Digital Kids Asia Pacific (DKAP) in Thailand

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Abstract

The objectives of this survey research were to 1) develop and validate the Thai version of the DKAP survey instrument to measure digital citizenship competencies in Thailand and 2) survey the baseline of Thai children's digital citizenship competencies in an educational context. The research sample consisted of 1,216 Mathayom Suksa 3 or Grade 9 students from schools under the Office of the Basic Education Commission, academic year 2019. A multistage sampling was used to obtain data from 15 schools in different regions of Thailand. Analysis data using descriptive statistics consisted of frequency, percentage age. mean and standard deviation. The validation of the tools consisted of construct validity using confirmatory factor analysis and internal consistency reliability using Cronbach's alpha coefficient. The results were summarized as follow: 1) The Thai version of the DKAP survey instrument to measure digital citizenship competencies in Thailand has construct validity in all domains: digital literacy; digital safety and resilience; digital participation and agency; digital emotional intelligence; and digital creativity and innovation. Moreover, it also had high reliability in all domains (α = 0.80 – 0.88). 2) The results of Thai children's digital citizenship competencies in an educational context showed that the digital safety and resilience domain was the highest competency (M=3.34, SD=0.44), followed by digital literacy domain (M=3.12, SD=0.48); digital participation and agency domain (M=3.09, SD=0.47); digital emotional intelligence domain (M=3.07, SD=0.47); and digital creativity and innovation domain (M=2.84, SD=0.55) respectively.

Background

Disruptive technology now affects education around the world. In this digital age, children need to use information and communication technology (ICT) for learning. The use of ICT has both advantages and disadvantages. The advantages are that the children can access information via the Internet from around the world, learn useful life skills through technology and enhance the mode of virtual communication. However, the disadvantages that children may face include the misuse of technology; misleading and misguiding information; and cyberbullying. Among the different countries in Asia-Pacific, there is great disparity in terms of social, economic and technological development. This diversity also affects the ICT development level. The focus of the 2030 agenda for sustainable development in goal 4 is to achieve inclusive and equitable learning for all through the use of ICT. Therefore, The United Nations Organization for Education, Science and Culture (UNESCO), supported by the government of the Republic of Korea Funds-in-Trust, has initiated the Digital Kids Asia-Pacific (DKAP) research project to build an evidence-based database of children's digital citizenship. The digital citizenship was defined by UNESCO (2016) as "*being able to find, access, use and create information effectively; engage with other users and with content in an active, critical, sensitive and ethical manner; and navigate the online and ICT environment safely and responsibly, being aware of one's own rights*". The four Asia-Pacific members that collaborated this project in the first phase are Bangladesh, Fiji, the Republic of Korea, and Vietnam (Shin, Hwang, Park, Teng & Dang, 2019).

The final revision of the survey instrument was led by the Institute of School Violence Prevention (ISVP) at Ewha Womans University, Seoul, the Republic of Korea, which finalized the definitions for each domain and competency with a focus on consistency, clarity, and validity (Shin, Hwang, Park, Teng & Dang, 2019). However, the original instrument is in English, and this could pose an obstacle for Thai children due to their weak command of the English language. Therefore, the Faculty of Education, Chulalongkorn University, has partnered with UNESCO to develop the instrument in Thai version. The validity and reliability of the survey instrument were validated. Afterwards, the survey of the Thai children's digital citizenship competencies in an educational context was collected from all regions in Thailand.

Objectives

The objectives of this research were as follows:

1. To develop and validate the DKAP survey instrument in Thai version to measure digital citizenship competencies in Thailand.

