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INVESTIGATING THAI DIGITAL LITERACY STUDENT SKILL STRENGTHS AND PRIMARY EDUCATION MANAGEMENT TECHNIQUES IN AN ONLINE DIGITAL AGE EDUCATIONAL WORLD

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ABSTRACT

Due to the global COVID-19 pandemic, understanding and using online media in education has become an imperative. Therefore, the study sought to answer questions concerning what factors contribute to an elementary student's digital literacy education in a digital age. Furthermore, an additional investigation was undertaken concerning what aspects influenced the education management within this environment. From the study's use of mixed research methods, both a quantitative analysis from a sample of 400 individuals and a qualitative analysis from focus groups and in-depth interviews were performed. Questionnaire data were analyzed using the Pearson Product Moment Correlation (PPMC) and the Stepwise linear regression method. The data collected from the 36 individuals in the focus group, and the 34 in-depth interviewees, used both the mean ($\overline{x}$) and standard deviation (S.D.) for the analysis. The study's results determined that five factors had significant importance in contributing to a student's digital literacy strength. These were media use patterns (x5), curriculum management (x1), student-centered learning (x7), learning promotion (x2), and information management systems (x3). When added together, these five factors can explain 68% of the digital literacy student's strength. Furthermore, individuals involved in educational management at the provincial elementary level had opinions about digital literacy student management at a high level overall. The form of teaching and learning at the elementary school level was also determined to be strong in the digital age.

INTRODUCTION

Digital literacy is a phrase that has come to mean many things to many people. However, according to the American Library Association (ALA), digital literacy (DL) is defined in terms of how information and communication technologies are used to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (Digital Literacy, 2020). Like information literacy, DL requires skills in locating and using information, which requires critical thinking skills, digital tools knowledge, and using them in communicative and collaborative ways through social engagement (Phuapan et al., 2016). Furthermore, change is ever-present and accelerating, especially under the 'new normal' in a COVID-19 pandemic world (Konrad, 2020; Saengmanee, 2020).

Therefore, institutions and their respective leaders and educators must start preparing students at an early age for these new realities, as well as future opportunities which will require innovation, creativity, social intelligence, and higher forms of productivity (Phuapan et al., 2016; The Select Committee on Digital Skills, 2015). Thus, those that understand and can manage technology, automation, and information management systems (IMS) will play crucial roles in the future (Riddle, 2015).

Moreover, student-centered learning has become an essential precept in 21st Century education (Andresen & van den Brink, 2013), where teachers act more as facilitators than instructors (Ameliana, 2017). Students, on the other hand, are active participants in the learning process, choosing not only what to study but also how and why (TEAL, 2010). At the center heart of the learning environment are the student's responsibility and activity.
Sittipanya (2019) has also discussed the importance of online media use in Thai higher education learning. Platforms mentioned as frequently used by Thai students included Facebook and Twitter, while smartphones and tablet P.C.s were mentioned as the Internet connection devices of choice by students. Also, in Thailand, online media use has grown increasingly important with every passing day, with social media now being viewed by many educators as a potential educational tool resource (Phuseerit, 2020).

Free social media platforms such as Facebook, WhatsApp, Line, and Instagram have become popular for the use of online media and communications in education. However, the underlying technology must be robust and reliable, or students become disenchanted and frustrated ("Rocky start," 2020).

Muschamp et al. (2006) also added the importance of curriculum management in primary education but voiced their concerns on the problems in managing the curriculum's depth and complexity. Under the current COVID-19 pandemic crisis, UNESCO (n/d) has complied with and an extensive site of ways and resources for education curriculum management and distance learning solutions. We can find digital learning management tools such as Edmodo, Moodle, Schoology, and Google Classroom, as well as smartphone-enabled education apps such as Cell-Ed, Funzi, and Ubongo on UNESCO's site.

