

## Determinants of Digital Citizenship Skills in Online Safety among Higher Education Students: A Case Study of UiTM Kota Bharu

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**Abstract:** In today's digitally connected environment, where students rely extensively on online platforms, strong digital citizenship skills particularly in online safety are essential for navigating the digital space responsibly, ethically, and securely. This study examined factors influencing online safety related digital citizenship skills among undergraduate students at Universiti Teknologi MARA (UiTM) Kota Bharu, focusing on internet attitude, computer self-efficacy, and internet skills. A quantitative cross-sectional design was employed, using data collected from 317 students via an online questionnaire. Stratified random sampling was applied across two faculties which were FPP (Faculty of Business and Management) and FSKM (Faculty of Computer and Mathematical Sciences) to ensure balanced representation. Data were analysed using descriptive statistics, independent t-tests, Pearson correlations, and multiple linear regression. The results showed no significant differences in digital citizenship skills by gender or faculty. However, digital citizenship skills demonstrated strong positive correlations with internet attitude and internet skills, while computer self-efficacy exhibited a weaker yet significant relationship. Regression findings indicated that all three factors significantly predicted digital citizenship skills, with internet attitude emerging as the strongest predictor. These findings underscore the importance of targeted educational initiatives aimed at enhancing digital citizenship, particularly by cultivating positive internet attitudes and strengthening students' technical competencies.

**Keywords:** Internet Attitude, Computer Self-Efficacy, Digital Citizenship Skills, Internet Skill, Multiple Linear Regression, Online Safety

### 1 Introduction

The rapid changes in technology have introduced new concepts such as digital citizenship, digital literacy, digital gaps, and digital migration, which have become important aspects of modern life [1]. In higher education, the integration of digital technologies has transformed how students interact, communicate, and obtain information. The shift toward online and distance learning, in particular, has



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placed greater emphasis on the development of digital citizenship skills, especially in the area of online safety. These skills are crucial because they allow students to engage in the digital environment ethically, responsibly, and securely, which has become an essential component of contemporary education. Digital citizenship, as explained by Ribble [2], involves the responsible and ethical use of technology, including participation in online communities, observing proper etiquette, ensuring safety, and understanding digital rights. Similarly, Pua'at and Yunus [3] highlighted that it reflects good online behavior and values, while Althibyani and Al-Zahrani [4] linked it directly to the United Nations Sustainable Development Goal 4 (Quality Education), showing its importance in preparing students for responsible digital participation.

According to Mahadir et al. [5], digital citizenship encompasses nine important elements, including digital access, commerce, communication, literacy, ethics, law, rights and responsibilities, health, and security. These elements encourage responsible use of technology, guiding students in both personal and academic contexts. However, while students today are highly skilled in using digital tools, previous studies indicate that many lack a deeper understanding of digital norms, ethics, and online safety practices [6]. At Universiti Teknologi MARA (UiTM) Kota Bharu, informal observations suggest that many students struggle with essential aspects of digital citizenship, such as practicing safe online behaviors, recognizing digital rights, and protecting themselves from threats like cyberbullying, misinformation, and privacy breaches. This situation raises concerns about their preparedness to engage in the digital environment responsibly.

Although gender and faculty differences in digital competence have been noted in past research by Hossain et al. [7], with female students and those from technology-related fields often performing better, these differences remain underexplored in the context of digital citizenship and online safety. In addition, factors such as internet attitude, computer self-efficacy, and internet skills are believed to influence how students behave online. For instance, internet attitude reflects students' beliefs and feelings about internet use, computer self-efficacy relates to their confidence in using digital tools, and internet skills involve the ability to search, evaluate, and manage online information effectively. However, it is still unclear which of these factors exerts the greatest influence on students' digital citizenship skills. Weaknesses in these areas can expose students to risks that may impact their studies, personal well-being, and digital reputation [8].

To address these gaps, this study was conducted to investigate digital citizenship skills in online safety among UiTM Kota Bharu students by examining the influence of internet attitude, computer self-efficacy, and internet skills. Specifically, it seeks to determine whether there are significant differences in digital citizenship skills across gender and faculty, to explore the relationship between these three independent variables and digital citizenship, and to identify which factor serves as the strongest predictor. These objectives are guided by several hypotheses that suggest significant mean differences between gender and faculty, significant relationships among the variables, and significant influences of each independent factor on digital citizenship skills. The theoretical framework illustrates these relationships, emphasizing how internet attitude, computer self-efficacy, and internet skills contribute to shaping responsible digital behavior.

The scope of this study focuses on undergraduate students from UiTM Kota Bharu, specifically those from the Faculty of Computer and Mathematical Sciences (FSKM) and the Faculty of Business and Management (FPP). It emphasizes online safety through three key elements: digital security, digital etiquette, and digital literacy. The study is limited by a relatively small sample size, budget constraints, and reliance on students' willingness to participate, which may affect the generalizability of the findings. Moreover, the results are context-specific and may not fully represent students from other universities with different demographics and technological contexts.