2. To survey the baseline of Thai children's digital citizenship competencies in an educational context in Thailand.

Scope of the study

The focus of this research was to develop and validate the DKAP survey instrument in Thai version to measure digital citizenship competencies in Thailand. Validity and reliability were used to validate the instrument. The baseline of

Thai children's digital citizenship competencies in an educational context was collected from 1,216 Grade 9 students, academic year 2019, from the Office of the Basic Education Commission from all regions in Thailand.
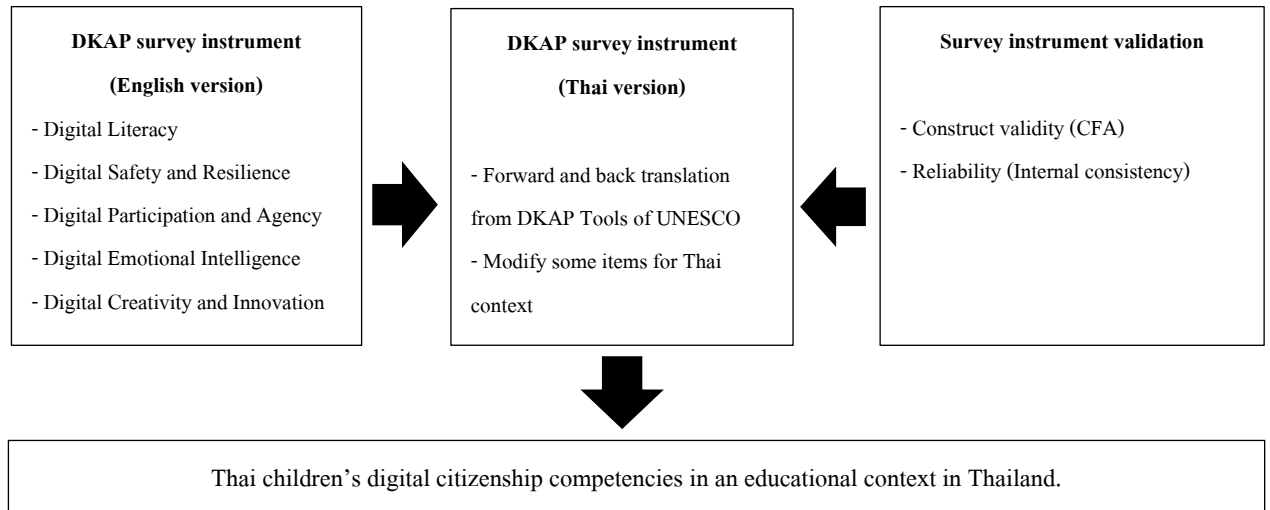
Conceptual Framework

Figure 1 Conceptual Framework

Research Methodology

Population and sample

Population consisted of 554,703 Mathayom Suksa 3 or Grade 9 students from schools under the Office of the Basic Education Commission, academic year 2019.

Sample comprised 1,216 Mathayom Suksa 3 or Grade 9 students from schools under the Office of the Basic Education Commission, academic year 2019. A multistage sampling was used to obtain data from sample which represented the target population. The data was collected from 15 schools in different regions of Thailand.

Survey instrument

The survey instrument in Thai version was developed as follows:

Step 1: Forward translation by researcher team.

Step 2: Expert panel discussion by project advisor and one expert who was bilingual (English and Thai).

Step 3: Back translation by a native English speaker with sufficient knowledge of Thai.

Step 4: Cognitive interviewing of target students.

Step 5. Revised for final version.

The DKAP survey instrument comprises five domains: digital literacy (14 items), digital safety and resilience (20 items), digital participation and agency (12 items), digital emotional intelligence (16 items), digital creativity and innovation (11 items).

Digital literacy means the ability to seek, critically evaluate, and use digital tools and information effectively to make informed decisions. Digital literacy consists of two competencies, ICT literacy and information literacy. ICT literacy

means the ability to manage and operate ICT hardware and software responsibly in digital environments, in order to access and search for data, information and content, and to use them successfully. Information literacy means the ability to seek, critically evaluate and use digital information effectively to make informed decisions.

Digital safety and resilience mean the individual's ability to understand how to protect himself or herself and others from harm in the digital space. Digital safety and resilience consist of four competencies, understanding child rights; personal data, privacy and reputation; promoting and protecting health and well-being; and digital resilience. The competency of understanding child rights relates to students' knowledge of rights and obligations with respect to digital activities within the local and global context.

