

STRATEGIC FACTORS FOR DIGITAL CITIZENSHIP DEVELOPMENT AMONG STUDENTS IN CATHOLIC SCHOOLS IN NAKHON SAWAN DIOCESE, THAILAND

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ABSTRACT

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This mixed-method research aims to study the digital citizenship development activities and the strategic factors for digital citizenship development among students in Catholic schools in the Nakhon Sawan Diocese, Thailand. The qualitative part of the research involved document analysis and in-depth interviews with experts. The quantitative part was conducted with a sample of 1,477 teachers and students from Catholic schools in the Nakhon Sawan Diocese. The statistics applied consist of descriptive statistics (mean, S.D.) and Exploratory Factor Analysis (EFA). The research findings are as follows: 1) The digital citizenship development activities organized by Catholic schools in the Nakhon Sawan Diocese are integrated into the curriculum. These curriculum enhancement activities cover 8 aspects of digital citizenship: digital citizen identity, screen time management, cyberbullying management, cybersecurity management, privacy management, critical thinking, digital footprint, and digital empathy; 2) The factor analysis, conducted using Principal Component Analysis and orthogonal rotation via the varimax method, identified 4 factors: Cybersecurity in the Digital World Development Strategy, Rational Decision-Making in the Digital World Strategy, Empathy in the Digital World Development Strategy, and Screen Time Management in the Digital World Development Strategy. Together, these four factors constitute 62.449 percent of the variance; 3) The digital citizenship development strategy for students in Catholic schools in the Nakhon Sawan Diocese aligns with the guidelines of the Congregation for Catholic Education and the teachings of Pope Francis on the use of digital technologies in our daily lives. It also aligns with the vision of educational administration outlined by the Catholic Education Council of Thailand. Therefore, this strategy can be applied across all Catholic schools.

Keywords: School administration; development strategy; digital citizenship; Nakhon Sawan Diocese

1. INTRODUCTION

The Catholic Education Council of Thailand established the vision for Catholic Education: “Learning Persons, Loving and Caring Community, Reaching for Human Excellence According to Christian Principles.” This vision is part of the Catholic Church’s educational management mission, which aims to develop students’ humanity in every aspect, guide them to conduct themselves with sanctity, and contribute to the greater good (Catholic Education Council of Thailand [CECT], 2022; Suriyapongpraphai et al., 2021). The principle of effective educational management emphasizes participatory learning management, encouraging schools to become centers for achieving the highest good while ensuring they serve as safe and compassionate communities (Wetchawut, 2024). This approach is rooted in the ethos of living in congruence with values of the Gospel and adapting to the rapidly changing global social dynamics (CECT, 2022; Mariaphatthanakit et al., 2021).

The Nakhon Sawan Diocese, a religious administrative region of the Catholic Church in Thailand, encompasses 13 provinces: Nakhon Sawan, Chai Nat, Uthai Thani, Singburi, Lopburi, Saraburi, Phetchabun, Phitsanulok, Phichit, Sukhothai, Uttaradit, Kamphaeng Phet, and Tak. Within this diocese, Catholic schools are overseen by the Catholic Education Council of Thailand. The 26 elementary and secondary schools in the Nakhon Sawan Diocese vary in their administration: 13 are managed directly by the diocese, 1 by a male Catholic religious order, 8 by female Catholic religious orders, and 3 are private Catholic schools (CECT, 2022). Education has been organized according to the vision of the Catholic Education Council of Thailand, which aims for human excellence based on Christian principles. This vision focuses on developing students’ humanity in accordance with Gospel values, while also aligning with global social trends. In today’s rapidly changing world, these trends are heavily influenced by advancements in digital technology (Sakonthawat, 2017).

The educational administration, according to the vision of the Catholic Education Council of Thailand, aims to develop individuals who align with global social trends, particularly in the digital world, in accordance with Article 794 of the Canon Law. This approach is consistent with various guidelines from the Congregation for Catholic Education, including “The Catholic School” in 1977, “The Religious Dimension of Education in a Catholic School” in 1988, “The Catholic School on the Threshold of the Third Millennium” in 1997, and “Educating Together in Catholic Schools” in 2007 (Chanupakara, 2013). It also resonates with the teachings of Pope Francis, which emphasize the importance of using digital technology in daily life (Somsangsuang, 2018; Suriyapongpraphai et al., 2021; Campbell & Vitullo, 2019; Baldino, 2023).

While teachers and administrators of Catholic schools integrate digital citizenship development activities into the curriculum, they continue to uphold the distinctive teaching characteristics of Catholic school educators. These characteristics include living as witnesses to Jesus Christ, recognizing and committing to the vocation of teaching, engaging in community service, being experts in moral and religious teachings, being capable of synthesizing beliefs, culture, and life, directly developing students’ spiritual lives, and preparing teaching materials that incorporate secular knowledge. This approach ensures that Catholic schools achieve their goal of producing well-rounded individuals (Rungrojworawatana & Kulophas, 2021). However, in addition to developing secular knowledge, there must be a focus on enhancing students’ digital citizenship, preparing them to be responsible digital citizens who are adaptable in the ever-changing digital world (Sakonthawat, 2017).

