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Research Article

The Influence of Social Media Use, Demographic, and Critical Thinking Skills on the Digital Citizenship

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Abstract
This study aims to analyze the influence of social media use, demographic factors, and critical thinking skills on digital citizenship among students at the Faculty of Teacher Training and Education, Universitas Muhammadiyah Surakarta. This study used a quantitative approach with a correlational design, involving 367 active student respondents who were selected proportionally from various study programs. The results indicate that social media use and critical thinking skills have a positive and significant effect on the digital citizenship. In addition, demographic factors such as gender, parental education, and level of study also have a significant relationship with digital citizenship. Mediation analysis shows that critical thinking skills can mediate the influence of social media use on digital citizenship, but do not mediate the influence of demographics. This study provides a new contribution by revealing the important role of critical thinking skills as a mediator between social media use and digital citizenship among prospective teacher students. These findings are useful for the development of digital literacy curricula in higher education, especially in strengthening digital citizenship competencies through the use of social media and the strengthening of critical thinking skills.

Keywords: *critical thinking skills, demographics, digital citizenship, social media use*

Introduction

The development of information and communication technology (ICT) has brought significant changes to all aspects of human life, including education. In Indonesia, the digitization process is developing rapidly, but its distribution is not yet evenly spread across all regions (Putri et al., 2024). This condition shows that there is a clear digital divide between urban centers and suburban areas. The use of ICT in the learning process offers various opportunities to improve the quality of education, expand access to information, and create a more interactive and effective learning environment (Al-fadhilah & Fatiha, Azzahra, 2024). In addition, the use of ICT in learning is not limited to the use of hardware such as computers and projectors, but also involves the use of educational software, online learning platforms, and digital learning resources. This technology allows teachers to access a variety of information sources and teaching methods, while students can learn in a more interactive and independent manner.

Social media has changed the way students interact, learn, and form their social identities. These platforms open up great opportunities for collaborative learning and information sharing, but also pose serious challenges to digital ethics and information literacy. The high use of social media among students is often not balanced with awareness of data security, personal privacy, and moral responsibility in online communication (Sari, 2019). The widespread phenomenon of hoaxes, hate speech, and digital plagiarism among young users demonstrates that technological advancement has not been accompanied by adequate awareness of digital citizenship (Drakel et al., 2018); Ikhsan 2024). This condition indicates the need to strengthen digital citizenship values in higher education so that students are not only technically competent but also socially and ethically responsible in the digital space.

Ideally, students in the digital age are expected to be able to use technology wisely, ethically, and productively. They should not only be passive users of social media, but also be able to become reflective and critical producers of information on public issues (Fitriana & Iskandar, 2025). This is in line with the concept of digital citizenship introduced by Ribble (2015), which emphasizes nine main dimensions such as digital literacy, ethics of technology use, social responsibility, and digital security. In the context of higher education, students should ideally be able to actively participate in the digital space while upholding moral values, respecting the digital rights of others, and maintaining personal and community cyber safety (Fitriana dan Iskandar, 2025). Students of the Faculty of Teacher Training and Education (FKIP) have a very important role in this context, because they are not only future users of technology, but also future educators who will shape the next generation. Hanif and Salsabillah (2024) emphasize that FKIP students must be role models in instilling digital ethics values in students, especially amid the increasing complexity of technology use in education.

However, the reality on the ground still shows a gap between ideal norms and actual practices. Many students still lack digital ethics awareness and are unable to think critically about the rapid and massive flow of information in cyberspace (Salsabila et al., 2025). As a result, they tend to easily believe unverified information, spread fake news, or get caught up in digital polarization (Natalia et al.. 2025). In fact, critical thinking skills are a key prerequisite for maintaining integrity and responsibility when interacting in the digital world. Meliyani (2024) explains that critical thinking is not only a cognitive process but also a moral reflection to assess the truth of information and the social impact of one's digital actions. Reza (2025) adds that strengthening critical thinking skills in an academic environment can help students avoid the trap of misinformation and form healthier and more ethical digital behavior.

In addition to critical thinking skills, research also shows that demographic characteristics play an important role in determining students' digital behavior. Factors such as age, gender, socioeconomic background, and region of origin can influence an individual's level of digital literacy and online participation (Akduman et al. 2024). Students from regions with limited digital infrastructure generally have less access to information than those from urban areas. . Permana et al. (2023) also found that demographic variables help determine perceptions of digital citizenship, as different social and cultural experiences can shape varying levels of responsibility and ethical awareness in the digital space. Therefore, demographic factors cannot be ignored in studies of digital citizenship, as they provide an important context for explaining variations in student behavior in the use of social media.