Other scholars have also voiced their opinions about what is being termed the science of learning and development (SoLD) (Cantor et al., 2018; Darling-Hammond et al., 2020; Osher et al., 2018). Critical insights from these studies indicate that the brain and the development of intelligence and capacities are malleable, and brain development is an experience-dependent process. Additionally, events within one domain can influence occurrences in other domains,

with emotions either triggering or blocking learning. Therefore, emotions and social contexts can contribute to attention, concentration, and memory, to knowledge transfer and application. Darling-Hammond et al. (2020) have also added that computer-based tools assist productive collaborative exchanges that support self-regulation and metacognition. A specific well-known example is the Knowledge Forum, which is an early example that allowed students to collaborate on learning activities through a networked multimedia environment. Today, with the COVID-19 pandemic still rampaging throughout most societies, online education has taken on critical importance at all levels of education and institutions, with online testing and evaluation a rising topic in importance as entire educational systems continued to be physically locked down (Meesuk, 2020; UNESCO, 2020). Moreover, Sharma and Madeshia (2020) added that methods of teaching and learning must be evaluation centered to provide opportunities for learners to demonstrate developed skills and obtain support for the acquisition and enrichment of their knowledge. Therefore, testing and evaluation processes in many cases and places have moved into an online world.

Furthermore, Meesuk (2020) has stated that in Thailand, the purpose of learner measurement and evaluation today is focused on the evaluation of learner development and their learning outcomes. With the present situation shifting to online learning, there is now a question and challenge of how teachers and administrators can measure and evaluate their students' learning when they are online and not in the classroom.

Finally, concerning learning promotion, Erawan (2015) has written that Thai schools are strategic organizations responsible for the development of a nation's youth who have characteristics beneficial to society as a whole. This is consistent with other studies in Thailand in which learning promotion is stated to entail thinking skills, self-learning strategies, and moral development, all of which are at the heart of teaching and learning in the Thai National Curriculum (Bureau of International Cooperation, 2008).
Therefore, the researchers outlined the following research objective and conceptual framework details shown in Figure 1.

1.1 Research Objectives

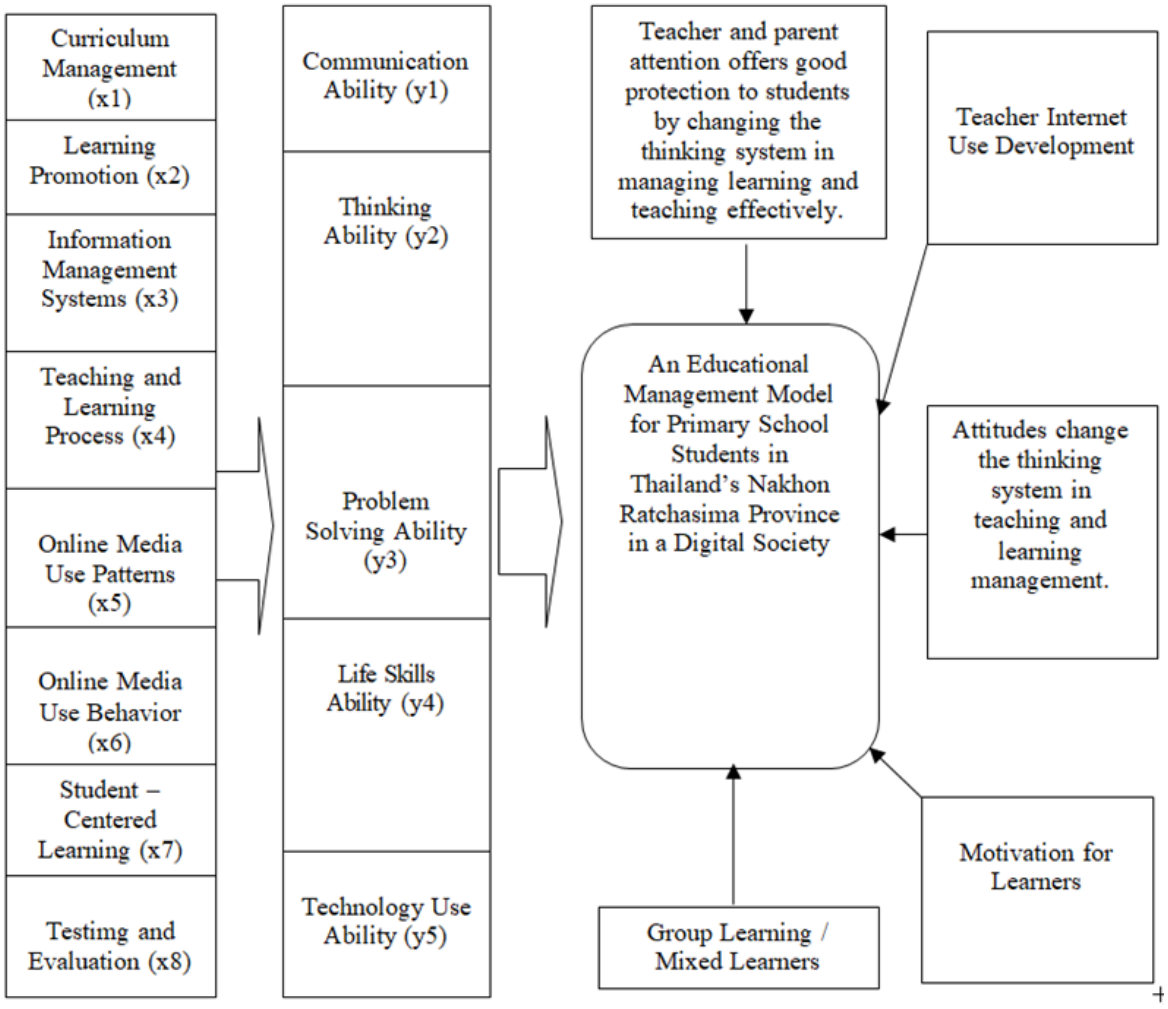
1.1.1 To study the opinions about elementary school student management.
1.1.2 To study opinions concerning elementary school students, digital literacy strengths in a digital age society.
1.1.3 To further investigate which factors influence the strength of elementary school students in a digital age society.
1.1.4. To strengthen the model of teaching and learning at the elementary school level in a digital age society.

