Date:	Feb 13, 2025
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📎**Attachment(s):** SSHO-D-25-00745 new.pdf

Ref.: Ms. No. **SSHO-D-25-00745**
The Mediating role of digital privacy awareness and digital social campaigns in digital citizenship literacy: An empirical study from Indonesia
Social Sciences & Humanities Open

Dear Mr Iskandar,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.

Your revision is due by **Jun 29, 2025**.

To submit a revision, go to https://www.editorialmanager.com/ssho/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

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Yours sincerely

Nasser Mansour
Subject Editor
Social Sciences & Humanities Open

Comments from the Editors and Reviewers:

Reviewer's Responses to Questions

Note: In order to effectively convey your recommendations for improvement to the author(s), and help editors make well-informed and efficient decisions, we ask you to answer the following specific questions about the manuscript and provide additional suggestions where appropriate.

1. Are the objectives and the rationale of the study clearly stated?

Please provide suggestions to the author(s) on how to improve the clarity of the objectives and rationale of the study. Please number each suggestion so that author(s) can more easily respond.

Reviewer #1: The the objectives and the rationale of the study are clearly stated.

Reviewer #2: The study objectives, hypotheses, and explicitly stated research questions are adequate. However, the rationale is not at all clear. Firstly, it presents a very narrow view of Digital Citizenship Education (DCE) from the Council of Europe's perspective (available at this link: https://www.coe.int/en/web/education/dce-concept). Curiously, the authors cite the DCE model but do not explain it and treat DCE as a variable that can be correlated with others when, according to the model, these other variables are part of DCE. In reality, DCE is organised into 10 domains, grouped into three categories. Some of these domains include "access and inclusion", "Ethics and Empathy", "Active Participation", and "Privacy and Security", i.e., domains that encompass the variables correlated with DCE in this study. Furthermore, the rationale lacks conceptual clarification. For instance, what is the difference between "Digital Citizenship Education" and "Digital Citizenship Literacy Ability"? It is mentioned at one point that one is more theoretical and the other practical. However, the study provides no evidence of measuring practices. It only collects self-reported data via a questionnaire that appears too simplistic to gather the data intended here.

Reviewer #3: the objectives are clear and measurable . the author has to add a rationale justifying why Indonesia is mentioned in the title but failing to justify why Indonesia in specific ?

Reviewer #5: It could be further improved by listing out the research questions in bullet points.

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2. If applicable, is the method/study reported in sufficient detail to allow for its replicability and/or reproducibility?

Please provide suggestions to the author(s) on how to improve the replicability/reproducibility of their study. Please number each suggestion so that the author(s) can more easily respond.

Reviewer #1: Yes

Reviewer #2: Mark as appropriate with an X:
Yes X No [] N/A []
Provide further comments here: This study can be replicated, but we cannot discern the interest in doing so, at least not until the rationale is improved and the actual questionnaire applied is clarified, providing evidence that the questionnaire effectively measures what it purports to measure.

Reviewer #3: Mark as appropriate with an X:
Yes [X] No [] N/A []
Provide further comments here:
concerning the methodology , critical protocols are missing: survey administration mode (online/paper?), duration, supervision, and ethical safeguards (e.g., consent processes for minors). the author has to add Data Accessibility since there is no mention of data availability (repository, conditions for access), hindering independent verification.

Reviewer #5: Mark as appropriate with an X:
Yes [x] No [] N/A []
Provide further comments here:
Add ethical considerations, ethical approval and the code.
Please add more information about the pilot test 30 respondents. Do they possess similar background compared to 250 respondents in the actual study?
Please add validity. Any experts' validation (Face, language, construct, content)?

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3. If applicable, are statistical analyses, controls, sampling mechanism, and statistical reporting (e.g., P-values, CIs, effect sizes) appropriate and well described?

Please clearly indicate if the manuscript requires additional peer review by a statistician. Kindly provide suggestions to the author(s) on how to improve the statistical analyses, controls, sampling mechanism, or statistical reporting. Please number each suggestion so that the author(s) can more easily respond.

Reviewer #1: Yes

Reviewer #2: Mark as appropriate with an X:
Yes X No [] N/A []
The statistical treatment, however correct it may be, focuses on a dataset that appears limited to us and lacks the necessary depth to form the basis for the inferences drawn from it. It suffices to say that correlation does not imply causation. Here, without further evidence, it seems this principle is assumed. Even if corroborated by other studies, these correlations need to be proven with something more than a simple self-reported questionnaire on the uses and practices with digital technologies.

Reviewer #3: Mark as appropriate with an X:
Yes [] No [] N/A []
Provide further comments here:
The Strength of the statistical lies in Hypothesis Testing: Direct/mediation paths report β coefficients, standard errors, t-statistics, and p-values (Tables 4–5), allowing basic interpretation. secondly , Reliability/Validity: Cronbach's α, CR, AVE, and outer loadings (Table 3) exceed benchmarks, supporting measurement quality. thirdly , Sampling Demographics: Age, gender, school type, and regional distribution are clearly tabulated (Table 1). revision is required concering the fact that there is no seize effect , it could be revised by adding missing Cohen's f^2 (predictor impact) and R^2 (model explanatory power). Incomplete SEM diagnostics

Reviewer #5: Mark as appropriate with an X:
Yes [x] No [] N/A []
Provide further comments here:
If purposive sampling, inclusion and exclusion criteria have to be added. Since it is a quantitative research, generalisation seems essential. Hence, please define how 250 is sufficient to generalise the results.
Perhaps, add G-power.

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4. Could the manuscript benefit from additional tables or figures, or from improving or removing (some of the) existing ones?

Please provide specific suggestions for improvements, removals, or additions of figures or tables. Please number each suggestion so that author(s) can more easily respond.

3

Reviewer #1: No

Reviewer #2: The tables and diagrams are adequate. The study's problem does not stem from the graphical information, which is indeed interesting, were it not for what is stated above regarding the data.

Reviewer #3: No , the paper has adequate figures and table fitting the topic

Reviewer #5: The current tables and figures are sufficient.

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5. If applicable, are the interpretation of results and study conclusions supported by the data?

Please provide suggestions (if needed) to the author(s) on how to improve, tone down, or expand the study interpretations/conclusions. Please number each suggestion so that the author(s) can more easily respond.

Reviewer #1: Yes

Reviewer #2: Mark as appropriate with an X:
Yes [] No X N/A []
Provide further comments here: In our opinion, as explained above, no. The correlations are a fact, but the questionnaire underpinning the study needs to be more robust. For example, the authors should clearly present the data on the questionnaire's development and validation, specifically the item construction phase.

Reviewer #3: Mark as appropriate with an X:
Yes [] No [] N/A [X]
Provide further comments here:
The interpretation of results is partially supported but overreaches on generalizability. While direct effects (e.g., DCE → DPA, TLA → DPA) and DPA's mediation role are robustly backed by statistical evidence (β, *p*-values), conclusions about digital social campaigns (PIDS) correctly reflect non-significant findings. However, claims about "digital citizenship literacy development" lack support due to:
Sampling bias: Urban Jakarta students (high internet access) dominate the sample, yet conclusions imply broader applicability. Ceiling effects: Artificially high self-reported scores (means >4.27/5) suggest social desirability bias, undermining validity. Omitted controls: Demographic variables (e.g., school type) were not analyzed as moderators, weakening causal claims.

Reviewer #5: Mark as appropriate with an X:
Yes [x] No [] N/A []
Provide further comments here:
Can add personal critical voice.

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6. Have the authors clearly emphasized the strengths of their study/methods?

Please provide suggestions to the author(s) on how to better emphasize the strengths of their study. Please number each suggestion so that the author(s) can more easily respond.

Reviewer #1: The authors have clearly emphasized the strengths of their study/methods

Reviewer #2: Yes, but it does not seem to us that the data and results allow for this, even when cross-referenced with relevant scientific literature.

Reviewer #3: Yes , the author uses a strong methodology , apropriately notes high reliability (Cronbach's α > 0.90), strong validity (AVE > 0.80), and robust sample size (N=250). the author also correctly positions the discovery of digital privacy awareness (DPA) as a key mediator and the non-significance of digital campaigns (PIDS) as a challenge to existing literature. but the paper has fail to leverage the Indonesian setting as a strength (e.g., high internet penetration with emerging literacy challenges offers unique insights for Global South).

Reviewer #5: The implications could be expanded to other stakeholders (curriculum developers, education industry etc)

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7. Have the authors clearly stated the limitations of their study/methods?

Please list the limitations that the author(s) need to add or emphasize. Please number each limitation so that author(s) can more easily respond.

Reviewer #1: No

Reviewer #2: Yes. And we agree with it, especially the first one: "First, the study relied on self-reported survey data, which may be subject to social desirability bias".

Reviewer #3: Yes , the author added a section addressing the limitation of the paper

Reviewer #5: Separate limitations and contributions.
Regarding limitations, please improve. List some limitations that the researchers cannot control. For instance, self-reported data, have you done anything to minimise the bias such as given the respondent a certain time to respond rather than referring to friends' responses.

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8. Does the manuscript structure, flow or writing need improving (e.g., the addition of subheadings, shortening of text, reorganization of sections, or moving details from one section to another)?

Please provide suggestions to the author(s) on how to improve the manuscript structure and flow. Please number each suggestion so that author(s) can more easily respond.

Reviewer #1: No

Reviewer #2: This will be a subsequent issue, as some repetitions need to be eliminated and the English reviewed, although the article is comprehensible. However, there are other more pressing aspects to correct, as stated above.

Reviewer #3: The manuscript needs slight improving in the following points :
Adding 3 subheadings in Literature Review:
Shortening Methods by moving: Demographic details (Table 1) → Supplement. and Instrument examples (Table 3) →
Appendix.
Restructure Discussion:

Paragraph 1: Key findings , Paragraph 2: Contrast with Indonesian/local studies ,
Paragraph 3: Policy actions (e.g., "Revise Kominfo's framework to weight privacy at 60% of curricula").

Reviewer #5: Acceptable.

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9. Could the manuscript benefit from language editing?

Reviewer #1: No

Reviewer #2: Yes

Reviewer #3: No

Reviewer #5: No

Reviewer #1: - The title is too long. It is better to be condensed.
- The respondents in the abstract need to be clarified: teachers, students, etc.
- The research questions must be written after the Literature Review.
- Draw a table and write the participants' details: age, gender, level, L1, etc.
- The authors are asked to use the following articles in their study to boost their research (i.e. add the articles into
your Literature Review and References):

- Ajideh, P., Zohrabi, M. & Mohammadpour, R. (2024). The effect of global digital citizenship education on intercultural
communicative competence and learners' perceptions. Journal of Applied Linguistics and Applied Literature: Dynamics
and Advances, 12(2), 59-86. https://doi.org/10.22049/jalda.2024.29174.1630

- Zohrabi, M. (2013). Mixed method research: Instruments, validity, reliability and reporting findings. Theory and
Practice in Language Studies, 3(2), 254-262.

Reviewer #2: Overall, the study presents interesting objectives and research questions. However, several key areas
require significant improvement to enhance the manuscript's clarity, robustness, and impact. Here are the main
recommendations for improving your article:

1. Broaden the explanation of Digital Citizenship Education (DCE), moving beyond a narrow Council of Europe
perspective, and explicitly detail how the DCE model (e.g., its 10 domains) relates to the variables you are correlating.
2. Provide a clear conceptual distinction between "Digital Citizenship Education" and "Digital Citizenship Literacy
Ability", as the current explanation (theoretical vs. practical) is insufficient, especially given the self-reported nature of
your data.
3. If the study aims to measure practices ("Digital Citizenship Literacy Ability"), ensure the methodology provides
actual evidence of practice measurement, rather than solely relying on self-reported data from a questionnaire that
appears too simplistic for this purpose.
4. Crucially, provide comprehensive details about the questionnaire used, including evidence of its development and
validation process (e.g., item construction phase data). This is essential to demonstrate that the questionnaire
effectively measures what it purports to measure.
5. While correlations are presented, the inferences drawn from the limited and seemingly shallow dataset are not fully
supported.
6. Correlation does not imply causation. If causal links are implied, provide additional robust evidence beyond a simple
self-reported questionnaire on digital technology uses and practices. Even if corroborated by other studies, these
correlations require stronger empirical backing within your study.
7. A professional language edit is recommended to improve the overall English, although the current text is
comprehensible.

Reviewer #3: I have added detailed comments in the manuscript file , please check it

Reviewer #5: It is a good paper.

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Social Sciences & Humanities Open

The Mediating role of digital privacy awareness and digital social campaigns in digital citizenship literacy: An empirical study from Indonesia
--Manuscript Draft--

Manuscript Number:	SSHO-D-25-00745
Full Title:	The Mediating role of digital privacy awareness and digital social campaigns in digital citizenship literacy: An empirical study from Indonesia
Article Type:	Full Length Article
Section/Category:	Education
Keywords:	Digital Citizenship Education; Technological Literacy Ability: Digital Privacy Awareness; Participation in Digital Social Campaigns; Digital Citizenship Literacy Ability
Manuscript Region of Origin:	INDONESIA
Abstract:	This study aims to examine the impact of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns, as well as their subsequent influence on Digital Citizenship Literacy Ability. Additionally, the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns are analyzed. A quantitative research approach was employed, using a survey method to collect data from 250 respondents. Structural Equation Modeling (SEM) was used to test the proposed hypotheses. The findings confirm that Digital Citizenship Education significantly enhances both Digital Privacy Awareness and Participation in Digital Social Campaigns. Similarly, Technological Literacy Ability positively influences Digital Privacy Awareness and Participation in Digital Social Campaigns. Moreover, Digital Privacy Awareness directly improves Digital Citizenship Literacy Ability and mediates the relationships between Digital Citizenship Education and Technological Literacy Ability with Digital Citizenship Literacy Ability. However, the influence of Participation in Digital Social Campaigns on Digital Citizenship Literacy Ability was not supported, nor did it serve as a mediator in the tested relationships. This study contributes to the literature by providing empirical evidence on the role of digital education and technological skills in fostering responsible digital behavior. It highlights the critical function of Digital Privacy Awareness as a key driver of Digital Citizenship Literacy Ability. The findings have important implications for policymakers and educators, emphasizing the need to strengthen digital privacy education within curricula. The originality of this research lies in its comprehensive examination of Digital Citizenship Literacy Ability and the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns, offering new insights into the mechanisms underlying digital competence development

The Mediating role of digital privacy awareness and digital social campaigns in digital citizenship literacy: An empirical study from Indonesia

Abstract

This study aims to examine the impact of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns, as well as their subsequent influence on Digital Citizenship Literacy Ability. Additionally, the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns are analyzed. A quantitative research approach was employed, using a survey method to collect data from 250 respondents. Structural Equation Modeling (SEM) was used to test the proposed hypotheses. The findings confirm that Digital Citizenship Education significantly enhances both Digital Privacy Awareness and Participation in Digital Social Campaigns. Similarly, Technological Literacy Ability positively influences Digital Privacy Awareness and Participation in Digital Social Campaigns. Moreover, Digital Privacy Awareness directly improves Digital Citizenship Literacy Ability and mediates the relationships between Digital Citizenship Education and Technological Literacy Ability with Digital Citizenship Literacy Ability. However, the influence of Participation in Digital Social Campaigns on Digital Citizenship Literacy Ability was not supported, nor did it serve as a mediator in the tested relationships. This study contributes to the literature by providing empirical evidence on the role of digital education and technological skills in fostering responsible digital behavior. It highlights the critical function of Digital Privacy Awareness as a key driver of Digital Citizenship Literacy Ability. The findings have important implications for policymakers and educators, emphasizing the need to strengthen digital privacy education within curricula. The originality of this research lies in its comprehensive examination of Digital Citizenship Literacy Ability and the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns, offering new insights into the mechanisms underlying digital competence development.

Keywords: *Digital Citizenship Education; Technological Literacy Ability: Digital Privacy Awareness; Participation in Digital Social Campaigns; Digital Citizenship Literacy Ability*

1. Introduction

One of the critical literacies in 21st-century life is citizenship literacy. This can be taught from an early age in a simple, contextual manner appropriate to the level of cognitive ability. Various activities have rapidly shifted from conventional to digitalization. The digital era has shaped citizens who routinely use the internet in their daily lives as a necessity (Cortesi et al., 2020). Thus, whether society is prepared or not, they will inevitably migrate and coalesce into a new entity known as digital citizenship. Digital citizenship refers to activities performed by individuals using internet technology as a medium to seek and process information to meet daily needs (Blevins et al., 2014; Emejulu & Mcgregor, 2019). Digital citizenship has become a topical issue in citizenship studies, particularly regarding how to instill the character of an intelligent and wise digital citizen in the face of globalization and technological advancements (Gleason & Von Gillern, 2018; Kim & Choi, 2018; Peart et al., 2020).

This issue highlights that digital citizenship has become a discussion in education and academia, particularly concerning cultivating the character of intelligent and wise citizens amidst the flow of globalization and technological development. According to the OECD (2019), digital skills are essential in ensuring that students engage with technology safely and responsibly, whether at school, in the community, or at home. These skills are foundational in fostering active and ethical technology users from an early age. The concept of digital citizenship has thus become integral to empowering communities, enabling citizens to assume active and responsible roles in the digital realm. This responsibility is particularly relevant for individuals who view internet usage as an everyday necessity, as it encourages adherence to established norms and ethical behavior in online activities (Burns & Gottschalk, 2019; Finkenauer et al., 2020). In light of these

concepts, it is imperative that today's young citizens actively and responsibly navigate the advancements in internet technology.

In practice, several challenges persist within the concept of digital citizenship literacy that require further attention. These challenges include educators limited technological literacy, the spread of misinformation, a lack of interest in reading, and insufficient comprehension of the material students engage with (Asmayawati et al., 2024). Additionally, the issue of citizenship literacy, particularly in relation to national character values, is critical for shaping future generations. These values are foundational in developing a generation with strong personalities and good moral character. National character values are intrinsically linked to literacy, as the integration of literacy within the school environment fosters character traits such as discipline, creativity, a passion for learning, respect for achievements, reading habits, social and communication skills, and a sense of responsibility. These values are conveyed both directly and indirectly through the learning process.

Digital citizenship literacy is an essential component of modern education, aimed at equipping students with the skills necessary to engage responsibly in the digital world. Research indicates that incorporating digital citizenship into primary school curricula helps students develop positive digital ethics, behavior, and habits. Moreover, studies have shown that primary school teachers are increasingly implementing digital citizenship principles effectively, emphasizing the importance of further enhancing educators' digital literacy (Alqirnas, 2022). Furthermore, projects focused on digital citizenship education for young children have proven successful in empowering students to become proactive and influential citizens in the digital era ("Empower. Communities with Media Lit.," 2022). However, some studies suggest that a more critical approach to digital citizenship education is needed, one that ensures students not only learn about but also actively practice meaningful digital citizenship (Tadlaoui-Brahmi et al., 2022). This approach calls for a deeper engagement with the concept of digital citizenship, where students develop not only knowledge but also the critical thinking and ethical behavior necessary to navigate the digital landscape.

This study aims to analyze the influence of digital citizenship education and the level of technological literacy on digital citizenship literacy among young generations. Additionally, it explores the role of digital privacy awareness as a mediating variable in the relationship between digital citizenship education and digital citizenship literacy. On the other hand, participation in digital social campaigns is also examined as a mediating factor between technological literacy and digital citizenship literacy. By understanding these dynamics, this research is expected to provide insights into more effective strategies for enhancing young people's digital skills, enabling them to engage ethically and responsibly in the digital world.

Based on these objectives, this study seeks to answer several key questions. First, how does digital citizenship education influence the level of digital citizenship literacy? Second, how does technological literacy affect digital citizenship literacy? Third, does digital privacy awareness mediate the relationship between digital citizenship education and digital citizenship literacy? Fourth, does participation in digital social campaigns mediate the relationship between technological literacy and digital citizenship literacy? Lastly, this study aims to identify the key challenges in improving digital citizenship literacy among young generations and provide policy recommendations to address these challenges.

2. Literature Review

Digital Citizenship Education

According to Frau-Meigs et al. (2017), Digital Citizenship Education refers to the process of teaching individuals, particularly students, about responsible, ethical, and effective engagement in digital environments. It encompasses knowledge and skills related to online safety, digital communication, cyber ethics, digital literacy, and responsible participation in digital spaces. This education aims to equip individuals with the ability to navigate digital platforms wisely, protect personal information, critically evaluate online content, and contribute positively to the digital community (Richardson & Milovidov, 2019).

Digital Citizenship Education significantly impacts Digital Privacy Awareness by providing individuals with essential knowledge about online security, data protection, and personal information management (Althibyani & Al-Zahrani, 2023; Bayzan, 2024; Martin et al., 2020). Through structured learning, individuals become more aware of the risks associated with sharing personal data online and develop strategies to safeguard their digital identities. This education fosters a deeper understanding of privacy settings, cybersecurity threats, and responsible data handling, encouraging proactive behavior in maintaining online privacy (Malik, 2024).

Digital Citizenship Education also plays a crucial role in encouraging participation in Digital Social Campaigns (Chen et al., 2020; Pangrazio et al., 2020). By instilling a sense of digital responsibility and ethical engagement, individuals are more likely to actively participate in online advocacy, awareness initiatives, and social movements that promote positive digital citizenship. Education in this area enhances individuals' ability to recognize societal issues, utilize digital platforms for meaningful interactions, and contribute constructively to online communities, ultimately fostering a culture of responsible and impactful digital activism (Huang, 2024).

H1a: Digital Citizenship Education impact on Digital Privacy Awareness
H1b: Digital Citizenship Education impact on participation in Digital Social Campaigns

Technological Literacy Ability

Dyrenfurth & Kozak (1991) define that Technological Literacy Ability refers to an individual's capacity to effectively understand, use, and adapt to digital technologies in various contexts. It encompasses skills related to operating digital devices, navigating online platforms, critically assessing digital content, and utilizing technology for problem-solving and communication. A high level of technological literacy enables individuals to engage safely, ethically, and efficiently in digital environments while continuously adapting to technological advancements (Cetindamar Kozanoglu & Abedin, 2021).

Technological Literacy Ability significantly influences Digital Privacy Awareness by enhancing individuals' understanding of online security risks and privacy management (S. Choi, 2023; Nikou et al., 2022; Prince et al., 2024). Those with higher technological literacy are more capable of recognizing potential cyber threats, understanding data encryption, setting up strong privacy controls, and protecting personal information across digital platforms. This ability fosters a proactive approach to digital safety, encouraging individuals to adopt secure online behaviors and minimize exposure to data breaches and identity theft (Kapoor et al., 2024; Muawanah et al., 2024).

Technological Literacy Ability also plays a crucial role in influencing participation in Digital Social Campaigns (Anthonysamy & Sivakumar, 2022; Mei, 2024; Zhang et al., 2024).

Individuals with strong technological literacy can effectively utilize digital tools, social media, and online platforms to engage in advocacy, raise awareness, and contribute to digital activism. Their ability to navigate digital spaces allows them to access and share information, collaborate with like-minded individuals, and amplify social causes, ultimately increasing their engagement in meaningful online campaigns and social movements (Kumar & Haneef, 2023).

H2a: Technological Literacy Ability impact on Digital Privacy Awareness

H2b: Technological Literacy Ability impact on participation in Digital Social Campaigns

Digital Privacy Awareness

Affonso & Sant'Ana (2018) assess that Digital Privacy Awareness encompass an individual's understanding of the importance of protecting personal information and maintaining security while engaging in digital environments. It involves recognizing potential threats such as data breaches, identity theft, and unauthorized access, as well as implementing privacy-enhancing measures like secure passwords, encryption, and cautious information sharing. A high level of digital privacy awareness enables individuals to navigate the digital world responsibly, ensuring their safety and ethical digital interactions (Flyverbom et al., 2019).

Digital Privacy Awareness plays a crucial role in shaping an individual's Digital Citizenship Literacy Ability (Bouzguenda et al., 2019; Cetindamar Kozanoglu & Abedin, 2021; Junaedi et al., 2024). When individuals are aware of privacy risks and protective measures, they become more responsible digital users, making informed decisions about their online activities. This awareness enhances their ability to critically assess digital information, engage safely in online interactions, and contribute positively to digital communities. As a result, individuals with strong digital privacy awareness tend to demonstrate higher competence in digital citizenship literacy.

Digital Privacy Awareness serves as a key mediator in the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability. Education in digital citizenship equips individuals with foundational knowledge about ethical and responsible digital engagement, but privacy awareness strengthens this learning by emphasizing the importance of safeguarding personal data (Alenezi & Alfaleh, 2024). When individuals internalize privacy principles through digital citizenship education, they develop a more comprehensive understanding of digital literacy, leading to improved digital citizenship literacy ability. Digital Privacy Awareness also mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability. While technological literacy enables individuals to effectively use digital tools and navigate online spaces, privacy awareness ensures that these skills are applied responsibly (Anurogo et al., 2023; Huang, 2024). Individuals with high technological literacy who also possess strong privacy awareness are more likely to practice safe digital behaviors, critically evaluate online information, and contribute positively to digital communities. Thus, privacy awareness enhances the transition from mere technological proficiency to responsible and informed digital citizenship.

H3: Digital Privacy Awareness impact on Digital Citizenship Literacy Ability

H3a: Digital Privacy Awareness mediate the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability

H3b: Digital Privacy Awareness mediate the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability

Participation in Digital Social Campaigns

Lilleker & Koc-Michalska (2018) explain that Participation in Digital Social Campaigns is an individual's engagement in online initiatives aimed at raising awareness, advocating for social issues, and fostering positive change through digital platforms. This participation can take various forms, such as sharing informational content, signing petitions, joining online discussions, or actively contributing to digital activism efforts. Engaging in digital social campaigns allows individuals to exercise their digital rights, enhance their civic responsibilities, and contribute to collective problem-solving in digital spaces (Herani & Pranandari, 2024).

Participation in Digital Social Campaigns significantly enhances an individual's Digital Citizenship Literacy Ability (Moon & Bai, 2020; Pangrazio & Sefton-Green, 2021). Actively engaging in digital advocacy or social movements fosters a deeper understanding of online ethics, responsible digital behavior, and effective communication within digital communities. Individuals who participate in digital social campaigns develop critical thinking skills, digital collaboration abilities, and an awareness of societal issues, all of which contribute to a higher level of digital citizenship literacy.

Participation in Digital Social Campaigns mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability by providing a practical application of digital citizenship principles. While digital citizenship education equips individuals with theoretical knowledge about responsible digital engagement, participation in social campaigns reinforces this knowledge through real-world experiences. By actively engaging in digital advocacy and discussions, individuals solidify their digital literacy skills and develop a stronger sense of digital responsibility.

Participation in Digital Social Campaigns also mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability. While technological literacy enables individuals to effectively use digital tools and platforms, participation in social campaigns transforms these technical skills into meaningful digital engagement. Individuals with high technological literacy who actively participate in social campaigns develop a more profound understanding of digital ethics, online collaboration, and responsible digital communication, ultimately enhancing their digital citizenship literacy ability.