Previous research by Fadil (2024) shows that critical thinking skills have a positive effect on students' digital behavior, but does not highlight the influence of individual social characteristics. Meanwhile, Xu et al.. (2019) introduced the concept of social media competence, which describes students' ability to use social media effectively and responsibly, but did not consider cognitive aspects as mediators. Thus, there is still room for research to examine the relationship between social media use, demographics, and critical thinking skills in shaping digital citizenship behavior, especially among prospective teachers who will have pedagogical responsibilities in the future.

Theoretically, this study is based on two main frameworks, namely Social Cognitive Theory (SCT) by Bandura and Digital Citizenship Theory (DCT) by (Ribble 2015). Social Cognitive Theory emphasizes that individual behavior is shaped by the reciprocal interaction between personal factors, behavior, and the environment (Nickerson, 2025). In the digital context, students learn behavior from social models they see in digital media through the process of observational learning. Personal factors such as demographics and critical thinking skills influence how students assess and imitate the digital behavior they observe. Meanwhile, Digital Citizenship Theory emphasizes that digital behavior is not only the result of technological interactions, but also a reflection of moral awareness, social responsibility, and ethical literacy (Ribble 2015).

The integration of these two theories provides a comprehensive understanding that the formation of digital citizenship is not only behavioral but also moral and social, combining the cognitive, social, and affective dimensions of students in the digital space.

This research is very necessary, as it addresses the empirical need to bridge the gap between theoretical studies and actual practice in the field. Most previous studies still separate technological and cognitive aspects in understanding digital citizenship, while this study attempts to integrate both through a mediation approach (Purwanti & Nurhayati 2025). In addition, the context of FKIP UMS students as prospective teachers who will transfer digital citizenship values to students makes this study even more relevant. This population has rarely been studied in depth, even though they have a strategic role in shaping Indonesia's digital education culture (Hanif & Salsabillah 2024). Thus, this study is not only academically important but also has practical implications for the formulation of a digital literacy-based citizenship education curriculum.

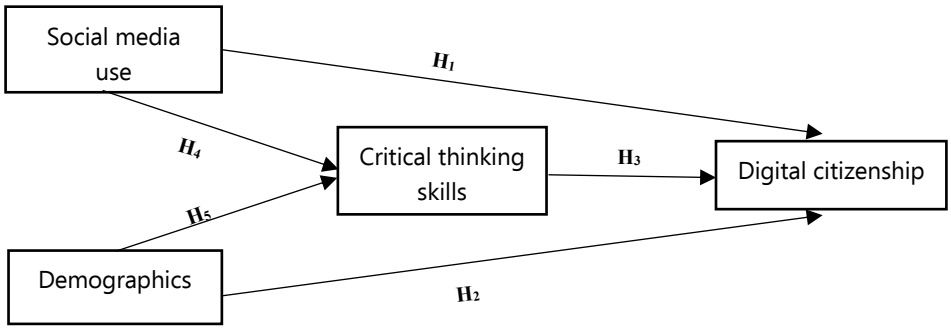

Figure 1. Research hypothesis

Note:

Yellow (social cognitive theory)

Green (digital citizenship theory)

Yellow and green (social cognitive theory and digital citizenship theory)

According to Figure 1, this study is based on Social Cognitive Theory and Digital Citizenship Theory. Bandura's Social Cognitive Theory explains that behavior is shaped through reciprocal interactions between cognitive processes, behavior, and environmental factors (Nickerson, 2025). In this context, social media use serves as an environmental influence that can influence students' critical thinking skills and, in turn, their digital behavior. Digital Citizenship Theory emphasizes that responsible digital engagement involves competencies such as digital literacy, ethical communication, and awareness of digital rights and responsibilities (Ribble, 2015). Therefore, this study examines the direct influence of social media use, demographic characteristics, and critical thinking skills on digital citizenship, as well as the mediating role

of critical thinking skills in explaining how social media use contributes to the development of responsible digital citizenship.

Method

This study used a quantitative approach with a correlational design to examine the relationship between social media use, demographic factors, and critical thinking skills on the digital citizenship of students. The research was conducted at the Faculty of Teacher Training and Education, Universitas Muhammadiyah Surakarta, in October 2025. The population consisted of all active undergraduate students across various study programs within FKIP UMS, from the first to the final semester. A total of 367 respondents were selected through proportional random sampling to ensure that the representation from each department was balanced. Several variables were defined and measured based on previous literature. Digital citizenship refers to students' ability to participate actively, ethically, critically, and responsibly in digital environments (Al-Zahrani, 2015). Social media use, adapted from Guarnieri et al. (2013) was operationalized through three dimensions: intensity, purpose, and manner of use. In this study, students' social media engagement was further categorized into productive us such as using social media for learning, collaboration, and content creation and passive consumption, including browsing or entertainment activities. This categorization was intended to provide conceptual clarity and to distinguish between active and passive forms of digital engagement. Each dimension was assessed using Likert-type items on a five point scale ranging from "never" to "very often." Demographic factors referred to students' socio-economic and educational background, such as gender, age, study program, and parental education, as outlined by Alhajraf and Alasfour (2014). Critical thinking skills were measured based on Facione's (2011) framework, which includes analysis, evaluation, inference, and self-regulation when interacting with information in digital contexts.