Digital participation and agency mean the ability to equitably interact, engage and positively influence society through ICT use. Digital participation and agency consist of three competencies: interacting, sharing, and collaborating; civic engagement; and netiquette. The competency of netiquette relates to students' ethical and courteous behavior that informs their choices when interacting and engaging in different digital environments with different individuals and audiences.

Digital emotional intelligence focuses on the ability to recognize, navigate and express emotions in one's digital intrapersonal and interpersonal interactions. Children's interactions with ICT have changed in various ways as online activity has become more pervasive and as children become increasingly socialized in part via their online activities (Genner & Süss, 2017). These factors may influence young people's behaviors, and their use of ICTs in networked digital spaces. The digital emotional intelligence domain consists of five competencies: self-awareness; self-regulation; self-motivation; interpersonal skills; and empathy.

Digital creativity and innovation refer to the individual's ability to express and explore herself or himself through creation of content using ICT tools. As mentioned earlier, this domain had the lowest mean scores compared to the other four domains. This finding supports the "ladder of opportunity" model (Livingstone, Haddon, & Görzig, 2012) which suggests that most students tend to engage in basic digital activities, while fewer of them progressively reach the advanced level where they are competent and motivated enough to create digital artifacts. Digital creativity and innovation consist of two competencies: creative literacy and expression.

Data collection

The data collection was carried out between March and September 2020 (during the COVID-19 pandemic) by using paper-based surveys to ensure equal access to the survey.

The data collection process was described as below:

Step 1: Research team sampled the eligible schools around Thailand and contacted the coordinator who was the teacher in each school.

Step 2: School coordinator sent the list of students to research team.

Step 3: Research team sampled students and sent the list of students to school coordinator.

Step 4: Research team and school coordinator agreed on the availability of sampled students and the survey process.

Step 5: Research team sent the survey instrument and manual to school coordinator.

Step 6: Research team clarified the survey instrument and process with the school coordinator.

Step 7: School coordinator prepared for the survey administration.

Step 8: Survey administrators conducted the survey.

Step 9: School coordinator collected survey materials for shipment and sent them back to research team.

Data analysis

1. Descriptive statistics including the frequency, percentage, mean (*M*) and standard deviation (*SD*) were used to describe the demographic data of the research sample.

2. Confirmatory factor analysis (CFA) was used to examine the construct validity of the instrument that measured in the same construct of the instrument in English version.

3. Internal consistency reliability using Cronbach alpha's coefficient was used to examine the consistency of the instrument.

Results

1. Development of DKAP survey instrument in Thai version to measure digital citizenship competencies in Thailand

1.1 Validity

Confirmatory Factor Analysis (CFA) was used to validate construct validity of the children's digital citizenship competencies. It was used to statistically assess how well the survey instrument measured the constructs in each of the domains. CFA for each of the items and competencies were measured to assess convergence validity and discriminant validity of the survey. Convergence validity was shown when each measurement item correlates strongly with the others. Discriminant validity was shown when each measurement item correlates weakly with all other constructs except for the same hypothesized construct. Convergence validity was verified by analyzing whether the factor loadings exceed .50 and are significant, while discriminant validity is verified when all correlations between each sub-competency in a specified domain of competency are lower than 0.850 (Clemence, Hilsenroth, Ackerman, Strassle & Handler, 2005).

To test the validity, various model fit indices could be used. In the current study, χ^2 (Chi square), comparative fit index (CFI), root mean square error of approximation (RMSEA) and Tucker Lewis index (TLI) were reported. The suggested model fit indices for perfect and acceptable model fit were summarized by İlhan and Çetin (2014) based on the various references.