CONCEPTUAL FRAMEWORK

This study set out to examine which factors influenced the digital literacy strengths of Thai primary school students in a digital society in the province of Nakhon Ratchasima. From the review of the theory and related literature a model was developed which included curriculum management (x1), learning promotion (x2), information management systems (x3), teaching and learning process (x4), online media use patterns (x5), online media use behavior (x6), student-centered learning (x7), and testing and evaluation (x8) to investigate primary school student management variables. Furthermore, communication ability (y1), thinking ability

(y2), problem-solving ability (y3), life skills ability (y4), and technology usability (y5), were identified as the factors influencing a student's digital society participation strengths.

Figure 1: The conceptual framework for strengthening elementary school students' digital literacy in a digital age society.



3. METHODS

3.1 Population and sample

The study's sample was drawn from Thailand's largest province by area, Nakhon Ratchasima commonly referred to as Korat. Of the 2.7 million residents in Nakhon Ratchasima Province, the researchers identified 171,051 individuals as the potential population for the study. This population included Primary Education Services Area Office (PESAO) Directors or Deputy Directors (principals), educational supervisors, school administrators, teachers, or educational personnel as specified in the educational law and primary school student parents or their legal guardians.

From a review of the statistical sample size theory, multiple authors have suggested sample size selection should use 10-20 surveys for each observed variable (Schumacker and Lomax, 2010), or specific formulas (Yamane, 1973).

Based on these studies' recommendations, the researchers accounted for sampling and questionnaire non-response errors (Cornish, 2002) set a target of 400 individuals (Pimdee, 2020). Initially, the researchers used stratified random sampling (proportional random sampling) in which the population was divided into smaller sub-groups (strata) (Lai & Ye, 2020). The strata were based on each participant's shared attributes. After that, simple random sampling was undertaken by using a lottery method. The survey was started and completed within the 2017 academic year.