Digital citizenship entails the standards and responsibilities concerning individuals’ sensible use of digital technologies for cohesive coexistence (Castells, 2000; Isman & Gungoren, 2014; Ribble, 2017). It involves learning to wisely leverage the advantages of digital technologies while safeguarding oneself and others from digital risks (Hussainy & Jumalullah, 2021; Ribble, 2021; Sadiku et al., 2018).

Digital citizenship development in various countries emphasizes nine key aspects: digital access, digital commerce, digital communication, digital etiquette, digital law, digital rights and responsibilities, digital health and wellness, digital literacy, and digital security (Ribble, 2011, 2015, 2017). In Thailand, digital citizenship development focuses on eight aspects or skills: digital citizen identity, privacy management, critical thinking, screen time management, cyberbullying management, digital footprint, cybersecurity management, and digital empathy (Wongkitrungruang, 2018; Office of National Digital Economy and Society Commission, 2018; Thai Health Promotion Foundation, 2019).

Students who undergo digital citizenship training at their schools not only acquire knowledge, skills, and positive attitudes towards using digital tools in their daily lives but also develop enhanced capacities and readiness to adapt to changes. Moreover, they contribute to reducing cybercrimes in society (Chumpanin, 2020). Consequently, administrators of schools across various educational authorities bodies in Thailand are continuously expanding digital citizenship development activities for students (Goonasith & Kulophas, 2017; Sakonthawat, 2017; Chumpanin, 2020; Hussainy & Jumalullah, 2021).

The major challenge for Thai Catholic schools is to implement digital citizenship development for students while maintaining the vision and identity of Catholic education as outlined by the Catholic Education Council of Thailand. However, Catholic schools in the Nakhon Sawan Diocese have successfully integrated digital citizenship development for students consistently over time.

Therefore, to disseminate information about the digital development activities and the factors contributing to the successful digital development strategy for students, this study analyzes these strategic factors employed by Catholic schools in the Nakhon Sawan Diocese, Thailand. The findings from this research will benefit teachers, homeroom teachers, activity coordinators, subject teachers, school administrators, and educational policymakers or administrative bodies. These stakeholders will gain insights into the schools' digital citizenship development efforts and can utilize the results for policymaking, strategy development, activity guideline setting, and establishing collaboration with various organizations to help students better adapt to the evolving digital world.

2. RESEARCH OBJECTIVES

The objectives of this research are as follows:

1. To examine the digital citizenship development activities for students in Catholic schools in the Nakhon Sawan Diocese, Thailand.
2. To identify the factors influencing the digital citizenship development strategy for students in Catholic schools in the Nakhon Sawan Diocese, Thailand.
3. To evaluate the implementation of digital citizenship development strategies for students in Catholic schools across Thailand.

3. RESEARCH METHODOLOGY

This research, conducted from March 2022 to December 2023, employed a mixed-methods approach conducted in three steps, as follows:

Step 1: Investigating the digital citizenship development activities for students at Catholic schools in the Nakhon Sawan Diocese, Thailand.

The data sources included (1) Documents and research on digital citizenship development activities and (2) six experts, specifically three administrators from Catholic schools in the Nakhon Sawan Diocese, one Catholic education expert, and two digital citizenship development experts.

Data collection involved synthesizing information on digital citizenship development activities for students from relevant research documents and conducting in-depth interviews with the six experts.

Data analysis: The data gathered from the documents and interviews were analyzed using content analysis.

Step 2: The analysis of the factors influencing the digital citizenship development strategy for students at Catholic schools in the Nakhon Sawan Diocese, Thailand.

The population consists of 27,013 teachers and students from Catholic schools in the Nakhon Sawan Diocese. A sample group of 1,477 individuals, which is more than 20 times the number of variables studied, was selected through systematic random sampling based on provincial locations.

The research instrument was a questionnaire developed by the researchers, formulated based on the findings from Step 1 regarding digital citizenship development activities. The questionnaire was designed with a 5-point Likert scale to measure the extent of implementation (highest, high, moderate, low, or lowest) and consisted of 57 items. The quality of the questionnaire was assessed by experts, resulting in an Index of Content Validity (IOC) ranging from .62 to 1.00. It was then trialed on with a non-sample group of 30 teachers and students, demonstrating discrimination power ranging from .356 to .771 and an overall reliability coefficient of .972.

Data collection: The researchers personally collected the questionnaires by distributing them to the schools and retrieving them directly. A total of 1,477 questionnaires were returned from the 1,477 sent out, achieving a response rate of 100 percent.