H4: Participation in Digital Social Campaigns impact on Digital Citizenship Literacy Ability
H4a: Participation in Digital Social Campaigns mediate the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability
H4b: Participation in Digital Social Campaigns mediate the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability

Figure 1 illustrates the conceptual framework of this study, highlighting the relationships among key variables in understanding digital citizenship literacy ability. The framework positions Digital Citizenship Literacy Ability as the dependent variable, influenced by two independent variables: Digital Citizenship Education and Technological Literacy Ability. Additionally, two mediating variables, Digital Privacy Awareness and Participation in Digital Social Campaigns, are introduced to explain the indirect effects of the independent variables on the dependent variable. This model provides a structured approach to analyzing how education and technological proficiency contribute to digital citizenship literacy through privacy awareness and active engagement in digital social initiatives.
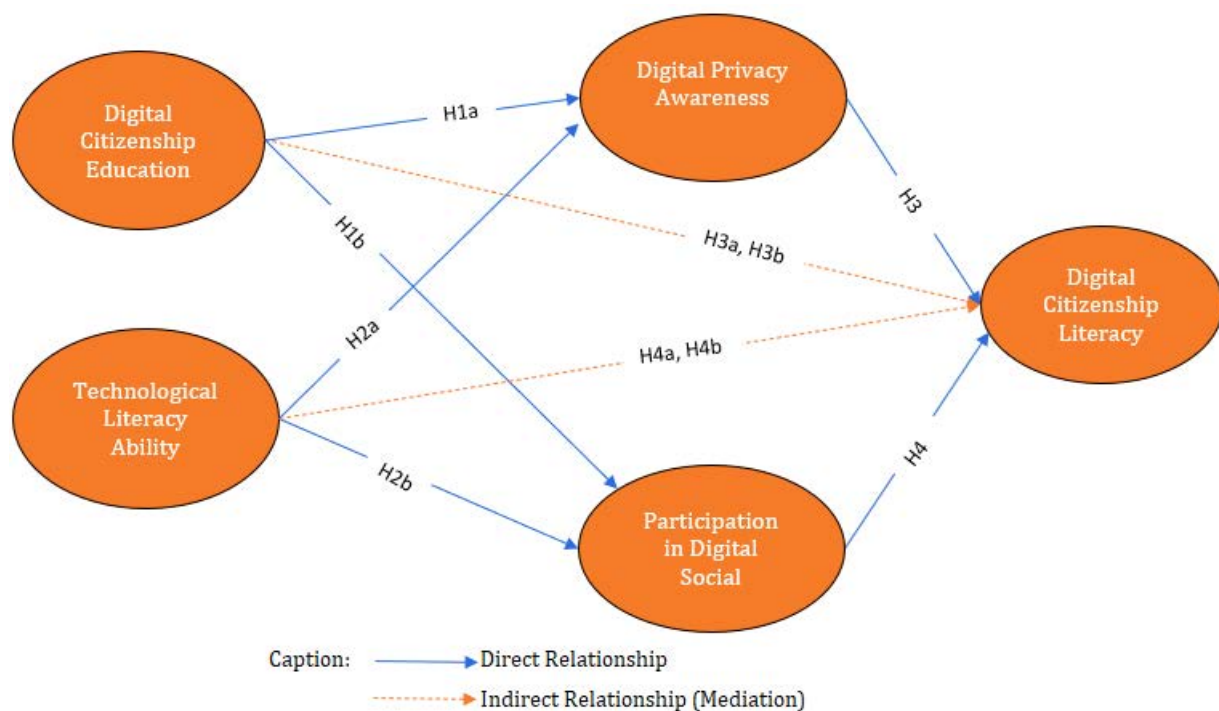
Figure 1. Conceptual Framework

3. Methodology

Research Design

This study employed a quantitative approach with a causal research design, aiming to analyze the relationship between Digital Citizenship Education and Technological Literacy Ability on Digital Citizenship Literacy Ability, with Digital Privacy Awareness and Participation in Digital Social Campaigns as mediating variables. This approach was chosen because it allowed for an empirical measurement of causal relationships between variables using quantitative data obtained from respondents. By employing a causal design, this study provided a deeper understanding of the factors influencing digital citizenship literacy among high school students. This study was cross-sectional, where data was collected within a specific period to capture the current state of digital citizenship literacy. Data collection was conducted over two months, from November to December 2024, using questionnaires distributed to selected respondents. With this research design, the findings offered insights into the influence of digital citizenship education and technological proficiency on digital privacy awareness and students' participation in digital social campaigns.

Population and Sample

The population of this study consisted of high school students in Jakarta, as this age group (15-18 years old) represents the younger generation actively using digital technology and social media in their daily lives. Jakarta was selected as the research location due to its high internet penetration rate and the diversity in education levels and access to technology, which reflect broader conditions of digital citizenship literacy. A *purposive sampling* method was applied to ensure that the selected sample comprised high school students with access to and experience in using digital technology. A total of 250 students from several high schools in Jakarta participated in this study, considering factors such as school type (public and private). Data collection from respondents was conducted

between November and December 2024 to obtain a more accurate representation of digital citizenship literacy among high school students.

Variable Measurement

The variables in this study were measured using a questionnaire with a 5-point Likert scale, where respondents were asked to indicate their level of agreement with various statements related to the study's variables. The Likert scale ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), allowing for the measurement of respondents' perceptions of digital citizenship education, technological proficiency, digital privacy awareness, participation in digital social campaigns, and digital citizenship literacy. The questionnaire instrument was developed based on relevant previous studies and was adapted to fit the context of this research. Each variable was measured through multiple indicators designed to reflect the key dimensions of the concept being studied. Before being used in the main study, the questionnaire underwent validity and reliability testing through a pilot study to ensure that the instrument accurately and consistently measured the intended concepts (Kumar & Kothari, 2018).

A preliminary questionnaire was tested on 30 respondents, revealing that the calculated r-value surpasses the r-table value (0.458) at a 0.05 significance level. This finding verifies the validity of the items used to assess the variables of Digital Citizenship Education, Technological Literacy Ability, Digital Citizenship Literacy Ability, Digital Privacy Awareness, and Participation in Digital Social Campaigns. Additionally, the Cronbach's Alpha coefficient exceeding 0.79 indicates strong reliability, while values above 0.9 reflect excellent internal consistency. These results confirm that the research instruments are highly reliable for measuring the intended variables. Therefore, the pilot study establishes that the questionnaire is both valid and reliable for implementation in the main research.

Data Analysis

The collected data was analyzed using the *Partial Least Squares - Structural Equation Modeling* (PLS-SEM) method. This method was selected as it effectively analyzed relationships between variables in complex research models, including direct and indirect effects through mediating variables. PLS-SEM was also suitable for studies with relatively small sample sizes and could handle data that was not perfectly normally distributed (Hair Jr et al., 2020). The data analysis process involved several stages, including evaluating the measurement model (*outer model*) to test the validity and reliability of the research instrument and evaluating the structural model (*inner model*) to examine the relationships between variables as formulated in the research hypotheses (Chin, 2010). By employing PLS-SEM, this study provided comprehensive results in understanding the contributing factors to digital citizenship literacy among high school students in Jakarta.

4. Results and Finding

Descriptive Statistics

The respondent distribution in Table 1 provides an overview of the demographic characteristics of the 250 participants in this study. In terms of gender, the sample consisted of 120 male respondents (48%) and 130 female respondents (52%), ensuring a balanced representation. Regarding age distribution, the majority of respondents were 16 years old (32%), followed by 17-year-olds (28%), 15-year-olds (24%), and 18-year-olds (16%). This distribution reflects a broad coverage of high school students at different stages of their education. The school type category indicates that 150 respondents (60%)

attended public schools, while 100 respondents (40%) came from private schools. This suggests a higher participation rate from students enrolled in government-funded educational institutions. In terms of regional distribution, the highest number of respondents were from South Jakarta (24%), followed by West Jakarta (22%), Central Jakarta (20%), North Jakarta (18%), and East Jakarta (16%). This spread ensures that the study captures perspectives from students across different areas of Jakarta, contributing to a more comprehensive analysis.

Table 1. Respondent Distribution

Category	Subcategory	Frequency (n)	Percentage (%)
Gender	Male	120	48.00%
	Female	130	52.00%
Age	15 years old	60	24.00%
	16 years old	80	32.00%
	17 years old	70	28.00%
	18 years old	40	16.00%
School Type	Public	150	60.00%
	Private	100	40.00%
Region	Central Jakarta	50	20.00%
	South Jakarta	60	24.00%
	North Jakarta	45	18.00%
	West Jakarta	55	22.00%
	East Jakarta	40	16.00%
Total		**250**	**100.00%**

Based on the descriptive analysis in Table 2, all variables measured in this study have high mean values, ranging from 4.268 to 4.352, on a scale of 2 to 5. This indicates that most respondents tend to provide positive assessments of the various aspects examined in this study. For the Digital Citizenship Education (DCE) variable, the mean values range from 4.280 to 4.344, with standard deviations between 0.603 and 0.616. This suggests that respondents have a relatively high understanding of digital citizenship education, with a fairly uniform data distribution and no significant variation.

In the Technological Literacy Ability (TLA) variable, the mean values range from 4.280 to 4.324, with standard deviations between 0.591 and 0.616. These results indicate that most respondents feel they have a good level of technological literacy, with a relatively consistent distribution. Meanwhile, the Digital Privacy Awareness (DPA) variable has mean values ranging from 4.276 to 4.348, with standard deviations between 0.598 and 0.617. This suggests that awareness of digital privacy is quite high among respondents, although there is slight variation in the distribution of responses.

For the Participation in Digital Social Campaigns (PIDS) variable, the mean values range from 4.280 to 4.348, with standard deviations between 0.600 and 0.616. This indicates that participation in digital social campaigns is relatively strong, with responses showing little variation. Lastly, the Digital Citizenship Literacy Ability (DCL) variable has mean values between 4.268 and 4.352, with standard deviations ranging from 0.601 to 0.618. These results suggest that the level of digital citizenship literacy is relatively high among respondents, though there is some minor variation in data distribution.

Overall, the descriptive analysis results indicate that respondents have a high level of understanding and awareness of digital citizenship, technological literacy, and digital

privacy. Additionally, they are quite active in digital social campaigns. The relatively small variations in standard deviation suggest that responses were fairly consistent across all variables.

Table 2. Descriptive Statistics

Variable	Items	No. of Obs.	Min	Max	Mean	Median	Std. Dev.
Digital Citizenship Education	DCE1	250	2	5	4.344	4	0.603
	DCE2	250	2	5	4.324	4	0.597
	DCE3	250	2	5	4.316	4	0.608
	DCE4	250	2	5	4.292	4	0.607
	DCE5	250	2	5	4.280	4	0.616
Technological Literacy Ability	TLA1	250	2	5	4.324	4	0.597
	TLA2	250	2	5	4.304	4	0.591
	TLA3	250	2	5	4.316	4	0.608
	TLA4	250	2	5	4.292	4	0.607
	TLA5	250	2	5	4.280	4	0.616
Digital Privacy Awareness	DPA1	250	2	5	4.348	4	0.604
	DPA2	250	2	5	4.328	4	0.598
	DPA3	250	2	5	4.324	4	0.617
	DPA4	250	2	5	4.296	4	0.608
	DPA5	250	2	5	4.276	4	0.614
Participation in Digital Social Campaigns	PIDS1	250	2	5	4.348	4	0.604
	PIDS2	250	2	5	4.336	4	0.600
	PIDS3	250	2	5	4.316	4	0.615
	PIDS4	250	2	5	4.292	4	0.607
	PIDS5	250	2	5	4.280	4	0.616
Digital Citizenship Literacy Ability	DCL1	250	2	5	4.352	4	0.605
	DCL2	250	2	5	4.316	4	0.601
	DCL3	250	2	5	4.296	4	0.615
	DCL4	250	2	5	4.284	4	0.611
	DCL5	250	2	5	4.268	4	0.618

Validity and Reliability

The validity and reliability analysis of the research constructs demonstrates strong measurement properties across all variables (see Table 3). The outer loading values for all indicators exceed the recommended threshold of 0.70, indicating that each item contributes significantly to its respective construct. Specifically, the Digital Citizenship Education construct has outer loading values ranging from 0.872 to 0.921, reflecting high item reliability. Similarly, the Technological Literacy Ability construct shows values between 0.883 and 0.927, reinforcing its strong measurement validity. Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy Ability also exhibit consistently high outer loadings, confirming the robustness of the measurement model.

Reliability measures further support the consistency of the constructs. Cronbach's Alpha values for all constructs exceed 0.90, indicating excellent internal consistency. Specifically, Digital Citizenship Education has a Cronbach's Alpha of 0.940, while Technological Literacy Ability and Digital Privacy Awareness score 0.946 and 0.949, respectively. Similarly, Participation in Digital Social Campaigns and Digital Citizenship Literacy Ability achieve values of 0.950 and 0.939, respectively, demonstrating strong reliability. Additionally, Composite Reliability (CR) values for all constructs are above 0.95, further confirming their consistency. The Average Variance Extracted (AVE) values for each construct surpass the 0.50 threshold, with the lowest being 0.804, indicating strong convergent validity. Overall, the findings confirm that the measurement model is both valid and reliable, ensuring the robustness of the study's structural model.

Table 3. Validity and Reliability Result

Construct	Items	Indicators	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
Digital Citizenship Education	DCE1	I understand my rights and responsibilities as a digital citizen after receiving digital citizenship education.	0.872	0.940	0.941	0.954	0.807
	DCE2	Digital citizenship education helps me distinguish between accurate information and hoaxes on the internet.	0.895				
	DCE3	I have gained a better understanding of ethics in online communication.	0.921				
	DCE4	I can recognize various forms of cyber threats after receiving digital citizenship education.	0.899				
	DCE5	Digital citizenship education has increased my awareness of the importance of protecting personal data.	0.905				
Technological Literacy Ability	TLA1	I can effectively use various technological devices to search for and manage information.	0.883	0.946	0.947	0.959	0.824
	TLA2	I am able to understand and troubleshoot technical issues that frequently occur with my digital devices.	0.915				
	TLA3	I have skills in using software or applications to enhance productivity.	0.927				
	TLA4	I can assess the security of a website or application before using it.	0.902				
	TLA5	I understand the impact of technology on social and economic aspects of society.	0.910				

Digital Privacy Awareness	DPA1	I always check privacy settings before using social media or other digital platforms.	0.885	0.949	0.950	0.961	0.832
	DPA2	I am aware of the risks of sharing personal information carelessly on the internet.	0.923				
	DPA3	I understand the importance of using strong and unique passwords for each digital account.	0.936				
	DPA4	I know how to prevent identity theft and online privacy violations.	0.906				
	DPA5	I regularly update and secure my personal data on digital devices.	0.909				
Participation in Digital Social Campaigns	PIDS1	I actively participate in digital social campaigns aimed at raising public awareness of specific issues.	0.885	0.950	0.950	0.961	0.833
	PIDS2	I frequently share information from digital social campaigns with friends and family.	0.921				
	PIDS3	I have participated in online petitions or social movements conducted through digital platforms.	0.935				
	PIDS4	I use social media to support social issues that I consider important.	0.907				
	PIDS5	I believe that digital social campaigns have a significant impact on social change.	0.914				
Digital Citizenship Literacy Ability	DCL1	I can accurately identify valid and invalid information on the internet.	0.874	0.939	0.939	0.953	0.804
	DCL2	I understand the importance of ethical behavior when interacting with others online.	0.908				
	DCL3	I can use technology responsibly for academic and professional purposes.	0.923				
	DCL4	I have skills in protecting my digital identity and personal data.	0.885				
	DCL5	I can recognize and report unethical or harmful online behavior.	0.892				

Path Analysis

The path analysis results indicate significant relationships between several constructs in the study (see Table 4 and Figure 2). The first hypothesis (H1a) stated that digital citizenship education influences digital privacy awareness. The findings support this hypothesis, as digital citizenship education positively impacted students' awareness of digital privacy (β = 0.472, p = 0.005). Similarly, the second hypothesis (H1b) proposed that digital citizenship education influences participation in digital social campaigns. The results confirm this relationship, showing that students with a strong foundation in digital citizenship education were more likely to engage in digital social campaigns (β = 0.499, p = 0.002).

Furthermore, the analysis supports H1c, which examined the effect of technological literacy ability on digital privacy awareness. The findings indicate a significant positive relationship, suggesting that students with higher technological literacy ability demonstrated greater awareness of digital privacy (β = 0.524, p = 0.002). Additionally, H2b tested whether technological literacy ability influences participation in digital social campaigns. This hypothesis is supported, as students with higher technological literacy ability were more engaged in digital social campaigns (β = 0.497, p = 0.002).

Moreover, H3 tested the impact of digital privacy awareness on digital citizenship literacy ability. The results confirm this hypothesis, indicating that digital privacy awareness plays a crucial role in shaping students' digital citizenship literacy ability (β = 0.741, p = 0.000). However, H4, which proposed a relationship between participation in digital social campaigns and digital citizenship literacy ability, was rejected (β = 0.248, p = 0.184). This suggests that participation in digital social campaigns does not significantly contribute to the development of digital citizenship literacy ability.

Overall, five hypotheses were supported, confirming the importance of digital citizenship education and technological literacy ability in enhancing digital privacy awareness and participation in digital social campaigns. However, the findings also highlight that participation in digital social campaigns does not directly influence digital citizenship literacy ability, suggesting that other factors may play a more dominant role in shaping students' digital literacy.

Table 4. Path Analysis Result

Hypothesis	Construct*)	β	STDEV	T Statistics	P Values	Result
H1a	DCE -> DPA	0.472	0.169	2.791	0.005	Supported
H1b	DCE -> PIDS	0.499	0.158	3.148	0.002	Supported
H1c	TLA -> DPA	0.524	0.170	3.087	0.002	Supported
H2b	TLA -> PIDS	0.497	0.158	3.135	0.002	Supported
H3	DPA -> DCL	0.741	0.186	3.973	0.000	Supported
H4	PIDS -> DCS	0.248	0.186	1.331	0.184	Rejected

*) DCE=Digital Citizenship Education; TLA=Technological Literacy Ability: DPA=Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL=Digital Citizenship Literacy Ability
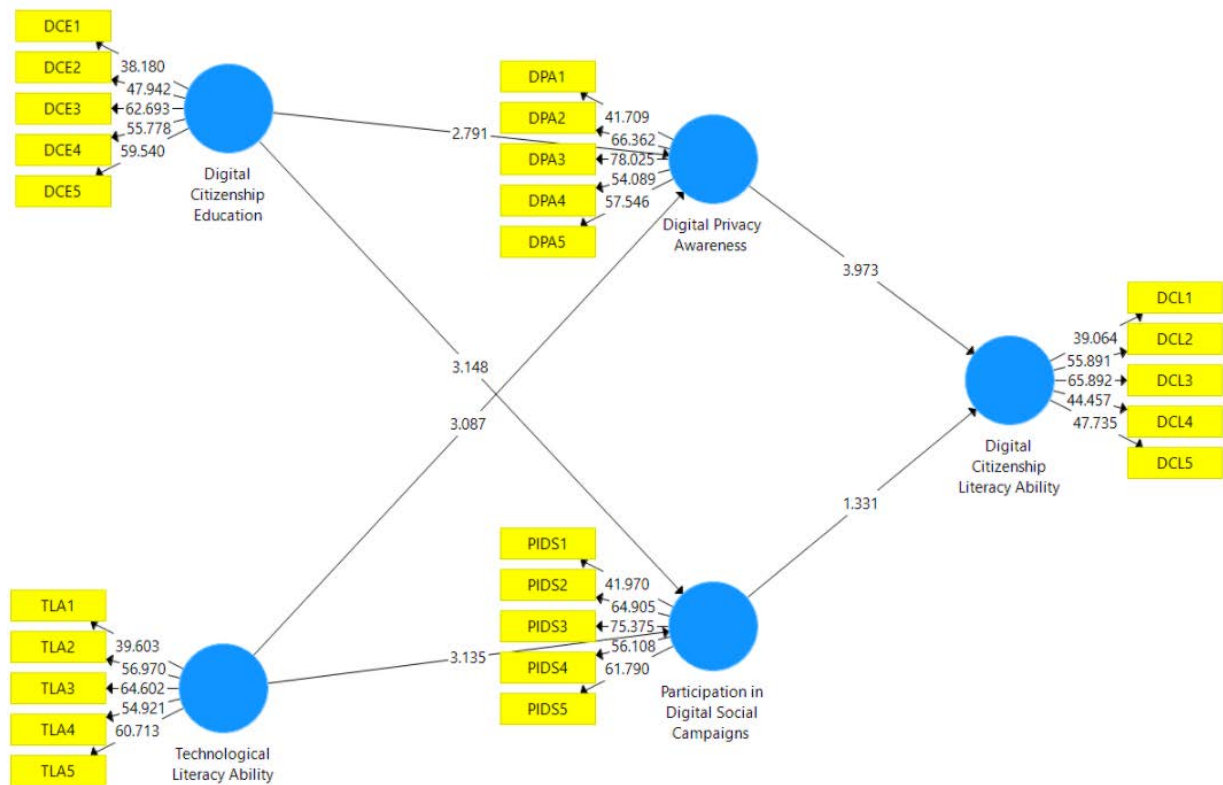
Figure 2. PLS-SEM Construct

Mediation Test

The mediation test results provide insights into the indirect relationships between the constructs (see Table 5). The first mediation hypothesis (H3a) proposed that digital privacy awareness mediates the relationship between digital citizenship education and digital citizenship literacy ability. The findings support this hypothesis (β = 0.350, p = 0.006), indicating that digital privacy awareness plays a significant role in strengthening the effect of digital citizenship education on digital citizenship literacy ability. Similarly, H3b tested whether digital privacy awareness mediates the relationship between technological literacy ability and digital citizenship literacy ability. This hypothesis is also supported (β = 0.388, p = 0.044), suggesting that students with higher technological literacy ability are more likely to develop digital citizenship literacy ability through improved digital privacy awareness.

However, not all mediation hypotheses were supported. H4a examined whether participation in digital social campaigns mediates the relationship between digital citizenship education and digital citizenship literacy ability. The results indicate that this mediation effect is not significant (β = 0.124, p = 0.289), leading to the rejection of this hypothesis. Similarly, H4b, which tested whether participation in digital social campaigns mediates the relationship between technological literacy ability and digital citizenship literacy ability, was also rejected (β = 0.123, p = 0.150). These findings suggest that while digital privacy awareness serves as an effective mediator, participation in digital social campaigns does not significantly enhance the link between digital citizenship education, technological literacy ability, and digital citizenship literacy ability.

Table 5. Mediation Test Result

Hypothesis	Construct*)	β	STDEV	T Statistics	P Values	Result
H3a	DCS -> DPA -> DCL	0.350	0.128	2.744	0.006	Supported
H3b	TLA -> DPA -> DCL	0.388	0.192	2.020	0.044	Supported
H4a	DCS -> PIDS -> DCL	0.124	0.116	1.062	0.289	Rejected
H4b	TLA -> PIDS -> DCL	0.123	0.085	1.441	0.150	Rejected

*) DCE=Digital Citizenship Education; TLA=Technological Literacy Ability: DPA=Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL=Digital Citizenship Literacy Ability

5. Discussion

The acceptance of Hypothesis H1a, which states that Digital Citizenship Education positively impacts Digital Privacy Awareness, aligns with prior studies conducted in various countries. Research by Pangrazio & Sefton-Green (2021) and Falloon (2020) in Australia demonstrated that structured digital citizenship education significantly improves individuals' awareness of online privacy and security. Similarly, studies in China, such as the work by Lo et al. (2024), found that digital literacy programs in schools directly contributed to an increased understanding of personal data protection among students. These findings indicate that structured education about digital citizenship fosters better privacy awareness, as individuals become more conscious of the risks and necessary precautions in digital environments.

The acceptance of H1b, which states that Digital Citizenship Education impacts participation in Digital Social Campaigns, supports previous empirical evidence. For instance, research by Peart et al. (2024) in United Kingdom highlighted that individuals exposed to digital citizenship curricula are more likely to engage in online advocacy and social movements. This relationship is explained by the empowerment gained through digital education, enabling individuals to understand their roles and responsibilities in the digital sphere. The ability to critically assess online information and engage in digital activism stems from structured education, which equips individuals with the necessary knowledge and skills.

Hypothesis H2a, which confirms that Technological Literacy Ability impacts Digital Privacy Awareness, resonates with studies conducted in South Asia and Europe. For example, a study by Park (2019) in the United States found that individuals with higher technological literacy are more adept at recognizing privacy threats, leading to better online security practices. Similarly, research by Usman et al. (2024) in Pakistan suggests that technological competence enables users to navigate privacy settings effectively, reducing their vulnerability to data breaches. These findings underscore the importance of technical skills in fostering a proactive approach to digital privacy management.

The acceptance of H2b, indicating that Technological Literacy Ability influence on Participation in Digital Social Campaigns, is corroborated by previous research. Studies by Sanders & Scanlon (2021) and von Gillern et al. (2024) in the United States of America suggest that individuals with greater technological proficiency are more likely to engage in online activism, as they can effectively utilize digital platforms for advocacy. In addition, McInroy (2021) found that students with advanced technological skills were more engaged in social media-driven campaigns on environmental and political issues. This highlights the role of technological literacy in enabling individuals to participate meaningfully in digital civic engagement.

The acceptance of H3, which establishes a direct relationship between Digital Privacy Awareness and Digital Citizenship Literacy Ability, is supported by existing literature. A

study by Fernández-Prados et al. (2021) in Spain found that individuals with high privacy awareness tend to possess a deeper understanding of digital citizenship concepts. This is because privacy-conscious individuals are more inclined to critically evaluate online interactions, ethical considerations, and responsible digital behaviors. Such findings reinforce the notion that digital privacy awareness is a crucial component of comprehensive digital citizenship literacy.

The mediation effect proposed in H3a, wherein Digital Privacy Awareness mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability, aligns with prior empirical studies. Research by Vajen et al. (2023) in Germany and Hongkong demonstrated that structured digital citizenship education programs not only enhance privacy awareness but also indirectly strengthen overall digital literacy. This occurs because privacy education fosters a heightened sense of responsibility, critical thinking, and ethical digital engagement, which are key elements of digital citizenship literacy.

Similarly, the acceptance of H3b, which states that Digital Privacy Awareness mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability, is consistent with previous research. Studies by Acquisti et al. (2020) in the United States of America found that technological literacy alone does not guarantee responsible digital citizenship; instead, privacy awareness serves as a crucial intermediary factor. Without privacy awareness, individuals with high technological skills may misuse digital platforms or remain unaware of ethical considerations, thereby limiting their overall digital literacy.

In contrast, the rejection of H4, which hypothesized that Participation in Digital Social Campaigns impacts Digital Citizenship Literacy Ability, challenges some assumptions in the field. While studies such as those by Sharma et al. (2024) and Winarnita et al. (2022) suggested that online activism contributes to civic engagement, the present findings indicate that mere participation in digital campaigns does not necessarily translate to broader digital citizenship literacy. One potential explanation is that individuals engage in online activism passively or superficially, without gaining deeper insights into digital ethics, rights, and responsibilities.

The rejection of H4a, which posited that Participation in Digital Social Campaigns mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability, further substantiates the argument that online activism alone does not foster digital literacy. Research by Martzoukou et al. (2020) suggests that while digital education may encourage online engagement, the quality of participation matters more than mere involvement. If participation lacks critical reflection and deep engagement, it fails to contribute meaningfully to digital citizenship literacy.

Similarly, the rejection of H4b, which proposed that Participation in Digital Social Campaigns mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability, aligns with prior research questioning the effectiveness of digital activism in enhancing literacy. Studies by Al-Mulla et al. (2022) found that digital participation, particularly in social media-driven campaigns, often remains at a surface level, with limited impact on users' broader digital competencies. This finding suggests that while technological skills enable participation, they do not necessarily enhance critical digital citizenship literacy.

Overall, these findings contribute to the existing body of research by reinforcing the role of education and technological literacy in shaping privacy awareness and digital literacy. However, they also highlight the limitations of digital activism in fostering deep digital citizenship competencies. Future research should explore qualitative dimensions of

digital engagement, focusing on how different forms of participation contribute to meaningful digital literacy development. Additionally, policymakers should emphasize structured digital education programs that not only encourage online engagement but also cultivate critical thinking and ethical digital behavior.

These insights offer important implications for digital literacy education and policy-making. By focusing on privacy awareness as a crucial mediator, educational institutions can design curricula that integrate digital ethics and security into broader digital literacy frameworks. Likewise, initiatives aimed at promoting digital citizenship should prioritize active and reflective engagement rather than merely encouraging participation in online campaigns. Future research should investigate how digital literacy interventions can be optimized to enhance both individual competencies and collective digital responsibility.

6. Conclusion

The findings of this study provide strong empirical support for the impact of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns. Digital Privacy Awareness is shown to be a key factor influencing Digital Citizenship Literacy Ability, serving as a significant mediator between Digital Citizenship Education and Technological Literacy Ability. However, contrary to expectations, Participation in Digital Social Campaigns does not significantly contribute to Digital Citizenship Literacy Ability, suggesting that active engagement in digital advocacy does not necessarily translate into a higher level of digital citizenship literacy.

The acceptance of hypotheses H1a, H1b, H2a, H2b, H3, H3a, and H3b indicates that Digital Privacy Awareness plays a crucial role in bridging the gap between education, technological literacy, and digital citizenship literacy. This aligns with previous research that highlights the importance of privacy consciousness in fostering responsible digital behavior. Meanwhile, the rejection of H4, H4a, and H4b suggests that participation in digital campaigns alone is insufficient to enhance digital literacy, implying that other factors such as content quality, critical thinking, or long-term engagement may be necessary for meaningful literacy development.

Overall, this study reinforces the significance of digital education and technological skills in promoting privacy awareness and responsible digital behavior. It also emphasizes the need for further exploration into the role of digital campaigns in shaping digital literacy, as their influence appears to be more complex than initially assumed.

Implications

From a practical standpoint, these findings highlight the necessity for educational institutions and policymakers to prioritize Digital Citizenship Education and Technological Literacy Ability as key components in curricula. By strengthening these areas, digital privacy awareness can be significantly improved, leading to more responsible and informed digital citizens. Additionally, organizations and educators should design interventions that emphasize digital privacy education as a bridge toward enhancing digital literacy.

