by instilling digital citizenship values (Calzada & Bustard, 2023).

The Use of Digital Citizenship in Civic Education

Digital citizenship is the skill of being a good digital citizen by using technology and the internet wisely, ethically, responsibly, and respecting the rights and privacy of others in the digital world.

"Digital citizenship is an interaction that occurs in online media. It involves utilising existing technology and is not just about interaction, but also about the behaviour, responsibility, and understanding of users based on civic education." (PK 8, August 2025).

The interview results illustrate that digital citizenship can be integrated with the concept of civic education. In other words, the utilisation of digital citizenship in civic education involves instilling in students an understanding of their rights and obligations in the digital space, communication ethics, personal data security, and critical thinking skills for filtering information. Thus, digital citizenship emphasises the importance of being a smart, wise, and responsible digital citizen. This is because students still encounter discrimination and intolerance on the digital media they use.

"Misinformation and disinformation are still found in videos on digital media such as Instagram and TikTok. Content creators often do not include clear sources, such as content related to political policies. It is not uncommon for titles and phrases in content to use provocative clickbait." (PK 11, August 2025).

Based on the research findings, a common problem in the digital era is the lack of digital citizenship skills among people who use digital media. This was experienced by various participants when using digital media such as Instagram and TikTok (Zis et al., 2021). In

addition, participants noted that some content creators often insert policy memes or fictional policies as jokes. Digital media users who lack digital citizenship skills are easily swayed and provoked. Therefore, it is important to incorporate digital citizenship skills into civic education learning materials. Digital citizenship skills include digital access, digital etiquette, digital commerce, digital rights and responsibilities, digital literacy, digital law, digital communication, digital health and wellness, and digital security (Fadhillah et al., 2024).

Augmented Reality Based on Digital Citizenship

In instilling the values of digital citizenship in civic education, learning transformation is carried out through augmented reality. This is because students consider civic education to be still rather theoretical and lacking in practical application.

'In my opinion, civic education is often considered uninteresting because it is too theoretical, monotonous, and does not relate the material to students' daily lives. In addition, the lack of interactive discussion and real-life examples also makes the material seem distant and boring' (PK 18, August 2025).

Based on the interview results, civic education requires innovation in learning activities. In addition, the learning strategies used must also be relevant to students' daily lives.

'The use of communication and information technology in civic education is necessary to provide a different learning experience.' (PK 8, August 2025).

„Other learning media are needed because they can help deliver material in a more varied, interactive, and easy-to-understand way for students. With a variety of media, learning is not monotonous, can be adapted to different learning styles, and makes students more active and motivated in the learning process.' (PK 9, August 2025).

The interview results above illustrate that the use of technology in civic education is necessary. Augmented reality is a learning medium developed to instil digital citizenship values in civic education. This aligns with participants' views that communication and information technology are needed for innovation in learning. Augmented reality is a technology that combines digital objects or information with the real world, allowing users to see both simultaneously through devices such as mobile phones and special glasses. Students are directed to upload the Digital Citizenship Augmented Reality (DC-AR) application on their respective devices. Next, they scan the provided QR code.

Building on the interview findings, the integration of augmented reality within civic education represents a pedagogical shift toward experiential and constructivist learning. Drawing on the theoretical foundations of Constructivism, AR enables learners to actively construct knowledge through interaction with digital civic scenarios embedded in real-world contexts. This approach not only enhances cognitive engagement but also supports the internalisation of digital citizenship values, such as ethical online behaviour, critical evaluation of information, and responsible participation in digital spaces. In this regard, the DC-AR application functions not merely as a technological tool but as an instructional medium that bridges abstract civic concepts with concrete, immersive experiences.

The use of AR in civic education can be situated within the framework of Digital Citizenship Education, which emphasises the development of competencies required for active and responsible participation in digital society. By scanning QR codes and interacting with AR-based content, students are exposed to contextualised problem-solving situations that simulate

real-life digital interactions. This aligns with contemporary perspectives on learner-centred education, where technology facilitates differentiated instruction and accommodates diverse learning styles. Consequently, AR-based learning environments not only mitigate the limitations of traditional instructional media but also foster higher-order thinking skills, learner autonomy, and sustained motivation in civic education contexts.