Table 1 Suggested values for perfect and acceptable model fit

Model fit indices	Perfect fit	Acceptable fit
CFI	$.95 \le CFI \le 1.00$	$.90 \le CFI \le .95$
RMSEA	$.00 \le RMSEA \le .05$	$05 \le RMSEA \le .08$
TLI	$.95 \le TLI \le 1.00$	$.90 \le TLI \le .95$

Digital literacy

Digital literacy domain consists of two sub-competencies, ICT literacy and information literacy. The model fit values showed that they had perfect fit (χ^2= 1.82, df=1, TLI = .998, CFI = .999, RMSEA = .027). All factor loadings or standardized regression (β) weights exceeded .50 and significant at the .001 alpha level. Therefore, digital literacy showed that it had convergence validity. Correlation between sub-competencies was .895. Hence, digital literacy domain did not have discriminant validity.

Digital safety and resilience

Digital safety and resilience domain consists of four sub-competencies, understanding child rights; personal data; privacy and reputation; promoting and protecting health; and well-being and digital resilience. The model fit values showed that they had acceptable fit (χ^2= 96.230, df=21, TLI = .979, CFI = .988, RMSEA = .056.). All factor loadings exceed .50 and significant at the .001 alpha level. Therefore, the digital safety and resilience domain had convergence validity. Some correlations between sub-competencies in digital safety and resilience domain were lower than 0.850. Therefore, digital safety and resilience domain did not have discriminant validity.

Digital participation and agency

Digital participation and agency domain consists of three sub-competencies, interacting, sharing and collaborating; civic engagement; and netiquette. The model fit values showed that they had acceptable fit (χ^2 = 24.758, df=6; TLI = .980; CFI = .993; RMSEA = .052). All factor loadings exceeded .50 and were significant at the .001 alpha level and correlations between all sub-competency were lower than 0.850 (correlations= .212-.650). Therefore, digital participation and agency domain were found to have both convergence and discriminant validities.

Digital emotional intelligence

Digital emotional intelligence consists of five sub-competencies: self-awareness; self-regulation; self-motivation; interpersonal skills; and empathy. The model fit values showed that they had perfect fit (χ^2 = 230.181, df=67, TLI = .983, CFI = .987, RMSEA = .046). Therefore, the digital emotional intelligence had convergence validity. Some correlations between sub-competencies were lower than 0.850. Hence, the digital emotional intelligence did not have discriminant validity.

Digital creativity and innovation

Digital creativity and innovation domain consists of two sub-competencies, creative literacy and expression. The model fit values showed that they had perfect fit (χ^2= 0.069, df=1, TLI = 1.000, CFI = 1.000, RMSEA = .000). All factor loadings exceeded .50 and were significant at the .001 alpha level and correlations between all sub-competency were lower than 0.850 (correlations= .716). Therefore, the digital creativity and innovation domain was found to have both convergence and discriminant validities.

The model fit summary and factor loadings for all domains are illustrated in Table 2 and 3 respectively.

Table 2 Model fit summary

Measurement model	χ^2(df)	TLI	CFI	RMSEA (90% Confidence Interval)
Digital literacy	1.82 (1)	.998	.999	.027 (.000, .088)
Digital safety and resilience	96.230*(21)	.979	.988	.056 (.045, .068)
Digital participation and agency	24.758*(6)	.980	.993	.052 (.032, .074)
Digital emotional intelligence	230.181*(67)	.983	.987	.046 (.039, .052).
Digital creativity and innovation	0.069(1)	1.000	1.000	.000 (.000, .049)

* p<0.05

Table 3 Factor loadings

Sub-competency	Observed variables	b	β	S.E.	C.R.
Digital literacy					
ICT Literacy	ICT_1 (A1-A5)	0.881	.776	.034	25.820*
	ICT_2 (A6-A9)	1.000	.836	-	-
Information Literacy	IL_1 (A10-A12)	1.000	.890	-	-
	IL_2 (A13-A14)	0.694	.551	.042	16.416*