Furthermore, the findings suggest that participation in digital campaigns alone is not sufficient to improve digital literacy. Policymakers and educators should focus on strategies that integrate critical digital literacy skills, ensuring that campaign participation is accompanied by deeper learning experiences. This could involve interactive learning models, case studies, or simulations that encourage critical reflection and knowledge retention.

Limitations and Contributions

This study has several limitations that should be acknowledged. First, the study relied on self-reported survey data, which may be subject to social desirability bias. Future research could benefit from experimental or longitudinal designs to capture behavioral changes over time. Second, the study focused on a specific demographic group, and generalizability to other populations should be approached with caution. Expanding the scope to diverse demographic and cultural settings would provide a more comprehensive understanding of digital citizenship dynamics.

Despite these limitations, this study makes significant contributions to the existing literature by empirically validating the role of Digital Privacy Awareness as a mediator in digital citizenship development. The findings also challenge assumptions regarding the impact of digital social campaigns, offering new insights for educators and policymakers seeking to enhance digital literacy. These contributions pave the way for future research on the mechanisms through which digital engagement fosters responsible digital behavior.

References

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2020). Secrets and Likes: The Drive for Privacy and the Difficulty of Achieving It in the Digital Age. *Journal of Consumer Psychology*, *30*(4), 736–758. https://doi.org/https://doi.org/10.1002/jcpy.1191

Affonso, E. P., & Sant'Ana, R. C. G. (2018). Privacy awareness issues in user data collection by digital libraries. *IFLA Journal*, *44*(3), 170–182.

Al-Mulla, S., Ari, I., & Koç, M. (2022). Social media for sustainability education: Gaining knowledge and skills into actions for sustainable living. *International Journal of Sustainable Development & World Ecology*, *29*(5), 455–471.

Alenezi, N., & Alfaleh, M. (2024). Enhancing digital citizenship education in Saudi Arabian elementary schools: designing effective activities for curriculum integration. *Frontiers in Education*, *9*, 1494487.

Althibyani, H. A., & Al-Zahrani, A. M. (2023). Investigating the effect of students' knowledge, beliefs, and digital citizenship skills on the prevention of cybercrime. *Sustainability*, *15*(15), 11512.

Anthonysamy, L., & Sivakumar, P. (2022). A new digital literacy framework to mitigate misinformation in social media infodemic. *Global Knowledge, Memory and Communication*.

Anurogo, D., La Ramba, H., Putri, N. D., & Putri, U. M. P. (2023). Digital Literacy 5.0 to enhance multicultural education. *Multicultural Islamic Education Review*, *1*(2), 109–179.

Asmayawati, Yufiarti, & Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(1), 100233. https://doi.org/https://doi.org/10.1016/j.joitmc.2024.100233

Bayzan, Ş. (2024). Are Digital teachers anxious? An investigation of the relationship between teachers' Digital Citizenship behaviors and online privacy concerns. *Education and Information Technologies*, 1–29.

Blevins, B., LeCompte, K., & Wells, S. (2014). Citizenship education goes digital. *Journal of Social Studies Research*, *38*(1). https://doi.org/10.1016/j.jssr.2013.12.003

Bouzguenda, I., Alalouch, C., & Fava, N. (2019). Towards smart sustainable cities: A review of the role digital citizen participation could play in advancing social sustainability.

Sustainable Cities and Society, *50*, 101627.

Cetindamar Kozanoglu, D., & Abedin, B. (2021). Understanding the role of employees in digital transformation: conceptualization of digital literacy of employees as a multi-dimensional organizational affordance. *Journal of Enterprise Information Management*, *34*(6), 1649–1672.

Chen, C.-H., Liu, C.-L., Hui, B. P. H., & Chung, M.-L. (2020). Does education background affect digital equal opportunity and the political participation of sustainable digital citizens? A Taiwan case. *Sustainability*, *12*(4), 1359.

Chin, W. W. (2010). *How to Write Up and Report PLS Analyses BT - Handbook of Partial Least Squares: Concepts, Methods and Applications* (V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (eds.); pp. 655–690). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_29

Choi, M. (2016). A Concept Analysis of Digital Citizenship for Democratic Citizenship Education in the Internet Age. *Theory and Research in Social Education*, *44*(4), 565–607. https://doi.org/10.1080/00933104.2016.1210549

Choi, S. (2023). Privacy literacy on social media: Its predictors and outcomes. *International Journal of Human–Computer Interaction*, *39*(1), 217–232.

Cortesi, S., Hasse, A., Sonia, A. L., & Urs, K. (2020). *Youth and Digital Citizenship+ (Plus) | Berkman Klein Center*.

Dyrenfurth, M. J., & Kozak, M. R. (1991). *Technological literacy*.

Emejulu, A., & Mcgregor, C. (2019). Critical Studies in Education Towards a radical digital citizenship in digital education. *Critical Studies in Education*, *60*(1).

Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational Technology Research and Development*, *68*(5), 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Fernández-Prados, J. S., Lozano-Díaz, A., & Ainz-Galende, A. (2021). Measuring digital citizenship: A comparative analysis. *Informatics*, *8*(1), 18.

Flyverbom, M., Deibert, R., & Matten, D. (2019). The governance of digital technology, big data, and the internet: New roles and responsibilities for business. *Business & Society*, *58*(1), 3–19.

Frau-Meigs, D., O'Neill, B., Soriani, A., & Tomé, V. (2017). *Digital citizenship education: Volume 1: Overview and new perspectives*.

Gleason, B., & Von Gillern, S. (2018). International Forum of Educational Technology & Society Digital Citizenship Innovations in Education , Practice , and Pedagogy Published by : International Forum of Educational Technology & Society Linked references are available on JSTOR for this article. *Journal of Educational Technology & Society*, *21*(1), 200–212.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, *109*, 101–110.

Herani, R., & Pranandari, A. (2024). Promote or inhibit? Examining the influence of youth digital advocacy on digital social entrepreneurship. *Social Enterprise Journal*, *20*(5), 654–677.

Huang, B. (2024). Navigating digital divide: exploring the influence of ideological and political education on cyber security and digital literacy amid information warfare. *Current Psychology*, 1–22.

Junaedi, A. T., Panjaitan, H. P., Yovita, I., Veronica, K., Renaldo, N., & Jahrizal, J. (2024). Advancing Digital and Technology Literacy through Qualitative Studies to Bridging the Skills Gap in the Digital Age. *Journal of Applied Business and Technology*, *5*(2), 123–

133.

Kapoor, S. K., Sankhla, K., Agarwal, P., & Rathi, S. K. (2024). Security and Threat in Online Social Networking. *Online Social Networks in Business Frameworks*, 449–477.

Kim, M., & Choi, D. (2018). Development of Youth Digital Citizenship Scale and Implication for Educational Setting Published by : International Forum of Educational Technology & Society Development of Youth Digital Citizenship. *Journal of Educational Technology & Society*, *21*(1), 155–171.

Kumar, A., & Haneef, M. S. M. (2023). (Dis) Empowered Civic Voices in Social Media: An Episteme of Civic Engagement, Advocacy, and Social Change. In *The Palgrave Handbook of Global Social Change* (pp. 1–22). Springer.

Lilleker, D. G., & Koc-Michalska, K. (2018). What drives political participation? Motivations and mobilization in a digital age. In *Digital Politics: Mobilization, Engagement and Participation* (pp. 21–43). Routledge.

Lo, H.-C., Wang, T.-H., & Chen, R.-S. (2024). Enhancing Critical Digital Literacy of Preservice Preschool Teachers through Service Learning: The Moderator of Online Social Capital. *Sustainability*, *16*(6), 2253.

Malik, K. (2024). Integrating Digital Citizenship Education in the Contemporary Educational Ecosystem. In *Digital Analytics Applications for Sustainable Training and Education* (pp. 357–376). Apple Academic Press.

Martin, F., Hunt, B., Wang, C., & Brooks, E. (2020). Middle school student perception of technology use and digital citizenship practices. *Computers in the Schools*, *37*(3), 196–215.

Martzoukou, K., Fulton, C., Kostagiolas, P., & Lavranos, C. (2020). A study of higher education students' self-perceived digital competences for learning and everyday life online participation. *Journal of Documentation*, *76*(6), 1413–1458. https://doi.org/10.1108/JD-03-2020-0041

McInroy, L. B. (2021). Teaching Technology Competencies: A Social Work Practice With Technology Course. *Journal of Social Work Education*, *57*(3), 545–556. https://doi.org/10.1080/10437797.2019.1671272

Mei, Y. (2024). Exploring the mechanisms driving elderly Fintech engagement: the role of social influence and the elderly's digital literacy. *Frontiers in Psychology*, *15*, 1420147.

Moon, S. J., & Bai, S. Y. (2020). Components of digital literacy as predictors of youth civic engagement and the role of social media news attention: the case of Korea. *Journal of Children and Media*, *14*(4), 458–474.

Muawanah, U., Marini, A., & Sarifah, I. (2024). The interconnection between digital literacy, artificial intelligence, and the use of E-learning applications in enhancing the sustainability of Regional Languages: Evidence from Indonesia. *Social Sciences & Humanities Open*, *10*, 101169. https://doi.org/https://doi.org/10.1016/j.ssaho.2024.101169

Nikou, S., De Reuver, M., & Mahboob Kanafi, M. (2022). Workplace literacy skills—how information and digital literacy affect adoption of digital technology. *Journal of Documentation*, *78*(7), 371–391.

Pangrazio, L., Godhe, A.-L., & Ledesma, A. G. L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-Learning and Digital Media*, *17*(6), 442–459.

Pangrazio, L., & Sefton-Green, J. (2021). Digital Rights, Digital Citizenship and Digital Literacy: What's the Difference? *Journal of New Approaches in Educational Research*, *10*(1), 15–27. https://doi.org/10.7821/naer.2021.1.616

Peart, M., Higgins, S., Gutiérrez-Esteban, P., & Cubo Delgado, S. (2024). Digital and socio-

civic skills development and young people's perceptions of digital citizenship in the UK. *Education, Citizenship and Social Justice*, *19*(3), 463–475.

Peart, M. T., Gutiérrez-Esteban, P., & Cubo-Delgado, S. (2020). Development of the digital and socio-civic skills (DIGISOC) questionnaire. *Educational Technology Research and Development*. https://doi.org/10.1007/s11423-020-09824-y

Prince, C., Omrani, N., & Schiavone, F. (2024). Online privacy literacy and users' information privacy empowerment: the case of GDPR in Europe. *Information Technology & People*, *37*(8), 1–24. https://doi.org/10.1108/ITP-05-2023-0467

Richardson, J., & Milovidov, E. (2019). *Digital citizenship education handbook: Being online, well-being online, and rights online*. Council of Europe.

Sanders, C. K., & Scanlon, E. (2021). The Digital Divide Is a Human Rights Issue: Advancing Social Inclusion Through Social Work Advocacy. *Journal of Human Rights and Social Work*, *6*(2), 130–143. https://doi.org/10.1007/s41134-020-00147-9

Sharma, S., Kar, A. K., & Gupta, M. P. (2024). Untangling the web between digital citizen empowerment, accountability and quality of participation experience for e-government: Lessons from India. *Government Information Quarterly*, *41*(3), 101964.

Usman, W., Sadik, J., Elgedawy, R., Ruoti, S., & Zappala, D. (2024). Security and Privacy Experiences of First-and Second-Generation Pakistani Immigrants to the US: Perceptions, Practices, Challenges, and Parent-Child Dynamics. *2025 IEEE Symposium on Security and Privacy (SP)*, 31.

Vajen, B., Kenner, S., & Reichert, F. (2023). Digital citizenship education–Teachers' perspectives and practices in Germany and Hong Kong. *Teaching and Teacher Education*, *122*, 103972.

von Gillern, S., Korona, M., Wright, W., Gould, H., & Haskey-Valerius, B. (2024). Media literacy, digital citizenship and their relationship: Perspectives of preservice teachers. *Teaching and Teacher Education*, *138*, 104404. https://doi.org/https://doi.org/10.1016/j.tate.2023.104404

Winarnita, M., Bahfen, N., Mintarsih, A. R., Height, G., & Byrne, J. (2022). Gendered digital citizenship: How Indonesian female journalists participate in gender activism. *Journalism Practice*, *16*(4), 621–636.

Young, D. (2014). A 21st-Century Model for Teaching Digital Citizenship. *Educational Horizons*, *92*(3), 9–12. https://doi.org/10.1177/0013175x1409200304

Zhang, Y., Zhang, W., & Wang, J. (2024). Effect of digital skills on citizens' digital participation: mediating effects of political interest, social issues concern and national identity. *Kybernetes*.

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Regular Article

Digital citizenship literacy in Indonesia: The role of privacy awareness and social campaigns

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ABSTRACT

This study aims to examine the influence of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns, as well as their subsequent influence on Digital Citizenship Literacy Ability. Additionally, the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns are analyzed. A quantitative research approach was employed, using a survey method to collect data from 250 respondents of students from several high schools in Jakarta. Structural Equation Modeling (SEM) was used to test the proposed hypotheses. The findings confirm that Digital Citizenship Education significantly enhances both Digital Privacy Awareness and Participation in Digital Social Campaigns. Similarly, Technological Literacy Ability positively influences Digital Privacy Awareness and Participation in Digital Social Campaigns. Moreover, Digital Privacy Awareness directly improves Digital Citizenship Literacy Ability and mediates the relationships between Digital Citizenship Education and Technological Literacy Ability with Digital Citizenship Literacy Ability. However, the influence of Participation in Digital Social Campaigns on Digital Citizenship Literacy Ability was not supported, nor did it serve as a mediator in the tested relationships. This study contributes to the literature by providing empirical evidence on the role of digital education and technological skills in fostering responsible digital behavior. It highlights the critical function of Digital Privacy Awareness as a key driver of Digital Citizenship Literacy Ability. The findings have important implications for policymakers and educators, emphasizing the need to strengthen digital privacy education within curricula. The originality of this research lies in its comprehensive examination of Digital Citizenship Literacy Ability and the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns, offering new insights into the mechanisms underlying digital competence development.

1. Introduction

One of the critical literacies in 21st-century life is citizenship literacy. This can be taught from an early age in a simple, contextual manner appropriate to the level of cognitive ability. Various activities have rapidly shifted from conventional to digitalization. The digital era has shaped citizens who routinely use the internet in their daily lives as a necessity (Cortesi et al., 2020). Thus, whether society is prepared or not, they will inevitably migrate and coalesce into a new entity known as digital citizenship. Digital citizenship refers to activities performed by individuals using internet technology as a medium to seek and process information to meet daily needs (Blevins et al., 2014; Emejulu & Mcgregor, 2019). Digital citizenship has become a topical issue in citizenship studies, particularly regarding how to instill the character of an intelligent and wise digital citizen in the face of globalization and

technological advancements (Gleason & Von Gillern, 2018; Kim & Choi, 2018; Peart et al., 2020).

This issue highlights that digital citizenship has become a discussion in education and academia, particularly concerning cultivating the character of intelligent and wise citizens amidst the flow of globalization and technological development (Ajideh et al., 2024). According to the OECD (2019), digital skills are essential in ensuring that students engage with technology safely and responsibly, whether at school, in the community, or at home. These skills are foundational in fostering active and ethical technology users from an early age. The concept of digital citizenship has thus become integral to empowering communities, enabling citizens to assume active and responsible roles in the digital realm. This responsibility is particularly relevant for individuals who view internet usage as an everyday necessity, as it encourages adherence to established norms and ethical behavior in online activities (Burns &

Gottschalk, 2019; Finkenauer et al., 2020). In light of these concepts, it is imperative that today's young citizens actively and responsibly navigate the advancements in internet technology.

Moreover, according to Council of Europe (2025), digital citizenship education competencies are divided into ten core domains, which are grouped into three major categories: Presence in the digital space, Well-being in digital environments, and Rights and responsibilities in the online world (see Fig. 1). The first category, Presence in the digital space, refers to the skills required to access the digital ecosystem, express opinions freely, and utilize technology in innovative ways through reflective and analytical approaches. The second category, Well-being in digital environments, encompasses the abilities that enable individuals to engage positively within online communities and to cultivate a balanced and healthy relationship with digital technologies. The third category, Rights and responsibilities in the online world, includes knowledge and attitudes related to safeguarding individual rights and promoting active involvement in a diverse and complex digital society, where personal data is protected and civic participation is empowered.

In practice, several challenges persist within the concept of digital citizenship literacy that require further attention. These challenges include educators limited technological literacy, the spread of misinformation, a lack of interest in reading, and insufficient comprehension of the material students engage with (Asmayawati & Yetti, 2024). Additionally, the issue of citizenship literacy, particularly in relation to national character values, is critical for shaping future generations. These values are foundational in developing a generation with strong personalities and good moral character. National character values are intrinsically linked to literacy, as the integration of literacy within the school environment fosters character traits such as discipline, creativity, a passion for learning, respect for achievements, reading habits, social and communication skills, and a sense of responsibility. These values are conveyed both directly and indirectly through the learning process.

Digital citizenship literacy is an essential component of modern education, aimed at equipping students with the skills necessary to engage responsibly in the digital world. Research indicates that incorporating digital citizenship into primary school curricula helps students develop positive digital ethics, behavior, and habits. Moreover, studies have shown that primary school teachers are increasingly implementing digital citizenship principles effectively, emphasizing the importance of further enhancing educators' digital literacy (Alqirnas, 2022). Furthermore, projects focused on digital citizenship education for young children have proven successful in empowering students to become proactive and influential citizens in the digital era ("Empower. Communities with Media Lit.," 2022). However, some studies suggest that a more critical approach to digital citizenship education is needed, one that ensures students not only learn about but also actively practice meaningful digital citizenship (Tadlaoui-Brahmi et al., 2022). This approach calls for a deeper engagement with the concept of digital citizenship, where students develop not only knowledge but also the critical thinking and ethical behavior necessary to navigate the digital landscape.

Digital citizenship education and digital citizenship literacy share the common goal of preparing individuals to function responsibly in the digital world, yet they differ in scope and emphasis. Both concepts underscore the importance of ethical, informed, and active engagement in digital environments, aligning with the Council of Europe's (2025) framework that categorizes digital citizenship competencies into three domains: presence in digital spaces, well-being in digital environments, and the exercise of rights and responsibilities online. While DCE focuses on structured pedagogical efforts to instill theoretical understanding and value-based guidance through formal education—particularly within school curricula—Digital Citizenship Literacy refers more directly to the practical, real-world application of these skills and values. It reflects an individual's actual ability to use digital tools critically, protect privacy, participate in online communities, and make ethical decisions. However, DCE lays the foundation through education, whereas Digital Citizenship Literacy represents the realized capability of individuals to apply that foundation in their everyday digital interactions.

Indonesia was selected as the research setting due to its status as the fourth-largest internet user population in the world, with a significant proportion of users aged 15–24 who are highly active on social media and digital platforms (Hidayat et al., 2023). Despite its high internet penetration rate, Indonesia continues to face substantial challenges in digital literacy, privacy awareness, and responsible online behavior (Anurogo et al., 2023). Although the government has initiated various programs—such as the National Digital Literacy Movement—empirical research evaluating the effectiveness of digital citizenship education among students remains limited (Rahmatunnisa, 2024). Therefore, this study is particularly relevant for exploring the dynamics of digital citizenship education in a developing country undergoing rapid digital transformation, offering practical implications for shaping education policies that are responsive to the demands of the digital age.

Therefore, this study aims to analyze the influence of digital citizenship education and the level of technological literacy on digital citizenship literacy among young generations. Additionally, it explores the role of digital privacy awareness as a mediating variable in the relationship between digital citizenship education and digital citizenship literacy. On the other hand, participation in digital social campaigns is also examined as a mediating factor between technological literacy and digital citizenship literacy. By understanding these dynamics, this research is expected to provide insights into more effective strategies for enhancing young people's digital skills, enabling them to engage ethically and responsibly in the digital world.

2. Literature review

2.1. Digital literacy gaps and dynamics in Indonesia

Several local studies have examined digital literacy in Indonesia from the perspectives of access, technological culture, and policy. According to the Indonesian Internet Service Providers Association (APJII) survey in 2023, Indonesia's internet penetration has reached approximately 78 %; however, usage distribution remains uneven between urban and rural areas—82 % in urban settings and 74 % in rural regions (Halim et al., 2024). A joint report by the 10th Commission of the Indonesian House of Representatives (DPR-RI) and APJII highlighted that, despite ongoing expansion of access, the lack of equitable digital infrastructure and low levels of digital safety remain key obstacles in

Fig. 1. Framework of digital citizenship competencies.

advancing national digital literacy.

A study by Habibi et al. (2020) on rural communities in Indonesia found that digital competencies in rural areas are comparable to those in urban ones. However, the main gap lies in infrastructure and the integration of technology into daily life. Meanwhile, students and teachers in some urban areas still exhibit limited understanding of digital ethics, online privacy, and responsible digital participation. Jayadiputra et al. (2023) emphasized that digital character development has yet to be systematically integrated into the Pancasila and Civics Education curricula.

In the regional context, comparisons with neighboring countries such as Singapore and Malaysia reveal that Indonesia still lacks a systematic and standardized framework for digital citizenship (Yue, 2022). This concern was clearly voiced by policy analysts during parliamentary hearings, who noted that Indonesia lags behind other ASEAN countries in implementing digital citizenship education (Hicks, 2021). Based on these findings, it is essential for this study to incorporate relevant local evidence. By linking structural and cultural digital issues in Indonesia—including access gaps, infrastructure readiness, and curriculum preparedness—this research aims not only to enrich the global digital literacy discourse but also to offer context-sensitive policy and educational solutions for countries in the Global South.

2.2. Digital Citizenship Education

According to Frau-Meigs et al. (2017), Digital Citizenship Education refers to the process of teaching individuals, particularly students, about responsible, ethical, and effective engagement in digital environments. It encompasses knowledge and skills related to online safety, digital communication, cyber ethics, digital literacy, and responsible participation in digital spaces. This education aims to equip individuals with the ability to navigate digital platforms wisely, protect personal information, critically evaluate online content, and contribute positively to the digital community (Richardson & Milovidov, 2019).

Digital Citizenship Education significantly influences Digital Privacy Awareness by providing individuals with essential knowledge about online security, data protection, and personal information management (Althibyani & Al-Zahrani, 2023; Bayzan, 2024; Martin et al., 2020). Through structured learning, individuals become more aware of the risks associated with sharing personal data online and develop strategies to safeguard their digital identities. This education fosters a deeper understanding of privacy settings, cybersecurity threats, and responsible data handling, encouraging proactive behavior in maintaining online privacy (Malik, 2024).

Digital Citizenship Education also plays a crucial role in encouraging participation in Digital Social Campaigns (Chen et al., 2020; Pangrazio et al., 2020). By instilling a sense of digital responsibility and ethical engagement, individuals are more likely to actively participate in online advocacy, awareness initiatives, and social movements that promote positive digital citizenship. Education in this area enhances individuals' ability to recognize societal issues, utilize digital platforms for meaningful interactions, and contribute constructively to online communities, ultimately fostering a culture of responsible and influence digital activism (Huang, 2024).

H1a. Digital Citizenship Education influence on Digital Privacy Awareness

H1b. Digital Citizenship Education influence on participation in Digital Social Campaigns

2.3. Technological Literacy Ability

Dyrenfurth and Kozak (1991) define that Technological Literacy Ability refers to an individual's capacity to effectively understand, use, and adapt to digital technologies in various contexts. It encompasses skills related to operating digital devices, navigating online platforms, critically assessing digital content, and utilizing technology for problem-solving and communication. A high level of technological literacy enables individuals to engage safely, ethically, and efficiently in digital environments while continuously adapting to technological advancements (Cetindamar Kozanoglu & Abedin, 2021).

Technological Literacy Ability significantly influences Digital Privacy Awareness by enhancing individuals' understanding of online security risks and privacy management (S. Choi, 2023; Nikou et al., 2022; Prince et al., 2024). Those with higher technological literacy are more capable of recognizing potential cyber threats, understanding data encryption, setting up strong privacy controls, and protecting personal information across digital platforms. This ability fosters a proactive approach to digital safety, encouraging individuals to adopt secure online behaviors and minimize exposure to data breaches and identity theft (Kapoor et al., 2024, pp. 449–477; Muawanah et al., 2024).

Technological Literacy Ability also plays a crucial role in influencing participation in Digital Social Campaigns (Anthonysamy & Sivakumar, 2022; Mei, 2024; Zhang et al., 2024). Individuals with strong technological literacy can effectively utilize digital tools, social media, and online platforms to engage in advocacy, raise awareness, and contribute to digital activism. Their ability to navigate digital spaces allows them to access and share information, collaborate with like-minded individuals, and amplify social causes, ultimately increasing their engagement in meaningful online campaigns and social movements (A. Kumar & Haneef, 2023).

H2a. Technological Literacy Ability influence on Digital Privacy Awareness

H2b. Technological Literacy Ability influence on participation in Digital Social Campaigns

2.4. Digital Privacy Awareness

Affonso and Sant'Ana (2018) assess that Digital Privacy Awareness encompass an individual's understanding of the importance of protecting personal information and maintaining security while engaging in digital environments. It involves recognizing potential threats such as data breaches, identity theft, and unauthorized access, as well as implementing privacy-enhancing measures like secure passwords, encryption, and cautious information sharing. A high level of digital privacy awareness enables individuals to navigate the digital world responsibly, ensuring their safety and ethical digital interactions (Flyverbom et al., 2019).

Digital Privacy Awareness plays a crucial role in shaping an individual's Digital Citizenship Literacy Ability (Bouzguenda et al., 2019; Cetindamar Kozanoglu & Abedin, 2021; Junaedi et al., 2024). When individuals are aware of privacy risks and protective measures, they become more responsible digital users, making informed decisions about their online activities. This awareness enhances their ability to critically assess digital information, engage safely in online interactions, and contribute positively to digital communities. As a result, individuals with strong digital privacy awareness tend to demonstrate higher competence in digital citizenship literacy.

Digital Privacy Awareness serves as a key mediator in the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability. Education in digital citizenship equips individuals with foundational knowledge about ethical and responsible digital engagement, but privacy awareness strengthens this learning by emphasizing the importance of safeguarding personal data (Alenezi & Alfaleh, 2024). When individuals internalize privacy principles through digital citizenship education, they develop a more comprehensive understanding of digital literacy, leading to improved digital citizenship literacy ability. Digital Privacy Awareness also mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability. While technological literacy enables individuals to effectively use digital tools and navigate online spaces, privacy awareness ensures that these

skills are applied responsibly (Anurogo et al., 2023; Huang, 2024). Individuals with high technological literacy who also possess strong privacy awareness are more likely to practice safe digital behaviors, critically evaluate online information, and contribute positively to digital communities. Thus, privacy awareness enhances the transition from mere technological proficiency to responsible and informed digital citizenship.

H3. Digital Privacy Awareness influence on Digital Citizenship Literacy Ability

H3a. Digital Privacy Awareness mediate the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability

H3b. Digital Privacy Awareness mediate the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability

2.5. Participation in Digital Social Campaigns

Lilleker and Koc-Michalska (2018) explain that Participation in Digital Social Campaigns is an individual's engagement in online initiatives aimed at raising awareness, advocating for social issues, and fostering positive change through digital platforms. This participation can take various forms, such as sharing informational content, signing petitions, joining online discussions, or actively contributing to digital activism efforts. Engaging in digital social campaigns allows individuals to exercise their digital rights, enhance their civic responsibilities, and contribute to collective problem-solving in digital spaces (Herani & Pranandari, 2024).

Participation in Digital Social Campaigns significantly enhances an individual's Digital Citizenship Literacy Ability (Moon & Bai, 2020; Pangrazio & Sefton-Green, 2021). Actively engaging in digital advocacy or social movements fosters a deeper understanding of online ethics, responsible digital behavior, and effective communication within digital communities. Individuals who participate in digital social campaigns develop critical thinking skills, digital collaboration abilities, and an awareness of societal issues, all of which contribute to a higher level of digital citizenship literacy.

Participation in Digital Social Campaigns mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy

Ability by providing a practical application of digital citizenship principles. While digital citizenship education equips individuals with theoretical knowledge about responsible digital engagement, participation in social campaigns reinforces this knowledge through real-world experiences. By actively engaging in digital advocacy and discussions, individuals solidify their digital literacy skills and develop a stronger sense of digital responsibility.

Participation in Digital Social Campaigns also mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability. While technological literacy enables individuals to effectively use digital tools and platforms, participation in social campaigns transforms these technical skills into meaningful digital engagement. Individuals with high technological literacy who actively participate in social campaigns develop a more profound understanding of digital ethics, online collaboration, and responsible digital communication, ultimately enhancing their digital citizenship literacy ability.