Figure 1.

Digital Citizenship AR Home



Source: Research Project, 2025.

Figure 1 shows the augmented reality application students use on their smartphones. Students are directed to engage in independent learning on the theme of digital citizenship. Next, they are directed to practise civic communication.

"The use of DC-AR makes learning interesting. This technology makes virtual objects such as characters or visual effects appear as if they exist in the real world through the phone camera, making it more exciting and interactive." (PK 1, September 2025)

"When the phone camera is pointed at the QR code, interactive animations appear, making the material easier to understand. The experience was interesting because it made the learning process more real, visual, and not boring." (PK 9, September 2025)

"The experience made me feel that learning was more alive. Material that was usually difficult to imagine through textbooks could be seen clearly before my eyes." (PK 11, September 2025)

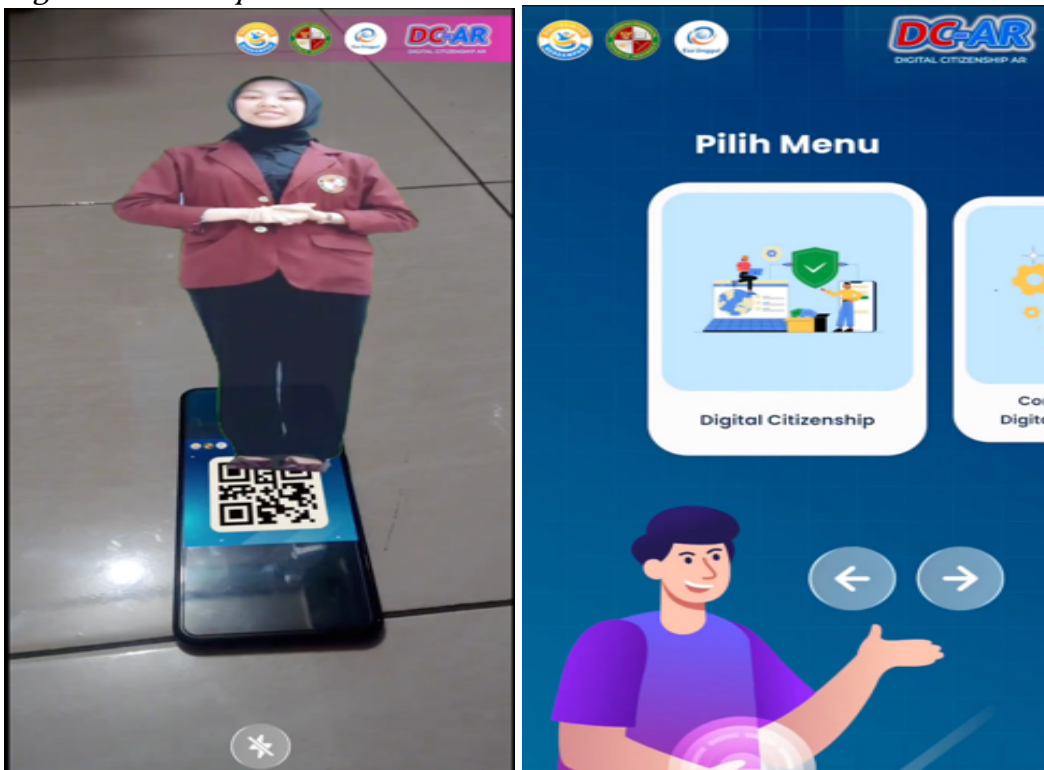
The results of interviews with participants describe students' experiences with augmented reality in civic education. Although many academics have utilised augmented reality in the learning process, the novelty of this research lies in the development of augmented reality-based digital citizenship that can be used as a practice of civic communication. This shows that civic education can be integrated with information and communication technology in accordance with the students' study programme. Thus, the learning process is in line with the study programme's objectives. Therefore, the application of digital citizenship values can be practised through civic communication.