Data collection was conducted online using a closed-ended questionnaire distributed through Google Forms. The instrument used a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) to measure respondents' agreement with each indicator. The questionnaire consisted of three items measuring social media use, six items assessing digital citizenship, and ten items evaluating critical thinking skills. The instrument was adapted from established frameworks and translated into Indonesian using a forward-backward translation procedure to ensure linguistic and conceptual equivalence (Facione 2011; Al-Zahrani 2015; Guarnieri et al., 2013) . Prior to the main data collection, a pilot test was conducted with 34 respondents to assess the validity and reliability of the instrument. Item validity was examined using Pearson's product-moment correlation, with items considered valid when the calculated r value exceeded the table r value of 0.329. The results showed that all items on the social media usage, critical thinking skills, and digital citizenship scales met the validity criteria. Reliability was assessed using Cronbach's Alpha coefficient, with values of 0.71 for social media usage, 0.94 for critical thinking skills, and 0.86 for digital

citizenship, indicating good internal consistency. After the instrument was confirmed to be valid and reliable, the main data analysis proceeded, including multicollinearity testing and Pearson correlation analysis to examine the relationships between variables.

Demographic data analysis was conducted first to describe the characteristics of respondents based on categories such as gender, age, and study program. Because demographic data is categorical, the analysis was performed using multiple linear regression tests to see the balance of proportions between respondent groups. The test results showed that most of the p-values were > 0.05, so it can be concluded that there were no significant differences in proportions between demographic categories and that the characteristics of the respondents were homogeneous. Next, the influence between variables was tested using simple linear regression analysis to assess the direct relationship between each independent variable and the dependent variable. In addition to direct influence analysis, this study also explored indirect (mediating) influences through critical thinking skills variables. To test the mediating role, the Sobel Test was used to determine whether the indirect effect was statistically significant. This test is calculated based on the z-value and p-value, where a z-value > 1.96 and p < 0.05 indicate a significant mediating effect. The entire analysis process was conducted using SPSS software version 24, and the results were interpreted based on the significance value and regression coefficient to determine the direction and magnitude of the influence between the research variables. The entire research process was carried out in accordance with social research ethics, in which the confidentiality and security of participant data were strictly maintained. All information and responses from respondents were used solely for academic purposes and the advancement of knowledge without disclosing personal identities, thereby ensuring the principles of anonymity and data confidentiality.

Data Analysis Results

Prerequisite Analysis Tests

Data analysis techniques were systematically arranged according to requirements. To facilitate analysis, the collected data was first tested for normality. In this study, we used Normality Tests and Heteroscedasticity Tests. The following are the results of the tests conducted:

Table 1. Normality test results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		367
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	3.23943620
Most Extreme Differences	Absolute	.040
	Positive	.040
	Negative	-.038

Test Statistic	.040
Asymp. Sig. (2-tailed)	.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Based on the normality test results presented in Table 1, it is known that the data in this study are normally distributed. This is reinforced by a significance value (Sig.) of 0.200, which is greater than 0.05. Thus, it can be concluded that the residual values are normally distributed, indicating that the variables meet the normality assumption.

Table 2. Multicollinearity test results

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Use of social media	.763	1.311
	Demographic	.857	1.166
	Critical thinking	.834	1.199

a. Dependent Variable: digital citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Based on the results of the multicollinearity test presented in Table 2, the tolerance and VIF values of each independent variable meet the required criteria. Specifically, the social media usage variable has a tolerance value of 0.763 (>0.1), the demographic variable has a tolerance value of 0.857, and the critical thinking skills variable has a tolerance value of 0.834 (>0.1). In addition, the VIF of the social media usage variable is 1.311 (<10), the VIF of the demographic variable is 1.166 (<10), and the VIF of the critical thinking skills variable is 1.199 (>10). Thus, it can be concluded that the data does not show multicollinearity.

Table 3. Results of heteroscedasticity test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.572	.631		2.490	.013
	Use of social media	.004	.048	.005	.088	.930
	Demographic	.029	.047	.035	.615	.539
	Critical thinking	.030	.028	.062	1.084	.279

a. Dependent Variable: Digital Citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Based on the results of the heteroscedasticity test presented in Table 3, the social media usage variable shows a significance value (Sig.) of 0.930 (> 0.05), the demographic variable has a significance value of 0.539 (> 0.05), and the critical thinking skills variable has a significance value of 0.279 (> 0.05). Therefore, it can be concluded that there is no heteroscedasticity in the regression model.