H4. Participation in Digital Social Campaigns influence on Digital Citizenship Literacy Ability

H4a. Participation in Digital Social Campaigns mediate the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability

H4b. Participation in Digital Social Campaigns mediate the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability

In addition, Fig. 2 illustrates the conceptual framework of this study, highlighting the relationships among key variables in understanding digital citizenship literacy ability. The framework positions Digital Citizenship Literacy Ability as the dependent variable, influenced by two independent variables: Digital Citizenship Education and Technological Literacy Ability. Additionally, two mediating variables, Digital Privacy Awareness and Participation in Digital Social Campaigns, are introduced to explain the indirect effects of the independent variables on the dependent variable. This model provides a structured approach to analyzing how education and technological proficiency contribute to digital citizenship literacy through privacy awareness and active engagement in digital social initiatives.

Based on the conceptual framework, this study seeks to answer
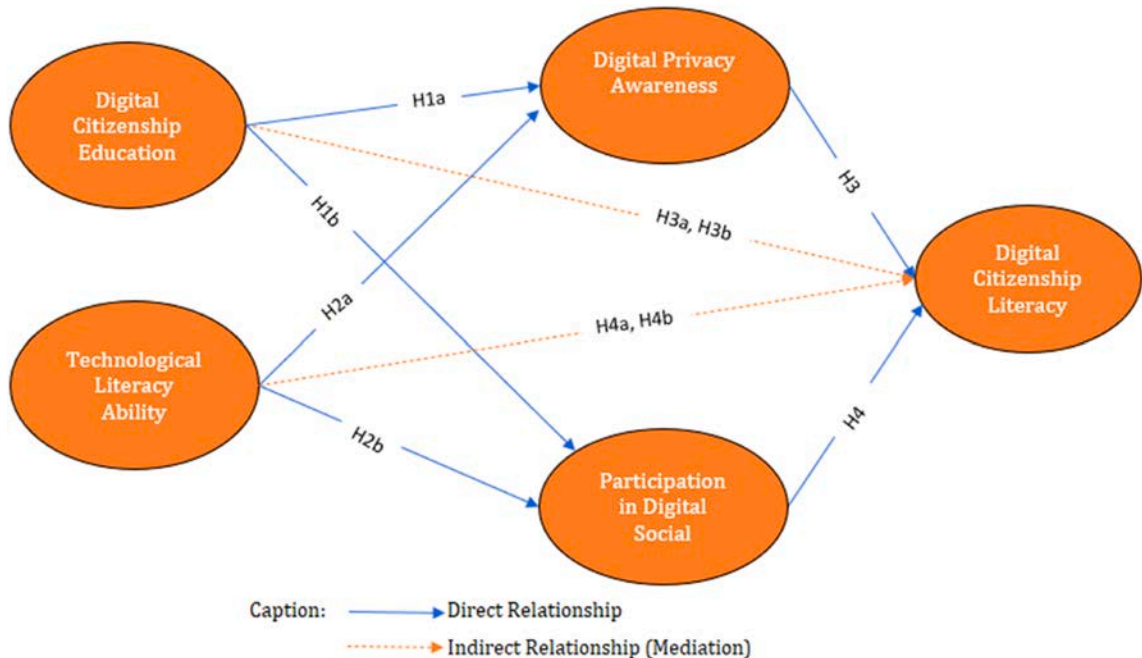

Fig. 2. Conceptual framework.

several key questions.

- How does Digital Citizenship Education influence digital citizenship literacy?This question aims to evaluate the extent to which digital citizenship education—covering domains such as privacy awareness, digital security, and participatory engagement—can enhance individuals' competencies in acting responsibly in digital environments.
- How does technological literacy affect digital citizenship literacy? This question explores whether technical skills in using digital tools (e.g., devices, applications, social media platforms) significantly contribute to shaping an individual's capacity to practice digital citizenship, especially in ethical, legal, and participatory aspects.
- Does Digital Privacy Awareness mediate the relationship between Digital Citizenship Education and digital citizenship literacy?This question seeks to determine whether awareness of digital privacy serves as a key mediator that connects digital citizenship education with the development of practical digital citizenship skills in everyday life.
- Does participation in digital social campaigns mediate the relationship between technological literacy and digital citizenship literacy? This question focuses on socially-driven digital activities and examines whether active participation in such campaigns strengthens or mediates the link between technological abilities and digital citizenship understanding and practices.
- What are the key challenges in improving digital citizenship literacy among the younger generation, and what policies can be recommended to address them?This question is reflective and policy-oriented, aiming to identify structural, psychosocial, and pedagogical barriers to advancing digital citizenship literacy, and to provide research-based recommendations for educators and policymakers.

3. Methodology

3.1. Research design

This study employed a quantitative approach with a causal research design, aiming to analyze the relationship between Digital Citizenship Education and Technological Literacy Ability on Digital Citizenship Literacy Ability, with Digital Privacy Awareness and Participation in Digital Social Campaigns as mediating variables. This approach was chosen because it allowed for an empirical measurement of causal relationships between variables using quantitative data obtained from respondents. By employing a causal design, this study provided a deeper understanding of the factors influencing digital citizenship literacy among high school students. This study was cross-sectional, where data was collected within a specific period to capture the current state of digital citizenship literacy. Data collection was conducted over two months, from November to December 2024, using questionnaires distributed to selected respondents.

The sample size of 250 was deemed adequate for the purposes of this study based on power analysis using G*Power 3.1.9.7. For a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, with an anticipated medium effect size ($f^2 = 0.15$), an alpha level of 0.05, and statistical power of 0.95, the minimum required sample size was approximately 138 for a model with three predictors (as in this study). Therefore, the actual sample of 250 not only meets but exceeds the minimum threshold, enhancing the robustness and generalizability of the findings within the defined population. Moreover, this sample size supports the reliability of the model estimation and reinforces confidence in the structural relationships tested. While the results are primarily generalizable to digitally connected high school students in Jakarta, the diversity of the sample enhances the potential transferability of the findings to similar urban populations in Indonesia and Southeast Asia.

3.2. Population and sample

The population of this study consisted of high school students in Jakarta, as this age group (15–18 years old) represents the younger generation actively using digital technology and social media in their daily lives. Jakarta was selected as the research location due to its high internet penetration rate and the diversity in education levels and access to technology, which reflect broader conditions of digital citizenship literacy. A *purposive sampling* method was applied to ensure that the selected sample comprised high school students with access to and experience in using digital technology. A total of 250 students from several high schools in Jakarta participated in this study, considering factors such as school type (public and private). The data collection was conducted between November and December 2024 using a paper-based survey administration mode. The survey was completed in classrooms under the direct supervision of trained research assistants and school-teachers to ensure standardized administration. Each session lasted approximately 30–45 min, and students were instructed to complete the questionnaire independently without discussing their responses with peers. This controlled environment was implemented to maintain the integrity and reliability of the data collected and to reduce potential social desirability or peer-influenced bias.

3.3. Variable measurement

To ensure the robustness of the research instrument, the questionnaire items were meticulously developed based on a theoretical framework that combines global standards of digital citizenship adapted from Kumar and Kothari (2018) with contextual considerations relevant to the Indonesian digital landscape (see Appendix 1). This approach ensured both theoretical rigor and cultural relevance. Subject matter experts were involved in the item development process to evaluate content validity. Their review ensured that each item accurately reflected the conceptual definitions of the variables and adequately represented the constructs being measured. Additionally, care was taken to formulate each statement in a clear, accessible, and culturally sensitive manner, reducing the potential for misinterpretation among respondents.

Beyond expert validation, construct validity was assessed statistically through item-total correlation analysis. All items demonstrated corrected item-total correlation coefficients above the critical threshold ($r > 0.458$), indicating that each item meaningfully contributed to the internal consistency of its respective construct (see Appendix 2). This empirical evidence affirms the structural coherence of the questionnaire, supporting the alignment between theoretical dimensions and measured indicators. Coupled with reliability testing, these results provide strong assurance that the instrument is both conceptually valid and psychometrically sound.

The variables in this study were measured using a structured questionnaire employing a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Respondents were asked to indicate their level of agreement with statements covering five key domains: Digital Citizenship Education, Technological Literacy, Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy. Each variable was operationalized through multiple indicators that reflected the main dimensions of the construct. Notably, the instrument focused on capturing self-perceptions, attitudes, and perceived competencies rather than observable behaviors. Thus, the data reflect subjective responses, which may not perfectly represent respondents' actual digital practices.

A pilot test involving 30 respondents was conducted prior to the main study to assess the psychometric quality of the instrument. The results revealed that all questionnaire items achieved r-values greater than the r-table value of 0.458 at a 0.05 significance level (Zohrabi, 2013), confirming their validity. Moreover, the internal consistency reliability test using Cronbach's Alpha yielded values exceeding 0.79,

with several scales surpassing 0.9—indicating excellent reliability. These findings affirm that the instrument is both valid and reliable, making it a dependable tool for collecting data in the main research phase.

3.4. Data analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS software. This method was selected as it effectively analyzed relationships between variables in complex research models, including direct and indirect effects through mediating variables. PLS-SEM was also suitable for studies with relatively small sample sizes and could handle data that was not perfectly normally distributed (Hair Jr et al., 2020). The data analysis process involved several stages, including evaluating the measurement model (*outer model*) to test the validity and reliability of the research instrument and evaluating the structural model (*inner model*) to examine the relationships between variables as formulated in the research hypotheses (Chin, 2010). To ensure the robustness of the statistical estimates, bootstrapping with 5000 subsamples was performed, providing standard errors, t-statistics, and p-values for hypothesis testing. By employing PLS-SEM, this study provided comprehensive results in understanding the contributing factors to digital citizenship literacy among high school students in Jakarta.

In employing PLS-SEM, this study acknowledges that while the method allows for the testing of complex predictive relationships among constructs, it does not establish deterministic causality. The analysis emphasizes directional associations based on theoretical underpinnings and validated measurement models. Given that the data is cross-sectional and based on self-reported responses, the findings should be interpreted with caution regarding causal inference. Nonetheless, the use of bootstrapping procedures, along with high construct reliability and validity, strengthens the empirical support for the proposed relationships. This analytical approach aligns with recent methodological practices in social sciences, where PLS-SEM is widely adopted for theory testing and exploratory modeling in emerging research contexts.

3.5. Ethical considerations

This study was conducted in accordance with ethical principles for social and educational research. All research procedures were designed to ensure participant confidentiality, anonymity, and protection of individual rights. Participation was entirely voluntary, and no form of coercion was involved. Prior to completing the questionnaire, each respondent was provided with a written explanation of the research objectives, their right to withdraw at any time without penalty, and assurance that their data would be used solely for academic purposes. Informed consent was obtained at the beginning of the online questionnaire. This research received ethical approval from Universitas Negeri Jakarta ethic committee, with Ethical Approval Code: No. 211/ UNJ/XI/2024, indicating that the study met the applicable ethical standards, including data confidentiality, the principle of do-no-harm, and respect for participant autonomy. The researchers also adhered to the Research Ethics Code in accordance with the guidelines of Indonesian Educational Research Ethics Code, which includes responsibilities to participants, methodological transparency, and scientific integrity in reporting results.

4. Results and finding

4.1. Descriptive statistics

The respondent distribution in Appendix 3 provides an overview of the demographic characteristics of the 250 participants in this study. In terms of gender, the sample consisted of 120 male respondents (48 %) and 130 female respondents (52 %), ensuring a balanced representation.

Regarding age distribution, the majority of respondents were 16 years old (32 %), followed by 17-year-olds (28 %), 15-year-olds (24 %), and 18-year-olds (16 %). This distribution reflects a broad coverage of high school students at different stages of their education. The school type category indicates that 150 respondents (60 %) attended public schools, while 100 respondents (40 %) came from private schools. This suggests a higher participation rate from students enrolled in government-funded educational institutions. In terms of regional distribution, the highest number of respondents were from South Jakarta (24 %), followed by West Jakarta (22 %), Central Jakarta (20 %), North Jakarta (18 %), and East Jakarta (16 %). This spread ensures that the study captures perspectives from students across different areas of Jakarta, contributing to a more comprehensive analysis.

Based on the descriptive analysis in Table 1, all variables measured in this study have high mean values, ranging from 4.268 to 4.352, on a scale of 2–5. This indicates that most respondents tend to provide positive assessments of the various aspects examined in this study. For the Digital Citizenship Education (DCE) variable, the mean values range from 4.280 to 4.344, with standard deviations between 0.603 and 0.616. This suggests that respondents have a relatively high understanding of digital citizenship education, with a fairly uniform data distribution and no significant variation.

In the Technological Literacy Ability (TLA) variable, the mean values range from 4.280 to 4.324, with standard deviations between 0.591 and 0.616. These results indicate that most respondents feel they have a good level of technological literacy, with a relatively consistent distribution. Meanwhile, the Digital Privacy Awareness (DPA) variable has mean values ranging from 4.276 to 4.348, with standard deviations between 0.598 and 0.617. This suggests that awareness of digital privacy is quite high among respondents, although there is slight variation in the distribution of responses.

For the Participation in Digital Social Campaigns (PIDS) variable, the mean values range from 4.280 to 4.348, with standard deviations between 0.600 and 0.616. This indicates that participation in digital social campaigns is relatively strong, with responses showing little variation. Lastly, the Digital Citizenship Literacy Ability (DCL) variable has mean values between 4.268 and 4.352, with standard deviations ranging from 0.601 to 0.618. These results suggest that the level of digital citizenship

Table 1
Descriptive statistics.

Variable	Items	No. of Obs.	Min	Max	Mean	Median	Std. Dev.
Digital Citizenship Education	DCE1	250	2	5	4.344	4	0.603
	DCE2	250	2	5	4.324	4	0.597
	DCE3	250	2	5	4.316	4	0.608
	DCE4	250	2	5	4.292	4	0.607
	DCE5	250	2	5	4.280	4	0.616
Technological Literacy Ability	TLA1	250	2	5	4.324	4	0.597
	TLA2	250	2	5	4.304	4	0.591
	TLA3	250	2	5	4.316	4	0.608
	TLA4	250	2	5	4.292	4	0.607
	TLA5	250	2	5	4.280	4	0.616
Digital Privacy Awareness	DPA1	250	2	5	4.348	4	0.604
	DPA2	250	2	5	4.328	4	0.598
	DPA3	250	2	5	4.324	4	0.617
	DPA4	250	2	5	4.296	4	0.608
	DPA5	250	2	5	4.276	4	0.614
Participation in Digital Social Campaigns	PIDS1	250	2	5	4.348	4	0.604
	PIDS2	250	2	5	4.336	4	0.600
	PIDS3	250	2	5	4.316	4	0.615
	PIDS4	250	2	5	4.292	4	0.607
	PIDS5	250	2	5	4.280	4	0.616
Digital Citizenship Literacy Ability	DCL1	250	2	5	4.352	4	0.605
	DCL2	250	2	5	4.316	4	0.601
	DCL3	250	2	5	4.296	4	0.615
	DCL4	250	2	5	4.284	4	0.611
	DCL5	250	2	5	4.268	4	0.618

literacy is relatively high among respondents, though there is some minor variation in data distribution. Overall, the descriptive analysis results indicate that respondents have a high level of understanding and awareness of digital citizenship, technological literacy, and digital privacy. Additionally, they are quite active in digital social campaigns. The relatively small variations in standard deviation suggest that responses were fairly consistent across all variables.

4.2. Validity and reliability

The results of the Confirmatory Factor Analysis (CFA) strongly support the convergent validity of the constructs measured in this study (see Appendix 4). All indicator loadings exceeded the recommended threshold of 0.70, with most items demonstrating loadings above 0.87, indicating that each item is a strong representative of its respective latent construct. High outer loadings suggest that the items are both statistically and conceptually aligned with the theoretical definitions of the constructs such as Digital Citizenship Education, Technological Literacy Ability, Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy Ability. These findings confirm that the measurement model exhibits a robust factor structure and that each indicator significantly contributes to explaining its construct.

In terms of convergent validity, the Average Variance Extracted (AVE) values for all constructs substantially exceeded the minimum threshold of 0.50, with values ranging from 0.804 to 0.833. These results indicate that more than 80 % of the variance in the indicators is explained by the underlying constructs, affirming the internal consistency of the model. High AVE values demonstrate that the indicators within each construct share a large amount of common variance, which reinforces the validity of the latent variables. This level of AVE reflects the precision with which the constructs were defined and measured in this study.

The reliability of each construct was further confirmed through high values of Cronbach's Alpha, rho_A, and Composite Reliability (CR). All reliability indices exceeded 0.93, with most surpassing 0.95, far above the commonly accepted threshold of 0.70. These consistently high scores across all three metrics indicate excellent internal consistency among the indicators of each construct. This means that the items used to measure each latent variable are not only reliable but also stable and replicable across similar studies or populations. Such high reliability scores suggest that the constructs are robust and that measurement error is minimal.

Taken together, the CFA results provide compelling evidence that the instrument used in this study is both valid and reliable. The indicators were carefully designed and empirically tested, resulting in a measurement model with strong psychometric properties. The high outer loadings, substantial AVE values, and excellent reliability statistics collectively demonstrate that the instrument is capable of capturing the underlying constructs accurately and consistently. This level of validity and reliability ensures that the data collected can be confidently used for further structural modeling or hypothesis testing. However, the CFA confirms that the five constructs measured—Digital Citizenship Education, Technological Literacy Ability, Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy Ability—are empirically sound and conceptually distinct.

Moreover, Discriminant validity was assessed using both the Fornell-Larcker criterion and the HTMT ratio (see Tables 2 and 3). The square roots of AVE values for each construct exceeded the inter-construct correlations, fulfilling the Fornell-Larcker criterion. Additionally, all HTMT values were below the threshold of 0.85, indicating strong discriminant validity and confirming that the constructs measured distinct concepts (Henseler et al., 2015).

In addition, the f^2 value is used to measure the effect of each predictor construct on the dependent construct, while R^2 indicates the proportion of variance in the dependent construct that can be explained by the predictor constructs (see Table 4). The Coefficient of Determination (R^2) and Effect Size (f^2) values provide insight into the strength and explanatory power of the model. The R^2 values show that 45 % of the variance in Digital Privacy Awareness (DPA) is explained by Digital Citizenship Education (DCE), and 39 % of the variance in Participation in Digital Social Campaigns (DSC) is also explained by DCE. Moreover, 56 % of the variance in Digital Citizenship Literacy Ability (DCLA) can be explained by DPA, indicating a strong predictive relationship. In terms of f^2, DCE has a medium effect size (0.28) on DPA and a medium effect (0.22) on DSC. Technological Literacy Ability (TLA) shows a small to medium effect (0.17) on DPA and a small effect (0.09) on DSC. The strongest effect is observed from DPA to DCLA, with a large effect size of 0.35, while DSC has a small effect (0.04) on DCLA. These results suggest that DCE and DPA play significant roles in predicting digital citizenship literacy, with DPA emerging as the most influential mediator.

4.3. Path analysis

The path analysis results indicate significant relationships between several constructs in the study (see Table 5 and Fig. 3). The first hypothesis (H1a) stated that digital citizenship education influences digital privacy awareness. The findings support this hypothesis, as digital citizenship education positively influenceed students' awareness of digital privacy (β = 0.472, p = 0.005). Similarly, the second hypothesis (H1b) proposed that digital citizenship education influences participation in digital social campaigns. The results confirm this relationship, showing that students with a strong foundation in digital citizenship education were more likely to engage in digital social campaigns (β = 0.499, p = 0.002).

Furthermore, the analysis supports H1c, which examined the effect of technological literacy ability on digital privacy awareness. The findings indicate a significant positive relationship, suggesting that students with higher technological literacy ability demonstrated greater awareness of digital privacy (β = 0.524, p = 0.002). Additionally, H2b tested whether technological literacy ability influences participation in digital social campaigns. This hypothesis is supported, as students with higher technological literacy ability were more engaged in digital social campaigns (β = 0.497, p = 0.002).

Moreover, H3 tested the influence of digital privacy awareness on digital citizenship literacy ability. The results confirm this hypothesis, indicating that digital privacy awareness plays a crucial role in shaping students' digital citizenship literacy ability (β = 0.741, p = 0.000). However, H4, which proposed a relationship between participation in digital social campaigns and digital citizenship literacy ability, was rejected (β = 0.248, p = 0.184). This suggests that participation in digital social campaigns does not significantly contribute to the

Table 2
Fornell-Larcker criterion.

Constructs	DCE	TLA	DPA	DSC	DCL
Digital Citizenship Education (DCE)	**0.78**				
Technological Literacy Ability (TLA)	0.62	**0.8**			
Digital Privacy Awareness (DPA)	0.55	0.6	**0.76**		
Digital Social Campaign (DSC)	0.51	0.56	0.52	**0.79**	
Digital Citizenship Literacy (DCL)	0.58	0.64	0.59	0.6	**0.81**

Table 3
HTMT ratio.

Constructs	DCE	TLA	DPA	DSC	DCL
Digital Citizenship Education (DCE)	–				
Technological Literacy Ability (TLA)	0.73	–			
Digital Privacy Awareness (DPA)	0.69	0.72	–		
Digital Social Campaign (DSC)	0.74	0.67	0.76	–	
Digital Citizenship Literacy (DCL)	0.71	0.68	0.65	0.7	–

Table 4
Coefficient of determination (R^2) and effect size (f^2).

Endogenous Variable*)	Predictors	R^2	f^2 (Cohen)	Effect Size Interpretation
DPA	DCE	0.45	0.28	Medium
DPA	TLA	–	0.17	Small to Medium
DSC	DCE	0.39	0.22	Medium
DSC	TLA	–	0.09	Small
DCLA	DPA	0.56	0.35	Large
DCLA	DSC	–	0.04	Small

*)DCE = Digital Citizenship Education; TLA = Technological Literacy Ability: DPA = Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL = Digital Citizenship Literacy Ability.

development of digital citizenship literacy ability.

Overall, five hypotheses were supported, confirming the importance of digital citizenship education and technological literacy ability in enhancing digital privacy awareness and participation in digital social campaigns. However, the findings also highlight that participation in digital social campaigns does not directly influence digital citizenship literacy ability, suggesting that other factors may play a more dominant role in shaping students' digital literacy.
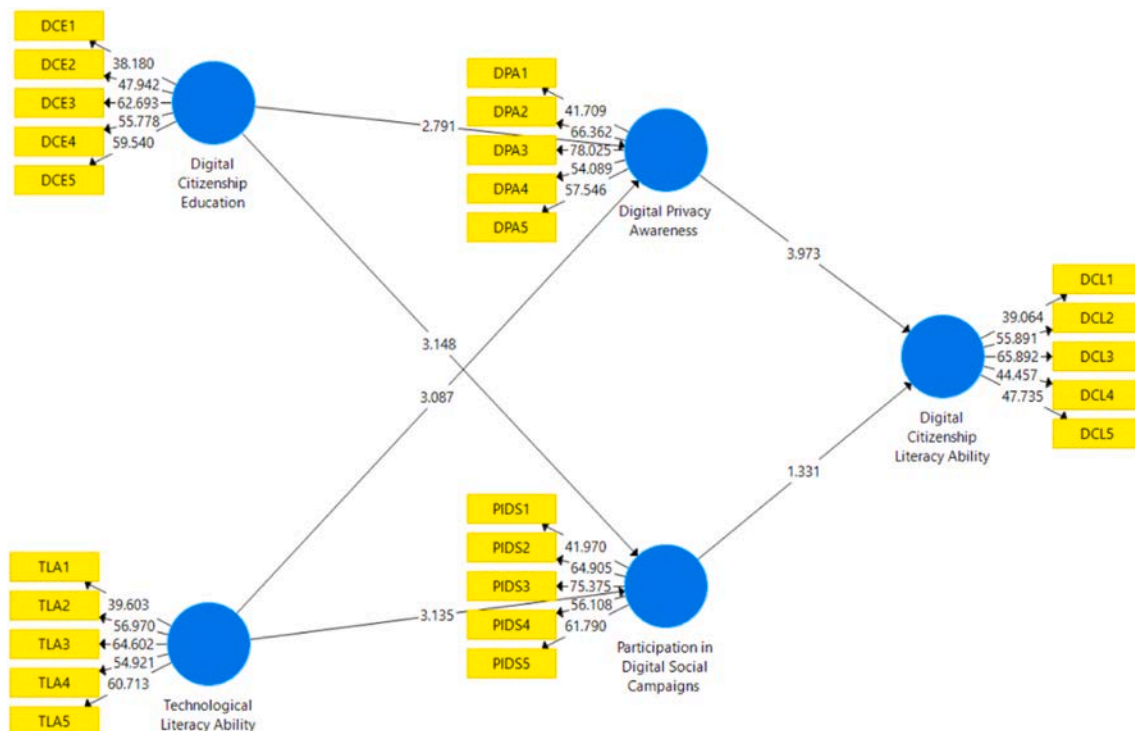
4.4. Mediation test

The mediation test results provide insights into the indirect relationships between the constructs (see Table 6). The first mediation hypothesis (H3a) proposed that digital privacy awareness mediates the relationship between digital citizenship education and digital citizenship literacy ability. The findings support this hypothesis ($\beta = 0.350$, p = 0.006), indicating that digital privacy awareness plays a significant role in strengthening the effect of digital citizenship education on digital citizenship literacy ability. Similarly, H3b tested whether digital privacy awareness mediates the relationship between technological literacy ability and digital citizenship literacy ability. This hypothesis is also supported ($\beta = 0.388$, p = 0.044), suggesting that students with higher technological literacy ability are more likely to develop digital citizenship literacy ability through improved digital privacy awareness.

However, not all mediation hypotheses were supported. H4a examined whether participation in digital social campaigns mediates the relationship between digital citizenship education and digital citizenship literacy ability. The results indicate that this mediation effect is not significant ($\beta = 0.124$, p = 0.289), leading to the rejection of this hypothesis. Similarly, H4b, which tested whether participation in digital social campaigns mediates the relationship between technological literacy ability and digital citizenship literacy ability, was also rejected ($\beta = 0.123$, p = 0.150). These findings suggest that while digital privacy

Table 5
Path analysis result.

Hypothesis	Construct*)	β	STDEV	T Statistics	P Values	Result
H1a	DCE - > DPA	0.472	0.169	2.791	0.005	Supported
H1b	DCE - > PIDS	0.499	0.158	3.148	0.002	Supported
H1c	TLA - > DPA	0.524	0.170	3.087	0.002	Supported
H2b	TLA - > PIDS	0.497	0.158	3.135	0.002	Supported
H3	DPA - > DCL	0.741	0.186	3.973	0.000	Supported
H4	PIDS - > DCS	0.248	0.186	1.331	0.184	Rejected

*)DCE = Digital Citizenship Education; TLA = Technological Literacy Ability: DPA = Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL = Digital Citizenship Literacy Ability.

Fig. 3. PLS-SEM construct.

Table 6
Mediation test result.

Hypothesis	Construct*)	β	STDEV	T Statistics	P Values	Result
H3a	DCS - > DPA - > DCL	0.350	0.128	2.744	0.006	Supported
H3b	TLA - > DPA - > DCL	0.388	0.192	2.020	0.044	Supported
H4a	DCS - > PIDS - > DCL	0.124	0.116	1.062	0.289	Rejected
H4b	TLA - > PIDS - > DCL	0.123	0.085	1.441	0.150	Rejected

*)DCE = Digital Citizenship Education; TLA = Technological Literacy Ability: DPA = Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL = Digital Citizenship Literacy Ability.

awareness serves as an effective mediator, participation in digital social campaigns does not significantly enhance the link between digital citizenship education, technological literacy ability, and digital citizenship literacy ability.

5. Discussion

The results demonstrate that Digital Citizenship Education plays a crucial role in boosting both Digital Privacy Awareness and engagement in Digital Social Campaigns. Likewise, Technological Literacy Ability shows a positive association with these two outcomes. Notably, Digital Privacy Awareness not only contributes directly to improving Digital Citizenship Literacy Ability, but also functions as a mediating variable linking both DCE and TLA to DCLA. On the other hand, Participation in Digital Social Campaigns does not exhibit a significant direct effect on Digital Citizenship Literacy Ability, nor does it mediate any of the key relationships examined in this study.

Previous studies in the Indonesian context, such as those by Nugroho (2020) and Raharjo (2022), often emphasize the role of digital access and infrastructure as primary drivers of digital citizenship. In contrast, this study shifts the focus toward the cognitive and ethical dimensions, particularly privacy. While existing local literature tends to treat privacy as a peripheral topic, this research positions it as a central mediator. This divergence highlights the need to reframe digital literacy discussions in Indonesia beyond technical usage and toward critical awareness and ethical responsibility.

