C-ED38

แบบบันทึกความคิดเห็นของผู้ทรงคุณวุฒิ

ชื่อบทความ A MODEL FOR DEVELOPING DIGITAL-ERA LEADERSHIP OF PRIMARY SCHOOL TEACHERS IN THE NORTHEAST

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ข้อมูลเพิ่มเติม

-Misspelling in Figure 1-Research Framework (primary school teaches and promary school teachers should be rewritten as primary school teachers)

-Re-check all x-bar ($\bar{X}$)

-Being an academic writing, grammatical accuracy and correct spelling matter. Thus, please double-check the structure of all statements and fix all typos.

C-ED38

A MODEL FOR DEVELOPING DIGITAL–ERA LEADERSHIP OF PRIMARY SCHOOL TEACHERS IN THE NORTHEAST

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ABSTRACT

The purposes of this research were to 1) examine the components of digital–era leadership of primary school teachers in the Northeast, 2) construct and develop a model of developing digital–era leadership of primary school teachers in the Northeast, and 3) validate the effectiveness of the developed model. This research employed a Research and Development approach which was performed in three phases with seven stages. The samples, obtained through multi–stage random sampling, consisted of 375 teachers from 375 primary schools in the Northeast in the academic year 2021. Additionally, the sampling schools were selected as the unit of analysis, and one teacher as a key informant was drawn from each school. The samples for the development process consisted of 20 primary school teachers from the 5th Basic Education Network Center under Sakon Nakhon Primary Educational Service Area Office 2. The research instruments included 1) structured interview forms for experts examining the components of digital–era leadership of primary school teachers, and 2) a set of questionnaires examining the levels of digital–era leadership of primary school teachers, and 3) teacher behavior assessment forms. Statistics for data collection were percentage, means, and standard deviation. The findings were as follows: The digital–era leadership of primary school teachers consisted of four major components with 16 sub–components and 60 indicators: 1) Instructional knowledge and abilities with seven sub–components and 15 indicators; 2) Digital skills and knowledge with four sub–components and 15 indicators; 3) Digital technology abilities of instruction with two sub–components and 15 indicators; and 4) Literacy in digital technologies with three sub–components and 15 indicators. The model for developing digital–era leadership of primary school teachers in the Northeast included five components: 1) principles, 2) objectives, 3) contents, 4) development processes, 5) instructional media and learning resources, and 6) measurement and evaluation. The assessment results of the effective index of the developed model revealed that the model, as a whole, was suitable at the highest level ($\overline{X}$ = 4.67). The effectiveness index of the development of digital–era leadership of primary school teachers in the Northeast achieved 70 percent, which was higher than that of before the model implementation.

Keywords: A Development Model, Digital–Era Leadership

Introduction

The driving forces as globalization, borderless connectivity and digital technologies are dramatically transforming the practice of individuals. Inevitably, the rapid technological transformation is altering the present and future nature of work and lives in Thailand. Issues in terms of human resources, education, public service, and healthcare provision in a technology–dominated society are widely debated and bring about altered responses to various resulting challenges. It is, therefore, necessary to prepare Thailand to accommodate a long–term and sustainable development. The passage of the 2017 Constitution of the Kingdom of Thailand in section 258B was more closely linked to keeping pace with the rapid changes of advanced technology addressing the administration of State affairs to ensure the application of appropriate technology for the administration of State affairs and provision of public services for the benefit of the administration of State affairs and the convenience of the people. Similarly, the twelfth National Economic and Social Development Plan (2017– 2021) adhered to Thailand's 20–year National Strategy framework (2018– 2037) was formulated to prepare human resources, society, and the economy by using digital technology as a key tool to develop the economic system through innovation and to create a digital development plan for improving economic and social development; thereafter being a catalyst for a driven framework of digital technology for national economic and social development. The guidelines for developing digital government skill set for civil servants and personnel in public sectors has also been established to transform to the digital government which influences all organizations both from public and private sectors to optimize complex tasks solution and decision– making improvements, including collaborative experiences, and services. This is a process of paradigm shifts – thereby changing the ways of the thinking processes within the organization body.

The National Education Act (NEC) of B.E. 2542 (1999), and Amendments (No.2) B.E. 2545 (2002), and (No. 3) B. E. 2553 (2010) Chapter 9 concerning guidelines for education provision stress the importance of technology to keep pace in the digital era, demanding innovation actions from all supporting personnel and teachers. In line with the NEC, education involving technology is transformative of the education system. The Thai Ministry of Education has taken the initiative to develop the skills of educators, and teachers in the use of technology to effective teacher management to the success of quality education. Teachers also need to improve digital teaching practices, which is considered as a new role of teachers in effectively managing the digital learning environment for students. According to several relevant research papers, a critical factor of organizational efficiency and success is the management and leadership of organizations and services in the public and private sectors. Indeed, during the Covid– 19 pandemic, the need for digital skills by leaders to transform the work environment, and processes at all levels has become more urgent. In the current era, the importance of digital leaders has emerged. The present study highlights the leadership characteristics required for the digital age in academic organizations.

In this light, it is necessary to present the digital skills that characterize a leader. Indeed, as already mentioned, the present research study aimed to explore and construct a model for developing digital– era leadership of primary school teachers in the Northeast. Not only has such a process been highlighted, but the

benefits would also be an alternative model for the Primary Educational Service Area Office in the Northeast and other primary schools to further improve teacher leadership in a digital era.

Objectives of the Study

The objectives of the study were as follows:

1. to examine the components of digital–era leadership of primary school teachers in the Northeast.