Results

The results of this study are based on data processing obtained through the distribution of questionnaires to 367 students from various study programs at the Faculty of Teacher Training and Education of Universitas Muhammadiyah Surakarta. The respondents represented diverse demographic backgrounds, thus providing a comprehensive picture of the relationship between social media use, critical thinking skills, and demographic factors on the digital citizenship of FKIP UMS students.

Table 4. Results of multiple linear regression test and t-test

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15,178	2,505		6,058	.000
	Use of social media	.445	.130	.200	3,420	.001
	Gender	1,176	.570	.114	2,062	.041
	Level education highest parents	-.047	.188	-.014	-.248	.804
	Level studying	-.029	.194	-.008	-.151	.880
	Critical thinking skills	.796	.083	.563	9,571	.000

a. Dependent Variable: Digital Citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Based on Table 4, the results of the multiple linear regression test, the regression equation model can be formulated as follows.

$$Y = 15.178\ (\alpha) + 0.445\ (X_1) + (1.176 + 0.047 + 0.029\ (X_2)) + 0.796\ (X_3) + e$$

This multiple regression equation model means, among other things, first, that the constant (α) = 15.178, meaning that if the use of social media and critical thinking skills is (0) or remains the same, then the value of students' digital citizenship is 15.178. Second, B1 (X_1) = 0.445 means that if social media use increases by one unit, students' digital citizenship will also increase by 0.445. Third, B2 (X_2) demographics

(gender) = 1.176, meaning that if gender increases by one unit, students' digital citizenship will also increase by 1.176. Demographics (parents' highest level of education) = 0.047, meaning that if the parents' highest level of education increases by one unit, students' digital citizenship will also increase by 0.047. Demographics (level of study) = 0.029, meaning that if the level of study increases by one unit, the students' digital citizenship will also increase by 0.029. Fourth B3 (X_3) critical thinking skills = 0.796, meaning that if critical thinking skills increase by one unit, students' digital citizenship will also increase by 0.796.

The results of this study indicate that the use of social media, demographic factors, and critical thinking skills together have a positive effect on students' digital citizenship. This indicates that the higher the level of student engagement in productive social media use, the better their critical thinking skills, and the higher the supporting factors from demographic aspects, the more digital citizenship behavior among students will increase. Digital citizenship reflects an individual's ability to participate actively, ethically, and responsibly in the digital space (Al-Zahrani, 2015). In line with Bandura's 1986 social cognitive theory Nickerson (2025), positive digital behavior is formed through a process of observation, reflection, and social interaction, which in this context is manifested through the conscious use of social media and critical thinking in sorting information in the digital world.

Referring to Table 6, the T-test results show that, first, the social media usage variable (X_1) has a t-value of 3.420 (> t table 1.645), so it can be concluded that social media has a significant effect on digital citizenship. Second, the demographic variable (gender) (X_2) shows a t-count of 2.062 (> t table 1.645), so it can be concluded that demographics (gender) have a significant effect on digital citizenship. Then, demographics (parents' highest level of education) (X_2) shows a t-count of 0.248 (< t table 1.645), so it can be concluded that demographics (parents' highest level of education) does not have a significant effect on digital citizenship. Furthermore, demographics (level of college education) (X_2) showed a t-value of 0.151 (< t table 1.645), so it can be concluded that demographics (level of college education) do not have a significant effect on digital citizenship. Third, critical thinking skills (X_3) show a t-value of 9.571 (> t table 1.645), so it can be concluded that critical thinking skills have a significant effect on digital citizenship.

Table 5. F test results

ANOVA [a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1697,407	5	339,481	30,750	.000 [b]
	Residual	2064,520	187	11,040		
	Total	3761.927	192			

a. Dependent Variable: Digital Citizenship

b. Predictors: (Constant), Use of Social Media, Gender, College Level , Parents' Highest Education Level , Critical Thinking Skills

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Table 5 presents that the F test results show a calculated F value of 30.750 > the table F value of 1.645, with a significance value (Sig.) of 0.000, which is less than 0.05. This hypothesis test shows that there is a combined effect between social media, demographics (gender, parents' highest level of education, and level of college education), and critical thinking skills on digital citizenship.

Table 6. Simple linear regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.411[a]	.169	.165	4.05314

a. Predictors: (Constant), Use of Social Media
b. Dependent Variable: Digital Citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

The value of R^2 or R Square in Table 6 is 0.169, indicating that the contribution of social media to digital citizenship is 16.9%, while the remaining 83.1% is contributed by other variables outside the scope of this study. Meanwhile, the value of e1 = (1 – 0.169)2 = 0.971. To determine the R Square value of the influence of X_1 and X_3 on Y, refer to the following table:

Table 7. Analysis Simple Linear Regression

Model Summary [b]

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.665 [a]	.442	.436	3.32945

a. Predictors: (Constant), Skill think critical , Use of Social Media
b. Dependent Variable: Digital Citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

According to Table 7, the R^2 value of 0.422 indicates that social media and critical thinking skills contribute 42.2% to digital citizenship, while the remaining 57.8% is influenced by other variables outside the scope of this study. The error value e1 = (1 – 0.422)2 = 0.821. This finding shows that although social media contributes to digital citizenship, there is still another 83.1% of the variation influenced by factors outside this study. When the variables of social media use and critical thinking skills are entered simultaneously, the R^2 value becomes 0.422. This indicates a moderate influence, but more than half of the variation in digital citizenship still cannot be explained by the model. Therefore, the results of this study need to be interpreted with caution, and it is important to understand the influence of social media as one of the driving factors, not as the main influence on students' digital citizenship.