In light of these findings, it is recommended that Indonesia's Ministry of Communication and Information Technology (Kominfo) revise its national digital literacy framework to prioritize digital privacy education. Specifically, the curriculum structure should assign at least 60 % weight to privacy and ethical considerations, while technical and campaign-based components should be integrated as supporting elements. Additionally, collaborations between Kominfo, the Ministry of Education, and digital literacy NGOs should focus on developing privacy-centered learning modules, simulation-based workshops, and educator training that emphasize individual agency and responsible data behavior in digital environments.

The acceptance of Hypothesis H1a, which posits that Digital Citizenship Education positively influences Digital Privacy Awareness, aligns with prior studies conducted in various countries. Research by Pangrazio and Sefton-Green (2021) and Falloon (2020) in Australia demonstrated that structured digital citizenship education significantly improves individuals' awareness of online privacy and security. Similarly, studies in China, such as the work by Lo et al. (2024), found that digital literacy programs in schools directly contributed to an increased understanding of personal data protection among students. These findings indicate that structured education about digital citizenship fosters better privacy awareness, as individuals become more conscious of the risks and necessary precautions in digital environments.

The acceptance of H1b, which states that Digital Citizenship Education influences participation in Digital Social Campaigns, is consistent with prior empirical findings. For instance, research by Peart et al. (2024) in United Kingdom highlighted that individuals exposed to digital citizenship curricula are more likely to engage in online advocacy and social movements. This relationship is explained by the

empowerment gained through digital education, enabling individuals to understand their roles and responsibilities in the digital sphere. The ability to critically assess online information and engage in digital activism is facilitated by structured education, which equips individuals with the necessary knowledge and skills.

Hypothesis H2a, which confirms that Technological Literacy Ability influences Digital Privacy Awareness, resonates with studies conducted in South Asia and Europe. For example, a study by Park (2019) in the United States found that individuals with higher technological literacy are more adept at recognizing privacy threats, leading to better online security practices. Similarly, research by Usman et al. (2024, p. 31) in Pakistan suggests that technological competence enables users to navigate privacy settings effectively, reducing their vulnerability to data breaches. These findings underscore the importance of technical skills in fostering a proactive approach to digital privacy management.

The acceptance of H2b, indicating that Technological Literacy Ability influences on Participation in Digital Social Campaigns, is corroborated by previous research. Studies by Sanders and Scanlon (2021) and von Gillern et al. (2024) in the United States of America suggest that individuals with greater technological proficiency are more likely to engage in online activism, as they can effectively utilize digital platforms for advocacy. In addition, McInroy (2021) found that students with advanced technological skills were more engaged in social media-driven campaigns on environmental and political issues. This highlights the role of technological literacy in enabling individuals to participate meaningfully in digital civic engagement.

The acceptance of H3, which identifies a significant association between Digital Privacy Awareness and Digital Citizenship Literacy Ability, is supported by existing literature. A study by Fernández-Prados et al. (2021) in Spain found that individuals with high privacy awareness tend to possess a deeper understanding of digital citizenship concepts. This is because privacy-conscious individuals are more inclined to critically evaluate online interactions, ethical considerations, and responsible digital behaviors. Such findings reinforce the notion that digital privacy awareness is a crucial component of comprehensive digital citizenship literacy.

The mediation effect proposed in H3a, wherein Digital Privacy Awareness mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability, aligns with prior empirical studies. Research by Vajen et al. (2023) in Germany and Hongkong demonstrated that structured digital citizenship education programs not only enhance privacy awareness but also indirectly strengthen overall digital literacy. This occurs because privacy education fosters a heightened sense of responsibility, critical thinking, and ethical digital engagement, which are key elements of digital citizenship literacy.

Similarly, the acceptance of H3b, which states that Digital Privacy Awareness mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability, is consistent with previous research. Studies by Acquisti et al. (2020) in the United States of America found that technological literacy alone does not guarantee responsible digital citizenship; instead, privacy awareness serves as a crucial intermediary factor. Without privacy awareness, individuals with high technological skills may use digital platforms without sufficient ethical consideration, thereby limiting their overall digital literacy.

In contrast, the rejection of H4, which hypothesized that Participation in Digital Social Campaigns influences Digital Citizenship Literacy Ability, challenges some assumptions in the field. While studies such as those by Sharma et al. (2024) and Winarnita et al. (2022) suggested that online activism contributes to civic engagement, the present findings indicate that mere participation in digital campaigns does not necessarily translate to broader digital citizenship literacy. One potential explanation is that individuals engage in online activism passively or with limited depth of engagement, without gaining deeper insights into digital ethics, rights, and responsibilities.

The rejection of H4a, which posited that Participation in Digital Social Campaigns mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability, further substantiates the argument that online activism alone does not foster digital literacy. Research by Martzoukou et al. (2020) suggests that while digital education may encourage online engagement, the quality of participation matters more than mere involvement. If participation lacks critical reflection and deep engagement, it fails to contribute meaningfully to digital citizenship literacy.

Similarly, the rejection of H4b, which proposed that Participation in Digital Social Campaigns mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability, aligns with prior research questioning the effectiveness of digital activism in enhancing literacy. Studies by Al-Mulla et al. (2022) found that digital participation, particularly in social media-driven campaigns, often remains at a surface level, with limited influence on users' broader digital competencies. This finding suggests that while technological skills enable participation, they do not necessarily enhance critical digital citizenship literacy.

Overall, these findings contribute to the existing body of research by reinforcing the role of education and technological literacy in shaping privacy awareness and digital literacy. However, they also highlight the limitations of digital activism in fostering deep digital citizenship competencies. Future research should explore qualitative dimensions of digital engagement, focusing on how different forms of participation contribute to meaningful digital literacy development. Additionally, policymakers should emphasize structured digital education programs that not only encourage online engagement but also cultivate critical thinking and ethical digital behavior.

These insights carry significant implications for both digital literacy education and policy development. By focusing on privacy awareness as a crucial mediator, educational institutions can design curricula that integrate digital ethics and security into broader digital literacy frameworks. Likewise, initiatives aimed at promoting digital citizenship should prioritize active and reflective engagement rather than merely encouraging participation in online campaigns. Future research should investigate how digital literacy interventions can be optimized to enhance both individual competencies and collective digital responsibility.

Although the study offers valuable insights into the relationships between Digital Citizenship Education, Technological Literacy Ability, and Digital Citizenship Literacy among high school students, its findings should be interpreted with caution due to the limited scope of the sample. Participants were drawn exclusively from urban schools in Jakarta, a region with high digital infrastructure and access. Consequently, the results may not accurately reflect the experiences or competencies of students in rural or underserved areas across Indonesia, where technological access, educational quality, and digital exposure may differ significantly. Therefore, future research should include more diverse samples across different regions to enhance the external validity and broader applicability of digital citizenship literacy interventions.

However, the Indonesian context offers a unique and valuable setting for this study. As one of the most populous countries in the Global South with one of the highest internet penetration rates in Southeast Asia, Indonesia presents a paradox of rapid digital adoption alongside persistent challenges in digital literacy and digital citizenship awareness. This juxtaposition provides critical insights into how digital education and literacy initiatives can be developed in emerging contexts. The findings thus contribute not only to the local discourse but also offer lessons for other developing nations experiencing similar transitions, reinforcing the relevance of this study beyond the Indonesian context.

From the researcher's perspective, the findings of this study reveal a compelling yet cautionary narrative. While digital citizenship education and technological literacy clearly contribute to privacy awareness and broader literacy competencies, the absence of a significant relationship between digital activism and literacy suggests a growing gap between digital participation and reflective engagement. As a researcher, I believe this highlights a concerning trend where students may equate frequent online involvement with informed digital citizenship, without critically evaluating the ethical or civic implications of their actions. This phenomenon warrants further attention, especially in educational contexts where participation is often celebrated without assessing the depth of understanding it fosters.

Reflecting critically on these results, I recognize the need to revisit current approaches in digital education. Educators and curriculum developers must not only teach students how to use digital tools effectively, but also to reflect on their responsibilities, the power structures behind digital platforms, and the long-term consequences of their online behavior. Personally, I am convinced that embedding digital ethics and critical media analysis more deeply into school curricula is not just beneficial—it is essential. Only through such intentional, reflective education can we cultivate truly literate digital citizens who are both competent and conscientious.

6. Conclusion

The findings of this study provide strong empirical support for the influence of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns. Digital Privacy Awareness is shown to be a key factor influencing Digital Citizenship Literacy Ability, serving as a significant mediator between Digital Citizenship Education and Technological Literacy Ability. However, contrary to expectations, Participation in Digital Social Campaigns does not significantly contribute to Digital Citizenship Literacy Ability, suggesting that active engagement in digital advocacy does not necessarily translate into a higher level of digital citizenship literacy.

The acceptance of hypotheses H1a, H1b, H2a, H2b, H3, H3a, and H3b indicates that Digital Privacy Awareness plays a crucial role in bridging the gap between education, technological literacy, and digital citizenship literacy. This aligns with previous research that highlights the importance of privacy consciousness in fostering responsible digital behavior. Meanwhile, the rejection of H4, H4a, and H4b suggests that participation in digital campaigns alone is insufficient to enhance digital literacy, implying that other factors such as content quality, critical thinking, or long-term engagement may be necessary for meaningful literacy development.

Overall, this study reinforces the significance of digital education and technological skills in promoting privacy awareness and responsible digital behavior. It also emphasizes the need for further exploration into the role of digital campaigns in shaping digital literacy, as their influence appears to be more complex than initially assumed.

6.1. Implications

From a practical standpoint, these findings highlight the necessity for educational institutions and policymakers to prioritize Digital Citizenship Education and Technological Literacy Ability as key components in curricula. By strengthening these areas, digital privacy awareness can be significantly improved, leading to more responsible and informed digital citizens. Additionally, organizations and educators should design

interventions that emphasize digital privacy education as a bridge toward enhancing digital literacy.

Furthermore, the findings suggest that participation in digital campaigns alone is not sufficient to improve digital literacy. Policymakers and educators should focus on strategies that integrate critical digital literacy skills, ensuring that campaign participation is accompanied by deeper learning experiences. This could involve interactive learning models, case studies, or simulations that encourage critical reflection and knowledge retention.

Beyond schools and policymakers, curriculum developers should consider revising existing educational frameworks to incorporate multidimensional digital citizenship competencies, including ethical reasoning, online safety, and civic engagement. The education industry, including ed-tech companies and training providers, can also play a vital role by creating learning platforms and tools that promote active, reflective digital behavior. Private sector stakeholders, particularly those in the digital and communication industries, are encouraged to collaborate with educators in developing content and outreach programs that support digital ethics, privacy awareness, and responsible participation in digital spaces. These cross-sectoral efforts are essential to building a comprehensive ecosystem where digital citizenship is not only taught but internalized, practiced, and continuously adapted to evolving technological landscapes.

6.2. Limitations and contributions

This study has several limitations that should be acknowledged. First, the study relied on self-reported survey data, which may be subject to social desirability bias and may not fully capture actual behavior or the complexity of digital practices. While the use of Partial Least Squares - Structural Equation Modeling (PLS-SEM) allowed the analysis of complex variable relationships, the correlational nature of the design limits the ability to draw definitive causal inferences. Future research could benefit from incorporating experimental or longitudinal approaches, behavioral tracking, or mixed-method designs to provide stronger empirical evidence and capture causal pathways more robustly. Second, the study focused on a specific demographic group—high school students in Jakarta—therefore generalizability to other populations or age groups should be approached with caution. Expanding the scope to diverse demographic and cultural contexts would offer a more comprehensive understanding of digital citizenship development.

Despite these limitations, this study makes significant contributions to the existing literature by empirically validating the role of Digital Privacy Awareness as a mediating factor in the development of digital citizenship literacy. In other hand, to minimize the bias, respondents were instructed to complete the questionnaire independently within a designated time frame, without discussion or influence from peers. This approach was intended to encourage honest and individual responses, reducing the likelihood of answers being shaped by group norms or peer suggestions. It also provides a critical reevaluation of the assumed benefits of digital social campaign participation, revealing that such involvement does not automatically enhance broader digital literacy. These findings offer practical insights for educators and policymakers, emphasizing the importance of structured digital citizenship education and privacy awareness in fostering responsible digital behavior. In doing so, this research lays the groundwork for future inquiries into the mechanisms and conditions under which digital engagement contributes meaningfully to civic and ethical participation online.

CRediT authorship contribution statement

Rossi Iskandar: Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Arifin Maksum:** Writing – original draft, Validation, Methodology, Conceptualization. **Arita Marini:** Writing – original draft, Validation, Methodology, Conceptualization.

Data availability statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. However, the data cannot be publicly shared due to ethical considerations and the protection of participants who are underage high school students. Requests for access to the data will be reviewed in accordance with privacy regulations, participant consent agreements, and the policies of the institution where the study was conducted.

Ethical statement and approval

This study was conducted in accordance with ethical standards and received approval from ethics committee, No. 211/UNJ/XI/2024, Approval Date: 12 November 2024. The research adhered to the ethical guidelines established by Universitas Negeri Jakarta ethic committee, ensuring the protection of participant rights and confidentiality throughout the study.

Declaration of competing interest

The authors declare no conflicts of interest related to this research.

Appendix 1. Questionnaire

Using a 5-point Likert scale.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

A. Digital Citizenship Education (DCE)

Instructions: Please indicate your level of agreement with the following statements about your understanding and exposure to digital citizenship education.

Code	Statement
DCE1	I understand the basic concept of digital citizenship.
DCE2	I have received formal education or training about digital citizenship.
DCE3	I am aware of the importance of ethics in using digital media.
DCE4	The digital citizenship education I received is relevant to current needs.
DCE5	I can explain the benefits of digital citizenship for society.

B. Technological Literacy Ability (TLA)

Instructions: Please assess your ability to use digital technology.

Code	Statement
TLA1	I can operate various technological devices such as computers and smartphones.
TLA2	I can use various digital applications for daily purposes.
TLA3	I am able to search and evaluate information from the internet effectively.
TLA4	I know how to safely store and organize data on digital devices.
TLA5	I can troubleshoot basic technical issues on my digital devices.

C. Digital Privacy Awareness (DPA)

Instructions: Please indicate your awareness of digital privacy issues.

Code	Statement
DPA1	I understand the importance of protecting personal information online.
DPA2	I always read privacy policies before using apps or websites.
DPA3	I use security features such as passwords or two-factor authentication.
DPA4	I am aware of the risks of sharing personal information on social media.
DPA5	I regularly check and adjust privacy settings on my digital accounts.

D. Participation in Digital Social Campaigns (PIDS)

Instructions: Please indicate the extent of your involvement in digital social campaigns.

Code	Statement
PIDS1	I have participated in online social campaigns (e.g., digital petitions, online donations).
PIDS2	I have created or shared content related to social campaigns through digital media.
PIDS3	I believe digital social campaigns have an influence on social change.
PIDS4	I actively express my views on social issues through social media.
PIDS5	I feel a sense of social responsibility as a digital citizen.

E. Digital Citizenship Literacy Ability (DCL)

Instructions: Please indicate your ability to practice digital citizenship.

Code	Statement
DCL1	I use the internet responsibly and respectfully.
DCL2	I can distinguish fake news from credible information.
DCL3	I respect others' digital rights when interacting online.
DCL4	I help maintain a safe and positive digital environment.
DCL5	I apply ethical values in all my digital activities.

Appendix 2. Validity Test Results (Corrected Item-Total Correlation)

No	Item Statement	Variable	Corrected Item-Total Correlation	Validity
1	I understand my rights and responsibilities as a digital citizen.	Digital Citizenship Education	0.621	Valid
2	Digital citizenship education helps me distinguish between accurate information and hoaxes online.	Digital Citizenship Education	0.684	Valid
3	I have gained a better understanding of ethics in online communication.	Digital Citizenship Education	0.703	Valid
4	I can recognize various cyber threats after receiving digital citizenship education.	Digital Citizenship Education	0.717	Valid
5	Digital citizenship education has increased my awareness of the importance of protecting personal data.	Digital Citizenship Education	0.682	Valid
6	I can effectively use various technological devices to search for and manage information.	Technological Literacy Ability	0.694	Valid
7	I am able to understand and troubleshoot common technical issues on my digital devices.	Technological Literacy Ability	0.728	Valid
8	I have skills in using software or applications to enhance productivity.	Technological Literacy Ability	0.711	Valid
9	I can assess the security of a website or application before using it.	Technological Literacy Ability	0.677	Valid
10	I understand the influence of technology on the social and economic aspects of society.	Technological Literacy Ability	0.705	Valid
11	I always check privacy settings before using social media or other digital platforms.	Digital Privacy Awareness	0.689	Valid
12	I am aware of the risks of carelessly sharing personal information on the internet.	Digital Privacy Awareness	0.704	Valid
13	I understand the importance of using strong and unique passwords for each digital account.	Digital Privacy Awareness	0.728	Valid
14	I know how to prevent identity theft and online privacy violations.	Digital Privacy Awareness	0.751	Valid
15	I regularly update and secure my personal data on digital devices.	Digital Privacy Awareness	0.693	Valid
16	I actively participate in digital social campaigns to raise public awareness on specific issues.	Participation in Digital Campaigns	0.687	Valid
17	I frequently share content from digital social campaigns with friends and family.	Participation in Digital Campaigns	0.659	Valid
18	I have participated in online petitions or digital social movements.	Participation in Digital Campaigns	0.683	Valid
19	I use social media to support social issues that I consider important.	Participation in Digital Campaigns	0.722	Valid
20	I believe that digital social campaigns have a significant influence on social change.	Participation in Digital Campaigns	0.695	Valid
21	I can accurately identify valid and invalid information on the internet.	Digital Citizenship Literacy	0.741	Valid
22	I understand the importance of ethical behavior when interacting with others online.	Digital Citizenship Literacy	0.766	Valid
23	I can use technology responsibly for academic and professional purposes.	Digital Citizenship Literacy	0.783	Valid
24	I have skills in protecting my digital identity and personal data.	Digital Citizenship Literacy	0.799	Valid
25	I can recognize and report unethical or harmful online behavior.	Digital Citizenship Literacy	0.812	Valid

Appendix 3. Respondent Distribution

Category	Subcategory	Frequency (n)	Percentage (%)
Gender	Male	120	48.00 %
	Female	130	52.00 %
Age	15 years old	60	24.00 %
	16 years old	80	32.00 %
	17 years old	70	28.00 %
	18 years old	40	16.00 %
School Type	Public	150	60.00 %
	Private	100	40.00 %
Region	Central Jakarta	50	20.00 %
	South Jakarta	60	24.00 %
	North Jakarta	45	18.00 %
	West Jakarta	55	22.00 %
	East Jakarta	40	16.00 %
Total		**250**	**100.00 %**

Appendix 4. Confirmatory Factor Analysis

Construct	Items	Indicators	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
Digital Citizenship Education	DCE1	I understand my rights and responsibilities as a digital citizen after receiving digital citizenship education.	0.872	0.940	0.941	0.954	0.807
	DCE2	Digital citizenship education helps me distinguish between accurate information and hoaxes on the internet.	0.895				
	DCE3	I have gained a better understanding of ethics in online communication.	0.921				
	DCE4	I can recognize various forms of cyber threats after receiving digital citizenship education.	0.899				
	DCE5	Digital citizenship education has increased my awareness of the importance of protecting personal data.	0.905				
Technological Literacy Ability	TLA1	I can effectively use various technological devices to search for and manage information.	0.883	0.946	0.947	0.959	0.824

(continued)

Construct	Items	Indicators	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
	TLA2	I am able to understand and troubleshoot technical issues that frequently occur with my digital devices.	0.915				
	TLA3	I have skills in using software or applications to enhance productivity.	0.927				
	TLA4	I can assess the security of a website or application before using it.	0.902				
	TLA5	I understand the influence of technology on social and economic aspects of society.	0.910				
Digital Privacy Awareness	DPA1	I always check privacy settings before using social media or other digital platforms.	0.885	0.949	0.950	0.961	0.832
	DPA2	I am aware of the risks of sharing personal information carelessly on the internet.	0.923				
	DPA3	I understand the importance of using strong and unique passwords for each digital account.	0.936				
	DPA4	I know how to prevent identity theft and online privacy violations.	0.906				
	DPA5	I regularly update and secure my personal data on digital devices.	0.909				
Participation in Digital Social Campaigns	PIDS1	I actively participate in digital social campaigns aimed at raising public awareness of specific issues.	0.885	0.950	0.950	0.961	0.833
	PIDS2	I frequently share information from digital social campaigns with friends and family.	0.921				
	PIDS3	I have participated in online petitions or social movements conducted through digital platforms.	0.935				
	PIDS4	I use social media to support social issues that I consider important.	0.907				
	PIDS5	I believe that digital social campaigns have a significant influence on social change.	0.914				
Digital Citizenship Literacy Ability	DCL1	I can accurately identify valid and invalid information on the internet.	0.874	0.939	0.939	0.953	0.804
	DCL2	I understand the importance of ethical behavior when interacting with others online.	0.908				
	DCL3	I can use technology responsibly for academic and professional purposes.	0.923				
	DCL4	I have skills in protecting my digital identity and personal data.	0.885				
	DCL5	I can recognize and report unethical or harmful online behavior.	0.892				

References

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2020). Secrets and likes: The drive for privacy and the difficulty of achieving it in the digital age. *Journal of Consumer Psychology, 30*(4), 736–758. https://doi.org/10.1002/jcpy.1191

Affonso, E. P., & Sant'Ana, R. C. G. (2018). Privacy awareness issues in user data collection by digital libraries. *IFLA Journal, 44*(3), 170–182.

Ajideh, P., Zohrabi, M., & Mohammadpour, R. (2024). The effect of global digital citizenship education on intercultural communicative competence and learners' perceptions. *Journal of Applied Linguistics and Applied Literature: Dynamics and Advances, 12*(2), 59–86. https://doi.org/10.22049/jalda.2024.29174.1630

Al-Mulla, S., Ari, I., & Koç, M. (2022). Social media for sustainability education: Gaining knowledge and skills into actions for sustainable living. *The International Journal of Sustainable Development and World Ecology, 29*(5), 455–471.

Alenezi, N., & Alfaleh, M. (2024). Enhancing digital citizenship education in Saudi Arabian elementary schools: Designing effective activities for curriculum integration. *Frontiers in Education, 9*, Article 1494487.

Althibyani, H. A., & Al-Zahrani, A. M. (2023). Investigating the effect of students' knowledge, beliefs, and digital citizenship skills on the prevention of cybercrime. *Sustainability, 15*(15), Article 11512.

Anthonysamy, L., & Sivakumar, P. (2022). A new digital literacy framework to mitigate misinformation in social media infodemic. *Global Knowledge, Memory and Communication*.

Anurogo, D., La Ramba, H., Putri, N. D., & Putri, U. M. P. (2023). Digital literacy 5.0 to enhance multicultural education. *Multicultural Islamic Education Review, 1*(2), 109–179.

Asmayawati, Y., & Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(1), Article 100233. https://doi.org/10.1016/j.joitmc.2024.100233

Bayzan, Ş. (2024). Are digital teachers anxious? An investigation of the relationship between teachers' digital citizenship behaviors and online privacy concerns. *Education and Information Technologies*, 1–29.

Blevins, B., LeCompte, K., & Wells, S. (2014). Citizenship education goes digital. *Journal of Social Studies Research, 38*(1). https://doi.org/10.1016/j.jssr.2013.12.003

Bouzguenda, I., Alalouch, C., & Fava, N. (2019). Towards smart sustainable cities: A review of the role digital citizen participation could play in advancing social sustainability. *Sustainable Cities and Society, 50*, Article 101627.

Cetindamar Kozanoglu, D., & Abedin, B. (2021). Understanding the role of employees in digital transformation: Conceptualization of digital literacy of employees as a multi-dimensional organizational affordance. *Journal of Enterprise Information Management, 34*(6), 1649–1672.

Chen, C.-H., Liu, C.-L., Hui, B. P. H., & Chung, M.-L. (2020). Does education background affect digital equal opportunity and the political participation of sustainable digital citizens? A Taiwan case. *Sustainability, 12*(4), 1359.

Chin, W. W. (2010). In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *How to write up and report PLS analyses BT - Handbook of partial least squares: Concepts, methods and applications* (pp. 655–690). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_29

Choi, S. (2023). Privacy literacy on social media: Its predictors and outcomes. *International Journal of Human-Computer Interaction, 39*(1), 217–232.

Cortesi, S., Hasse, A., Sonia, A. L., & Urs, K. (2020). *Youth and digital citizenship+ (plus) | Berkman Klein Center*.

Council of Europe. (2025). Digital citizenship education concept. https://www.coe.int/en/web/education/dce-concept.

Dyrenfurth, M. J., & Kozak, M. R. (1991). *Technological literacy*.

Emejulu, A., & Mcgregor, C. (2019). Critical studies in education towards a radical digital citizenship in digital education. *Critical Studies in Education, 60*(1).

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research & Development, 68*(5), 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Fernández-Prados, J. S., Lozano-Díaz, A., & Ainz-Galende, A. (2021). Measuring digital citizenship: A comparative analysis. *Informatics, 8*(1), 18.

Flyverbom, M., Deibert, R., & Matten, D. (2019). The governance of digital technology, big data, and the internet: New roles and responsibilities for business. *Business & Society, 58*(1), 3–19.

Frau-Meigs, D., O'Neill, B., Soriani, A., & Tomé, V. (2017). *Digital citizenship education: Volume 1: Overview and new perspectives*.

Gleason, B., & Von Gillern, S. (2018). International forum of educational technology & society digital citizenship innovations in education, practice, and pedagogy. *Journal of Educational Technology & Society, 21*(1), 200–212. Published by : International Forum of Educational Technology & Society Linked references are available on JSTOR for this article.

Habibi, A., Mukminin, A., & Hadisaputra, P. (2020). Science teachers' integration of digital resources in education: A survey in rural areas of one Indonesian province. *Heliyon, 6*(8), Article 1.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101–110. https://doi.org/10.1016/j.jbusres.2019.11.069

Halim, U., Hidayat, N., Rosit, M., Suri, I., & Handoko, D. (2024). Digital opportunities and internet outcomes on educational domain: A comparison between urban and rural of Indonesian university students. *Pakistan Journal of Life & Social Sciences, 22*(2).

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Herani, R., & Pranandari, A. (2024). Promote or inhibit? Examining the influence of youth digital advocacy on digital social entrepreneurship. *Social Enterprise Journal, 20*(5), 654–677.

Hicks, J. (2021). A 'data realm'for the global south? Evidence from Indonesia. *Third World Quarterly, 42*(7), 1417–1435.

Hidayat, A. R. T., Onitsuka, K., Sianipar, C. P. M., Basu, M., & Hoshino, S. (2023). To migrate or not to migrate: Internet use and migration intention among rural youth in developing countries (case of malang, Indonesia). *Digital Geography and Society, 4,* Article 100052.

Huang, B. (2024). Navigating digital divide: Exploring the influence of ideological and political education on cyber security and digital literacy amid information warfare. *Current Psychology*, 1–22.

Jayadiputra, E., Karim, A. A., Sapriya, S., & Rahmat, R. (2023). The Pancasila and civic education curriculum model at 21st century. *Jurnal Civics: Media Kajian Kewarganegaraan, 20*(1), 65–74.

Junaedi, A. T., Panjaitan, H. P., Yovita, I., Veronica, K., Renaldo, N., & Jahrizal, J. (2024). Advancing digital and technology literacy through qualitative studies to bridging the skills gap in the digital age. *Journal of Applied Business and Technology, 5*(2), 123–133.

Kapoor, S. K., Sankhla, K., Agarwal, P., & Rathi, S. K. (2024). *Security and threat in online social networking. Online social networks in business frameworks*.

Kim, M., & Choi, D. (2018). Development of youth digital citizenship scale and implication for educational setting published by : International forum of educational technology & society development of youth digital citizenship. *Journal of Educational Technology & Society, 21*(1), 155–171.

Kumar, A., & Haneef, M. S. M. (2023). (Dis) empowered civic voices in social media: An episteme of civic engagement, advocacy, and social change. In *The palgrave handbook of global social change* (pp. 1–22). Springer.

Kumar, C. S., & Kothari, H. (2018). Pilot test for reliability and validity of the study on exploring factors of training effectiveness for it competency among the employees of public sector banks. *Splint International Journal of Professionals, 5*(3), 33–44.

Lilleker, D. G., & Koc-Michalska, K. (2018). What drives political participation? Motivations and mobilization in a digital age. In *Digital politics: Mobilization, engagement and participation* (pp. 21–43). Routledge.

