QUESTIONING DIGITAL CITIZENSHIP IN DEVELOPING SCIENTIFIC CULTURE: PROBLEMS AND CHALLENGES IN INDONESIAN SCHOOLS

Hastangka[1*], Adison Sihombing[2], Iskandar Agung[3], Benny Widaryanto[4], Herlinawati[5], Etty Sisdiana[6], Heni Waluyo Siswanto[7], Ibnu Salman[8], Sulhi[9], Marga Surya Mudhari[10]

[12345678910]The Research Group on Educational Policy, Civic Engagement, and School Diversity, Research Center for Education, National Research and Innovation Agency

*hastangka@brin.go.id

ABSTRACT

The topic of digital citizenship has gained significant attention from the academic community due to the rapid development and widespread use of digital technology across various sectors. Education is one such area that has been impacted by the diverse models and applications of digital technology, which can enhance users' skills and knowledge. However, this has also led to a diminished importance of humanity in society. Digital technology remains a problematic concern without clear guidelines, instructions, or indications of permissible and credible sources of knowledge. This raises the question of how digital citizenship, an integral part of society's lifestyle, supports citizens in developing a scientific culture. Digital technology has had a significant impact on the methods and behaviors used to develop a scientific culture in education. This study aims to describe and analyze the challenges of digital citizenship as a societal paradigm in nurturing a scientific culture in schools. A systematic literature review of literature on digital citizenship and the challenges of establishing a scientific culture in schools is employed in this study. The findings indicate that digital citizenship has not received significant attention in shaping science-based character in schools and developing a scientific culture. The study focuses on Indonesia and its schools.

Keywords*: Citizen, Digital, Indonesia, Scientific Culture, School.*

1. INTRODUCTION

Several studies on digital citizenship have demonstrated its dynamics and evolution. Felice's study discusses the crisis in digital citizenship due to the neglected role and involvement of humans. Digital technology has led to inadequate interaction beyond technology usage. In another study, a review of the dynamics and developments indicates that previous studies on digital citizenship perspectives have largely focused on issues of digital health, technocracy, digital literacy, technical competence, and the use of digital technologies (Di Felice: 2022). Research themes and discussions on digital citizenship have been directed toward issues of citizen participation and involvement in adapting to, using, and accessing technology that impacts citizens' lives (Aydoğan: 2022). Digital citizenship is generally defined as "the ability to navigate our digital environments in a way that's safe and responsible and to actively and respectfully engage in these spaces". The concept of digital citizenship has evolved and emerged alongside the increasingly widespread adoption of technology and the provision of various information (Media: 2024). Information technology has influenced the quality of knowledge and the way people acquire knowledge for various purposes. The issue that arises regarding the relationship between citizens and digital technology places more emphasis on the use of digital technology and its role in improving the quality of human life. In the field of education, digital citizenship is studied as an emerging approach, but the curriculum does not include the results of the learning process or understanding of digital citizenship material in various sections. The study conducted by Uğur Başarmak, Hamza Yakar, Erhan Güneş, and Zafer Kuş provides ample material and references for obtaining teaching and learning materials using a digital approach. The study introduces students to digital technology, as was done in the curriculum study for secondary

schools in Turkey. However, it falls short of covering rights, responsibilities, and building a digital ecosystem that fosters critical and ethical thinking. Other subject materials also lack a sufficient digital citizenship context. The study conducted by Victoria Palacin et al. (2021) analyses and describes citizen participation in using digital technology through the perspective of value orientation, sustainability, and the quality of interaction with digital technology (Basamak, et.al: 2014). The development of digital technology through the digital citizenship approach faces challenges, as highlighted by the study. To succeed as citizen scientists, it is important to ensure clear and logical communication, avoid biased language, and use precise technical vocabulary. The study conducted by Palacin, et al. (2021) analyses and describes citizen participation in using digital technology through the perspective of value orientation, sustainability, and the quality of interaction with digital technology. The study conducted by Palacin et al. (2021) analyses and describes citizen participation in using digital technology through the perspective of value orientation, sustainability, and the quality of interaction with digital technology. The study was conducted in Finland between 2018 and 2019. The study suggests a relationship between people's value orientation, sustainability, and the quality of digital technology interaction in shaping citizen science. The data indicates that individuals with higher levels of openness-to-change (OTC) values were more likely to use the mobile application to review others' submissions, even when they had no submissions of their own. Conversely, those with stronger security values tended to use the application only when they had relevant submissions (Palacin et al.: 2021). A scientific ecosystem is created to shape society's understanding and mastery of scientific knowledge and technology. It is an integral part of a scientist's lifestyle. This study investigates the position and role of digital citizenship in developing a scientific culture in schools, as well as the challenges and issues faced in Indonesian schools (Wang, 2018).