Despite these limitations, this study provides meaningful contributions. It highlights the challenges faced by students, particularly those from non-technical backgrounds, in developing digital citizenship skills and raises awareness of the importance of responsible digital practices. The findings will benefit lecturers by offering insights into students' digital challenges, enabling them to integrate digital citizenship concepts more effectively into teaching. University administrators can use the results to

improve curricula and policies that support safe digital engagement, while policymakers may apply the insights to design initiatives that encourage ethical online behavior. Ultimately, this study contributes to the growing body of knowledge on digital citizenship in higher education, offering valuable evidence for promoting safer and more responsible digital behavior. By doing so, it not only benefits students at UiTM Kota Bharu but also supports the broader goal of building a digitally responsible and ethical learning environment.

## 2 Methodology

### A Study and Sampling Design

The cross-sectional study was conducted among full-time undergraduate students from Semester 2 to Semester 7 during the March–August 2025 session at Universiti Teknologi MARA, Kota Bharu Campus (UiTMKB). The sampling frame comprised approximately 1,120 students who met the eligibility criteria. A total of 316 respondents were selected using proportionate stratified random sampling. The target population was divided into two strata, namely the Faculty of Computer and Mathematical Sciences (FSKM) and the Faculty of Business Administration (FPP), which accounted for 25.95% and 74.05% of the population, respectively. The required sample size was determined using the Raosoft Online Sample Size Calculator with a 5% margin of error and a 95% confidence level, with an additional 10% included to accommodate potential non-responses.

### B Research Instrument and Data Collection Method

A self-administered structured questionnaire was employed as the research instrument in this study. The questionnaire was primarily adapted from two main sources, namely Prasetiyo et al. [9] and Al-Zahrani [10]. It was organized into five sections: Section A covered demographic information, Section B focused on digital citizenship skills, Section C on internet attitude, Section D on computer self-efficacy, and Section E on internet skills. Sections B to E utilized a 10-point Likert scale ranging from “strongly disagree” to “strongly agree.” Table 1 presents the number of items in each section. A pilot test involving 30 students was conducted in May 2025, and revisions were made based on their feedback. The finalized questionnaire, accompanied by an information letter, was then distributed to all 316 randomly selected students.

Table 1: Summary of the Questionnaire by Section

Section	Variable	Number of Items	Sources
A	Demographic Profiles	5	
B	Digital citizenship skills	7	Al-Zahrani (2015) Prasetiyo et al. (2021)
C	Internet attitude	7	Al-Zahrani (2015) Prasetiyo et al. (2021)
D	Computer self-efficacy	5	Al-Zahrani (2015) Prasetiyo et al. (2021)
E	Internet skill	7	Al-Zahrani (2015) Prasetiyo et al. (2021)

### C Statistical Analyses

The reliability analysis was used to test the stability and consistency of the items in the questionnaire and it demonstrates how well the items measuring the concept. In Section A, for qualitative nominal variables such as gender and faculty, the data were represented using pie charts showing frequency and percentage, while ordinal and interval variables such as age, semester, and daily internet usage were displayed using bar charts also showing frequency and percentage. Meanwhile, for Sections B to E, the

data were represented using descriptive table consisting of measures of central tendency (mean), and standard deviation.

An independent samples t-test was performed to examine differences in digital citizenship skills across gender and faculty groups. In addition, Pearson correlation analysis was used to assess the relationships between the independent variables and digital citizenship skills. Finally, multiple linear regression with a backward selection method was applied to determine the significant factors influencing digital citizenship skills in online safety. The assumptions of multiple linear regression such as linearity, normality, homoscedasticity and multicollinearity were tested and the model adequacy were also assessed. The initial multiple linear regression model for the study is shown in Eq. (1).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (1)$$

where:

- $Y$ : Digital citizenship skills
- $X_1$ : Internet attitude
- $X_2$ : Computer self-efficacy
- $X_3$ : Internet skill
- $\varepsilon$ : The error
- $\beta_0, \beta_1, \beta_2$  and  $\beta_3$  are the parameter estimates
- $\varepsilon$ : The error

A two-sided hypotheses testing was used in all analyses with  $p < 0.05$  was considered statistically significant. All the analyses were done by using International Business Machines (IBM) Corporation's Statistical Package for the Social Sciences (SPSS) version 30.0.