Lo, H.-C., Wang, T.-H., & Chen, R.-S. (2024). Enhancing critical digital literacy of preservice preschool teachers through service learning: The moderator of online social capital. *Sustainability, 16*(6), 2253.

Malik, K. (2024). Integrating digital citizenship education in the contemporary educational ecosystem. In *Digital analytics applications for sustainable training and education* (pp. 357–376). Apple Academic Press.

Martin, F., Hunt, B., Wang, C., & Brooks, E. (2020). Middle school student perception of technology use and digital citizenship practices. *Computers in the Schools, 37*(3), 196–215.

Martzoukou, K., Fulton, C., Kostagiolas, P., & Lavranos, C. (2020). A study of higher education students' self-perceived digital competences for learning and everyday life online participation. *Journal of Documentation, 76*(6), 1413–1458. https://doi.org/10.1108/JD-03-2020-0041

McInroy, L. B. (2021). Teaching technology competencies: A social work practice with technology course. *Journal of Social Work Education, 57*(3), 545–556. https://doi.org/10.1080/10437797.2019.1671272

Mei, Y. (2024). Exploring the mechanisms driving elderly Fintech engagement: The role of social influence and the elderly's digital literacy. *Frontiers in Psychology, 15,* Article 1420147.

Moon, S. J., & Bai, S. Y. (2020). Components of digital literacy as predictors of youth civic engagement and the role of social media news attention: The case of Korea. *Journal of Children and Media, 14*(4), 458–474.

Muawanah, U., Marini, A., & Sarifah, I. (2024). The interconnection between digital literacy, artificial intelligence, and the use of E-learning applications in enhancing the sustainability of regional languages: Evidence from Indonesia. *Social Sciences & Humanities Open, 10*, Article 101169. https://doi.org/10.1016/j.ssaho.2024.101169

Nikou, S., De Reuver, M., & Mahboob Kanafi, M. (2022). Workplace literacy skills—how information and digital literacy affect adoption of digital technology. *Journal of Documentation, 78*(7), 371–391.

Pangrazio, L., Godhe, A.-L., & Ledesma, A. G. L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-learning and Digital Media, 17*(6), 442–459.

Pangrazio, L., & Sefton-Green, J. (2021). Digital rights, digital citizenship and digital literacy: What's the difference? *Journal of New Approaches in Educational Research, 10*(1), 15–27. https://doi.org/10.7821/naer.2021.1.616

Peart, M. T., Gutiérrez-Esteban, P., & Cubo-Delgado, S. (2020). Development of the digital and socio-civic skills (DIGISOC) questionnaire. *Educational Technology Research & Development.* https://doi.org/10.1007/s11423-020-09824-y

Peart, M., Higgins, S., Gutiérrez-Esteban, P., & Cubo Delgado, S. (2024). Digital and socio-civic skills development and young people's perceptions of digital citizenship in the UK. *Education, Citizenship and Social Justice, 19*(3), 463–475.

Prince, C., Omrani, N., & Schiavone, F. (2024). Online privacy literacy and users' information privacy empowerment: The case of GDPR in Europe. *Information Technology & People, 37*(8), 1–24. https://doi.org/10.1108/ITP-05-2023-0467

Rahmatunnisa, M. (2024). Learning lessons for Indonesia regarding the empowerment of women through digital literacy. *E-Journal of Media and Society (e-JOMS), 7*(3), 23–48.

Richardson, J., & Milovidov, E. (2019). *Digital citizenship education handbook: Being online, well-being online, and rights online.* Council of Europe.

Sanders, C. K., & Scanlon, E. (2021). The digital divide is a human rights issue: Advancing social inclusion through social work advocacy. *Journal of Human Rights and Social Work, 6*(2), 130–143. https://doi.org/10.1007/s41134-020-00147-9

Sharma, S., Kar, A. K., & Gupta, M. P. (2024). Untangling the web between digital citizen empowerment, accountability and quality of participation experience for e-government: Lessons from India. *Government Information Quarterly, 41*(3), Article 101964.

Usman, W., Sadik, J., Elgedawy, R., Ruoti, S., & Zappala, D. (2024). Security and privacy experiences of first-and second-generation Pakistani immigrants to the US: Perceptions, practices, challenges, and parent-child dynamics. *2025 IEEE symposium on security and privacy (SP)*.

Vajen, B., Kenner, S., & Reichert, F. (2023). Digital citizenship education–Teachers' perspectives and practices in Germany and Hong Kong. *Teaching and Teacher Education, 122*, Article 103972.

von Gillern, S., Korona, M., Wright, W., Gould, H., & Haskey-Valerius, B. (2024). Media literacy, digital citizenship and their relationship: Perspectives of preservice teachers. *Teaching and Teacher Education, 138*, Article 104404. https://doi.org/10.1016/j.tate.2023.104404

Winarnita, M., Bahfen, N., Mintarsih, A. R., Height, G., & Byrne, J. (2022). Gendered digital citizenship: How Indonesian female journalists participate in gender activism. *Journalism Practice, 16*(4), 621–636.

Yue, A. (2022). From digital literacy to digital citizenship: Policies, assessment frameworks and programs for young people in the Asia Pacific. In *Media in Asia* (pp. 181–194). Routledge.

Zhang, Y., Zhang, W., & Wang, J. (2024). Effect of digital skills on citizens' digital participation: Mediating effects of political interest, social issues concern and national identity. *Kybernetes*.

Zohrabi, M. (2013). Mixed method research: Instruments, validity, reliability and reporting findings. *Theory and Practice in Language Studies, 3*(2), 254–262.

Further readings

Choi, M. (2016). A concept analysis of digital citizenship for democratic citizenship education in the internet age. *Theory & Research in Social Education, 44*(4), 565–607. https://doi.org/10.1080/00933104.2016.1210549

Young, D. (2014). A 21st-Century model for teaching digital citizenship. *Educational Horizons, 92*(3), 9–12. https://doi.org/10.1177/0013175x1409200304

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Digital Citizenship Literacy in Indonesia: The Role of Privacy Awareness and Social Campaigns
Social Sciences & Humanities Open

Dear Mr Iskandar,

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It was accepted on Jun 17, 2025

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With kind regards

Nasser Mansour
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Note: In order to effectively convey your recommendations for improvement to the author(s), and help editors make well-informed and efficient decisions, we ask you to answer the following specific questions about the manuscript and provide additional suggestions where appropriate.

1. Are the objectives and the rationale of the study clearly stated?

Please provide suggestions to the author(s) on how to improve the clarity of the objectives and rationale of the study. Please number each suggestion so that author(s) can more easily respond.

Reviewer #1: yes

Reviewer #2: The study objectives, hypotheses, and explicitly stated research questions are adequate and the rationale is now clear.

Reviewer #5: The revisions are accepted.

2. If applicable, is the method/study reported in sufficient detail to allow for its replicability and/or reproducibility?

Please provide suggestions to the author(s) on how to improve the replicability/reproducibility of their study. Please number each suggestion so that the author(s) can more easily respond.

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Yes X No [] N/A []
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3. If applicable, are statistical analyses, controls, sampling mechanism, and statistical reporting (e.g., P-values, CIs, effect sizes) appropriate and well described?

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Please provide specific suggestions for improvements, removals, or additions of figures or tables. Please number each suggestion so that author(s) can more easily respond.

Reviewer #1: No

Reviewer #2: The tables and diagrams are adequate.

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5. If applicable, are the interpretation of results and study conclusions supported by the data?

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The revisions are accepted.

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6. Have the authors clearly emphasized the strengths of their study/methods?

Please provide suggestions to the author(s) on how to better emphasize the strengths of their study. Please number each suggestion so that the author(s) can more easily respond.

Reviewer #1: yes

Reviewer #2: Yes.

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7. Have the authors clearly stated the limitations of their study/methods?

Please list the limitations that the author(s) need to add or emphasize. Please number each limitation so that author(s) can more easily respond.

Reviewer #1: yes

Reviewer #2: Yes.

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8. Does the manuscript structure, flow or writing need improving (e.g., the addition of subheadings, shortening of text, reorganization of sections, or moving details from one section to another)?

Please provide suggestions to the author(s) on how to improve the manuscript structure and flow. Please number each suggestion so that author(s) can more easily respond.

Reviewer #1: No

Reviewer #2: No. Structure and flow are now ok.

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9. Could the manuscript benefit from language editing?

Reviewer #1: No

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Reviewer #2: Thank you for your revised manuscript. I appreciate the thoroughness of your revisions and the effort you've put into addressing the points raised in the previous review. It is significantly stronger and, in my opinion, now ready for publication.

Reviewer #5: The revisions are accepted.

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Social Sciences & Humanities Open

Regular Article

Digital citizenship literacy in Indonesia: The role of privacy awareness and social campaigns

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A B S T R A C T

This study aims to examine the influence of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns, as well as their subsequent influence on Digital Citizenship Literacy Ability. Additionally, the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns are analyzed. A quantitative research approach was employed, using a survey method to collect data from 250 respondents of students from several high schools in Jakarta. Structural Equation Modeling (SEM) was used to test the proposed hypotheses. The findings confirm that Digital Citizenship Education significantly enhances both Digital Privacy Awareness and Participation in Digital Social Campaigns. Similarly, Technological Literacy Ability positively influences Digital Privacy Awareness and Participation in Digital Social Campaigns. Moreover, Digital Privacy Awareness directly improves Digital Citizenship Literacy Ability and mediates the relationships between Digital Citizenship Education and Technological Literacy Ability with Digital Citizenship Literacy Ability. However, the influence of Participation in Digital Social Campaigns on Digital Citizenship Literacy Ability was not supported, nor did it serve as a mediator in the tested relationships. This study contributes to the literature by providing empirical evidence on the role of digital education and technological skills in fostering responsible digital behavior. It highlights the critical function of Digital Privacy Awareness as a key driver of Digital Citizenship Literacy Ability. The findings have important implications for policymakers and educators, emphasizing the need to strengthen digital privacy education within curricula. The originality of this research lies in its comprehensive examination of Digital Citizenship Literacy Ability and the mediating roles of Digital Privacy Awareness and Participation in Digital Social Campaigns, offering new insights into the mechanisms underlying digital competence development.

1. Introduction

One of the critical literacies in 21st-century life is citizenship literacy. This can be taught from an early age in a simple, contextual manner appropriate to the level of cognitive ability. Various activities have rapidly shifted from conventional to digitalization. The digital era has shaped citizens who routinely use the internet in their daily lives as a necessity (Cortesi et al., 2020). Thus, whether society is prepared or not, they will inevitably migrate and coalesce into a new entity known as digital citizenship. Digital citizenship refers to activities performed by individuals using internet technology as a medium to seek and process information to meet daily needs (Blevins et al., 2014; Emejulu & Mcgregor, 2019). Digital citizenship has become a topical issue in citizenship studies, particularly regarding how to instill the character of an intelligent and wise digital citizen in the face of globalization and

technological advancements (Gleason & Von Gillern, 2018; Kim & Choi, 2018; Peart et al., 2020).

This issue highlights that digital citizenship has become a discussion in education and academia, particularly concerning cultivating the character of intelligent and wise citizens amidst the flow of globalization and technological development (Ajideh et al., 2024). According to the OECD (2019), digital skills are essential in ensuring that students engage with technology safely and responsibly, whether at school, in the community, or at home. These skills are foundational in fostering active and ethical technology users from an early age. The concept of digital citizenship has thus become integral to empowering communities, enabling citizens to assume active and responsible roles in the digital realm. This responsibility is particularly relevant for individuals who view internet usage as an everyday necessity, as it encourages adherence to established norms and ethical behavior in online activities (Burns &

Gottschalk, 2019; Finkenauer et al., 2020). In light of these concepts, it is imperative that today's young citizens actively and responsibly navigate the advancements in internet technology.

Moreover, according to Council of Europe (2025), digital citizenship education competencies are divided into ten core domains, which are grouped into three major categories: Presence in the digital space, Well-being in digital environments, and Rights and responsibilities in the online world (see Fig. 1). The first category, Presence in the digital space, refers to the skills required to access the digital ecosystem, express opinions freely, and utilize technology in innovative ways through reflective and analytical approaches. The second category, Well-being in digital environments, encompasses the abilities that enable individuals to engage positively within online communities and to cultivate a balanced and healthy relationship with digital technologies. The third category, Rights and responsibilities in the online world, includes knowledge and attitudes related to safeguarding individual rights and promoting active involvement in a diverse and complex digital society, where personal data is protected and civic participation is empowered.

In practice, several challenges persist within the concept of digital citizenship literacy that require further attention. These challenges include educators limited technological literacy, the spread of misinformation, a lack of interest in reading, and insufficient comprehension of the material students engage with (Asmayawati & Yetti, 2024). Additionally, the issue of citizenship literacy, particularly in relation to national character values, is critical for shaping future generations. These values are foundational in developing a generation with strong personalities and good moral character. National character values are intrinsically linked to literacy, as the integration of literacy within the school environment fosters character traits such as discipline, creativity, a passion for learning, respect for achievements, reading habits, social and communication skills, and a sense of responsibility. These values are conveyed both directly and indirectly through the learning process.

Digital citizenship literacy is an essential component of modern education, aimed at equipping students with the skills necessary to engage responsibly in the digital world. Research indicates that incorporating digital citizenship into primary school curricula helps students develop positive digital ethics, behavior, and habits. Moreover, studies have shown that primary school teachers are increasingly implementing digital citizenship principles effectively, emphasizing the importance of further enhancing educators' digital literacy (Alqirnas, 2022). Furthermore, projects focused on digital citizenship education for young children have proven successful in empowering students to become proactive and influential citizens in the digital era ("Empower. Communities with Media Lit.," 2022). However, some studies suggest that a more critical approach to digital citizenship education is needed, one that ensures students not only learn about but also actively practice meaningful digital citizenship (Tadlaoui-Brahmi et al., 2022). This approach calls for a deeper engagement with the concept of digital citizenship, where students develop not only knowledge but also the critical thinking and ethical behavior necessary to navigate the digital landscape.

Digital citizenship education and digital citizenship literacy share the common goal of preparing individuals to function responsibly in the digital world, yet they differ in scope and emphasis. Both concepts underscore the importance of ethical, informed, and active engagement in digital environments, aligning with the Council of Europe's (2025) framework that categorizes digital citizenship competencies into three domains: presence in digital spaces, well-being in digital environments, and the exercise of rights and responsibilities online. While DCE focuses on structured pedagogical efforts to instill theoretical understanding and value-based guidance through formal education—particularly within school curricula—Digital Citizenship Literacy refers more directly to the practical, real-world application of these skills and values. It reflects an individual's actual ability to use digital tools critically, protect privacy, participate in online communities, and make ethical decisions. However, DCE lays the foundation through education, whereas Digital Citizenship Literacy represents the realized capability of individuals to apply that foundation in their everyday digital interactions.

Indonesia was selected as the research setting due to its status as the fourth-largest internet user population in the world, with a significant proportion of users aged 15–24 who are highly active on social media and digital platforms (Hidayat et al., 2023). Despite its high internet penetration rate, Indonesia continues to face substantial challenges in digital literacy, privacy awareness, and responsible online behavior (Anurogo et al., 2023). Although the government has initiated various programs—such as the National Digital Literacy Movement—empirical research evaluating the effectiveness of digital citizenship education among students remains limited (Rahmatunnisa, 2024). Therefore, this study is particularly relevant for exploring the dynamics of digital citizenship education in a developing country undergoing rapid digital transformation, offering practical implications for shaping education policies that are responsive to the demands of the digital age.

Therefore, this study aims to analyze the influence of digital citizenship education and the level of technological literacy on digital citizenship literacy among young generations. Additionally, it explores the role of digital privacy awareness as a mediating variable in the relationship between digital citizenship education and digital citizenship literacy. On the other hand, participation in digital social campaigns is also examined as a mediating factor between technological literacy and digital citizenship literacy. By understanding these dynamics, this research is expected to provide insights into more effective strategies for enhancing young people's digital skills, enabling them to engage ethically and responsibly in the digital world.

2. Literature review

2.1. Digital literacy gaps and dynamics in Indonesia

Several local studies have examined digital literacy in Indonesia from the perspectives of access, technological culture, and policy. According to the Indonesian Internet Service Providers Association (APJII) survey in 2023, Indonesia's internet penetration has reached approximately 78 %; however, usage distribution remains uneven between urban and rural areas—82 % in urban settings and 74 % in rural regions (Halim et al., 2024). A joint report by the 10th Commission of the Indonesian House of Representatives (DPR-RI) and APJII highlighted that, despite ongoing expansion of access, the lack of equitable digital infrastructure and low levels of digital safety remain key obstacles in

Fig. 1. Framework of digital citizenship competencies.

BEING ONLINE
► Access and Inclusion
► Learning and Creativity
► Media and Information Literacy

WELL-BEING ONLINE
► Ethics and Empathy
► Health and Well-being
► ePresence and Communications

RIGHTS ONLINE
► Active Participation
► Rights and Responsibilities
► Privacy and Security
► Consumer Awareness

advancing national digital literacy.

A study by Habibi et al. (2020) on rural communities in Indonesia found that digital competencies in rural areas are comparable to those in urban ones. However, the main gap lies in infrastructure and the integration of technology into daily life. Meanwhile, students and teachers in some urban areas still exhibit limited understanding of digital ethics, online privacy, and responsible digital participation. Jayadiputra et al. (2023) emphasized that digital character development has yet to be systematically integrated into the Pancasila and Civics Education curricula.

In the regional context, comparisons with neighboring countries such as Singapore and Malaysia reveal that Indonesia still lacks a systematic and standardized framework for digital citizenship (Yue, 2022). This concern was clearly voiced by policy analysts during parliamentary hearings, who noted that Indonesia lags behind other ASEAN countries in implementing digital citizenship education (Hicks, 2021). Based on these findings, it is essential for this study to incorporate relevant local evidence. By linking structural and cultural digital issues in Indonesia—including access gaps, infrastructure readiness, and curriculum preparedness—this research aims not only to enrich the global digital literacy discourse but also to offer context-sensitive policy and educational solutions for countries in the Global South.

2.2. Digital Citizenship Education

According to Frau-Meigs et al. (2017), Digital Citizenship Education refers to the process of teaching individuals, particularly students, about responsible, ethical, and effective engagement in digital environments. It encompasses knowledge and skills related to online safety, digital communication, cyber ethics, digital literacy, and responsible participation in digital spaces. This education aims to equip individuals with the ability to navigate digital platforms wisely, protect personal information, critically evaluate online content, and contribute positively to the digital community (Richardson & Milovidov, 2019).

Digital Citizenship Education significantly influences Digital Privacy Awareness by providing individuals with essential knowledge about online security, data protection, and personal information management (Althibyani & Al-Zahrani, 2023; Bayzan, 2024; Martin et al., 2020). Through structured learning, individuals become more aware of the risks associated with sharing personal data online and develop strategies to safeguard their digital identities. This education fosters a deeper understanding of privacy settings, cybersecurity threats, and responsible data handling, encouraging proactive behavior in maintaining online privacy (Malik, 2024).

Digital Citizenship Education also plays a crucial role in encouraging participation in Digital Social Campaigns (Chen et al., 2020; Pangrazio et al., 2020). By instilling a sense of digital responsibility and ethical engagement, individuals are more likely to actively participate in online advocacy, awareness initiatives, and social movements that promote positive digital citizenship. Education in this area enhances individuals' ability to recognize societal issues, utilize digital platforms for meaningful interactions, and contribute constructively to online communities, ultimately fostering a culture of responsible and influence digital activism (Huang, 2024).

H1a. Digital Citizenship Education influence on Digital Privacy Awareness

H1b. Digital Citizenship Education influence on participation in Digital Social Campaigns

2.3. Technological Literacy Ability

Dyrenfurth and Kozak (1991) define that Technological Literacy Ability refers to an individual's capacity to effectively understand, use, and adapt to digital technologies in various contexts. It encompasses skills related to operating digital devices, navigating online platforms,

critically assessing digital content, and utilizing technology for problem-solving and communication. A high level of technological literacy enables individuals to engage safely, ethically, and efficiently in digital environments while continuously adapting to technological advancements (Cetindamar Kozanoglu & Abedin, 2021).

Technological Literacy Ability significantly influences Digital Privacy Awareness by enhancing individuals' understanding of online security risks and privacy management (S. Choi, 2023; Nikou et al., 2022; Prince et al., 2024). Those with higher technological literacy are more capable of recognizing potential cyber threats, understanding data encryption, setting up strong privacy controls, and protecting personal information across digital platforms. This ability fosters a proactive approach to digital safety, encouraging individuals to adopt secure online behaviors and minimize exposure to data breaches and identity theft (Kapoor et al., 2024, pp. 449–477; Muawanah et al., 2024).

Technological Literacy Ability also plays a crucial role in influencing participation in Digital Social Campaigns (Anthonysamy & Sivakumar, 2022; Mei, 2024; Zhang et al., 2024). Individuals with strong technological literacy can effectively utilize digital tools, social media, and online platforms to engage in advocacy, raise awareness, and contribute to digital activism. Their ability to navigate digital spaces allows them to access and share information, collaborate with like-minded individuals, and amplify social causes, ultimately increasing their engagement in meaningful online campaigns and social movements (A. Kumar & Haneef, 2023).

H2a. Technological Literacy Ability influence on Digital Privacy Awareness

H2b. Technological Literacy Ability influence on participation in Digital Social Campaigns

2.4. Digital Privacy Awareness

Affonso and Sant'Ana (2018) assess that Digital Privacy Awareness encompass an individual's understanding of the importance of protecting personal information and maintaining security while engaging in digital environments. It involves recognizing potential threats such as data breaches, identity theft, and unauthorized access, as well as implementing privacy-enhancing measures like secure passwords, encryption, and cautious information sharing. A high level of digital privacy awareness enables individuals to navigate the digital world responsibly, ensuring their safety and ethical digital interactions (Flyverbom et al., 2019).

Digital Privacy Awareness plays a crucial role in shaping an individual's Digital Citizenship Literacy Ability (Bouzguenda et al., 2019; Cetindamar Kozanoglu & Abedin, 2021; Junaedi et al., 2024). When individuals are aware of privacy risks and protective measures, they become more responsible digital users, making informed decisions about their online activities. This awareness enhances their ability to critically assess digital information, engage safely in online interactions, and contribute positively to digital communities. As a result, individuals with strong digital privacy awareness tend to demonstrate higher competence in digital citizenship literacy.

Digital Privacy Awareness serves as a key mediator in the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability. Education in digital citizenship equips individuals with foundational knowledge about ethical and responsible digital engagement, but privacy awareness strengthens this learning by emphasizing the importance of safeguarding personal data (Alenezi & Alfaleh, 2024). When individuals internalize privacy principles through digital citizenship education, they develop a more comprehensive understanding of digital literacy, leading to improved digital citizenship literacy ability. Digital Privacy Awareness also mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability. While technological literacy enables individuals to effectively use digital tools and navigate online spaces, privacy awareness ensures that these

skills are applied responsibly (Anurogo et al., 2023; Huang, 2024). Individuals with high technological literacy who also possess strong privacy awareness are more likely to practice safe digital behaviors, critically evaluate online information, and contribute positively to digital communities. Thus, privacy awareness enhances the transition from mere technological proficiency to responsible and informed digital citizenship.

H3. Digital Privacy Awareness influence on Digital Citizenship Literacy Ability

H3a. Digital Privacy Awareness mediate the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability

H3b. Digital Privacy Awareness mediate the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability

2.5. Participation in Digital Social Campaigns

Lilleker and Koc-Michalska (2018) explain that Participation in Digital Social Campaigns is an individual's engagement in online initiatives aimed at raising awareness, advocating for social issues, and fostering positive change through digital platforms. This participation can take various forms, such as sharing informational content, signing petitions, joining online discussions, or actively contributing to digital activism efforts. Engaging in digital social campaigns allows individuals to exercise their digital rights, enhance their civic responsibilities, and contribute to collective problem-solving in digital spaces (Herani & Pranandari, 2024).

Participation in Digital Social Campaigns significantly enhances an individual's Digital Citizenship Literacy Ability (Moon & Bai, 2020; Pangrazio & Sefton-Green, 2021). Actively engaging in digital advocacy or social movements fosters a deeper understanding of online ethics, responsible digital behavior, and effective communication within digital communities. Individuals who participate in digital social campaigns develop critical thinking skills, digital collaboration abilities, and an awareness of societal issues, all of which contribute to a higher level of digital citizenship literacy.

Participation in Digital Social Campaigns mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy

Ability by providing a practical application of digital citizenship principles. While digital citizenship education equips individuals with theoretical knowledge about responsible digital engagement, participation in social campaigns reinforces this knowledge through real-world experiences. By actively engaging in digital advocacy and discussions, individuals solidify their digital literacy skills and develop a stronger sense of digital responsibility.

Participation in Digital Social Campaigns also mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability. While technological literacy enables individuals to effectively use digital tools and platforms, participation in social campaigns transforms these technical skills into meaningful digital engagement. Individuals with high technological literacy who actively participate in social campaigns develop a more profound understanding of digital ethics, online collaboration, and responsible digital communication, ultimately enhancing their digital citizenship literacy ability.

H4. Participation in Digital Social Campaigns influence on Digital Citizenship Literacy Ability

H4a. Participation in Digital Social Campaigns mediate the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability

H4b. Participation in Digital Social Campaigns mediate the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability

In addition, Fig. 2 illustrates the conceptual framework of this study, highlighting the relationships among key variables in understanding digital citizenship literacy ability. The framework positions Digital Citizenship Literacy Ability as the dependent variable, influenced by two independent variables: Digital Citizenship Education and Technological Literacy Ability. Additionally, two mediating variables, Digital Privacy Awareness and Participation in Digital Social Campaigns, are introduced to explain the indirect effects of the independent variables on the dependent variable. This model provides a structured approach to analyzing how education and technological proficiency contribute to digital citizenship literacy through privacy awareness and active engagement in digital social initiatives.

Based on the conceptual framework, this study seeks to answer
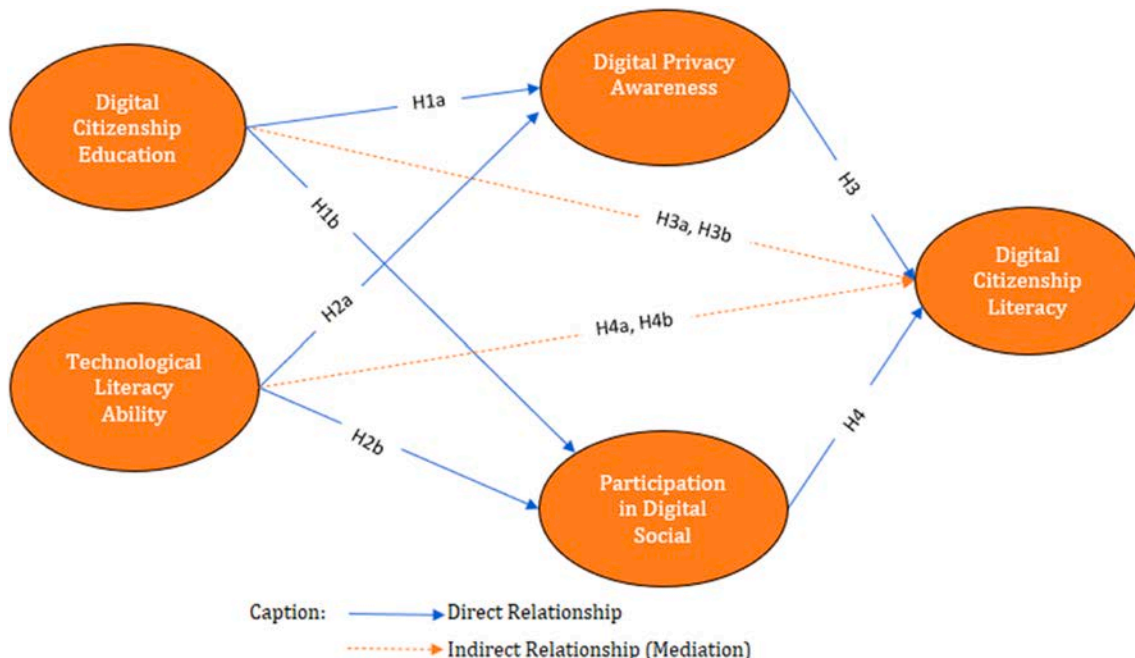

Fig. 2. Conceptual framework.

several key questions.