Data analysis: The researchers conducted a component analysis of the digital citizenship development strategy for students at Catholic schools in the Nakhon Sawan Diocese, Thailand. Statistical analysis was performed using the Exploratory Factor Analysis method. The appropriateness of the data was assessed using the KMO index (Kaiser-Meyer-Olkin Measure of Sampling Adequacy). The relationships among various variables were tested using Bartlett's Test of Sphericity, and the variance of each variable was examined by

considering the communality values. Components were extracted using Principal Component Analysis, and the component axes were rotated orthogonally using the Varimax Method.

Step 3: The study of the implementation of the digital citizenship development strategy among students at Catholic schools in Thailand.

The data source comprised five experts, a separate expert panel from the six experts in Step 1, consisting of two Catholic school administrators, one Catholic education expert, and two members of the Catholic Education Council of Thailand.

Data were collected through in-depth interviews with these five experts and subsequently analyzed using content analysis.

4. DATA ANALYSIS AND FINDINGS

4.1 Digital citizenship development activities for Catholic school students

The study, conducted through document analysis and in-depth interviews with experts on digital citizenship development activities for students, revealed that Catholic schools employed four types of activities to foster digital citizenship among students. These activities included: (1) Learning integration activities, whereby teachers incorporate digital citizenship activities into the subjects they teach, (2) curriculum enhancement activities, organized by teachers responsible for student activities, (3) student care activities, managed by academic counselors or homeroom teachers, and (4) special school activities such as club activities or special interest activities supervised by student affairs teachers. These four types of activities comprehensively cover the development of digital citizenship in eight aspects as follows.

4.1.1 Digital citizenship identity

This aspect involves activities aimed at instilling important digital citizenship identity behaviors in students, including the ability to develop and maintain an honest digital identity, manage their digital identity effectively, use it securely, present themselves as responsible digital citizens, and consistently uphold the qualities of a good digital citizen.

4.1.2 Screen time management

This aspect involves activities aimed at instilling important screen time management behaviors in students. These include the ability to allocate time appropriately on social media with friends and family, manage time spent watching movies, listening to music, playing games, and using various communication devices. It also involves using smartphones and other devices responsibly, balancing digital interactions with real-world activities, engaging in virtual gaming without adverse health effects, consuming digital media without negatively impacting learning outcomes, and dedicating time to self-directed learning on digital platforms to enhance academic performance.

4.1.3 Cyberbullying management

This aspect involves activities aimed at instilling crucial behaviors in students to prevent and address cyberbullying. These activities include teaching students to refrain from condoning or supporting cyberbullying, ensuring they never engage in cyberbullying themselves, effectively managing and addressing cyberbullying situations when they occur, protecting themselves from becoming victims of cyberbullying, controlling their own actions to avoid bullying others, and mitigating cyberbullying within peer groups.

4.1.4 Cybersecurity management

This aspect involves activities aimed at instilling essential cybersecurity management behaviors in students. These include managing cybersecurity effectively using proper methods and protocols, coping well with various cyber threats, being safety-conscious in the digital world, protecting personal identity, promptly dealing with cyber threats when they arise, and safely utilizing various communication technologies in the digital world.

4.1.5 Privacy management

This aspect involves activities aimed at instilling privacy-conscious behaviors in students. These include responsibly using and sharing information in the digital world while respecting others' privacy, safeguarding their own and others' information, adhering to proper privacy procedures and policies for managing and sharing information, and possessing the skills to maintain the anonymity of both their own and others' identities.

4.1.6 Critical thinking

This aspect involves activities aimed at instilling essential critical thinking behaviors in students. These include using reasoning to differentiate between true and false information, analyzing received content,

responding appropriately to information, and choosing to engage with or disengage from social media to avoid falling victim to cybercriminals. Additionally, students will develop the ability to make reasoned decisions, select accurate information and content, and make safe choices in response to information and content from the digital world.

4.1.7 Digital footprint

This aspect involves activities aimed at instilling important behaviors related to managing digital footprints in students. These include understanding the nature of digital footprints, protecting oneself from negative consequences caused by digital footprints, leveraging the benefits of responsible digital usage, and using digital platforms cautiously to avoid scrutiny. Students will learn to prevent violations of others' rights that may lead to legal action, appropriately utilize the benefits of their digital footprints, and leave footprints that indicate they are good digital citizens.

4.1.8 Digital empathy

This aspect involves activities aimed at instilling important digital empathy behaviors in students. These include expressing joy in others' successes, consistently displaying understanding and empathy towards others, collaborating with others in the digital world to solve problems when requested, and responding appropriately to others' needs in various situations. Additionally, students will develop digital empathy to congratulate and compliment others online, assist others in staying safe, and respond appropriately to the needs of others in the digital world.

4.2 The study on the strategic factors of digital citizenship development among students

4.2.1 The level of digital citizenship among students

The analysis of the level of digital citizenship among students at Catholic schools in the Nakhon Sawan Diocese covered all eight aspects, with the results presented in Table 1.