Sub-competency	Observed variables	b	β	S.E.	C.R.
Digital safety and resilience					
Understanding Child Rights	UCR_1 (B1)	1.000	.771	-	-
	UCR_2 (B2)	0.859	.770	.038	22.889*
Personal data, Privacy and	PPR_1 (B5-B6)	1.000	.710	-	-
Reputation	PPR_2 (B7-B8)	1.026	.777	.045	22.987*
Promoting and Protecting Health	PPW_1 (B9-B10)	1.000	.450	-	-
and Well-Being	PPW_2 (B11-B13)	1.433	.886	.127	11.239*
Digital Resilience	DR_1 (B14)	1.000	.658	-	-
	DR_2 (B15)	1.106	.666	.063	17.659*
	DR_3 (B16)	0.709	.406	.061	11.658*
Digital participation and agency					
Interacting, Sharing, and	ISC_1 (C1-C2)	1.000	.691	-	-
Collaborating	ISC_2 (C3-C4)	1.120	.830	.063	17.772*
Civic Engagement	CE_1 (C5-C6)	1.000	.990	-	-
	CE_2 (C7-C8)	0.722	.664	.066	11.002*
Netiquette	NET_1 (C9-C10)	1.000	.793	-	-
	NET_2 (C11-C12)	0.943	.768	.056	16.992*
Digital emotional intelligence					
Self-awareness	SA_1 (D1-D2)	1.000	.750	-	-
	SA_2 (D3-D4)	0.933	.705	.046	20.484*
Self-regulation	SR_1 (D5)	1.000	.580	-	-
	SR_2 (D6)	0.942	.536	.068	13.831*
	SR_3 (D7)	0.924	.546	.066	14.022*
Self-motivation	SM_1 (D8)	1.000	.626	-	-
	SM_2 (D9)	1.023	.637	.063	16.298*
	SM_3 (D10)	1.034	.625	.064	16.105*
Interpersonal skills	IS_1 (D11)	1.000	.664	-	-
	IS_2 (D12)	0.892	.654	.048	18.567*
	IS_3 (D13)	0.947	.701	.048	19.592*

Sub-competency	Observed variables	b	β	S.E.	C.R.
Empathy	EM_1 (D14)	1.000	.726	-	-
	EM_2 (D15)	0.963	.716	.047	20.390*
	EM_3 (D16)	0.949	.695	.048	19.969*
Digital creativity and innovation					
Creative Literacy	CL_1 (E1-E3)	1.000	.710	-	-
	CL_2 (E4-E5)	1.146	.747	.070	16.451*
Expression	EX_1 (E6-E8)	1.000	.860	-	-
	EX_2 (E9-E11)	0.898	.723	.049	18.203*

* $p < 0.05$

1.2 Reliability

Cronbach's alpha coefficient was used as an indicator of the internal consistency of items in the measurement scale. Cronbach's alpha coefficient of .70 and above is normally considered acceptable (Kline, 2000). The Cronbach's alpha for each domain ranged from 0.800 to 0.876. Therefore, the survey instrument had high reliability.

2. Thai children's digital citizenship competencies

2. 1 Demographic data of samples

A multistage sampling was used to obtain data from samples which represented the target population. The data was collected from 15 schools from different regions in Thailand (Northern, Northeastern, Central, Eastern and Southern). A total of 1,216 students participated in the survey. The birth year of respondents ranges from 2002 to 2006 and most were born in 2005 (93.4%). Girls made up 43.2% and boys made up 54.9% among all the respondents. The details are shown in the Table 4.

Table 4 Demographic data of samples

School Size	Number of School	Gender			Total
		Boy	Girl	N/A	
Large	5	298	198	14	510
Medium	5	257	233	7	497
Small	5	112	94	3	209
Total	15	667	525	24	1,216

2.2 The results of Thai children's digital citizenship competencies

The results of Thai children's digital citizenship competencies can be categorized into 5 domains, with each domain comprising of 2 to 5 competencies. The descriptive analysis results are as shown in Table 5. The results of Thai children's digital citizenship competencies in an educational context showed that the digital safety and resilience domain was the highest competency (*M*=3.34, *SD*=0.44), followed by digital literacy domain (*M*=3.12, *SD*=0.48), digital participation and agency domain (*M*=3.09, *SD*=0.47), digital emotional intelligence domain and (*M*=3.07, *SD*=0.47) digital creativity and innovation domain (*M*=2.84, *SD*=0.55) respectively.

