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Assessing the Digital Citizenship Self-efficacy of Pre-service Teachers

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Abstract

In this study, we aim to assess pre-service teachers' self-efficacy in using computer technology in the digital era as digital citizens. Briefly, students in the Faculty of Education were asked how they perceive computers and technology as a tool in life, education, and future careers. The samples were 615 pre-service teachers selected by Yamane's method in sample selection from the population of 3093 students in the Faculty of Education, Rajabhat Maha Sarakham University, Thailand. The samples were 1-5th year student teachers from 20 majors in the faculty. The samples were from middle to upper-middle-income families considering the public status of the university with the tuition fee of around 350-400 USD a semester. The sole instrument of the study was a questionnaire with the purpose to investigate computer self-efficacy as digital citizens of the samples. The data were collected in 2020 via an online questionnaire and analyzed by percentage, mean score, standard deviation, t-test, and one-way ANOVA. The results of the study lead to an explanation of the nature of prospective teachers' beliefs and willingness to develop themselves as a member of the post-digital world, a place where a blurred area of virtual and authentic exist and affect people's lives. It shows that pre-service teachers of a certain socio-economy group had a high level of digital citizenship self-efficacy.

Keywords: Computer self-efficacy, Digital citizenship, Teacher education

1. Introduction

The competency of ICT and technology in teaching is an expected quality of teachers in the 21st century (Gyurova & Zeleeva, 2017). Technology integration in school in terms of both teaching material development and extending learning boundaries allows teachers to comprehend their learners, serve them with appropriate learning experiences, and progress in their careers (Hennessy et al., 2022). Moreover, teacher professional development is more challenging in the technologically advanced era. As educational technology plays an

important role in learning management, teachers need to upgrade their skills in managing classes considering both instructional and learner factors (Hansson, 2006). They need to consider the nature of learners of the new generation who have grown up with the devices such as computers, the internet, and smartphones. Therefore, apart from teaching ability and content knowledge, teachers also need to develop the efficiency of technology in their career development.

In addition, developing teachers' educational technology ability needs computer self-efficacy as a self-assessment of how they believe the capability to perform teaching tasks using computer-related technology (Karsten et al., 2014). According to Karsten et al. (2012), the focus of computer self-efficiency is rather the beliefs of what a person is capable of rather than skills. Teachers with strong self-efficacy are more willing to attempt specific undertakings or activities, and vice versa Compeau and Higgins (1995) defined computer self-efficacy as an evaluation of one's computer-using skills and suggested that people with stronger self-efficacy used computers more regularly and had less computer-related anxiety. They believe that believe computer-related skills are utilizable. In contrast, low computer self-efficacy leads to frustration, anxiety, and reluctance to use computers when challenges arise (Igbaria & Iivari, 1995).

It should be noted that not all teaching personnel feel confident using technology in their work. For example, many people fear emerging ICTs because they believe computers will replace humans and their occupations (Garland & Noyes, 2008). Therefore, anxiety, animosity, and resistance impede the best usage of computer-based ICTs in teaching. Those with low self-esteem in the use of a computer would also avoid using it. Considering the new era of teaching, instructors who are not willing to develop their computer skills would fail to handle the class with the new generation of learners and to adapt to the world's changes in education. For instance, during the covid-19 pandemic, instructors with low technology skills had problems managing online classes, and it directly affected their students (Rahayu et al., 2022).

Moreover, apart from the ability to manage classes, computer self-efficiency also indicates teachers' competency as digital citizens. Schuler (2002) characterized digital citizens as members of a digital environment who are competent in utilizing the internet regularly and effectively. Ribble (2008) urged that digital citizenship involves the understanding of cultural and societal issues related to technology. Legal and ethical issues are also considered to contribute to the responsible use of information and technology. A digital citizen has a positive attitude toward using technology in supporting collaboration, learning, and productivity and takes personal responsibility for lifelong learning (Ribble & Bailey, 2007).

Ribble (2015) presents the unidimensional approach to teaching digital citizenship. 9 dimensions of digital access, digital commerce, digital communication, digital literacy, digital etiquette, digital law, digital rights and responsibilities, digital health and wellness, and digital security are considered the main content of digital citizenship education. The approach emphasizes the users' responsibility in using the advantages of technology in work, education, and life. Choi (2016) includes the idea of ethics, media and information literacy,

civic engagement, and critical thinking in describing digital citizenship. The authors described the term "digital citizenship as the 'interrelated but non-linear with offline (place-based) civic lives' (2016: 565). Therefore, interpersonal and intercultural issues should be taken into consideration in online communication as a person we interact with should be treated as a proper human rather than digital content.