Mean scores were interpreted using the following criteria: 4.21–5.00 = highest; 3.41–4.20 = high; 2.61–3.40 = moderate; 1.81–2.60 = low; and 1.00–1.80 = lowest.

Table 1: The level of digital citizenship among students in the Nakhon Sawan Diocese (N = 1,477)

No.	Aspects	Mean	S.D.	Digital citizenship
1	Digital citizen identity	4.17	.592	High
2	Screen time management	4.00	.616	High
3	Cyberbullying management	4.18	.566	High
4	Cybersecurity management	4.18	.600	High
5	Privacy management	4.27	.563	High
6	Critical thinking	4.18	.564	High
7	Digital footprint	4.13	.579	High
8	Digital empathy	4.20	.594	High
Overall		4.16	.507	High

According to Table 1, the overall level of digital citizenship among students was high. When considering each individual aspect, students' digital citizenship across all eight aspects was also high. The aspects ranked from highest to lowest are as follows: privacy management, digital empathy, cyberbullying management, cybersecurity management, digital citizen identity, critical thinking, digital footprint, and screen time management.

4.2.2 Validation of the appropriateness of correlation matrices between the variables used in the study

The validation of the correlation matrix appropriateness among the 57 variables used in the study showed a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.979. This high value indicated that all 57 variables were highly suitable for factor analysis. Additionally, Bartlett's Test of Sphericity (to assess the identity matrix) yielded a significant chi-square value of 63,907.822 at a significance level of .01, confirming the correlation among the 57 variables and their appropriateness for factor analysis.

4.2.3 The factor analysis

4.2.3.1 Initial factor analysis

The initial factor analysis, performed using principal component analysis, revealed that the communality values of all 57 variables ranged from .398 to .767. This indicated a high degree of correlation among the variables, suggesting their probable fit into one or more factors.

Upon performing orthogonal rotation using the Varimax method, six factors were extracted. However, one of these factors was found to be vague, encompassing 13 variables with high factor loadings on at least two factors or with factor loadings less than 0.50 on any factor. This suggested that these variables had specific and low cross-loading factors. Consequently, these 13 variables were excluded by the researcher, prompting the initiation of a second factor analysis.

4.2.3.2 Second factor analysis

The second factor analysis involved the remaining 44 variables, analyzed using the same method. The principal component analysis revealed that the communality values of all 44 variables ranged from .421 to .754, indicating a high degree of correlation and suggesting their suitability for inclusion in one or more factors.

Upon performing orthogonal rotation using the Varimax method, four factors were extracted. Each factor exhibited Eigenvalues greater than 1.0 and included three or more variables with factor loadings exceeding 0.50, which were statistically significant. The statistical test revealed significant factor loadings at the 0.01 level. Furthermore, these four factors collectively explained 62.449 percent of the variance in the variables.

From the results of the analysis on each factor, names were assigned to represent the variables they encompassed. The variables within each of the four factors are as follows.

Factor 1 encompasses 22 variables with factor loadings ranging from 0.764 to 0.853. The variables in factor 1 are as follows: 1) The ability to maintain the anonymity of one's personal information (e7). 2) The ability to manage information while adhering to privacy principles (e5). 3) The ability to safely use various communication technologies on digital platforms (d6). 4) The ability to maintain the anonymity of others' personal information (e8). 5) The ability to safeguard one's personal information (d8). 6) Digital footprints that demonstrate good digital citizenship (g8). 7) The ability to correctly filter received information or content (f7). 8) The ability to share information while adhering to privacy principles (e6). 9) The ability to appropriately leverage benefits from digital footprints (g7). 10) The ability to appropriately express joy for others' success in the digital world (h6). 11) Being cautious on digital platforms to avoid digital footprint scrutiny (g5). 12) The ability to control one's actions to avoid cyberbullying others (c5). 13) Assisting others appropriately to stay safe in the digital world (h7). 14) The ability to protect oneself from being a victim of cyberbullying (c4). 15) The ability to respond safely to information and content received (f8). 16) The ability to prevent oneself from violating others' rights that may lead to legal action (g6). 17) The ability to promptly deal with various cyber threats (d5). 18) The ability to make reasoned decisions (f6). 19) Managing one's digital citizen identity to be a good digital citizen (a5). 20) Responding safely to others' needs in the digital world (h8). 21) Having a quality digital citizen identity (a4). 22) The ability to mitigate cyberbullying within peer groups (c6). Given the characteristics of these variables, this factor is aptly named "Cybersecurity in the Digital World Development Strategy." The total factor loading for all variables within this factor is 15.265, accounting for 34.694 percent of the total variance explained by the four factors combined.