2.   METHODS

This study adopts a qualitative approach, data yielded from a review of documents of previous research and phenomena occurring in schools, as well as interviews with secondary school students. Data analysis employs deductive and inductive approaches emphasising the themes of digital citizenship and scientific culture.

3.   RESULTS & DISCUSSION

The topic of digital citizenship has been extensively discussed in Google Scholar data searches. As of 2 March 2024, there were approximately 1,590,000 titles on digital citizenship covering various issues and cases. When combined with the search term "scientific culture," there were 470,000 titles. Using the specific keyword "digital citizenship and scientific culture in Indonesian school," 28,400 titles were found. According to Wang, the goal of developing a scientific culture is to enable individuals to work and live according to scientific principles and methods, fostering more knowledgeable citizens in science and technology and striving to enhance the quality of society (Wang: 2018).

A study conducted by Prasetiyo Wibowo Heru et al. revealed trends in digital citizenship in the educational context based on a thematic analysis of data from Scopus, Google Scholar, and ProQuest. The analysis yielded important keywords related to the development and dynamics of digital citizenship, focusing on issues of digital competence, digital literacy, and ICT skills. More specifically, the study discussed digital readiness, digital citizenship competencies, and educational policies (Prasetiyo, et.al : 2021).

The perspective of digital citizenship in the context of school education emphasizes educating, empowering, and protecting students in the context of digital development. According to research conducted by Kokom Komalasari, Aim Abdulkarim, and Dede Iswandi, (Komalasari, et.al: 2023) that secondary school students in Bandung, Indonesia demonstrated a satisfactory level of understanding and awareness of digital citizenship. The study found that aspects of digital citizenship, such as digital etiquette, rights and responsibilities, digital security, digital communication, and health, were well-developed. However, the study only examined indicators of digital citizenship without linking them to the development of a scientific ecosystem. Nine indicators were used to assess secondary school students' understanding and awareness of digital citizenship in Bandung (Komalasari,et.al: 2023). These indicators included digital access, digital commerce, digital communication, digital literacy, digital etiquette, digital law, digital rights and responsibility, digital rights and wellness, and digital security. Another study focused specifically on strengthening digital literacy to foster scientific literacy in primary schools. The findings show that improving digital literacy aids the development of scientific literacy (Sari, et.al: 2022).

Approaches to understanding digital citizenship have largely focused on digital literacy and access. Studies and research are increasingly thematic, aiming to demonstrate improvements in literacy in specific areas through the use of digital technology. A study on improving scientific literacy through thematic learning based on ethnoscience has shown that it can enhance citizenship literacy. However, studies examining the role and position of digital citizenship in developing a scientific culture in secondary schools are yet to emerge (Muliadi, et.al.: 2023). Results from interviews indicate that:

> "Schools are not adequately providing students with the necessary materials and guidance to adapt to digital technology. Furthermore, schools have not provided orientation or guidance on how to use technology to enhance the scientific ecosystem within schools." (Zalika, 2024)

Schools, as institutions that guide young people, particularly students, towards understanding scientific culture as part of fostering citizen science, have yet to establish this as a customary practice. Students lack comprehension of research methods and scientific methods when conducting research or analyzing readings. They are unsure of what methods and scientific principles to employ to obtain sufficient scientific data and information. Observations in schools also revealed that students struggle to understand scientific methods and how to design them. For instance, students do not fully grasp how to use scientific methods to collect data through qualitative or quantitative approaches. On the other hand, the digital era and the use of digital technology have not been leveraged to shape a scientific culture and ecosystem in schools.

Challenges and issues persist in developing scientific culture in the digital age and environment. A fundamental problem is the lack of awareness and understanding of the role of digital technology and information in advancing science and technology. This unawareness stems from the prevalent use of digital technology for entertainment and self-expression, neglecting its potential for fostering scientific culture. One of the challenges is to establish and institutionalize a scientific culture by promoting scientific thinking methods, scientific knowledge, and a scientific environment. However, schools often prioritize completing curricula and meeting academic obligations.

4.   CONCLUSION

Digital citizenship in the context of education continues to raise questions and challenges in the effort to realise a scientific culture. The dynamism and development of digital citizenship as a theme and issue have not

yet led to a scientific culture. The transfer of knowledge and knowledge-building in schools through adequate education about digital citizenship has not yet occurred in the teaching and learning process in the classroom.

The current position of digital citizenship is simply the understanding and comprehension of an era in which citizens exist in the digital world and information technology. The process of shaping digital citizens capable of creating a scientific ecosystem in educational institutions has not yet been adequately realised. This study provides a comprehensive description of the issues of digital citizenship that have not yet been directed towards strengthening scientific culture.

5.   ACKNOWLEDGMENTS

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