3.2 Qualitative Research Data Collection

According to multiple researchers, one of the most common data collection methods used in qualitative research consists of interviews and focus groups (Gill et al., 2008). As such, on July 15, 2017, 36 individuals involved in provincial primary level education management participated in a focus group meeting. Participants included PESAO members and Ministry of Education officials (6), school administrators (7), teachers (7), provincial educational personnel (2), primary school student-parent representatives (7), and student representatives (7). From the synthesis of the focus group's input, descriptive methods were used to measure the consistency with the quantitative and qualitative analysis. After that, conclusions and recommendations on perspectives and relationships in each dimension were made to strengthen and add reliability to the academic research and the questionnaire's development (Britten, 1999; Legard et al., 2003).

Furthermore, in August 2017, 34 structured in-depth interviews were undertaken and used to ask about managing elementary students in Nakhon Ratchasima Province. The first part of the interview included general information concerning the interviewee, while the second part was concerned about guidelines for managing elementary students in Nakhon Ratchasima to be strong in the digital age society.

3.3 Research Instruments

The research instrument consisted of a questionnaire containing three parts. Each part's details are as follows:

Part 1 consisted of each respondent's general information, which included personal information concerning their gender, age, educational level, their position, monthly income, and work experience in which the question type is a checklist.

Part 2 consisted of eight items related to primary school student management. The individual's level of agreement used a five-level Likert type scale in which '5' anchored an agreement at the highest level, while '1' anchored an agreement at the lowest level. The eight aspects which were measured included curriculum management (x1), learning promotion (x2), information management systems (x3), teaching and learning process (x4), online media use patterns (x5), online media use behavior (x6), student-centered learning (x7), and testing and evaluation (x8).

Part 3 consisted of five items (open-ended format) related to each individual's perception of what aspect contributed the highest strength to an elementary school student in a digital age society. Part 3 also used the same scale as Part 2, which measured factors thought to be contributing to a student's digital age strength including each student's communication ability (y1), thinking ability (y2), problem-solving ability (y3), life skills ability (y4), and technology use ability (y5).

3.4 Questionnaire Analysis and Reliability

For this study, questionnaire consistency and reliability results were evaluated, with questionnaire content validity evaluated by three educational experts, after which, content validity verification was measured using the indexes of item-objective congruence (IOC) with suggested criteria of ≥ 0.50 (Turner & Carlson, 2003). After input from the three educational experts, an initial 'try-out' of 40 questionnaires was used on individuals who did not participate in the final survey. George and Mallery (2003) have suggested that α values should be ≥ 0.70. Since the average value of α from the pilot-test was calculated for part 2, and part 3 of the questionnaire was an average of .977, the authors concluded that the questionnaire items were ready for survey use. Regarding the questionnaire, the 5-level Likert agreement scale used ranges of 1.00 – 1.80 (disagree strongly), 1.81 – 2.60 (disagree), 2.61 – 3.40 (moderate agreement), 3.41 – 4.20 (agree) and 4.21 – 5.00 (agree strongly).

Data were analyzed by using the Pearson Product Moment Correlation (PPMC), with correlation coefficients (r) strength interpretation suggesting that 0.1 – 0.3 is weak, 0.4 – 0.6 is moderate, and 0.7 – 1.0 is strong (Akoglu, 2018). Stepwise linear regression was also used, a technique regressing multiple variables while simultaneously removing those that are not important (Efroymson, 1960). Stepwise regression mostly does multiple regressions multiple times, each time removing the weakest correlated variable. Additionally, content analysis was used to analyze data from the multiple focus groups and structured in-depth interviews.

4. RESULTS AND DISCUSSION

Table 1 details the survey results from each respondent, in which 52.8 indicated they were male, and 47.3% indicated they were female. The majority of 35.5% also stated they were 51 years of age older, which was closely followed by 32%, indicating they were 41-50 years of age. Educational levels were mixed, with 71.8% indicating they had an undergraduate degree or higher, while 28.3% revealed they had never finished university education. Moreover, income seems to be nearly correlated with age as 38.5% indicated a monthly income level of over 45,001 Thai baht per month, while 29% indicated they received 35,001 – 45,000 Thai baht per month. Finally, 53% stated they had worked 16 years or more. Finally, the study was fortunate to get a large number of parents/guardians to participate in the survey, with 46.3% of the participants indicating they were responsible for primary level students.