### 3 Results and Discussion

#### A Reliability Analysis

Table 2 presents the results of the reliability analysis conducted for both the pilot study and the actual study. As presented, the pilot study demonstrated that all sections of the questionnaire displayed good internal consistency, with Cronbach's alpha values exceeding the acceptable threshold of 0.7 as suggested by Arof et al[15]. Section E recorded the highest reliability coefficient at 0.962, while section D reported the lowest at 0.785. In the actual study, the reliability of all sections showed further improvement: section B increased to 0.947, section C to 0.959, section D to 0.932, and section E to 0.976. Once again, section E maintained the highest reliability, and section D showed the lowest. The consistently high Cronbach's alpha values confirm that the questionnaire is a reliable instrument for data collection in the main study.

Table 2: Cronbach's Alpha for Pilot and Actual Study

Variable	Cronbach's Alpha for Pilot Study	Cronbach's Alpha for Actual Study
Digital Citizenship Skills	0.856	0.947
Internet Attitude	0.914	0.959
Computer Self-Efficacy	0.785	0.932
Internet Skill	0.962	0.976

## B Descriptive Statistics

All randomly selected respondents completed the questionnaire ( $n=316$ ). Majority of the respondents were female students with 124 (39.24%) of the total number of respondents. In terms of faculty, 234 students (74.05%) were from the Faculty of Business and Management (FPP), while 82 students (25.95%) were from the Faculty of Computer and Mathematical Sciences (FSKM), consistent with the proportional sampling approach. Most respondents were aged between 22 and 25 years old (58.86%), followed by 18–21 years (20.89%) and 26 years and above (20.25%). The highest number of students were from Semester 4 (32.59%), while the lowest were from Semester 7 (3.16%) and Semester 2 (5.38%). In terms of daily internet usage, more than half of the respondents (51.58%) reported using the internet for 7 to 9 hours per day, followed by 25% who used it for 4 to 6 hours, and 23.42% who spent more than 9 hours online daily.

Table 3 summarizes the main variables based on mean and standard deviation. Internet skill showed the highest mean (5.53), while digital citizenship skills recorded the lowest (4.67).

Table 3: Descriptive Statistics of Quantitative Variables

Variable	Mean (SD)
Digital Citizenship Skills	4.665 (1.381)
Internet Attitude	4.742 (1.402)
Computer Self-Efficacy	5.348 (1.667)
Internet Skill	5.531 (1.431)

## C Independent t-Test

The independent samples t-test in this study was valid since the assumptions of normality and homogeneity of variances were met. Normality was supported as the skewness values for male and female were -0.072 and 0.354 respectively while for FPP and FSKM were 0.313 and -0.057 respectively. All the skewness values were within  $\pm 1$ , and Levene's test showed p-values greater than 0.05 for both gender and faculty, confirming equal variances across groups. Thus, the results of the analysis are reliable.

The findings revealed no significant differences in digital citizenship skills across demographic groups. For gender, the p-value was 0.453 ( $t = -0.751$ ), exceeding the 0.05 threshold, indicating no difference between male and female students. Similarly, for faculty, the p-value was 0.664 ( $t = -0.434$ ), suggesting no significant difference between students from FPP and FSKM.

As shown in Table 4, neither gender nor faculty significantly influenced students' digital citizenship skills in online safety. This implies that challenges in digital citizenship are relatively similar across groups, regardless of gender or faculty background.

Table 4: Independent Samples t-Test for Digital Citizenship Skills by Faculty and Gender

Variable	t- statistics	p- value
Gender	-0.751	0.453
Faculty	-0.434	0.664

## D Pearson Correlation

Pearson correlation analysis was employed to examine the relationships between digital citizenship skills in online safety and the independent variables: internet attitude, computer self-efficacy, and internet skill. Assumption testing confirmed that the data met both linearity and normality requirements. Linearity was supported as all variables showed significant linear relationships ( $p < 0.001$ ) without

significant deviations ( $p > 0.05$ ). The Shapiro-Wilk results further indicated that none of the variables significantly deviated from normality ( $p > 0.05$ ).

As shown in Table 5, digital citizenship skills were strongly and positively correlated with internet attitude ( $r = 0.952, p < 0.001$ ) and internet skill ( $r = 0.764, p < 0.001$ ). This suggests that students with more positive attitudes toward the internet and stronger technical skills demonstrated higher levels of digital citizenship. In contrast, computer self-efficacy showed a weak but significant positive correlation ( $r = 0.250, p < 0.001$ ), indicating a modest contribution of computer confidence to online safety practices. Overall, internet attitude was the strongest correlate of digital citizenship skills, followed by internet skill and computer self-efficacy.

Table 5: Pearson Correlation

Variable	Pearson Correlation, $r$ (Digital Citizenship Skills)	$p$ - value
Internet Attitude	0.952	<0.001
Computer Self-Efficacy	0.250	<0.001
Internet Skill	0.764	<0.001

### E Multiple Linear Regression

The regression model developed in this study was found to be statistically significant ( $p < 0.001$ ), indicating that internet attitude, computer self-efficacy, and internet skill serve as significant predictors of digital citizenship skills in online safety. All underlying model assumptions, including linearity, normality, homoscedasticity, and independence of residuals, were satisfied. In addition, multicollinearity diagnostics confirmed that tolerance values exceeded 0.10 and all variance inflation factor (VIF) values were below 10, demonstrating the absence of multicollinearity among predictors.