Table 8. Sobel test analysis

Coefficients [a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	16,999	1,955		8,698	.000
	Use of Social Media	.442	.129	.200	3,430	.001
	Critical thinking Skills	.797	.082	.564	9.671	.000

a. Dependent Variable: Digital Citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Based on mediation analysis calculations using the Sobel Test with the mediation model approach of Baron and Kenny (1986), we calculated the direct effect and indirect effect to obtain the total effect between the independent and dependent variables. The indirect effect of social media on digital citizenship through critical thinking skills was obtained from the product of the beta coefficient of the effect of social media on critical thinking skills ($\beta X_1 \rightarrow X_3$) and the effect of critical thinking skills on digital citizenship ($\beta X_3 \rightarrow Y$). Based on the regression analysis results in Table 8, the beta coefficients used in the regression model include social media (X_1 = 0.200 with a standard error of 0.129) and critical thinking skills (X_3 = 0.564 with a standard error of 0.082) with a total contribution of 1.512.

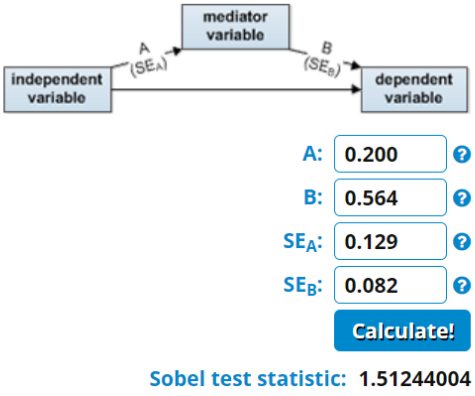

Figure 2. Sobel test results

Based on Figure 2, t count = 1.512 > t table with a significance level of 0.05, which is 0.200, it can be concluded that the mediation coefficient is significant, meaning that there is a mediating effect. The path analysis results show that social media has a direct effect on digital citizenship, and critical thinking skills can mediate the effect of social media on digital citizenship.

Table 9. Sobel test analysis

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	17,754	2,457		7,227	.000
	Skills think critical	.900	.080	.636	11,288	.000
	Gender	1,074	.585	.104	1,835	.068
	Parents' Highest Education Level	-.106	.192	-.031	-.550	.583
	College Level	-.052	.199	-.015	-.258	.796

a. Dependent Variable: Digital Citizenship

Source: Results of data processing IBM SPSS Software Version 24 for Windows

Based on mediation analysis calculations using the Sobel Test with the mediation model approach of Baron and Kenny (1986), we calculated the direct effect and indirect effect to obtain the total effect between the independent and dependent variables. The indirect effect of social media on digital citizenship through critical thinking skills was obtained from the product of the beta coefficient of the demographic effect on critical thinking skills ($\beta X_2 \rightarrow X_3$) and the effect of critical thinking skills on digital citizenship ($\beta X_3 \rightarrow Y$). Based on the regression analysis results in Table 9, the beta coefficients used in the regression model include, first, demographics (gender) (X_2 = 0.104 with a standard error of 0.585). Second, demographics (parents' highest level of education) (X_2 = 0.031 with a standard error of 0.192). Third, demographics (level of college education) (X_2 = 0.015 with a standard error of 0.199) and critical thinking skills (X_3 = 0.633 with a standard error of 0.080).

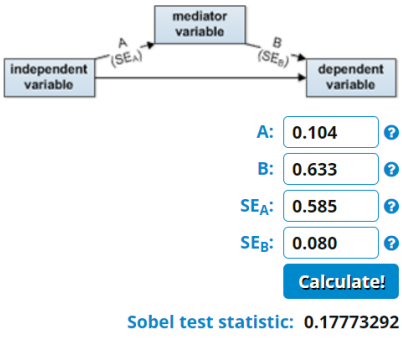

Figure 3. Sobel test results

Based on Figure 3, t count = 0.177 > t table with a significance level of 0.05, which is 0.104, it can be concluded that the mediation coefficient is significant, meaning that there is a mediating effect. The path

analysis results show that demographics (gender) have a direct effect on digital citizenship, and critical thinking skills can mediate the effect of demographics on digital citizenship.