Factor 2 encompasses 15 variables with factor loadings ranging from 0.508 to 0.718. The variables in factor 2 are as follows: 1) Safeguarding one's personal information (e3). 2) The ability to use reasoning to respond appropriately to information and content received (f4). 3) Sharing information with others while adhering to privacy principles (e2). 4) Using information in the digital world while adhering to privacy principles (e1). 5) Being safety-conscious in the digital world (d3). 6) The ability to use reasoning to differentiate received information and content (f3). 7) Using reasoning to choose to engage with or disengage from social media appropriately (f2). 8) The ability to safeguard others' personal information (e4). 9) The ability to use reasoning to differentiate between true and fake information (f1). 10) The ability to use reasoning to prevent falling victim to cybercriminals (f5). 11) The ability to cope well with various cyber threats (d2). 12) Understanding the nature of digital footprints (g1). 13) The ability to prepare for leveraging benefits from digital footprints (g2). 14) Leaving digital footprints that demonstrate responsible usage of the digital world for oneself and others (g4). 15) The ability to protect oneself from negative results caused by digital footprints (g3). Given the characteristics of these variables, this factor is aptly named "Rational Decision-Making in the Digital World Strategy." The total factor loading for all variables within this factor is 7.656, accounting for 17.399 percent of the total variance explained by the four factors combined.

Factor 3 encompasses 4 variables with factor loadings ranging from 0.538 to 0.650. The variables in factor 3 are as follows: 1) Helping others in the digital world when requested (h3). 2) The ability to respond to others appropriately in various situations (h5). 3) Collaborating with others in the digital world to solve problems (h4). 4) Exhibiting a consistent display of understanding and empathy towards others (h2). Given the characteristics of these variables, this factor is aptly named “Empathy in the Digital World Development Strategy.” The total factor loading for all variables within this factor is 2.419, accounting for 5.499 percent of the total variance explained by the four factors combined.

Factor 4 comprises 3 variables with factor loadings ranging from 0.699 to 0.765. The variables in factor 4 are: 1) The ability to allocate communication device use time appropriately (b3). 2) The ability to allocate time appropriately on social media with friends and family (b1). 3) The ability to allocate time appropriately for watching movies, listening to music, and playing games (b2). Considering the characteristics of these variables, this factor is appropriately named “Screen Time Management in the Digital World Development Strategy.” The total factor loading for all variables within this factor is 2.137, which accounts for 4.857 percent of the total variance explained by the four factors combined.

The overall findings from the factor analysis are summarized in Table 2.

Table 2: Factor analysis of the digital citizenship development strategy for students

Component	Eigenvalues	% of variance	Name of factor
1	15.265	34.694	Cybersecurity in the Digital World Development Strategy
2	7.656	17.399	Rational Decision-Making in The Digital World Strategy
3	2.419	5.499	Empathy in the Digital World Development Strategy
4	2.137	4.857	Screen Time Management in the Digital World Development Strategy

According to Table 2, four factors emerged in the digital citizenship development strategy for students at Catholic schools in the Nakhon Sawan Diocese. Each factor has an Eigenvalue greater than 1. Collectively, these four factors account for 62.449 percent of the total variance among the variables.

5. DISCUSSION

5.1 Digital citizenship development activities

The study on digital citizenship development activities for students at Catholic schools in the Nakhon Sawan Diocese shows that these activities are seamlessly integrated into the curriculum. These curriculum enhancement activities cover eight key aspects of digital citizenship: digital citizen identity, screen time management, cyberbullying management, cybersecurity management, privacy management, critical thinking, digital footprint, and digital empathy.

These findings are consistent with Ribble (2011, 2015, 2017), who emphasized that effective digital citizenship development must be embedded across multiple dimensions of school life rather than treated as a standalone subject. Similarly, Chumpanin (2020) and Goonnasith and Kulophas (2017) found that Thai schools that systematically integrate digital citizenship into curriculum activities produce students with stronger digital competencies. The four activity types identified in this study (learning integration, curriculum enhancement, student care, and special school activities) reflect a whole-school approach that aligns with best practices documented in the literature.

5.2 Strategic factors for digital citizenship development

The factor analysis yielded four strategic factors that together explain 62.449 percent of the variance, suggesting that digital citizenship development in Catholic schools in the Nakhon Sawan Diocese can be meaningfully understood through these four dimensions. This finding aligns with Hussainy and Jumalullah (2021), who similarly identified multidimensional factors underlying digital citizenship among students, and with Isman and Gungoren (2014), who argued that digital citizenship encompasses both technical and ethical dimensions that cannot be reduced to a single construct.

The emergence of Cybersecurity in the Digital World Development Strategy as the dominant factor (Eigenvalue = 15.265, explaining 34.694% of variance) reflects growing global concerns about online safety and privacy. This is consistent with Ribble (2017) and Sadiku et al. (2018), who identified digital security and privacy as foundational competencies for responsible digital citizenship.