Table 1: General information of respondents.

Survey item	Respondents	%
Gender		
Male	211	52.8
Female	189	47.3
Total	400	100
Respondent's Age 18- 30 years of age	58	14.5
31-40 years of age	72	18.0

41-50 years of age	128	32.0
51 years of age or over	142	35.5
Total	400	100
Educational Level No university degree	113	28.3
BA/BS degree	141	35.3
Graduate Degree	146	36.5
Total	400	100
Position		
Director/Deputy Director of the Office of Primary Education Areas	6	15
Educational personnel as specified in the educational law	14	3.5
Educational supervisors	38	9.5
School administrators	142	35.5
Teacher	15	3.8
Parent or guardian	185	46.3
Total	400	100
Monthly Income 15,000 – 25,000 Thai baht per month ($475-$793)	71	17.8
25,001 – 35,000 Thai baht per month	59	14.8
35,001 – 45,000 Thai baht per month	116	29.0
Over 45,001 Thai baht per month	154	38.5
Total	400	100
Work Experience Less than 5 years	42	10.5
5 – 10 years.	69	17.3
11-15 years.	77	19.3
16 or more years of work experience	212	53.0
Total	400	100

Table 2 details the testing results for the $\overline{x}$ and S.D. of the eight aspects concerning opinions about primary school management, with four of the items having a $\overline{x}$ score of 4.0 or higher. In Taiwan, Lai and Ye (2020) have suggested that school principals adopt methods that show 'out of the box' thinking, which also entails stepping out of their comfort zone. These same administrators should also be willing to apply different strategies or approaches when running their school business.

However, in Thailand initial trials of the government's distance learning television (DLTV) and online classrooms has been bumpy ("Rocky start," 2020), with officials now indicating that DLTV is only an online teaching trial only intended to help deal with the "long wait" before schools reopen. This might be one contributing reason to the study's very low score for the perceived importance of online media use behavior (x6).

Table 2: Opinions about primary school student management classified by aspect.

Variables	$\overline{x}$	S.D.
Curriculum management (x1)	4.18	0.49
Learning promotion (x2)	3.92	0.48
Data management system (x3)	3.88	0.47
Teaching and learning process (x4)	4.05	0.49
Online media use patterns (x5)	3.89	0.49
Online media use behavior (x6)	2.88	0.86
Study with student focus (x7)	4.00	0.42
Testing and evaluation (x8)	4.00	0.44
Average	3.85	0.37

Table 3 presents the results of each individual's opinions concerning how they view the most crucial aspect in a Thai child's ability to function well within a digital society, with communication ability (y1) rising to the top in importance. This was followed by their life skills ability (y4), technology use ability (y5), problem-solving ability (y3), and finally, their thinking ability (y2).

Table 3: Opinions about the strength of elementary school students in the digital age society classified by each aspect.

Variables	$\overline{x}$	S.D.
Communication ability (y1)	3.82	0.50
Thinking ability (y2)	3.62	0.63
Problem-solving ability (y3)	3.69	0.58
Life skills ability (y4)	3.79	0.50
Technology use ability (y5)	3.71	0.59
Average	3.73	0.52

Table 4 details the calculated value between student management and student strength. With x5, we note the importance of online media use patterns (.724), culminating in survey opinions concerning the media use format for research and communications in modern teaching and learning. Additionally, this covers how well students understand the various media use styles, and if teachers can understand and use online and digital media effectively. Support for the strength in online media use patterns come from Krogager et al. (2015), in which cross-media use by Danish children was stated to be complicated and differs according to gender and age. However, it was suggested that online media is oftentimes used for similar purposes, such as sustaining social relationships. Westwood (2019) has also stated that online media use is now an integral part of everyday life.

In Table 4, we note the respondents' importance placed on learning promotion (x2 = .631). This is consistent with research from Nacu et al. (2016), who suggested that numerous studies have documented the advantages of online learning communities. However, as in Thailand, so are inequities in how students and teachers access and use online media. The third most important aspect judged in the study as contributing to a student's digital age strength was their access and use of information management systems (x3 = .619). Numerous international and Thai studies also support this conclusion (Bureau of International Cooperation, 2008; Techataweewan & Prasertsin, 2018).