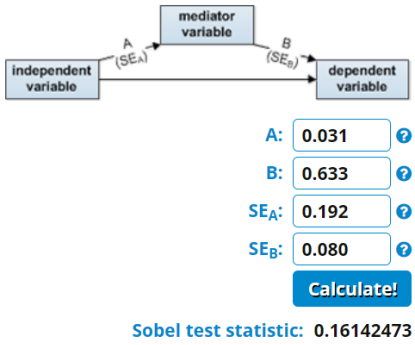

Figure 4. Sobel test results

Based on Figure 4, t count = 0.161 > t table with a significance level of 0.05, which is 0.031, it can be concluded that the mediation coefficient is significant, meaning that there is a mediating effect. The path analysis results show that demographics (parents' highest level of education) have a direct effect on digital citizenship, and critical thinking skills can mediate the effect of demographics on digital citizenship.

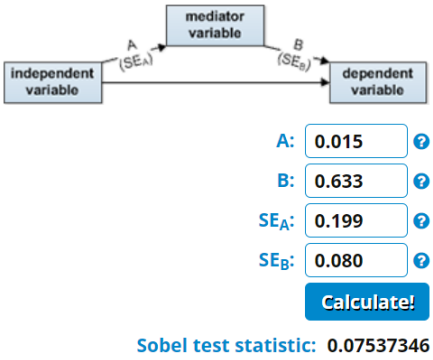

Figure 5. Sobel test results

Based on Figure 5, t count = 0.075 > t table with a significance level of 0.05, which is 0.015, it can be concluded that the mediation coefficient is significant, meaning that there is a mediating effect. The path analysis results show that demographics (level of education) have a direct effect on digital citizenship, and critical thinking skills can mediate the effect of demographics on digital citizenship.

Discussion

The Impact of Social Media Use on Digital Citizenship

The results of this study indicate that social media use has a significant effect on digital citizenship among FKIP UMS students. Multiple linear regression analysis produced the equation Y = 15.178 (α) + 0.445 (X1),

which means that every one-unit increase in social media use will increase the digital citizenship score by 0.445. The constant value of 15.178 indicates that when the social media usage variable is zero, digital citizenship is still at a basic level of 14.906. Based on the results of the T-test (partial) in Table 6, a t-value of 3.420 (> t table 1.645) with a significance value of 0.001 (<0.05) was obtained. Therefore, it can be concluded that H_0 is rejected and H_1 is accepted, which means that there is a positive and significant effect of social media use on students' digital citizenship.

These findings are in line with the results of studies conducted by Choi (2016) and Ribble (2015), which state that social media can serve as a means of strengthening digital literacy and developing digital citizenship behavior when used productively. The use of social media not only plays a role in communication and social interaction, but also as a space for learning, advocacy, and collaboration that can foster a sense of responsibility, digital empathy, and social engagement among students in the virtual world. Furthermore, the results of this study are also in line with Bandura social cognitive theory, which explains that individual behavior in the digital context is shaped through a process of observation, social experience, and interactive learning in the virtual environment. Thus, positive use of social media can strengthen students' digital competencies and encourage the emergence of more critical, ethical, and responsible digital citizenship behavior in the current era of digital transformation.

The Influence of Demographics on Digital Citizenship

The characteristics of respondents in this study included gender, parents' education level, and students' university level. In general, most respondents were female, had parents with a bachelor's degree or higher, and were in their fourth year of university or above.

Gender

The results of the calculation through multiple linear regression test show that the t-value is 2.062 (> t table 1.645). If the t-value is greater than the t-table value or the p-value is ≥ 0.05 → there is a significant relationship and vice versa, because 2.062 > 1.645 and p = 0.041 > 0.05, it can be concluded that H_0 is rejected and H_2 is accepted, meaning that demographic variables (gender) have a significant effect on digital citizenship. This result is in line with the study by by Salifu et al. (2025), which found gender differences in digital citizenship practices among students, where women are more consistent in applying digital ethics values. Research by Alamri and Alqahtani (2022) also shows that the dimensions of digital citizenship proposed by Ribble (2015), such as digital etiquette, digital responsibility, and digital security, are more dominant among female students than male students. Based on Ribble (2015) Digital Citizenship theory, this difference can be explained by variations in how individuals interpret and internalize the nine elements of digital citizenship, where gender can influence attitudes toward ethics, responsibility, and digital security. Thus, the results of this study emphasize the importance of a gender-responsive digital literacy approach

so that all students, both male and female, can become ethical, critical, and responsible digital citizens in the current era of digital transformation.