However, a notable finding warrants further discussion: although the overall level of digital citizenship among students was rated high across all eight aspects, screen time management received the lowest mean

score ($M = 4.00$) and ranked last among all dimensions. This pattern is not unique to the present study. Research by Chumpanin (2020) and Wongkitrungruang (2018) similarly found that Thai students, despite demonstrating awareness of digital norms, continue to struggle with self-regulation of device use. This gap may be attributed to the pervasive and highly engaging nature of digital platforms, which are deliberately designed to maximize user attention and time-on-screen (Castells, 2000). In the Catholic school context, screen time management may also be more challenging to address through conventional curriculum activities alone, as it requires ongoing behavioral formation that extends beyond school hours into the home environment. This underscores the recommendation already noted in this study that parental involvement and spiritual formation are essential complements to school-based interventions.

5.3 Implementation of the strategy in Catholic schools in Thailand

The study on the implementation of the digital citizenship development strategy at Catholic schools in Thailand revealed that the participating experts perceived its feasibility as high. However, it should be noted that this conclusion is based on the perspectives of five experts and reflects strong policy alignment rather than guaranteed practical feasibility across all regions of Thailand. The empirical data underlying this study were collected exclusively within the Nakhon Sawan Diocese, and broader implementation may involve contextual factors not captured in the present sample. This belief stems from the alignment of the development strategy with the principles of Catholic educational administration, the teachings of Pope Francis, and the educational vision of the Thai Catholic Education Council. The details are as follows.

Screen time management in the digital world development strategy includes activities that promote responsible screen time management, an essential aspect of digital citizenship and an important quality for being a good role model. This strategy aligns with the principles of Catholic education management, the guidelines of the Congregation for Catholic Education's "Educating Together in Catholic Schools" in 2007, and the educational vision of the Catholic Education Council of Thailand. It is crucial for Catholic school administrators to establish guidelines for activities that are both diverse and tailored to students' varied interests. They should develop content and media tools for various activities, emphasizing hands-on practice over instruction or lecturing. To support students struggling with screen time management, personalized care and spiritual formation may be necessary. Additionally, counselling can be provided to parents to engage them in their children's spiritual formation, beginning at home.

The rational decision-making in the digital world strategy encompasses activities that foster digital citizenship in privacy management, critical thinking, digital footprint, and cybersecurity management. These are essential for navigating a rapidly changing society. This strategy aligns with Catholic educational administration principles and the guidelines of the Congregation for Catholic Education, including "The Catholic School" in 1977, "The Religious Dimension of Education in a Catholic School" in 1988, "The Catholic School on The Threshold of The Third Millennium" in 1997, and "Consecrated Persons and their Mission in Schools" in 2022. It also aligns with Pope Francis' teachings on using digital technologies in daily life and the educational vision of the Catholic Education Council of Thailand. It is crucial for Catholic school administrators to communicate more with teachers responsible for organizing student activities about the objectives of various activities through curriculum enhancement. They should align development efforts in the same direction, aiming to develop students' humanity in every aspect, guiding them to conduct themselves with sanctity and to contribute to the overall benefit, in line with the educational mission of the Church.

The cybersecurity in the digital world development strategy encompasses activities that foster digital citizenship in privacy management, critical thinking, digital footprint, and cybersecurity management. These elements are fundamental to Catholic educational administration. This strategy aligns with the guidelines of the Congregation for Catholic Education, including "The Catholic School" in 1977, "Lay Catholics in Schools: Witnesses to Faith" in 1982, and "The Catholic School on The Threshold of The Third Millennium" in 1997. It also resonates with Pope Francis' teachings on the use of digital technologies in daily life and the educational vision of the Catholic Education Council of Thailand. Catholic school administrators must have Jesus Christ as their spiritual foundation and be committed to transforming their schools into centres for proclaiming the Good News of the Lord to all. This involves fostering a Catholic environment and providing catechesis within their institutions. Additionally, it requires integrating the Catholic faith with local cultures and daily life through activities across various subjects tailored to the context of the Church in each locality. This approach will ultimately shape the development of morality and ethics in accordance with Gospel values while also being relevant to the Thai societal context.

The empathy in the digital world development strategy encompasses activities that foster digital citizenship in digital empathy, which is the true essence of the Catholic identity. This strategy aligns with the principles of Catholic educational administration and the guidelines from the Congregation for Catholic Education, including "The Religious Dimension of Education in a Catholic School" in 1988 and "Educating Together in Catholic Schools" in 2007. Additionally, it aligns with the educational vision of the Catholic

Education Council of Thailand. To implement this strategy effectively, it is crucial for Catholic school administrators to recruit quality teachers with strong spirituality, who are ready to develop students' humanity in every aspect, in line with the Catholic identity.

6. CONCLUSION

6.1 Digital citizenship development activities for Catholic school students

The study on digital citizenship development activities for students at Catholic schools in the Nakhon Sawan Diocese shows that these activities are seamlessly integrated into the curriculum. These curriculum enhancement activities cover eight key aspects of digital citizenship: digital citizen identity, screen time management, cyberbullying management, cybersecurity management, privacy management, critical thinking, digital footprint, and digital empathy.

