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

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the abstract is well written but it will be better to add the study setting 'Indonesia' , for example insert this phrase " e.g., "using data from Indonesian high school students"

The Mediating role of digital privacy awareness and participation in digital social campaigns in digital citizenship literacy: An empirical study in 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 [illegible]. Additionally, it explores the role of digital privacy awareness [illegible] relationship between digital citizenship education and digital [illegible] other hand, participation in digital social campaigns is also ex[illegible] between technological literacy and digital citizenship litera[illegible] dynamics, this research is expected to provide insights into [illegible] enhancing young people's digital skills, enabling them to eng[illegible] in the digital world.

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the paper suddenly jumps from global concepts (OECD) to Indonesian context without transition . it is advised to use proper transition . also the author mentions Indonesia in the title but lacks justification for why Indonesia matters , he should add reasons

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; Bazzan, 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 sha[illegible] Digital Citizenship Literacy Ability (Bouzguenda et al., 2019; Cetin [illegible] 2021; Junaedi et al., 2024). When individuals are aware of [illegible] measures, they become more responsible digital users, maki[illegible] their online activities. This awareness enhances their abilit[illegible] information, engage safely in online interactions, and con[illegible] communities. As a result, individuals with strong digital [illegible] demonstrate higher competence in digital citizenship literacy

Digital Privacy Awareness serves as a key mediator [illegible] Digital Citizenship Education and Digital Citizenship Literacy [illegible] 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

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the author uses recent reference from 2020–2024 which positively indicate that the author engaged with recent findings and points to the importance of the topic

successfully differentiate between overlapping concepts like (e.g., digital citizenship literacy vs. technological literacy .

however there is no studies about Indonesia (e.g., digital literacy gaps in

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.

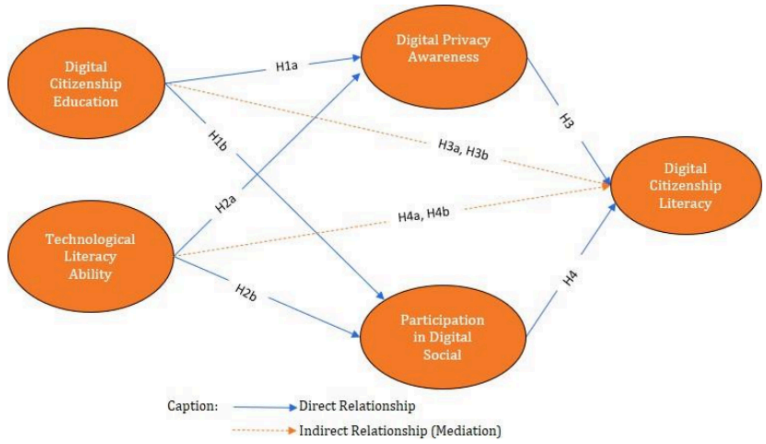

Figure 1. Conceptual Framework

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 questio Likert scale, where respondents were asked to indicate their le various statements related to the study's variables. The Likert (*Strongly Disagree*) to 5 (*Strongly Agree*), allowing for the measur perceptions of digital citizenship education, technological profi awareness, participation in digital social campaigns, and digital ci questionnaire instrument was developed based on relevant prev 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).

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No mention of data collection mode (online? paper?), duration, or supervision protocol and PLS-SEM analysis lacks software name (SmartPLS? R? ADANCO?), specify software/tools (e.g., "SmartPLS 4.0, 5,000 bootstrap samples").

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

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the paper claims "originality" but doesn't state how the dual-mediation model advances theory. You can revise as the following to frame novelty "This study extends Ribble's digital citizenship [illegible] by evidencing privacy awareness

4. Results and Finding

Descriptive Statistics

The respondent distribution in Table 1 provides an overvie characteristics of the 250 participants in this study. In terms consisted of 120 male respondents (48%) and 130 female respond 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

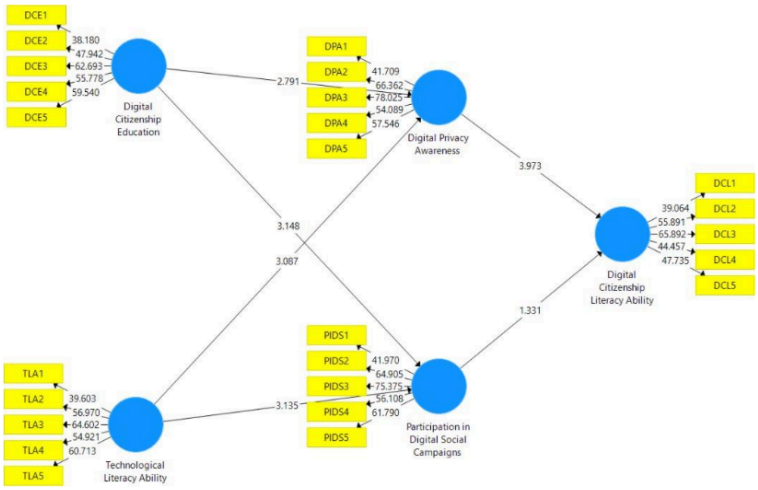

Figure 2. PLS-SEM Construct

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 ($\beta = 0.350$, $p = 0.006$), 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 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.

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