Table 4: Correlation values between the relationship of student management and the strength of elementary school students in the digital age society.

Student Management	Student Strength
Curriculum management (x1)	-.051
Learning promotion (x2)	.631*
Information management systems (x3)	.619*
Teaching and learning process (x4)	.357*
Online media use patterns (x5)	.724*
Online media use behavior (x6)	.335*
Learning with student focus (x7)	.434*
Test and evaluation (x8)	.408*
Average	.594*

Note: * Statistical significance at the .05 level.

Moreover, Table 5 details the regression analysis results coefficients, in which five aspects (x1, x2, x3, x5, & x7) concerning student strengths in a digital age had a combined influence of 68% (adjusted R2 = .680) at a statistical significance level of .05. All five aspects were deemed statistically significant and were thus added to the regression model. In regression analysis, the constant is the value at which the regression line crosses the y-axis, which is also referred to as the y-intercept (Rumsey, 2016). In this case, the constant/y-intercept = .838. Additionally, analysis of variables used to describe students' strength in a digital age society (x5, x1, x7, x2, & x3) used the following formulas to predict the raw scores and standard scores:

$$\text{Raw score } Y = .838 - .497\,X_1 + .316X_2 + .179X_3 + .323X_5 + .444X_7 \quad (1)$$

$$\text{Standard score } Z_r = -.474Z_1 + .357Z_2 + .305Z_5 + .292Z_2 + .161Z_3 \quad (2)$$

The above standard score (a.k.a. z-score) is describing the position of the raw score in terms of its distance from the $\overline{x}$, when measured in S.D. units. The z-score is positive if the value lies above the $\overline{x}$, and negative if it lies below the $\overline{x}$. The standard score also allows comparison of scores on different kinds of variables by standardizing the distribution. A standard normal distribution (SND) is a normally shaped distribution with a $\overline{x}$ of 0 and a S.D. of 1 (McLeod, 2019).

Table 5: Factors influencing the predictive power of models for predicting student strengths in a digital age society.

Variables	Regression Analysis Coefficients			
	B	beta	t	Sig
Curriculum Management (x1)	-.497	-.474	-12.855	.000
Learning promotion (x2)	.316	.292	6.159	.000
Information Management Systems (x3)	.179	.161	3.342	.001
Media use patterns (x5)	.323	.305	5.887	.000
Student-centered learning (x7)	.444	.357	8.251	.000
Constant (y-intercept)	.838			
Multiple R	.827			
R^2	.684			
Adjusted R^2	.680			
R^2 Change	.009			
F	170.916			

Note: * Statistical significance at the .05 level.

CONCLUSION

Drawing on a sample of 400 individuals in Thailand's largest province by landmass, Nakhon Ratchasima, the researchers investigated what elements contributed to a primary school student's digital literacy in a digital age society. Furthermore, additional analysis was undertaken to determine what aspects were deemed most appropriate in the management of these students in a digital age.

Relating to contributing aspects for a student's digital literacy strength, five factors rose to a significant level of importance. These were, media use patterns (x5), curriculum management (x1), student-centered learning (x7), learning promotion (x2), and IMSs (x3). These five factors, when added together, can explain 68% of the digital literacy student's strength. Furthermore, individuals involved in educational management at the provincial elementary level had opinions about digital literacy student management at a high level overall. The form

of teaching and learning at the elementary school level was also determined to be strong in the digital age.

IMPLICATIONS

For many years online media use in education has been discussed, tested, evaluated, and researched. Today in a COVID-19 pandemic world, online education discussions have shifted from the theoretical to the imperative. Educators, administrators, and students have all been thrown into a world where online media use has become critical (life or death) to an institution's survival and a student's success. Everyone must grasp this fact, and quickly identify the tools (e.g., Zoom, Dropbox, DocuSign, & Everbridge), and devices to make this 'new normal' function efficiently and effectively.

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