6.2 The factor analysis of the digital citizenship development strategy for students

6.2.1 Study of the level of digital citizenship among students

The study on the level of digital citizenship among students revealed that Catholic schools in the Nakhon Sawan Diocese effectively integrate digital citizenship activities into their curriculum. These curriculum enhancement activities have fostered a high level of digital citizenship among students overall and across all aspects. The top three ranked aspects were privacy management, digital empathy, and critical thinking. Conversely, the bottom three ranked aspects were digital citizen identity, digital footprint, and screen time management.

6.2.2 Validation of the appropriateness of correlation matrices between variables

The validation of the correlation matrix's appropriateness between the variables used in this study showed a KMO measure of sampling adequacy of 0.979, indicating that the sample was highly suitable for factor analysis. Additionally, Bartlett's Test of Sphericity yielded a significant chi-square value of 63,907.822 at a significance level of .01, confirming the presence of correlation among all variables and their appropriateness for factor analysis.

6.2.3 Factor analysis

By utilizing Principal Component Analysis and orthogonal rotation with the Varimax method, four factors were extracted. Each factor had an eigenvalue greater than 1.0 and a factor loading at a significant level of .01. The four factors identified were: 1) Cybersecurity in the Digital World Development Strategy, 2) Rational Decision-Making in the Digital World Strategy, 3) Empathy in the Digital World Development Strategy, and 4) Screen Time Management in the Digital World Development Strategy. Together, these four factors explained 62.449 percent of the variance in the variables.

1) The factor of "Cybersecurity in the Digital World Development Strategy" covered 22 variables, with factor loading values ranging between 0.764 and 0.853. Collectively, these variables contributed to a total factor loading of 15.265. This factor accounted for 34.694 percent of the total variance explained by the four factors combined.

2) The factor of "Rational Decision-Making in the Digital World Strategy" covered 15 variables, with factor loading values ranging between 0.508 and 0.718. Collectively, these variables contributed to a total factor loading of 7.656. This factor accounted for 17.399 percent of the total variance explained by the four factors combined.

3) The factor of "Empathy in the Digital World Development Strategy" covered 4 variables, with factor loading values ranging between 0.538 and 0.650. Collectively, these variables contributed to a total factor loading of 2.419. This factor accounted for 5.499 percent of the total variance explained by the four factors combined.

4) The factor of "Screen Time Management in the Digital World Development Strategy" covered 3 variables, with factor loading values ranging between 0.699 and 0.765. Collectively, these variables contributed to a total factor loading of 2.137. This factor accounted for 4.857 percent of the total variance explained by the four factors combined.

6.3 The digital citizenship development strategy for students

The study on the digital citizenship development strategy for students at Catholic schools in the Nakhon Sawan Diocese revealed a correlation between the development strategy, activities, and the students' acquired digital citizenship. The model for the digital citizenship development strategy for students is depicted in Figure 1.

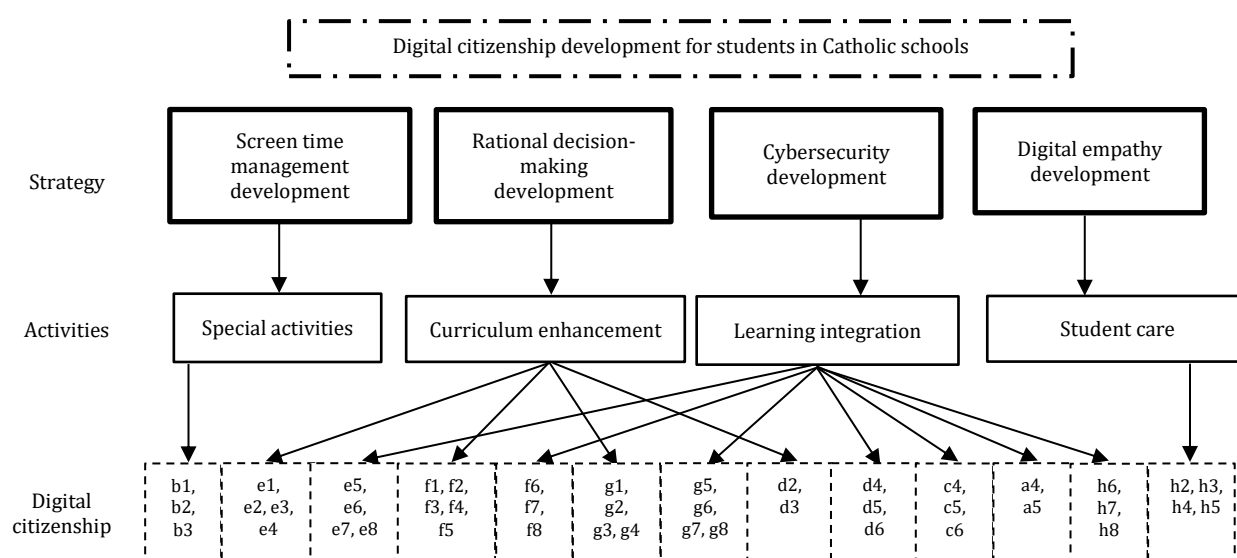


Figure 1: The model of the digital citizenship development strategy for students

The screen time management in the digital world development strategy includes various special school activities, such as club activities and special interest programs, with student affairs advisors overseeing these initiatives. These activities aim to foster digital citizenship in screen time management (b).