Parental Highest Education Level

The results of the calculation through multiple linear regression test show that the t-value is 0.248 (< t-table 1.645). If t-count > t-table or p-value ≥ 0.05 → there is a significant relationship and vice versa, because 0.248 < 1.645 and p = 0.804 > 0.05, it can be concluded that H_0 is accepted, H2 is rejected. This means that there is no significant effect between the demographic variable (parents' highest level of education) and the dependent variable (digital citizenship). This finding is in line with research by Pramesty et al. (2025), which states that based on quantitative descriptive analysis, it can be concluded that parents' education level has a significant influence on the formation of students' personalities, with results showing a strong positive relationship in eighth-grade students at Anugrah Tanjung Medan Private Junior High School. Wang (2018) research in his article "Exploring the influence of parental involvement and socioeconomic status on teen digital citizenship: A path modeling approach" shows that parental education is not a significant predictor of students' digital citizenship practices. They emphasize that direct digital experiences and individual digital literacy play a greater role in shaping digital citizenship behavior than family background. In addition, Ribble (2015) theory of Digital Citizenship also emphasizes that a person's digital competence is built through nine elements, including digital etiquette, digital literacy, and digital responsibility, which develop through active use and engagement in the digital environment, not solely through external family influence. Thus, the results of this study reinforce the understanding that digital learning and independent online experiences play a dominant role in shaping students' digital citizenship.

Academic Standing

The results of the calculation through multiple linear regression test show that the t-value is 0.151 (< t-table 1.645). If t-count > t-table or p-value ≥ 0.05 → there is a significant relationship and vice versa, because 0.151 < 1.645 and p = 0.880 > 0.05, it can be concluded that H_0 is accepted and H_2 is rejected. This means that there is no significant influence between demographic variables (level of study) and the digital citizenship of FKIP UMS students. This finding supports the study by Al-Zahrani (2015), which states that digital participation and engagement among students is more determined by their experience in using technology and digital learning, rather than by their level of formal education or length of study. Furthermore, according to Ribble (2015) in Digital Citizenship in Schools, mastery of digital citizenship does not develop automatically with educational level, but rather through active practice, reflection, and the habit of ethical behavior in the digital space. Therefore, even though the academic levels differ, the digital citizenship skills and attitudes of students still depend on the intensity and quality of their digital interactions, not solely on their academic level.

The Influence of Critical Thinking Skills on Digital Citizenship

Based on the research findings, critical thinking skills have been proven to have a significant effect on students' digital citizenship. Multiple linear regression produced the equation Y = 15.178 (α) + 0.796 (X3), which shows that every one-unit increase in critical thinking skills increases digital citizenship by 0.796. The partial test also shows a t-value of 9.571 (> t table 1.645) with a significance value of 0.001 (< 0.05), so it can be concluded that H_0 is rejected and H_3 is accepted. This means that there is a positive and significant effect between critical thinking skills and the digital citizenship of FKIP UMS students.

These findings indicate that students with higher critical thinking skills tend to act reflectively, ethically, and responsibly when interacting in digital spaces. Based on Bandura's Social Cognitive Theory in 1986, Nickerson (2025) states that digital citizenship behavior is formed through a reciprocal process of interaction between individuals, social environments, and cognitive factors (reciprocal determinism). These findings show that students who are capable of critical thinking tend to be more selective in accepting information, able to evaluate the credibility of digital sources, and behave more ethically in online interactions. These results support the view of Rafi et al. (2025) that critical thinking is a basic skill that shapes digital literacy and healthy digital citizenship behavior. Therefore, developing critical thinking skills through reflective learning and problem solving is very important to strengthen students' digital character.

These findings are also in line with the Digital Citizenship theory proposed by Ribble (2015), which emphasizes that good digital citizens are not only able to use technology, but also understand and apply the nine elements of digital citizenship, such as digital literacy, digital etiquette, and digital responsibility. Critical thinking skills play a role in helping students assess the accuracy of information, respect the digital rights of others, and maintain the security of personal data, as explained in Al-otaibi (2025) research that cultural intelligence and critical thinking skills are closely correlated with students' digital citizenship skills. Thus, these results reinforce that the combination of Bandura's social cognitive theory and Ribble's concept of digital citizenship explains how critical thinking skills function not only as academic skills but also as a mechanism for shaping responsible, reflective, and ethical digital behavior in the 21st-century learning ecosystem.

The Influence of Social Media Use on Digital Citizenship Through Critical Thinking Skills

Based on Figure 3, the Sobel Test results show a t-value = 1.512 > from the t-table with a significance level of 0.05, which is 0.200, so it can be concluded that H_0 is rejected and H_4 is accepted. This means that critical thinking skills act as a mediating variable in the relationship between social media use and the digital citizenship of FKIP UMS students. The path analysis results also reinforce these findings, showing that social media use has a direct effect on digital citizenship, as well as an indirect effect through critical thinking skills. Thus, it can be concluded that students who actively use social media will be better able to develop good

digital citizenship behavior if they have strong critical thinking skills.