In the era of what scholars defined as a post-digital (Jandrić et al., 2018) where human activities are in the undistinguished area of authentic and technological environment, digital competency becomes an expectation in teacher development. Örtegren (2022) illustrated how digital citizenship could affect teacher education. First, scholars in higher education institutions including those in the faculty of education must be aware of the importance of digital citizenship. They are expected to be the source of knowledge regarding digital citizen development. Moreover, teacher education institutions must prepare pre-service teachers to be able to use digital technology appropriately both as university students and prospective teachers. Lastly, school as a practice site for student teachers should allow them to practice using digital competency in learning and teaching as it both benefits pre-service teachers and school students.

Previous studies have investigated digital citizenship in various aspects. For example, Choi (2016), Çubukçu and Bayzan (2013), and Ribble (2015) put attempt to explain the definition of digital citizens and provide elements to explain the terms. Several studies investigate the level of digital citizenship and perception of the idea (*e.g.*, Al-Abdullatif & Gameil, 2020; Korucu & Totan, 2019; Yalçınkaya & Cibaroğlu, 2019). In addition, other studies focus on providing empirical evidence to support instructional methods in digital citizenship education (*e.g.*, Hui & Campbell, 2018; Martin et al., 2022). It can be seen that computer self-efficiency plays an important role in technical skill development, an element leading to digital citizenship for educational staff including pre-service teachers. In this study, the two concepts were interpreted as digital citizenship self-efficacy as it would reveal pre-service teachers' beliefs in how they could use computers and technology as digital citizens. The purposes of the study were 1) to examine the digital citizenship self-efficacy of pre-service teachers and 2) to examine the differences between the digital citizenship self-efficacy of pre-service teachers of different genders and years of study.

2. Methodology

2.1 Research Design

The study was designed with a survey approach aiming to investigate how students in the Faculty of Education as pre-service teachers believed in their computer self-efficacy. The data were gathered by a questionnaire and interpreted by the levels of agreement with the questionnaire statements.

2.2 Samples

The samples were 615 pre-service teachers selected by Yamane (1973)'s method in sample selection from the population of 3093 students in the Faculty of Education, Rajabhat Maha Sarakham University, Thailand. The samples were 1-5th year student teachers from 20 majors

in the faculty. The samples were from middle to upper-middle-income families considering the public status of the university with the tuition fee of around 350-400 USD a semester. Therefore, they were likely to be familiar with computers and devices with access to online technology.

2.3 Instrument

The sole instrument of the study was a questionnaire with the purpose to investigate computer self-efficacy as digital citizens of the samples. The questionnaire consisted of 3 main parts—background information, computer self-efficacy assessment, and open-ended questions. The statements were designed considering the idea of computer self-efficacy (Compeau & Higgins, 1995) and digital citizenship (Ribble, 2015; Choice, 2016). Therefore, the statements are related to the samples' self-beliefs in their computer efficacy and digital citizen issues such as digital access, digital literacy, digital rights and responsibilities, and digital security. The questionnaire consisted of 65 statements grouped into the aspects of digital uses, digital knowledge, digital literacy, digital rights and responsibilities, and digital security. They were validated by the IOC of 0.67-1.0. The discrimination of the item was 0.25-0.75, and the reliability of the questionnaire was 0.865.

2.4 Data Collection and Data Analysis

The data were collected in 2020 via an online questionnaire. The data collection processes were operated with careful consideration of the ethical issues in human research. The data were analyzed by percentage, mean score, standard deviation, t-test, and one-way ANOVA. The degree of the agreements was interpreted given 1-1.50 for a very low level, 1.51-2.50 for a low level, 2.54-3.50 for an average level, 3.51-5.00 for a high level, and 4.51-5.00 for a very high level.