The rational decision-making in the digital world development strategy involves curriculum enhancement activities organized by teachers responsible for student activities. These activities aim to foster digital citizenship in privacy management (e), critical thinking (f), digital footprint (g), and cybersecurity management (d).

The cybersecurity in the digital world development strategy includes learning integration activities conducted by subject teachers. These activities foster digital citizenship in privacy management (e), critical thinking (f), digital footprint (g), cybersecurity management (d), cyberbullying management (c), digital citizen identity (a), and digital empathy (h).

The digital empathy in the digital world development strategy involves student care activities organized by academic counsellors or homeroom teachers. These activities aim to foster digital citizenship in digital empathy (h).

6.4 The implementation of the digital citizenship development strategy for students at Catholic schools in Thailand

The implementation of the digital citizenship development strategy for students at Catholic schools in Thailand, as assessed through expert perspectives, shows strong policy alignment with Catholic educational principles; however, this reflects a policy-level assessment rather than confirmed nationwide practice, since the empirical data were collected specifically within the Nakhon Sawan Diocese. All four factors of the development strategy align with the principles of Catholic educational administration, the various guidelines of the Congregation for Catholic Education, the teachings of Pope Francis on utilizing digital technologies in daily life, and the vision of the Catholic Education Council of Thailand. Furthermore, Catholic school administrators must communicate more effectively with responsible parties about the objectives of the development activities. These communications should guide all those involved in the same direction of developing students' humanity in every aspect, encouraging them to conduct themselves with sanctity and contribute to the overall benefit, in line with the Church's mission for education.

7. RECOMMENDATIONS

7.1 Recommendations

The findings of this study indicate that the digital citizenship development strategy for students at Catholic schools in the Nakhon Sawan Diocese consists of four key strategic factors: screen time management in the digital world development strategy, rational decision-making in the digital world development strategy, cybersecurity in the digital world development strategy, and digital empathy in the digital world development strategy. These strategies, encompassing curriculum enhancement activities and school enrichment programs, have enabled students to develop high-level digital citizenship. Therefore, school administrators should

present the results of these efforts to supervisory and related organizations, both as recognition and encouragement for successful practices among teachers, and as models for other educators to follow or use as policy-setting guidelines. This collaborative effort aims to equip students to adapt to future societal changes.

7.2 Recommendations for further research

Based on the study on the factors of digital citizenship development strategy for students at Catholic schools in the Nakhon Sawan Diocese, the four identified factors together explained 62.449 percent of the total variance. Therefore, further research should be conducted on other related variables that were not included in this study to increase the explanatory power of the factor analysis.

Additionally, this research utilized Exploratory Factor Analysis (EFA) to uncover the four factors of the digital citizenship development strategy for students at Catholic schools in Nakhon Sawan Diocese. To further confirm these findings, it is recommended to conduct additional research using Confirmatory Factor Analysis (CFA).

Thirdly, the findings of the correlation between the digital citizenship development strategy, the activities implemented, and the acquired digital citizenship of students were summarized based on the findings of this research. To further validate these findings, it is recommended to conduct additional research using Path Analysis or other methods.

Lastly, the conclusion that it is highly possible to implement the digital citizenship development strategy for students at Catholic schools in Thailand was based solely on expert interviews. To further confirm these findings, it is recommended to conduct further research using other analytical methods.

DECLARATION

1. Conflict of interest

The authors declare no conflict of interest regarding the publication of this manuscript.

2. Generative AI and AI-assisted technologies in the writing process

In the course of composing this manuscript, the authors employed generative AI technologies exclusively as adjunctive instruments for grammatical verification and the refinement of textual lucidity. The authors undertook a comprehensive review and editing of all generated outputs, thereby assuming complete accountability for the precision and veracity of the material contained within this publication.

3. Data availability statement

The data supporting the findings of this study, titled “Strategic Factors for Digital Citizenship Development among Students in Catholic Schools in Nakhon Sawan Diocese, Thailand,” are contained within the manuscript.

4. Ethics statement

The authors affirm that this research was undertaken in accordance with research ethics principles, specifically concerning data confidentiality and the safeguarding of all participants’ rights. All data acquired were utilized solely for scholarly objectives, and participation in the study was completely voluntary.

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6. Contributor Role Taxonomy (CRediT)

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