The mean score of each competency in digital literacy domain was nearly the same, ICT literacy's mean score was 3.13 (*SD*=.51) and Information Literacy's was 3.08 *(SD=.53).* The mean score of understanding child rights in the digital safety and resilience domain was 3.55 (*SD*=0.64). The mean score for this competency was highest when compared with the other three competencies in this domain. On the contrary, the digital resilience competency, which addresses whether students have the preventative, reactive and transformative skills that allow young people to avoid or cope with the risky situations they face online, had the lowest score at 3.23 (*SD*=0.60).

The competency of netiquette had the highest mean score (*M*=3.37, *SD*=0.61) among the three competencies of the digital participation and agency domain while the competency of civic engagement has the lowest mean score (*M*=2.69, *SD*=0.71). The competency of self-awareness in the digital emotional intelligence relates to the students' ability to explain their moods, emotions, drives, and how these affect him or herself and others in the digital world, through introspection. It had the highest mean score of 3.15 (*SD*=0.57). On the contrary, the students had the lowest mean score in their competency of interpersonal skills (*M*=2.97, *SD*=0.65).

The competency of expression in the digital creativity and innovation domain had the highest mean score (*M*=2.94, *SD*=0.64). This competency relates to students' ability to use technology to creatively represent their identities and to exercise their right to have fun and relax. On the other hand, the competency of creative literacy had the lowest mean score (*M*=2.71, *SD*=0.62).

Table 5 Thai children's digital citizenship competencies

Domain	*M*	*SD*	Competency	*M*	*SD*
Digital Literacy	3.12	.48	ICT Literacy	3.13	.51
			Information Literacy	3.08	.53
Digital Safety and Resilience	3.34	.44	Understanding Child Rights	3.55	.64
			Personal Data, Privacy and Reputation	3.41	.60
			Promoting and Protecting Health and Well-being	3.31	.51
			Digital Resilience	3.23	.60

Domain	M	SD	Competency	M	SD
Digital Participation and Agency	3.09	.47	Interacting, Sharing and collaborating	3.19	.58
			Civic Engagement	2.69	.71
			Netiquette	3.37	.61
Digital Emotional Intelligence	3.07	.47	Self-Awareness	3.15	.57
			Self-Regulation	3.13	.58
			Self-Motivation	3.08	.60
			Interpersonal Skills	2.97	.65
			Empathy	3.01	.67
Digital Creativity and Innovation	2.84	.55	Creative Literacy	2.71	.62
			Expression	2.94	.64

Discussion

The validity and reliability of the instrument in Thai version were satisfactory according to the criteria. Therefore, it illustrated that the quality of the instrument could be used in the Asia-Pacific countries (Shin, Hwang, Park, Teng & Dang, 2019) including Thailand. The results from survey found that the digital safety and resilience domain was the highest competency. This illustrated that those Thai children had a higher competency to protect and control equipment in the aspects of cyber safety and resilience than other skills (Royal Academy of Engineering, 2018). On the contrary, digital creativity and innovation domain was the lowest. This might be because Thai children are not sufficiently digitally literate. Most of them do not know how to solve the problem with both hardware and software. This would affect the creativity of the children to develop new innovation (Černochová & Selcuk, 2019).

Limitations

This research started before the COVID-19 pandemic (end of 2019). The data collection process had to be postponed due to the worsening situation in mid-2020. Some schools were unable to join the project because of the strict measures to protect Thai citizens from the pandemic, and thus were not included in the research sample.

Recommendation and future work

1. The border schools were not included in this research because of the coronavirus pandemic. After the pandemic, there should be an updated survey to include the border schools. This will ensure that the results are more representative of Thailand as a whole.

2. The students tend to lack digital creativity competency. Therefore, policymakers should encourage more teaching of digital competency to children, such as problem-solving with software and hardware. This is because if children have a stronger foundation in digital competency, they will create and integrate technology and innovation for the future.

3. Policymakers in education should encourage digital literacy / citizenship for all schools in Thailand. This will help to improve digital citizenship competencies of Thai children.

Acknowledgement

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