3. Results

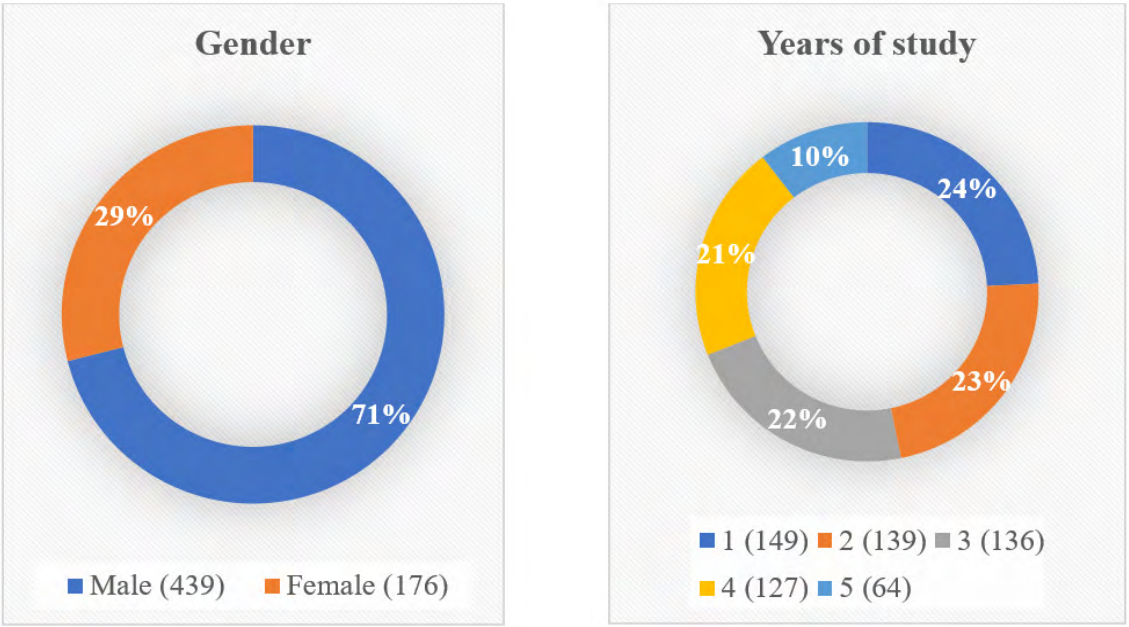

Figure 1. Samples' background information

Figure 1 shows that of all 615 samples, 71% (n = 439) were male and 29% (n = 176) were female. The samples were 149 first-year students (24.2%), 139 second-year students (22.6%), 136 third-year students (22.1%), 127 fourth-year students (20.7%), and 64 fifth-year students (10.4). The data were further used in the data analysis in the next section.

Table 1. The assessment of digital citizenship self-efficacy

Aspects	**$\bar{x}$**	**S.D.**	**Interpretation**
Digital uses	4.65	0.58	Very high
Digital knowledge	4.57	0.61	Very high
Digital literacy	4.41	0.55	High
Digital rights and responsibilities	4.36	0.65	High
Digital security	4.01	0.61	High
Overall	4.40	0.60	High

Table 1 shows the digital citizenship self-efficacy of the samples. In detail, statements in the

aspect of digital uses are related to the samples' beliefs of how they could use technology such as basic operating system functions, word processing software, and supportive hardware. The statements in digital knowledge are about technical knowledge such as basic components of computer hardware, types of software, and basic online technology. Regarding digital literacy, the samples were asked about how well they analyze information on the internet. In the digital rights and responsibilities, the statements are related to copyrights and permission in using intellectual property. Lastly, in the digital security aspect, the statements are related to network protection, password setting, uses of V.P.N, etc.

The results of the study indicate that the sample reported having a high level of digital citizenship self-efficacy overall ($\bar{x}$ = 4.40, 0.60). In detail, the aspects of digital uses ($\bar{x}$ = 4.65, 0.58), digital knowledge ($\bar{x}$ = 4.57, 0.61), digital literacy ($\bar{x}$ = 4.41, 0.55), digital rights and responsibilities ($\bar{x}$ = 4.36, 0.65), and digital security ($\bar{x}$ = 4.01, 0.61), were rated respectively. It could be interpreted that the samples believed they have computers and digital knowledge and could use them effectively with the concerns of rights, responsibilities, and security.

Table 2. The comparison between male and female samples' digital citizenship self-efficacy

		N	$\bar{x}$	S.D.	t	p
Genders	Male	439	4.42	0.59	1.12	0.262
	Female	176	4.36	0.63		

The result of the study indicates the monotony of the digital citizenship self-efficacy of samples with different genders. The dependent t-test shows that there was no significant difference between male (N = 439, $\bar{x}$ = 4.42, S.D. = 0.59) and female samples (N = 176, $\bar{x}$ = 4.36, S.D. = 0.63), t = 1.12, p = 0.262. The result could be interpreted that gender was not the factor separating the digital citizenship self-efficacy of pre-service teachers.