The model exhibited an excellent goodness of fit, with  $R = 0.997$  and  $R^2 = 0.995$ . This result implies that 99.5% of the variance in digital citizenship skills is explained by the three independent variables, whereas the remaining 0.5% is attributed to external or unobserved factors. Since the coefficient of determination exceeds 0.75, the model may be classified as highly explanatory.

Table 6 summarizes the regression coefficients for each predictor. All predictors were statistically significant ( $p < 0.001$ ). Internet attitude recorded the highest standardized coefficient ( $\beta_1 = 0.954$ ), followed by internet skill ( $\beta_3 = 0.764$ ). Computer self-efficacy, while significant, had a more moderate influence ( $\beta_2 = 0.243$ ). The negative constant term ( $\beta_0 = -1.375$ ) reflects the predicted digital citizenship skill score when all predictors are equal to zero.

Table 6: Regression Coefficient of the Regression Model and the Collinearity Diagnostic

Variable	Beta Coefficient	$p$ - value	Tolerance	VIF
(Constant)	-1.375	<0.001		
Internet Attitude	0.954	<0.001	0.995	1.005
Computer Self-Efficacy	0.243	<0.001	0.997	1.003
Internet Skill	0.764	<0.001	0.997	1.003

The coefficients indicate that, with other factors held constant, a one-unit increase in internet attitude increases digital citizenship skills by 0.954 units. Similarly, a one-unit increase in computer self-efficacy contributes to a 0.243-unit increase, whereas a one-unit increase in internet skill results in a 0.764-unit increase.

$$\hat{Y} = -1.375 + 0.954X_1 + 0.243X_2 + 0.764X_3$$

where  $\hat{Y}$  represents digital citizenship skills;  $X_1$ , internet attitude;  $X_2$ , computer self-efficacy; and  $X_3$ , internet skill.

#### 4 Conclusion and Recommendation

The independent t-tests indicated no significant differences in digital citizenship skills based on gender ( $t = -0.751, p = 0.453$ ) or faculty ( $t = -0.434, p = 0.664$ ). These findings suggest that digital citizenship challenges are relatively uniform across student groups, regardless of demographic background. This contrasts with studies by Hossain et al. [7] and Cleofas and Labayo [11], who reported gender-based disparities, as well as Mahadir et al. [5], who identified differences across academic faculties. The present results, however, support the view that digital citizenship concerns are widespread and transcend demographic boundaries, implying that institution-wide interventions may be more effective than demographic-specific strategies.

Correlation analysis further revealed strong positive associations between digital citizenship skills and both internet attitude ( $r = 0.952, p < 0.001$ ) and internet skill ( $r = 0.764, p < 0.001$ ), with computer self-efficacy showing a weaker but still significant relationship ( $r = 0.250, p < 0.001$ ). These findings were reinforced by the multiple linear regression analysis, which demonstrated that the model accounted for 99.5% of the variance in digital citizenship skills ( $R^2 = 0.995$ ). Internet attitude emerged as the most influential predictor, followed by internet skill and computer self-efficacy. This highlights the central role of students' perceptions toward internet use, their technical abilities, and their confidence levels in shaping safe and responsible online behavior.

These results align with prior work by Prasetyo et al. [9], Al-Zahrani [10], and Gutiérrez-Aguilar et al. [12], all of whom emphasized the importance of positive internet attitudes and strong digital competencies in promoting responsible digital engagement. However, while computer self-efficacy was a significant contributor in this study, its weaker effect contrasts with findings by Choi et al. [13] and Kukreja and Rajendran [14], who reported stronger links between self-efficacy and cybersecurity practices. This suggests that confidence alone may be insufficient without targeted digital literacy training and structured online safety programs.

Based on these results, several recommendations are proposed to strengthen digital citizenship skills among undergraduate students. Universities should integrate digital citizenship topics covering online safety, digital ethics, privacy, and responsible online behavior into curricula through relevant courses, short-term programs, or awareness campaigns. Given that internet attitude was the strongest predictor, initiatives such as seminars, campaigns, and interactive content should emphasize responsible and respectful internet use. To enhance computer self-efficacy, training workshops, peer mentoring, and digital literacy programs can help build student confidence in using digital tools. Furthermore, structured programs should be introduced to improve internet skills, enabling students to navigate, evaluate, and manage online information effectively. Special support should also be provided for students with lower confidence or negative attitudes toward internet use through tailored guidance and peer assistance. Finally, future research should expand to other campuses and explore additional factors such as digital stress, online behavior, or the role of social media in influencing digital citizenship.

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#### Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

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