These findings can be explained through Social Cognitive Theory Bandura, 1986 which emphasizes that human behavior is shaped through reciprocal interactions between personal (cognitive) factors, the social environment, and behavior itself (reciprocal determinism). In this context, critical thinking skills function as a cognitive factor that enables students to filter information, assess the validity of sources, and imitate positive digital behavior from the social media environment (Warastuti et al. 2025). When students observe ethical online interactions, they learn socially through the process of observational learning to adjust their behavior in the digital space.

This finding is in line with research by Fadil (2024), which states that social media has a complex influence on critical thinking skills. On the one hand, social media provides broader access to information and opportunities for discussion, which can improve critical thinking skills. A study by Bae (2022) shows that critical thinking and digital literacy play an important mediating role in improving digital citizenship among social media users. According to them, individuals with good critical thinking skills tend to be more aware of the consequences of digital behavior, enabling them to participate responsibly in the virtual world. Thus, the results of this study reinforce Bandura's theory that social learning through digital media can shape constructive digital citizenship behavior, as long as individuals have the ability to think reflectively and evaluatively about the content they consume.

The Influence of Demographics on Digital Citizenship Through Critical Thinking Skills

Based on the results of the Sobel test presented in Figures 3–5, the calculated t-values exceeded the critical values at the 0.05 significance level. However, further examination of the regression results indicates that the direct effects of demographic factors namely gender, parental education level, and academic standing on digital citizenship were not statistically significant ($p > 0.05$). According to the mediation criteria proposed by Baron and Kenny (1986), a significant direct relationship between the independent and dependent variables is a prerequisite for establishing mediation. Given that this condition was not satisfied, the Sobel test results cannot be interpreted as evidence of a confirmed mediating role of critical thinking skills in the relationship between demographic factors and digital citizenship. Therefore, although the Sobel test statistics suggest potential indirect pathways, no statistically valid mediation effect can be established. Demographic variables should instead be interpreted as contextual background factors rather than variables exerting direct or indirect causal influence on students' digital citizenship.

These findings align with the theory proposed by Ribble (2015), which emphasizes the importance of digital literacy, digital ethics, and digital rights and responsibilities. This suggests that the development of digital citizenship is influenced not only by access to technology but also by social and demographic factors that shape values, attitudes, and critical thinking in the digital realm. The analysis shows that students

from families with higher educational backgrounds and those with more comprehensive academic experiences tend to have stronger critical thinking skills. This supports the assertion that demographic characteristics, such as parental education, can significantly influence how students think critically and behave in the digital space. The work of Jabeen and Ahmad (2021) further strengthens this perspective by highlighting that social context, demographics, and critical thinking literacy are crucial in shaping digital citizenship. Research by Gambeh et al. (2025) shows that demographic characteristics do not always have a significant effect on behavioral variables. Students who possess good digital understanding and reflective thinking skills are more likely to become ethical, conscious, and responsible digital citizens in their online interactions.

Conclusion

This study investigates the influence of social media use, demographic factors, and critical thinking skills on digital citizenship of FKIP students at Muhammadiyah University of Surakarta (UMS). The analysis identified five key findings. First, responsible social media use positively impacts students' digital citizenship, increasing their awareness and sense of responsibility. Second, demographic factors such as gender, parental education level, and academic status are significantly correlated with digital citizenship. Third, strong critical thinking skills enable students to disseminate information effectively, engage in ethical online communication, and contribute to a healthy digital environment. Fourth, social media use enhances digital citizenship through critical thinking skills, with the Sobel test confirming a significant mediation effect. Fifth, although demographic factors negatively impact digital citizenship, they do not have an indirect effect through critical thinking skills. These insights emphasize the importance of combining technological literacy with reflective thinking skills as a foundation for responsible and ethical digital citizenship.

Based on these findings, we recommend specific changes to teacher training programs. First, curricula should include modules focused on responsible social media use and the development of critical thinking skills, creating opportunities for students to engage in real-world scenarios. Furthermore, training educators to integrate these elements into their teaching will empower them to cultivate responsible digital citizens. By enriching curricula in this way, higher education institutions can better prepare students to navigate the complexities of the digital world effectively and ethically.

This study has several limitations. The regression model explanation indicates that a significant portion of the variance in digital citizenship remains unexplained. Future studies are recommended to include additional variables to gain a more comprehensive understanding of students' digital citizenship. Furthermore, this study focused only on FKIP students at UMS, thus limiting generalizability to other contexts. Therefore, future studies should involve participants from various faculties and universities. Furthermore, the potential for perceptual bias from the closed-ended questionnaire suggests the need for

mixed methods in future research to gain a more comprehensive understanding. Future investigations could also explore the role of additional variables such as digital literacy, empathy, and ethics in enriching the digital citizenship framework. Finally, I would like to express my deepest gratitude to all FKIP UMS students who participated in this study. Their engagement and honesty in completing the questionnaire were invaluable to this research.

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Author's contributions

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Conflict of interest

All authors declare that they have no conflicts of interest.

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