Table 3. The comparative results of the samples of different years of study

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	26.099	4	6.525	4.547	.001*
Within Groups	875.26	610	1.435		
Total	901.36	614			

Note. p > 0.05.

The result of the study shows that the samples from different years of study perceive their digital citizenship self-efficacy differently. One-way ANOVA indicated that there was a significant difference between groups of the samples using years of study as a variable, F = 4.547, p = 0.01.

Table 4. Post-hoc analysis of the samples of different years of study

Years of study		(J) g	Mean Difference (I-J)	Std. Error	Sig.
Scheffe	1	2	-.233	.141	.604
		3	-.273	.142	.452
		4	-.362	.145	.182
		5	-.738*	.179	.002*
	2	1	.233	.141	.604
		3	-.039	.144	.999
		4	-.129	.147	.943
		5	-.504	.181	.102
	3	1	.273	.142	.452
		2	.039	.144	.999
		4	-.089	.148	.985
		5	-.465	.182	.163
	4	1	.362	.145	.182
		2	.129	.147	.943
		3	.089	.148	.985
		5	-.376	.184	.382
	5	1	.738*	.179	.002*
		2	.504	.181	.102
		3	.465	.182	.163
		4	.376	.184	.382

Note. p > 0.05.

Moreover, the Scheffe post-hoc analysis indicates that there was only a significant difference between the digital citizenship self-efficacy of the samples from year 1 and year 5 (p = 0.02).

Consequently, it could be interpreted that year of study was a factor separating the digital citizenship self-efficacy of pre-service teachers.

4. Discussions

The results of the study could be discussed in various aspects. First, it could be seen that pre-service teachers, in the current study, showed a high level of digital citizenship self-efficacy. This could be interpreted that they were confident in using technology as a digital citizen with the awareness of rights, responsibilities, and security. Considering that the samples were from middle to upper-middle-income families who can afford technology and internet service in the country, we can expect their familiarity and self-efficacy in using information technology in life, work, and education. The results went in line with the previous studies that also employed participants with similar characteristics in terms of ages and financial status and found a high level of digital citizenship (*e.g.*, Al-Abdullatif & Gameil, 2020; Korucu & Totan, 2019; Yalçınkaya & Cibaroğlu, 2019)). This also confirms the nature of new generation learners who have been with technology like computers, smartphones, tablets, and the internet since the beginning of their educational paths. They perceive these technologies as a part of their life and show the confidence and positive attitude to use them as shown in the results of the study.

Moreover, the results of the study indicate that there is no difference in the digital citizenship self-efficacy of pre-service teachers of different genders. The result was consistent with previous studies employing gender as a variable to study computer self-efficacy and digital citizenship (*e.g.*, Erdem & Koçyiit, 2019; İşman & Güngören, 2013). At the contextual level, some studies show different attitudes toward the use of technology among men and women. However, both genders perceive computer skills and digital citizenship at a comparative level in the current study. As pre-service teachers, the sample could be aware of the importance of computers and technology in their future careers. Therefore, the samples of both genders in the current study were confident in their computer skills and willing to develop them as digital citizens.

Lastly, it shows that the samples from the first and last year reported having different digital citizenship self-efficacy. This could be discussed by considering the concept of digital citizenship which involves the analysis of information as a part of digital literacy development (Choi, 2016). In the current study, the samples in year 5 gained more experience in life and technology uses. Therefore, they might have more experience dealing with online issues, develop better critical thinking in online information processing, and show different digital citizenship self-efficacy from first-year students.

5. Conclusion

In this study, we aim to assess pre-service teachers' self-efficacy in using computer technology in the digital era as digital citizens. Briefly, students in the Faculty of Education were asked how they perceive computers and technology as a tool in life, education, and future careers. The results of the study lead to an explanation of the nature of prospective teachers' beliefs and willingness to develop themselves as a member of the post-digital world,

a place where a blurred area of virtual and authentic exist and affect people's lives. It shows that pre-service teachers of a certain socio-economy group had a high level of digital citizenship self-efficacy.

The results of the study could be implicated in teacher education as stakeholders should be aware of the readiness of computer skill development of new generation student teachers. Therefore, courses, extended activities, and instructional methods that involve the use of technology should not be a problem for them. Further studies should investigate digital self-efficacy in student teachers with other variables such as fields of study and experiences using computers and online technology. Moreover, a qualitative method is also encouraged to be employed as it might provide other dimensions to the results of the study.

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