- How does Digital Citizenship Education influence digital citizenship literacy?This question aims to evaluate the extent to which digital citizenship education—covering domains such as privacy awareness, digital security, and participatory engagement—can enhance individuals' competencies in acting responsibly in digital environments.
- How does technological literacy affect digital citizenship literacy? This question explores whether technical skills in using digital tools (e.g., devices, applications, social media platforms) significantly contribute to shaping an individual's capacity to practice digital citizenship, especially in ethical, legal, and participatory aspects.
- Does Digital Privacy Awareness mediate the relationship between Digital Citizenship Education and digital citizenship literacy?This question seeks to determine whether awareness of digital privacy serves as a key mediator that connects digital citizenship education with the development of practical digital citizenship skills in everyday life.
- Does participation in digital social campaigns mediate the relationship between technological literacy and digital citizenship literacy? This question focuses on socially-driven digital activities and examines whether active participation in such campaigns strengthens or mediates the link between technological abilities and digital citizenship understanding and practices.
- What are the key challenges in improving digital citizenship literacy among the younger generation, and what policies can be recommended to address them?This question is reflective and policy-oriented, aiming to identify structural, psychosocial, and pedagogical barriers to advancing digital citizenship literacy, and to provide research-based recommendations for educators and policymakers.

3. Methodology

3.1. Research design

This study employed a quantitative approach with a causal research design, aiming to analyze the relationship between Digital Citizenship Education and Technological Literacy Ability on Digital Citizenship Literacy Ability, with Digital Privacy Awareness and Participation in Digital Social Campaigns as mediating variables. This approach was chosen because it allowed for an empirical measurement of causal relationships between variables using quantitative data obtained from respondents. By employing a causal design, this study provided a deeper understanding of the factors influencing digital citizenship literacy among high school students. This study was cross-sectional, where data was collected within a specific period to capture the current state of digital citizenship literacy. Data collection was conducted over two months, from November to December 2024, using questionnaires distributed to selected respondents.

The sample size of 250 was deemed adequate for the purposes of this study based on power analysis using G*Power 3.1.9.7. For a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, with an anticipated medium effect size ($f^2 = 0.15$), an alpha level of 0.05, and statistical power of 0.95, the minimum required sample size was approximately 138 for a model with three predictors (as in this study). Therefore, the actual sample of 250 not only meets but exceeds the minimum threshold, enhancing the robustness and generalizability of the findings within the defined population. Moreover, this sample size supports the reliability of the model estimation and reinforces confidence in the structural relationships tested. While the results are primarily generalizable to digitally connected high school students in Jakarta, the diversity of the sample enhances the potential transferability of the findings to similar urban populations in Indonesia and Southeast Asia.

3.2. Population and sample

The population of this study consisted of high school students in Jakarta, as this age group (15–18 years old) represents the younger generation actively using digital technology and social media in their daily lives. Jakarta was selected as the research location due to its high internet penetration rate and the diversity in education levels and access to technology, which reflect broader conditions of digital citizenship literacy. A *purposive sampling* method was applied to ensure that the selected sample comprised high school students with access to and experience in using digital technology. A total of 250 students from several high schools in Jakarta participated in this study, considering factors such as school type (public and private). The data collection was conducted between November and December 2024 using a paper-based survey administration mode. The survey was completed in classrooms under the direct supervision of trained research assistants and schoolteachers to ensure standardized administration. Each session lasted approximately 30–45 min, and students were instructed to complete the questionnaire independently without discussing their responses with peers. This controlled environment was implemented to maintain the integrity and reliability of the data collected and to reduce potential social desirability or peer-influenced bias.

3.3. Variable measurement

To ensure the robustness of the research instrument, the questionnaire items were meticulously developed based on a theoretical framework that combines global standards of digital citizenship adapted from Kumar and Kothari (2018) with contextual considerations relevant to the Indonesian digital landscape (see Appendix 1). This approach ensured both theoretical rigor and cultural relevance. Subject matter experts were involved in the item development process to evaluate content validity. Their review ensured that each item accurately reflected the conceptual definitions of the variables and adequately represented the constructs being measured. Additionally, care was taken to formulate each statement in a clear, accessible, and culturally sensitive manner, reducing the potential for misinterpretation among respondents.

Beyond expert validation, construct validity was assessed statistically through item-total correlation analysis. All items demonstrated corrected item-total correlation coefficients above the critical threshold ($r > 0.458$), indicating that each item meaningfully contributed to the internal consistency of its respective construct (see Appendix 2). This empirical evidence affirms the structural coherence of the questionnaire, supporting the alignment between theoretical dimensions and measured indicators. Coupled with reliability testing, these results provide strong assurance that the instrument is both conceptually valid and psychometrically sound.

The variables in this study were measured using a structured questionnaire employing a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Respondents were asked to indicate their level of agreement with statements covering five key domains: Digital Citizenship Education, Technological Literacy, Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy. Each variable was operationalized through multiple indicators that reflected the main dimensions of the construct. Notably, the instrument focused on capturing self-perceptions, attitudes, and perceived competencies rather than observable behaviors. Thus, the data reflect subjective responses, which may not perfectly represent respondents' actual digital practices.

A pilot test involving 30 respondents was conducted prior to the main study to assess the psychometric quality of the instrument. The results revealed that all questionnaire items achieved r-values greater than the r-table value of 0.458 at a 0.05 significance level (Zohrabi, 2013), confirming their validity. Moreover, the internal consistency reliability test using Cronbach's Alpha yielded values exceeding 0.79,

with several scales surpassing 0.9—indicating excellent reliability. These findings affirm that the instrument is both valid and reliable, making it a dependable tool for collecting data in the main research phase.

3.4. Data analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS software. This method was selected as it effectively analyzed relationships between variables in complex research models, including direct and indirect effects through mediating variables. PLS-SEM was also suitable for studies with relatively small sample sizes and could handle data that was not perfectly normally distributed (Hair Jr et al., 2020). The data analysis process involved several stages, including evaluating the measurement model (*outer model*) to test the validity and reliability of the research instrument and evaluating the structural model (*inner model*) to examine the relationships between variables as formulated in the research hypotheses (Chin, 2010). To ensure the robustness of the statistical estimates, bootstrapping with 5000 subsamples was performed, providing standard errors, t-statistics, and p-values for hypothesis testing. By employing PLS-SEM, this study provided comprehensive results in understanding the contributing factors to digital citizenship literacy among high school students in Jakarta.

In employing PLS-SEM, this study acknowledges that while the method allows for the testing of complex predictive relationships among constructs, it does not establish deterministic causality. The analysis emphasizes directional associations based on theoretical underpinnings and validated measurement models. Given that the data is cross-sectional and based on self-reported responses, the findings should be interpreted with caution regarding causal inference. Nonetheless, the use of bootstrapping procedures, along with high construct reliability and validity, strengthens the empirical support for the proposed relationships. This analytical approach aligns with recent methodological practices in social sciences, where PLS-SEM is widely adopted for theory testing and exploratory modeling in emerging research contexts.

3.5. Ethical considerations

This study was conducted in accordance with ethical principles for social and educational research. All research procedures were designed to ensure participant confidentiality, anonymity, and protection of individual rights. Participation was entirely voluntary, and no form of coercion was involved. Prior to completing the questionnaire, each respondent was provided with a written explanation of the research objectives, their right to withdraw at any time without penalty, and assurance that their data would be used solely for academic purposes. Informed consent was obtained at the beginning of the online questionnaire. This research received ethical approval from Universitas Negeri Jakarta ethic committee, with Ethical Approval Code: No. 211/ UNJ/XI/2024, indicating that the study met the applicable ethical standards, including data confidentiality, the principle of do-no-harm, and respect for participant autonomy. The researchers also adhered to the Research Ethics Code in accordance with the guidelines of Indonesian Educational Research Ethics Code, which includes responsibilities to participants, methodological transparency, and scientific integrity in reporting results.

4. Results and finding

4.1. Descriptive statistics

The respondent distribution in Appendix 3 provides an overview of the demographic characteristics of the 250 participants in this study. In terms of gender, the sample consisted of 120 male respondents (48 %) and 130 female respondents (52 %), ensuring a balanced representation.

Regarding age distribution, the majority of respondents were 16 years old (32 %), followed by 17-year-olds (28 %), 15-year-olds (24 %), and 18-year-olds (16 %). This distribution reflects a broad coverage of high school students at different stages of their education. The school type category indicates that 150 respondents (60 %) attended public schools, while 100 respondents (40 %) came from private schools. This suggests a higher participation rate from students enrolled in government-funded educational institutions. In terms of regional distribution, the highest number of respondents were from South Jakarta (24 %), followed by West Jakarta (22 %), Central Jakarta (20 %), North Jakarta (18 %), and East Jakarta (16 %). This spread ensures that the study captures perspectives from students across different areas of Jakarta, contributing to a more comprehensive analysis.

Based on the descriptive analysis in Table 1, all variables measured in this study have high mean values, ranging from 4.268 to 4.352, on a scale of 2–5. This indicates that most respondents tend to provide positive assessments of the various aspects examined in this study. For the Digital Citizenship Education (DCE) variable, the mean values range from 4.280 to 4.344, with standard deviations between 0.603 and 0.616. This suggests that respondents have a relatively high understanding of digital citizenship education, with a fairly uniform data distribution and no significant variation.

In the Technological Literacy Ability (TLA) variable, the mean values range from 4.280 to 4.324, with standard deviations between 0.591 and 0.616. These results indicate that most respondents feel they have a good level of technological literacy, with a relatively consistent distribution. Meanwhile, the Digital Privacy Awareness (DPA) variable has mean values ranging from 4.276 to 4.348, with standard deviations between 0.598 and 0.617. This suggests that awareness of digital privacy is quite high among respondents, although there is slight variation in the distribution of responses.

For the Participation in Digital Social Campaigns (PIDS) variable, the mean values range from 4.280 to 4.348, with standard deviations between 0.600 and 0.616. This indicates that participation in digital social campaigns is relatively strong, with responses showing little variation. Lastly, the Digital Citizenship Literacy Ability (DCL) variable has mean values between 4.268 and 4.352, with standard deviations ranging from 0.601 to 0.618. These results suggest that the level of digital citizenship

Table 1
Descriptive statistics.

Variable	Items	No. of Obs.	Min	Max	Mean	Median	Std. Dev.
Digital Citizenship Education	DCE1	250	2	5	4.344	4	0.603
	DCE2	250	2	5	4.324	4	0.597
	DCE3	250	2	5	4.316	4	0.608
	DCE4	250	2	5	4.292	4	0.607
	DCE5	250	2	5	4.280	4	0.616
Technological Literacy Ability	TLA1	250	2	5	4.324	4	0.597
	TLA2	250	2	5	4.304	4	0.591
	TLA3	250	2	5	4.316	4	0.608
	TLA4	250	2	5	4.292	4	0.607
	TLA5	250	2	5	4.280	4	0.616
Digital Privacy Awareness	DPA1	250	2	5	4.348	4	0.604
	DPA2	250	2	5	4.328	4	0.598
	DPA3	250	2	5	4.324	4	0.617
	DPA4	250	2	5	4.296	4	0.608
	DPA5	250	2	5	4.276	4	0.614
Participation in Digital Social Campaigns	PIDS1	250	2	5	4.348	4	0.604
	PIDS2	250	2	5	4.336	4	0.600
	PIDS3	250	2	5	4.316	4	0.615
	PIDS4	250	2	5	4.292	4	0.607
	PIDS5	250	2	5	4.280	4	0.616
Digital Citizenship Literacy Ability	DCL1	250	2	5	4.352	4	0.605
	DCL2	250	2	5	4.316	4	0.601
	DCL3	250	2	5	4.296	4	0.615
	DCL4	250	2	5	4.284	4	0.611
	DCL5	250	2	5	4.268	4	0.618

literacy is relatively high among respondents, though there is some minor variation in data distribution. Overall, the descriptive analysis results indicate that respondents have a high level of understanding and awareness of digital citizenship, technological literacy, and digital privacy. Additionally, they are quite active in digital social campaigns. The relatively small variations in standard deviation suggest that responses were fairly consistent across all variables.

4.2. Validity and reliability

The results of the Confirmatory Factor Analysis (CFA) strongly support the convergent validity of the constructs measured in this study (see Appendix 4). All indicator loadings exceeded the recommended threshold of 0.70, with most items demonstrating loadings above 0.87, indicating that each item is a strong representative of its respective latent construct. High outer loadings suggest that the items are both statistically and conceptually aligned with the theoretical definitions of the constructs such as Digital Citizenship Education, Technological Literacy Ability, Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy Ability. These findings confirm that the measurement model exhibits a robust factor structure and that each indicator significantly contributes to explaining its construct.

In terms of convergent validity, the Average Variance Extracted (AVE) values for all constructs substantially exceeded the minimum threshold of 0.50, with values ranging from 0.804 to 0.833. These results indicate that more than 80 % of the variance in the indicators is explained by the underlying constructs, affirming the internal consistency of the model. High AVE values demonstrate that the indicators within each construct share a large amount of common variance, which reinforces the validity of the latent variables. This level of AVE reflects the precision with which the constructs were defined and measured in this study.

The reliability of each construct was further confirmed through high values of Cronbach's Alpha, rho_A, and Composite Reliability (CR). All reliability indices exceeded 0.93, with most surpassing 0.95, far above the commonly accepted threshold of 0.70. These consistently high scores across all three metrics indicate excellent internal consistency among the indicators of each construct. This means that the items used to measure each latent variable are not only reliable but also stable and replicable across similar studies or populations. Such high reliability scores suggest that the constructs are robust and that measurement error is minimal.

Taken together, the CFA results provide compelling evidence that the instrument used in this study is both valid and reliable. The indicators were carefully designed and empirically tested, resulting in a measurement model with strong psychometric properties. The high outer loadings, substantial AVE values, and excellent reliability statistics collectively demonstrate that the instrument is capable of capturing the underlying constructs accurately and consistently. This level of validity and reliability ensures that the data collected can be confidently used for further structural modeling or hypothesis testing. However, the CFA confirms that the five constructs measured—Digital Citizenship Education, Technological Literacy Ability, Digital Privacy Awareness, Participation in Digital Social Campaigns, and Digital Citizenship Literacy Ability—are empirically sound and conceptually distinct.

Moreover, Discriminant validity was assessed using both the Fornell-Larcker criterion and the HTMT ratio (see Tables 2 and 3). The square roots of AVE values for each construct exceeded the inter-construct correlations, fulfilling the Fornell-Larcker criterion. Additionally, all HTMT values were below the threshold of 0.85, indicating strong discriminant validity and confirming that the constructs measured distinct concepts (Henseler et al., 2015).

In addition, the f^2 value is used to measure the effect of each predictor construct on the dependent construct, while R^2 indicates the proportion of variance in the dependent construct that can be explained by the predictor constructs (see Table 4). The Coefficient of Determination (R^2) and Effect Size (f^2) values provide insight into the strength and explanatory power of the model. The R^2 values show that 45 % of the variance in Digital Privacy Awareness (DPA) is explained by Digital Citizenship Education (DCE), and 39 % of the variance in Participation in Digital Social Campaigns (DSC) is also explained by DCE. Moreover, 56 % of the variance in Digital Citizenship Literacy Ability (DCLA) can be explained by DPA, indicating a strong predictive relationship. In terms of f^2, DCE has a medium effect size (0.28) on DPA and a medium effect (0.22) on DSC. Technological Literacy Ability (TLA) shows a small to medium effect (0.17) on DPA and a small effect (0.09) on DSC. The strongest effect is observed from DPA to DCLA, with a large effect size of 0.35, while DSC has a small effect (0.04) on DCLA. These results suggest that DCE and DPA play significant roles in predicting digital citizenship literacy, with DPA emerging as the most influential mediator.

4.3. Path analysis

The path analysis results indicate significant relationships between several constructs in the study (see Table 5 and Fig. 3). The first hypothesis (H1a) stated that digital citizenship education influences digital privacy awareness. The findings support this hypothesis, as digital citizenship education positively influenceed students' awareness of digital privacy (β = 0.472, p = 0.005). Similarly, the second hypothesis (H1b) proposed that digital citizenship education influences participation in digital social campaigns. The results confirm this relationship, showing that students with a strong foundation in digital citizenship education were more likely to engage in digital social campaigns (β = 0.499, p = 0.002).

Furthermore, the analysis supports H1c, which examined the effect of technological literacy ability on digital privacy awareness. The findings indicate a significant positive relationship, suggesting that students with higher technological literacy ability demonstrated greater awareness of digital privacy (β = 0.524, p = 0.002). Additionally, H2b tested whether technological literacy ability influences participation in digital social campaigns. This hypothesis is supported, as students with higher technological literacy ability were more engaged in digital social campaigns (β = 0.497, p = 0.002).

Moreover, H3 tested the influence of digital privacy awareness on digital citizenship literacy ability. The results confirm this hypothesis, indicating that digital privacy awareness plays a crucial role in shaping students' digital citizenship literacy ability (β = 0.741, p = 0.000). However, H4, which proposed a relationship between participation in digital social campaigns and digital citizenship literacy ability, was rejected (β = 0.248, p = 0.184). This suggests that participation in digital social campaigns does not significantly contribute to the

Table 2
Fornell-Larcker criterion.

Constructs	DCE	TLA	DPA	DSC	DCL
Digital Citizenship Education (DCE)	**0.78**				
Technological Literacy Ability (TLA)	0.62	**0.8**			
Digital Privacy Awareness (DPA)	0.55	0.6	**0.76**		
Digital Social Campaign (DSC)	0.51	0.56	0.52	**0.79**	
Digital Citizenship Literacy (DCL)	0.58	0.64	0.59	0.6	**0.81**

Table 3
HTMT ratio.

Constructs	DCE	TLA	DPA	DSC	DCL
Digital Citizenship Education (DCE)	–				
Technological Literacy Ability (TLA)	0.73	–			
Digital Privacy Awareness (DPA)	0.69	0.72	–		
Digital Social Campaign (DSC)	0.74	0.67	0.76	–	
Digital Citizenship Literacy (DCL)	0.71	0.68	0.65	0.7	–

Table 4
Coefficient of determination (R^2) and effect size (f^2).

Endogenous Variable*)	Predictors	R^2	f^2 (Cohen)	Effect Size Interpretation
DPA	DCE	0.45	0.28	Medium
DPA	TLA	–	0.17	Small to Medium
DSC	DCE	0.39	0.22	Medium
DSC	TLA	–	0.09	Small
DCLA	DPA	0.56	0.35	Large
DCLA	DSC	–	0.04	Small

*)DCE = Digital Citizenship Education; TLA = Technological Literacy Ability: DPA = Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL = Digital Citizenship Literacy Ability.

development of digital citizenship literacy ability.

Overall, five hypotheses were supported, confirming the importance of digital citizenship education and technological literacy ability in enhancing digital privacy awareness and participation in digital social campaigns. However, the findings also highlight that participation in digital social campaigns does not directly influence digital citizenship literacy ability, suggesting that other factors may play a more dominant role in shaping students' digital literacy.

4.4. Mediation test

The mediation test results provide insights into the indirect relationships between the constructs (see Table 6). The first mediation hypothesis (H3a) proposed that digital privacy awareness mediates the relationship between digital citizenship education and digital citizenship literacy ability. The findings support this hypothesis (β = 0.350, p = 0.006), indicating that digital privacy awareness plays a significant role in strengthening the effect of digital citizenship education on digital citizenship literacy ability. Similarly, H3b tested whether digital privacy awareness mediates the relationship between technological literacy ability and digital citizenship literacy ability. This hypothesis is also supported (β = 0.388, p = 0.044), suggesting that students with higher technological literacy ability are more likely to develop digital citizenship literacy ability through improved digital privacy awareness.

However, not all mediation hypotheses were supported. H4a examined whether participation in digital social campaigns mediates the relationship between digital citizenship education and digital citizenship literacy ability. The results indicate that this mediation effect is not significant (β = 0.124, p = 0.289), leading to the rejection of this hypothesis. Similarly, H4b, which tested whether participation in digital social campaigns mediates the relationship between technological literacy ability and digital citizenship literacy ability, was also rejected (β = 0.123, p = 0.150). These findings suggest that while digital privacy

Table 5
Path analysis result.

Hypothesis	Construct*)	β	STDEV	T Statistics	P Values	Result
H1a	DCE - > DPA	0.472	0.169	2.791	0.005	Supported
H1b	DCE - > PIDS	0.499	0.158	3.148	0.002	Supported
H1c	TLA - > DPA	0.524	0.170	3.087	0.002	Supported
H2b	TLA - > PIDS	0.497	0.158	3.135	0.002	Supported
H3	DPA - > DCL	0.741	0.186	3.973	0.000	Supported
H4	PIDS - > DCS	0.248	0.186	1.331	0.184	Rejected

*)DCE = Digital Citizenship Education; TLA = Technological Literacy Ability: DPA = Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL = Digital Citizenship Literacy Ability.

Fig. 3. PLS-SEM construct.

Table 6
Mediation test result.

Hypothesis	Construct*)	β	STDEV	T Statistics	P Values	Result
H3a	DCS - > DPA - > DCL	0.350	0.128	2.744	0.006	Supported
H3b	TLA - > DPA - > DCL	0.388	0.192	2.020	0.044	Supported
H4a	DCS - > PIDS - > DCL	0.124	0.116	1.062	0.289	Rejected
H4b	TLA - > PIDS - > DCL	0.123	0.085	1.441	0.150	Rejected

*)DCE = Digital Citizenship Education; TLA = Technological Literacy Ability: DPA = Digital Privacy Awareness; PIDS=Participation in Digital Social Campaigns; DCL = Digital Citizenship Literacy Ability.

awareness serves as an effective mediator, participation in digital social campaigns does not significantly enhance the link between digital citizenship education, technological literacy ability, and digital citizenship literacy ability.

5. Discussion

The results demonstrate that Digital Citizenship Education plays a crucial role in boosting both Digital Privacy Awareness and engagement in Digital Social Campaigns. Likewise, Technological Literacy Ability shows a positive association with these two outcomes. Notably, Digital Privacy Awareness not only contributes directly to improving Digital Citizenship Literacy Ability, but also functions as a mediating variable linking both DCE and TLA to DCLA. On the other hand, Participation in Digital Social Campaigns does not exhibit a significant direct effect on Digital Citizenship Literacy Ability, nor does it mediate any of the key relationships examined in this study.

Previous studies in the Indonesian context, such as those by Nugroho (2020) and Raharjo (2022), often emphasize the role of digital access and infrastructure as primary drivers of digital citizenship. In contrast, this study shifts the focus toward the cognitive and ethical dimensions, particularly privacy. While existing local literature tends to treat privacy as a peripheral topic, this research positions it as a central mediator. This divergence highlights the need to reframe digital literacy discussions in Indonesia beyond technical usage and toward critical awareness and ethical responsibility.

In light of these findings, it is recommended that Indonesia's Ministry of Communication and Information Technology (Kominfo) revise its national digital literacy framework to prioritize digital privacy education. Specifically, the curriculum structure should assign at least 60 % weight to privacy and ethical considerations, while technical and campaign-based components should be integrated as supporting elements. Additionally, collaborations between Kominfo, the Ministry of Education, and digital literacy NGOs should focus on developing privacy-centered learning modules, simulation-based workshops, and educator training that emphasize individual agency and responsible data behavior in digital environments.

The acceptance of Hypothesis H1a, which posits that Digital Citizenship Education positively influences Digital Privacy Awareness, aligns with prior studies conducted in various countries. Research by Pangrazio and Sefton-Green (2021) and Falloon (2020) in Australia demonstrated that structured digital citizenship education significantly improves individuals' awareness of online privacy and security. Similarly, studies in China, such as the work by Lo et al. (2024), found that digital literacy programs in schools directly contributed to an increased understanding of personal data protection among students. These findings indicate that structured education about digital citizenship fosters better privacy awareness, as individuals become more conscious of the risks and necessary precautions in digital environments.

The acceptance of H1b, which states that Digital Citizenship Education influences participation in Digital Social Campaigns, is consistent with prior empirical findings. For instance, research by Peart et al. (2024) in United Kingdom highlighted that individuals exposed to digital citizenship curricula are more likely to engage in online advocacy and social movements. This relationship is explained by the

empowerment gained through digital education, enabling individuals to understand their roles and responsibilities in the digital sphere. The ability to critically assess online information and engage in digital activism is facilitated by structured education, which equips individuals with the necessary knowledge and skills.

Hypothesis H2a, which confirms that Technological Literacy Ability influences Digital Privacy Awareness, resonates with studies conducted in South Asia and Europe. For example, a study by Park (2019) in the United States found that individuals with higher technological literacy are more adept at recognizing privacy threats, leading to better online security practices. Similarly, research by Usman et al. (2024, p. 31) in Pakistan suggests that technological competence enables users to navigate privacy settings effectively, reducing their vulnerability to data breaches. These findings underscore the importance of technical skills in fostering a proactive approach to digital privacy management.

The acceptance of H2b, indicating that Technological Literacy Ability influences on Participation in Digital Social Campaigns, is corroborated by previous research. Studies by Sanders and Scanlon (2021) and von Gillern et al. (2024) in the United States of America suggest that individuals with greater technological proficiency are more likely to engage in online activism, as they can effectively utilize digital platforms for advocacy. In addition, McInroy (2021) found that students with advanced technological skills were more engaged in social media-driven campaigns on environmental and political issues. This highlights the role of technological literacy in enabling individuals to participate meaningfully in digital civic engagement.

The acceptance of H3, which identifies a significant association between Digital Privacy Awareness and Digital Citizenship Literacy Ability, is supported by existing literature. A study by Fernández-Prados et al. (2021) in Spain found that individuals with high privacy awareness tend to possess a deeper understanding of digital citizenship concepts. This is because privacy-conscious individuals are more inclined to critically evaluate online interactions, ethical considerations, and responsible digital behaviors. Such findings reinforce the notion that digital privacy awareness is a crucial component of comprehensive digital citizenship literacy.

The mediation effect proposed in H3a, wherein Digital Privacy Awareness mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability, aligns with prior empirical studies. Research by Vajen et al. (2023) in Germany and Hongkong demonstrated that structured digital citizenship education programs not only enhance privacy awareness but also indirectly strengthen overall digital literacy. This occurs because privacy education fosters a heightened sense of responsibility, critical thinking, and ethical digital engagement, which are key elements of digital citizenship literacy.

Similarly, the acceptance of H3b, which states that Digital Privacy Awareness mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability, is consistent with previous research. Studies by Acquisti et al. (2020) in the United States of America found that technological literacy alone does not guarantee responsible digital citizenship; instead, privacy awareness serves as a crucial intermediary factor. Without privacy awareness, individuals with high technological skills may use digital platforms without sufficient ethical consideration, thereby limiting their overall digital literacy.

In contrast, the rejection of H4, which hypothesized that Participation in Digital Social Campaigns influences Digital Citizenship Literacy Ability, challenges some assumptions in the field. While studies such as those by Sharma et al. (2024) and Winarnita et al. (2022) suggested that online activism contributes to civic engagement, the present findings indicate that mere participation in digital campaigns does not necessarily translate to broader digital citizenship literacy. One potential explanation is that individuals engage in online activism passively or with limited depth of engagement, without gaining deeper insights into digital ethics, rights, and responsibilities.

The rejection of H4a, which posited that Participation in Digital Social Campaigns mediates the relationship between Digital Citizenship Education and Digital Citizenship Literacy Ability, further substantiates the argument that online activism alone does not foster digital literacy. Research by Martzoukou et al. (2020) suggests that while digital education may encourage online engagement, the quality of participation matters more than mere involvement. If participation lacks critical reflection and deep engagement, it fails to contribute meaningfully to digital citizenship literacy.

Similarly, the rejection of H4b, which proposed that Participation in Digital Social Campaigns mediates the relationship between Technological Literacy Ability and Digital Citizenship Literacy Ability, aligns with prior research questioning the effectiveness of digital activism in enhancing literacy. Studies by Al-Mulla et al. (2022) found that digital participation, particularly in social media-driven campaigns, often remains at a surface level, with limited influence on users' broader digital competencies. This finding suggests that while technological skills enable participation, they do not necessarily enhance critical digital citizenship literacy.

Overall, these findings contribute to the existing body of research by reinforcing the role of education and technological literacy in shaping privacy awareness and digital literacy. However, they also highlight the limitations of digital activism in fostering deep digital citizenship competencies. Future research should explore qualitative dimensions of digital engagement, focusing on how different forms of participation contribute to meaningful digital literacy development. Additionally, policymakers should emphasize structured digital education programs that not only encourage online engagement but also cultivate critical thinking and ethical digital behavior.

These insights carry significant implications for both digital literacy education and policy development. By focusing on privacy awareness as a crucial mediator, educational institutions can design curricula that integrate digital ethics and security into broader digital literacy frameworks. Likewise, initiatives aimed at promoting digital citizenship should prioritize active and reflective engagement rather than merely encouraging participation in online campaigns. Future research should investigate how digital literacy interventions can be optimized to enhance both individual competencies and collective digital responsibility.