„Through DC-AR, we can understand and practise civic communication in line with the values of Pancasila. Considering that civic communication is the process of conveying information, values, and messages aimed at strengthening the sense of unity, nationalism, and awareness of nationhood and statehood in society.“ (PK 1, September 2025)

“DC-AR provides strategic steps for students, especially those studying communication, to convey ideas and values related to national life, with the aim of building a common understanding, strengthening unity, and fostering a sense of nationalism among citizens.” (PK 3, September 2025)

Based on the research findings, civic education can be directed in a positive way so that students can actively and responsibly participate in community activities, including civic communication. Civic communication is not only carried out directly but also through media tools such as Instagram, TikTok, and YouTube. Students believe that civic communication should be integrated into civic education because it can help them understand the values of unity, tolerance, and national identity in ways that are more relevant to current social conditions.

Figure 1.
Digital Citizenship AR Home Interface



Source: Research Project, 2025.

Discussions

Civic education aims to build the character of the Indonesian nation by developing the participatory skills of competent, responsible citizens. Therefore, the Indonesian government strives to build this character through civic education from primary school to higher education (Biamba et al., 2021). As a result, students can participate in developing a civilised democratic culture and interact with other nations both directly and through information and communication technology (Govender, 2025). The results of this study show that civic education can be an alternative for students to practise their civic communication skills. Civic communication carried out by students can provide an understanding of the process of national unity and statehood through communication and interaction (Xie et al., 2025).

On the other hand, this research provides a new perspective on civic education courses. This is because the integration of civic education with civic communication can foster a sense of nationalism and strengthen national identity among students (Fadhillah et al., 2024). Through civic communication, the values of Pancasila, democracy, and unity can be conveyed more effectively and relevantly to real life. Thus, students not only understand the theory but also internalise and practise national values in their daily attitudes and behaviour.

In today's digital era, the transformation of civic education differs from previous learning models that focused solely on lectures (Febrianti et al., 2024). The civic education strategy implemented through augmented reality has become a catalyst for the diffusion of needed innovation. Learning democratic values and principles through a collaborative, augmented-reality-based digital citizenship process can be developed. Understanding digital citizenship values prepares students to think critically and innovatively. In other words, augmented reality-based civic education encourages students to become intelligent citizens who are aware of their rights and obligations in the context of social and state life. In addition, students have the skills to build their readiness to be part of a global society through civic communication. This is because, in general, civic education courses focus on attitudes, knowledge and skills. Therefore, civic education has a role in fostering sensitivity, critical thinking and social creativity in the context of an orderly, peaceful and creative community life.

On the other hand, this study provides empirical evidence that augmented reality, when integrated with digital citizenship learning in civic education, produces better learning strategies than traditional teaching methods. The instilling of digital citizenship values is not limited to theoretical concepts (Fadhillah et al., 2024). With the advent of augmented reality learning, students are encouraged to adopt a multiperspectival attitude towards issues from various points of view (Ávila et al., 2021). The development of augmented reality media is not limited to students' understanding of abstract concepts such as the values of Pancasila and the rights and obligations of citizens. This research contributes to the scientific integration of Pancasila values and civic communication through AR-based digital citizenship learning. Civic education, which generally takes the form of lectures, can provide students with a different learning experience by being delivered through direct civic communication practices.

Conclusion

This study concludes that the use of augmented reality in civic education can encourage students to develop civic communication skills and shape their character through an understanding of digital citizenship. This research contributes to the field of civic education, where the technology developed can serve to develop students' communication skills and

strengthen their ideology towards Pancasila. This research also contributes to the development of civic education theory, digital learning models, and the implementation of civic values in a global context. Civic education through digital citizenship-based augmented reality not only trains students to communicate well with fellow citizens, but also enables them to transform the values, morals, and norms of the messages conveyed. Therefore, civic education can develop students' character and confidence to communicate effectively about national issues. This research can help the younger generation understand and appreciate diversity and take responsibility for their country.

This study has practical implications, as the development of augmented reality is relevant to the current education curriculum. Digital citizenship learning-based augmented reality can be used as a learning strategy in higher education and in primary and secondary education. On the other hand, this study has limitations in terms of research methods and subjects. Future research should employ experimental designs to measure the effectiveness of AR-based civic learning on students' critical communication performance.

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Ethics Approval

No ethical approval is required.

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