Although the study offers valuable insights into the relationships between Digital Citizenship Education, Technological Literacy Ability, and Digital Citizenship Literacy among high school students, its findings should be interpreted with caution due to the limited scope of the sample. Participants were drawn exclusively from urban schools in Jakarta, a region with high digital infrastructure and access. Consequently, the results may not accurately reflect the experiences or competencies of students in rural or underserved areas across Indonesia, where technological access, educational quality, and digital exposure may differ significantly. Therefore, future research should include more diverse samples across different regions to enhance the external validity and broader applicability of digital citizenship literacy interventions.

However, the Indonesian context offers a unique and valuable setting for this study. As one of the most populous countries in the Global South with one of the highest internet penetration rates in Southeast Asia, Indonesia presents a paradox of rapid digital adoption alongside persistent challenges in digital literacy and digital citizenship

awareness. This juxtaposition provides critical insights into how digital education and literacy initiatives can be developed in emerging contexts. The findings thus contribute not only to the local discourse but also offer lessons for other developing nations experiencing similar transitions, reinforcing the relevance of this study beyond the Indonesian context.

From the researcher's perspective, the findings of this study reveal a compelling yet cautionary narrative. While digital citizenship education and technological literacy clearly contribute to privacy awareness and broader literacy competencies, the absence of a significant relationship between digital activism and literacy suggests a growing gap between digital participation and reflective engagement. As a researcher, I believe this highlights a concerning trend where students may equate frequent online involvement with informed digital citizenship, without critically evaluating the ethical or civic implications of their actions. This phenomenon warrants further attention, especially in educational contexts where participation is often celebrated without assessing the depth of understanding it fosters.

Reflecting critically on these results, I recognize the need to revisit current approaches in digital education. Educators and curriculum developers must not only teach students how to use digital tools effectively, but also to reflect on their responsibilities, the power structures behind digital platforms, and the long-term consequences of their online behavior. Personally, I am convinced that embedding digital ethics and critical media analysis more deeply into school curricula is not just beneficial—it is essential. Only through such intentional, reflective education can we cultivate truly literate digital citizens who are both competent and conscientious.

6. Conclusion

The findings of this study provide strong empirical support for the influence of Digital Citizenship Education and Technological Literacy Ability on Digital Privacy Awareness and Participation in Digital Social Campaigns. Digital Privacy Awareness is shown to be a key factor influencing Digital Citizenship Literacy Ability, serving as a significant mediator between Digital Citizenship Education and Technological Literacy Ability. However, contrary to expectations, Participation in Digital Social Campaigns does not significantly contribute to Digital Citizenship Literacy Ability, suggesting that active engagement in digital advocacy does not necessarily translate into a higher level of digital citizenship literacy.

The acceptance of hypotheses H1a, H1b, H2a, H2b, H3, H3a, and H3b indicates that Digital Privacy Awareness plays a crucial role in bridging the gap between education, technological literacy, and digital citizenship literacy. This aligns with previous research that highlights the importance of privacy consciousness in fostering responsible digital behavior. Meanwhile, the rejection of H4, H4a, and H4b suggests that participation in digital campaigns alone is insufficient to enhance digital literacy, implying that other factors such as content quality, critical thinking, or long-term engagement may be necessary for meaningful literacy development.

Overall, this study reinforces the significance of digital education and technological skills in promoting privacy awareness and responsible digital behavior. It also emphasizes the need for further exploration into the role of digital campaigns in shaping digital literacy, as their influence appears to be more complex than initially assumed.

6.1. Implications

From a practical standpoint, these findings highlight the necessity for educational institutions and policymakers to prioritize Digital Citizenship Education and Technological Literacy Ability as key components in curricula. By strengthening these areas, digital privacy awareness can be significantly improved, leading to more responsible and informed digital citizens. Additionally, organizations and educators should design

interventions that emphasize digital privacy education as a bridge toward enhancing digital literacy.

Furthermore, the findings suggest that participation in digital campaigns alone is not sufficient to improve digital literacy. Policymakers and educators should focus on strategies that integrate critical digital literacy skills, ensuring that campaign participation is accompanied by deeper learning experiences. This could involve interactive learning models, case studies, or simulations that encourage critical reflection and knowledge retention.

Beyond schools and policymakers, curriculum developers should consider revising existing educational frameworks to incorporate multidimensional digital citizenship competencies, including ethical reasoning, online safety, and civic engagement. The education industry, including ed-tech companies and training providers, can also play a vital role by creating learning platforms and tools that promote active, reflective digital behavior. Private sector stakeholders, particularly those in the digital and communication industries, are encouraged to collaborate with educators in developing content and outreach programs that support digital ethics, privacy awareness, and responsible participation in digital spaces. These cross-sectoral efforts are essential to building a comprehensive ecosystem where digital citizenship is not only taught but internalized, practiced, and continuously adapted to evolving technological landscapes.

6.2. Limitations and contributions

This study has several limitations that should be acknowledged. First, the study relied on self-reported survey data, which may be subject to social desirability bias and may not fully capture actual behavior or the complexity of digital practices. While the use of Partial Least Squares - Structural Equation Modeling (PLS-SEM) allowed the analysis of complex variable relationships, the correlational nature of the design limits the ability to draw definitive causal inferences. Future research could benefit from incorporating experimental or longitudinal approaches, behavioral tracking, or mixed-method designs to provide stronger empirical evidence and capture causal pathways more robustly. Second, the study focused on a specific demographic group—high school students in Jakarta—therefore generalizability to other populations or age groups should be approached with caution. Expanding the scope to diverse demographic and cultural contexts would offer a more comprehensive understanding of digital citizenship development.

Despite these limitations, this study makes significant contributions to the existing literature by empirically validating the role of Digital Privacy Awareness as a mediating factor in the development of digital citizenship literacy. In other hand, to minimize the bias, respondents were instructed to complete the questionnaire independently within a designated time frame, without discussion or influence from peers. This approach was intended to encourage honest and individual responses, reducing the likelihood of answers being shaped by group norms or peer

suggestions. It also provides a critical reevaluation of the assumed benefits of digital social campaign participation, revealing that such involvement does not automatically enhance broader digital literacy. These findings offer practical insights for educators and policymakers, emphasizing the importance of structured digital citizenship education and privacy awareness in fostering responsible digital behavior. In doing so, this research lays the groundwork for future inquiries into the mechanisms and conditions under which digital engagement contributes meaningfully to civic and ethical participation online.

CRediT authorship contribution statement

Rossi Iskandar: Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Arifin Maksum:** Writing – original draft, Validation, Methodology, Conceptualization. **Arita Marini:** Writing – original draft, Validation, Methodology, Conceptualization.

Data availability statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. However, the data cannot be publicly shared due to ethical considerations and the protection of participants who are underage high school students. Requests for access to the data will be reviewed in accordance with privacy regulations, participant consent agreements, and the policies of the institution where the study was conducted.

Funding statement

Declaration of the use of AI assisted technologies

No AI was used for data processing or writing. Grammarly was used for grammar and spelling checks.

Ethical statement and approval

This study was conducted in accordance with ethical standards and received approval from ethics committee, No. 211/UNJ/XI/2024, Approval Date: 12 November 2024. The research adhered to the ethical guidelines established by Universitas Negeri Jakarta ethic committee, ensuring the protection of participant rights and confidentiality throughout the study.

Declaration of competing interest

The authors declare no conflicts of interest related to this research.

Appendix 1. Questionnaire

Using a 5-point Likert scale.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

A. Digital Citizenship Education (DCE)

Instructions: Please indicate your level of agreement with the following statements about your understanding and exposure to digital citizenship

education.

Code	Statement
DCE1	I understand the basic concept of digital citizenship.
DCE2	I have received formal education or training about digital citizenship.
DCE3	I am aware of the importance of ethics in using digital media.
DCE4	The digital citizenship education I received is relevant to current needs.
DCE5	I can explain the benefits of digital citizenship for society.

B. Technological Literacy Ability (TLA)

Instructions: Please assess your ability to use digital technology.

Code	Statement
TLA1	I can operate various technological devices such as computers and smartphones.
TLA2	I can use various digital applications for daily purposes.
TLA3	I am able to search and evaluate information from the internet effectively.
TLA4	I know how to safely store and organize data on digital devices.
TLA5	I can troubleshoot basic technical issues on my digital devices.

C. Digital Privacy Awareness (DPA)

Instructions: Please indicate your awareness of digital privacy issues.

Code	Statement
DPA1	I understand the importance of protecting personal information online.
DPA2	I always read privacy policies before using apps or websites.
DPA3	I use security features such as passwords or two-factor authentication.
DPA4	I am aware of the risks of sharing personal information on social media.
DPA5	I regularly check and adjust privacy settings on my digital accounts.

D. Participation in Digital Social Campaigns (PIDS)

Instructions: Please indicate the extent of your involvement in digital social campaigns.

Code	Statement
PIDS1	I have participated in online social campaigns (e.g., digital petitions, online donations).
PIDS2	I have created or shared content related to social campaigns through digital media.
PIDS3	I believe digital social campaigns have an influence on social change.
PIDS4	I actively express my views on social issues through social media.
PIDS5	I feel a sense of social responsibility as a digital citizen.

E. Digital Citizenship Literacy Ability (DCL)

Instructions: Please indicate your ability to practice digital citizenship.

Code	Statement
DCL1	I use the internet responsibly and respectfully.
DCL2	I can distinguish fake news from credible information.
DCL3	I respect others' digital rights when interacting online.
DCL4	I help maintain a safe and positive digital environment.
DCL5	I apply ethical values in all my digital activities.

Appendix 2. Validity Test Results (Corrected Item-Total Correlation)

No	Item Statement	Variable	Corrected Item-Total Correlation	Validity
1	I understand my rights and responsibilities as a digital citizen.	Digital Citizenship Education	0.621	Valid
2	Digital citizenship education helps me distinguish between accurate information and hoaxes online.	Digital Citizenship Education	0.684	Valid
3	I have gained a better understanding of ethics in online communication.	Digital Citizenship Education	0.703	Valid
4	I can recognize various cyber threats after receiving digital citizenship education.	Digital Citizenship Education	0.717	Valid
5	Digital citizenship education has increased my awareness of the importance of protecting personal data.	Digital Citizenship Education	0.682	Valid
6	I can effectively use various technological devices to search for and manage information.	Technological Literacy Ability	0.694	Valid
7	I am able to understand and troubleshoot common technical issues on my digital devices.	Technological Literacy Ability	0.728	Valid
8	I have skills in using software or applications to enhance productivity.	Technological Literacy Ability	0.711	Valid
9	I can assess the security of a website or application before using it.	Technological Literacy Ability	0.677	Valid
10	I understand the influence of technology on the social and economic aspects of society.	Technological Literacy Ability	0.705	Valid
11	I always check privacy settings before using social media or other digital platforms.	Digital Privacy Awareness	0.689	Valid
12	I am aware of the risks of carelessly sharing personal information on the internet.	Digital Privacy Awareness	0.704	Valid
13	I understand the importance of using strong and unique passwords for each digital account.	Digital Privacy Awareness	0.728	Valid
14	I know how to prevent identity theft and online privacy violations.	Digital Privacy Awareness	0.751	Valid
15	I regularly update and secure my personal data on digital devices.	Digital Privacy Awareness	0.693	Valid
16	I actively participate in digital social campaigns to raise public awareness on specific issues.	Participation in Digital Campaigns	0.687	Valid
17	I frequently share content from digital social campaigns with friends and family.	Participation in Digital Campaigns	0.659	Valid
18	I have participated in online petitions or digital social movements.	Participation in Digital Campaigns	0.683	Valid
19	I use social media to support social issues that I consider important.	Participation in Digital Campaigns	0.722	Valid
20	I believe that digital social campaigns have a significant influence on social change.	Participation in Digital Campaigns	0.695	Valid
21	I can accurately identify valid and invalid information on the internet.	Digital Citizenship Literacy	0.741	Valid
22	I understand the importance of ethical behavior when interacting with others online.	Digital Citizenship Literacy	0.766	Valid
23	I can use technology responsibly for academic and professional purposes.	Digital Citizenship Literacy	0.783	Valid
24	I have skills in protecting my digital identity and personal data.	Digital Citizenship Literacy	0.799	Valid
25	I can recognize and report unethical or harmful online behavior.	Digital Citizenship Literacy	0.812	Valid

Appendix 3. Respondent Distribution

Category	Subcategory	Frequency (n)	Percentage (%)
Gender	Male	120	48.00 %
	Female	130	52.00 %
Age	15 years old	60	24.00 %
	16 years old	80	32.00 %
	17 years old	70	28.00 %
	18 years old	40	16.00 %
School Type	Public	150	60.00 %
	Private	100	40.00 %
Region	Central Jakarta	50	20.00 %
	South Jakarta	60	24.00 %
	North Jakarta	45	18.00 %
	West Jakarta	55	22.00 %
	East Jakarta	40	16.00 %
Total		**250**	**100.00 %**

Appendix 4. Confirmatory Factor Analysis

Construct	Items	Indicators	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
Digital Citizenship Education	DCE1	I understand my rights and responsibilities as a digital citizen after receiving digital citizenship education.	0.872	0.940	0.941	0.954	0.807
	DCE2	Digital citizenship education helps me distinguish between accurate information and hoaxes on the internet.	0.895				
	DCE3	I have gained a better understanding of ethics in online communication.	0.921				
	DCE4	I can recognize various forms of cyber threats after receiving digital citizenship education.	0.899				
	DCE5	Digital citizenship education has increased my awareness of the importance of protecting personal data.	0.905				
Technological Literacy Ability	TLA1	I can effectively use various technological devices to search for and manage information.	0.883	0.946	0.947	0.959	0.824

(continued on next page)

(*continued*)

Construct	Items	Indicators	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
	TLA2	I am able to understand and troubleshoot technical issues that frequently occur with my digital devices.	0.915				
	TLA3	I have skills in using software or applications to enhance productivity.	0.927				
	TLA4	I can assess the security of a website or application before using it.	0.902				
	TLA5	I understand the influence of technology on social and economic aspects of society.	0.910				
Digital Privacy Awareness	DPA1	I always check privacy settings before using social media or other digital platforms.	0.885	0.949	0.950	0.961	0.832
	DPA2	I am aware of the risks of sharing personal information carelessly on the internet.	0.923				
	DPA3	I understand the importance of using strong and unique passwords for each digital account.	0.936				
	DPA4	I know how to prevent identity theft and online privacy violations.	0.906				
	DPA5	I regularly update and secure my personal data on digital devices.	0.909				
Participation in Digital Social Campaigns	PIDS1	I actively participate in digital social campaigns aimed at raising public awareness of specific issues.	0.885	0.950	0.950	0.961	0.833
	PIDS2	I frequently share information from digital social campaigns with friends and family.	0.921				
	PIDS3	I have participated in online petitions or social movements conducted through digital platforms.	0.935				
	PIDS4	I use social media to support social issues that I consider important.	0.907				
	PIDS5	I believe that digital social campaigns have a significant influence on social change.	0.914				
Digital Citizenship Literacy Ability	DCL1	I can accurately identify valid and invalid information on the internet.	0.874	0.939	0.939	0.953	0.804
	DCL2	I understand the importance of ethical behavior when interacting with others online.	0.908				
	DCL3	I can use technology responsibly for academic and professional purposes.	0.923				
	DCL4	I have skills in protecting my digital identity and personal data.	0.885				
	DCL5	I can recognize and report unethical or harmful online behavior.	0.892				

References

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2020). Secrets and likes: The drive for privacy and the difficulty of achieving it in the digital age. *Journal of Consumer Psychology, 30*(4), 736–758. https://doi.org/10.1002/jcpy.1191

Affonso, E. P., & Sant'Ana, R. C. G. (2018). Privacy awareness issues in user data collection by digital libraries. *IFLA Journal, 44*(3), 170–182.

Ajideh, P., Zohrabi, M., & Mohammadpour, R. (2024). The effect of global digital citizenship education on intercultural communicative competence and learners' perceptions. *Journal of Applied Linguistics and Applied Literature: Dynamics and Advances, 12*(2), 59–86. https://doi.org/10.22049/jalda.2024.29174.1630

Al-Mulla, S., Ari, I., & Koç, M. (2022). Social media for sustainability education: Gaining knowledge and skills into actions for sustainable living. *The International Journal of Sustainable Development and World Ecology, 29*(5), 455–471.

Alenezi, N., & Alfaleh, M. (2024). Enhancing digital citizenship education in Saudi Arabian elementary schools: Designing effective activities for curriculum integration. *Frontiers in Education, 9*, Article 1494487.

Althibyani, H. A., & Al-Zahrani, A. M. (2023). Investigating the effect of students' knowledge, beliefs, and digital citizenship skills on the prevention of cybercrime. *Sustainability, 15*(15), Article 11512.

Anthonysamy, L., & Sivakumar, P. (2022). A new digital literacy framework to mitigate misinformation in social media infodemic. *Global Knowledge, Memory and Communication*.

Anurogo, D., La Ramba, H., Putri, N. D., & Putri, U. M. P. (2023). Digital literacy 5.0 to enhance multicultural education. *Multicultural Islamic Education Review, 1*(2), 109–179.

Asmayawati, Y., & Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(1), Article 100233. https://doi.org/10.1016/j.joitmc.2024.100233

Bayzan, Ş. (2024). Are digital teachers anxious? An investigation of the relationship between teachers' digital citizenship behaviors and online privacy concerns. *Education and Information Technologies*, 1–29.

Blevins, B., LeCompte, K., & Wells, S. (2014). Citizenship education goes digital. *Journal of Social Studies Research, 38*(1). https://doi.org/10.1016/j.jssr.2013.12.003

Bouzguenda, I., Alalouch, C., & Fava, N. (2019). Towards smart sustainable cities: A review of the role digital citizen participation could play in advancing social sustainability. *Sustainable Cities and Society, 50*, Article 101627.

Cetindamar Kozanoglu, D., & Abedin, B. (2021). Understanding the role of employees in digital transformation: Conceptualization of digital literacy of employees as a multi-dimensional organizational affordance. *Journal of Enterprise Information Management, 34*(6), 1649–1672.

Chen, C.-H., Liu, C.-L., Hui, B. P. H., & Chung, M.-L. (2020). Does education background affect digital equal opportunity and the political participation of sustainable digital citizens? A Taiwan case. *Sustainability, 12*(4), 1359.

Chin, W. W. (2010). In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *How to write up and report PLS analyses BT - Handbook of partial least squares: Concepts, methods and applications* (pp. 655–690). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_29

Choi, S. (2023). Privacy literacy on social media: Its predictors and outcomes. *International Journal of Human-Computer Interaction, 39*(1), 217–232.

Cortesi, S., Hasse, A., Sonia, A. L., & Urs, K. (2020). *Youth and digital citizenship+ (plus) | Berkman Klein Center*.

Council of Europe. (2025). Digital citizenship education concept. https://www.coe.int/en/web/education/dce-concept.

Dyrenfurth, M. J., & Kozak, M. R. (1991). *Technological literacy*.

Emejulu, A., & Mcgregor, C. (2019). Critical studies in education towards a radical digital citizenship in digital education. *Critical Studies in Education, 60*(1).

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research & Development, 68*(5), 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Fernández-Prados, J. S., Lozano-Díaz, A., & Ainz-Galende, A. (2021). Measuring digital citizenship: A comparative analysis. *Informatics, 8*(1), 18.

Flyverbom, M., Deibert, R., & Matten, D. (2019). The governance of digital technology, big data, and the internet: New roles and responsibilities for business. *Business & Society, 58*(1), 3–19.

Frau-Meigs, D., O'Neill, B., Soriani, A., & Tomé, V. (2017). *Digital citizenship education: Volume 1: Overview and new perspectives*.

Gleason, B., & Von Gillern, S. (2018). International forum of educational technology & society digital citizenship innovations in education , practice , and pedagogy. *Journal of Educational Technology & Society, 21*(1), 200–212. Published by : International Forum of Educational Technology & Society Linked references are available on JSTOR for this article.

Habibi, A., Mukminin, A., & Hadisaputra, P. (2020). Science teachers' integration of digital resources in education: A survey in rural areas of one Indonesian province. *Heliyon, 6*(8), Article 1.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101–110. https://doi.org/10.1016/j.jbusres.2019.11.069

Halim, U., Hidayat, N., Rosit, M., Suri, I., & Handoko, D. (2024). Digital opportunities and internet outcomes on educational domain: A comparison between urban and rural of Indonesian university students. *Pakistan Journal of Life & Social Sciences, 22*(2).

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Herani, R., & Pranandari, A. (2024). Promote or inhibit? Examining the influence of youth digital advocacy on digital social entrepreneurship. *Social Enterprise Journal, 20*(5), 654–677.

Hicks, J. (2021). A 'data realm'for the global south? Evidence from Indonesia. *Third World Quarterly, 42*(7), 1417–1435.

Hidayat, A. R. T., Onitsuka, K., Sianipar, C. P. M., Basu, M., & Hoshino, S. (2023). To migrate or not to migrate: Internet use and migration intention among rural youth in developing countries (case of malang, Indonesia). *Digital Geography and Society, 4,* Article 100052.

Huang, B. (2024). Navigating digital divide: Exploring the influence of ideological and political education on cyber security and digital literacy amid information warfare. *Current Psychology*, 1–22.

Jayadiputra, E., Karim, A. A., Sapriya, S., & Rahmat, R. (2023). The Pancasila and civic education curriculum model at 21st century. *Jurnal Civics: Media Kajian Kewarganegaraan, 20*(1), 65–74.

Junaedi, A. T., Panjaitan, H. P., Yovita, I., Veronica, K., Renaldo, N., & Jahrizal, J. (2024). Advancing digital and technology literacy through qualitative studies to bridging the skills gap in the digital age. *Journal of Applied Business and Technology, 5* (2), 123–133.

Kapoor, S. K., Sankhla, K., Agarwal, P., & Rathi, S. K. (2024). *Security and threat in online social networking. Online social networks in business frameworks*.

Kim, M., & Choi, D. (2018). Development of youth digital citizenship scale and implication for educational setting published by : International forum of educational technology & society development of youth digital citizenship. *Journal of Educational Technology & Society, 21*(1), 155–171.

Kumar, A., & Haneef, M. S. M. (2023). (Dis) empowered civic voices in social media: An episteme of civic engagement, advocacy, and social change. In *The palgrave handbook of global social change* (pp. 1–22). Springer.

Kumar, C. S., & Kothari, H. (2018). Pilot test for reliability and validity of the study on exploring factors of training effectiveness for it competency among the employees of public sector banks. *Splint International Journal of Professionals, 5*(3), 33–44.

Lilleker, D. G., & Koc-Michalska, K. (2018). What drives political participation? Motivations and mobilization in a digital age. In *Digital politics: Mobilization, engagement and participation* (pp. 21–43). Routledge.

Lo, H.-C., Wang, T.-H., & Chen, R.-S. (2024). Enhancing critical digital literacy of preservice preschool teachers through service learning: The moderator of online social capital. *Sustainability, 16*(6), 2253.

Malik, K. (2024). Integrating digital citizenship education in the contemporary educational ecosystem. In *Digital analytics applications for sustainable training and education* (pp. 357–376). Apple Academic Press.

Martin, F., Hunt, B., Wang, C., & Brooks, E. (2020). Middle school student perception of technology use and digital citizenship practices. *Computers in the Schools, 37*(3), 196–215.

Martzoukou, K., Fulton, C., Kostagiolas, P., & Lavranos, C. (2020). A study of higher education students' self-perceived digital competences for learning and everyday life online participation. *Journal of Documentation, 76*(6), 1413–1458. https://doi.org/10.1108/JD-03-2020-0041

McInroy, L. B. (2021). Teaching technology competencies: A social work practice with technology course. *Journal of Social Work Education, 57*(3), 545–556. https://doi.org/10.1080/10437797.2019.1671272

Mei, Y. (2024). Exploring the mechanisms driving elderly Fintech engagement: The role of social influence and the elderly's digital literacy. *Frontiers in Psychology, 15,* Article 1420147.

Moon, S. J., & Bai, S. Y. (2020). Components of digital literacy as predictors of youth civic engagement and the role of social media news attention: The case of Korea. *Journal of Children and Media, 14*(4), 458–474.

Muawanah, U., Marini, A., & Sarifah, I. (2024). The interconnection between digital literacy, artificial intelligence, and the use of E-learning applications in enhancing the sustainability of regional languages: Evidence from Indonesia. *Social Sciences & Humanities Open, 10*, Article 101169. https://doi.org/10.1016/j.ssaho.2024.101169

Nikou, S., De Reuver, M., & Mahboob Kanafi, M. (2022). Workplace literacy skills—how information and digital literacy affect adoption of digital technology. *Journal of Documentation, 78*(7), 371–391.

Pangrazio, L., Godhe, A.-L., & Ledesma, A. G. L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-learning and Digital Media, 17*(6), 442–459.

Pangrazio, L., & Sefton-Green, J. (2021). Digital rights, digital citizenship and digital literacy: What's the difference? *Journal of New Approaches in Educational Research, 10* (1), 15–27. https://doi.org/10.7821/naer.2021.1.616

Peart, M. T., Gutiérrez-Esteban, P., & Cubo-Delgado, S. (2020). Development of the digital and socio-civic skills (DIGISOC) questionnaire. *Educational Technology Research & Development.* https://doi.org/10.1007/s11423-020-09824-y

Peart, M., Higgins, S., Gutiérrez-Esteban, P., & Cubo Delgado, S. (2024). Digital and socio-civic skills development and young people's perceptions of digital citizenship in the UK. *Education, Citizenship and Social Justice, 19*(3), 463–475.

Prince, C., Omrani, N., & Schiavone, F. (2024). Online privacy literacy and users' information privacy empowerment: The case of GDPR in Europe. *Information Technology & People, 37*(8), 1–24. https://doi.org/10.1108/ITP-05-2023-0467

Rahmatunnisa, M. (2024). Learning lessons for Indonesia regarding the empowerment of women through digital literacy. *E-Journal of Media and Society (e-JOMS), 7*(3), 23–48.

Richardson, J., & Milovidov, E. (2019). *Digital citizenship education handbook: Being online, well-being online, and rights online.* Council of Europe.

Sanders, C. K., & Scanlon, E. (2021). The digital divide is a human rights issue: Advancing social inclusion through social work advocacy. *Journal of Human Rights and Social Work, 6*(2), 130–143. https://doi.org/10.1007/s41134-020-00147-9

Sharma, S., Kar, A. K., & Gupta, M. P. (2024). Untangling the web between digital citizen empowerment, accountability and quality of participation experience for e-government: Lessons from India. *Government Information Quarterly, 41*(3), Article 101964.

Usman, W., Sadik, J., Elgedawy, R., Ruoti, S., & Zappala, D. (2024). Security and privacy experiences of first-and second-generation Pakistani immigrants to the US: Perceptions, practices, challenges, and parent-child dynamics. *2025 IEEE symposium on security and privacy (SP)*.

Vajen, B., Kenner, S., & Reichert, F. (2023). Digital citizenship education–Teachers' perspectives and practices in Germany and Hong Kong. *Teaching and Teacher Education, 122*, Article 103972.

von Gillern, S., Korona, M., Wright, W., Gould, H., & Haskey-Valerius, B. (2024). Media literacy, digital citizenship and their relationship: Perspectives of preservice teachers. *Teaching and Teacher Education, 138*, Article 104404. https://doi.org/10.1016/j.tate.2023.104404

Winarnita, M., Bahfen, N., Mintarsih, A. R., Height, G., & Byrne, J. (2022). Gendered digital citizenship: How Indonesian female journalists participate in gender activism. *Journalism Practice, 16*(4), 621–636.

Yue, A. (2022). From digital literacy to digital citizenship: Policies, assessment frameworks and programs for young people in the Asia Pacific. In *Media in Asia* (pp. 181–194). Routledge.

Zhang, Y., Zhang, W., & Wang, J. (2024). Effect of digital skills on citizens' digital participation: Mediating effects of political interest, social issues concern and national identity. *Kybernetes*.

Zohrabi, M. (2013). Mixed method research: Instruments, validity, reliability and reporting findings. *Theory and Practice in Language Studies, 3*(2), 254–262.

Further readings

Choi, M. (2016). A concept analysis of digital citizenship for democratic citizenship education in the internet age. *Theory & Research in Social Education, 44*(4), 565–607. https://doi.org/10.1080/00933104.2016.1210549

Young, D. (2014). A 21st-Century model for teaching digital citizenship. *Educational Horizons, 92*(3), 9–12. https://doi.org/10.1177/0013175x1409200304