2. to construct and develop a model of developing digital–era leadership of primary school teachers in the Northeast.

3) to validate the effectiveness of the developed model.

Significance of the Study

1. This research gives a solution to examine the components of appropriate digital–era leadership for teachers in primary schools in the Northeast.

2. The result of this research can be used as a reference to improve digital–era leadership for teachers at a primary school level. The developed model was developed and confirmed its appropriateness through a research process and R&D research plan.

3. The primary school teachers as the target group were trained and improved their digital–era leadership.

4. The developed model could be implemented in other educational institutions.

Research Methodology

The Research and Development (R&D) was employed consisting of three phases with seven stages as follows:

Phase 1 Model Component Examination. This phase was related to examining components of digital–era leadership of teachers and components of a model and methods for developing digital–era leadership of teachers. The component examination was done through concept, theories, documents, and relevant studies on models for developing teachers' digital–era leadership at a primary school level in the Northeast. The results were drawn to formulate the research framework. The leadership components, methods for the development process, behaviors of teachers' digital–era leadership at a primary school level in the Northeast. ←Wrong structure

The research consisted of three steps, including document analysis, seven expert interviews about the development of digital–era leadership of teachers in primary schools with similar contexts or conditions, and a survey with 375 teachers examining a level of digital–era leadership of primary school teachers. The framework of this research was proposed as follows:

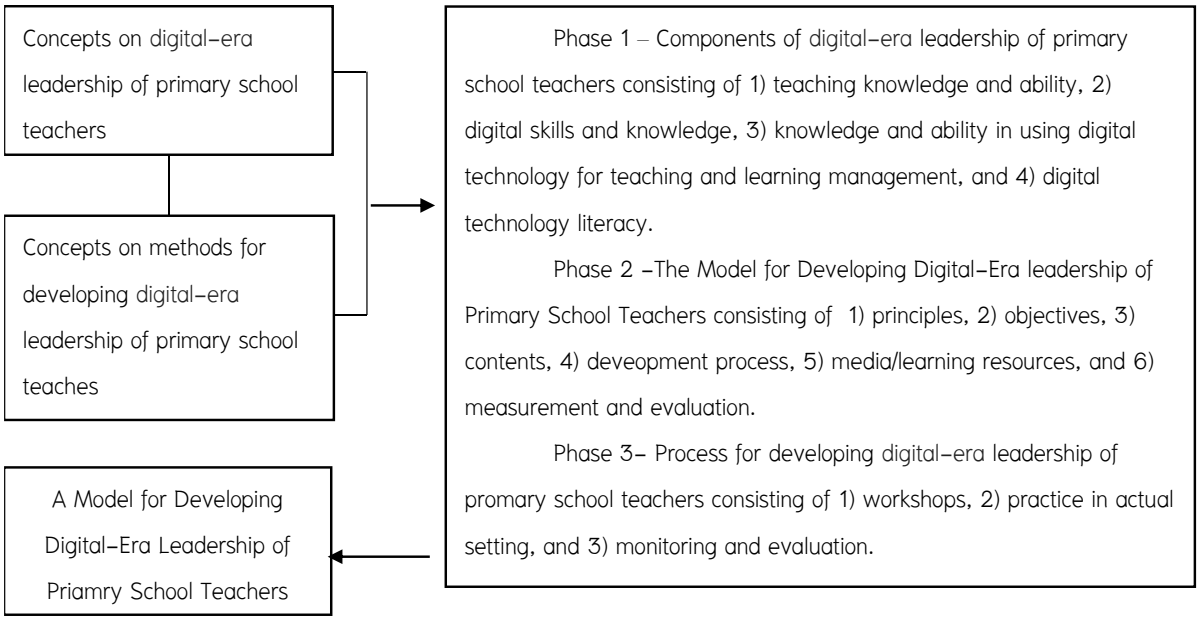

Figure 1 Research Framework

Population and Sample

The population ~~of teachers~~ consisted of 12,376 Northeastern ~~teachers teaching in~~ primary school teachers who performed their teaching duties in 2021 academic year. Selected through multi–stage random sampling, the sample group, as the key informants, included ~~teachers from~~ 375 Northeastern primary school teachers. Additionally, the sampled schools were selected as the unit of analysis, and one teacher was drawn as a key informant from each school. The sample size was determined through a table of Krejcie and Morgan (1970, p. 608 cited in Waro Pengsawat, 2007, p. 152)

Research Instruments

A 5–rating scale survey questionnaire on a model for developing digital–era leadership of primary school teachers in the Northeast was administered. Thereafter, the structured interview was used ~~conducted~~ to collect useful information and evaluate the same question responses.

Research Construction and Quality Confirmation

In this phase, the research construction and quality confirmation are described as follows:

1. A document analysis on model development and processes of digital–era leadership was carried out.

2. The structured interviews were also conducted by examining the opinions of seven experts on components of digital–era leadership of teachers.

3. The data collected from literature reviews, and interviews were analyzed using content analysis. The data congruence was confirmed for components and development methods for

developing digital-era leadership of teachers in the Northeast. Then, a set of survey questionnaires was formulated on the basis of the collected data.

4. The survey questionnaire was proposed to thesis advisors for accuracy and appropriateness, including a revision of the completed version.

5. After the approval, the set of survey questionnaires was then proposed for five experts to evaluate validity using the Index of Item-Objective Congruence (IOC) technique. The items with IOC Index ranging from 0.60 to 1.00 were accepted (Boonchom Srisa-ard, 2002, p. 62). The result revealed that the survey questionnaire achieved an IOC Index ranging from 0.80 to 1.00, which was congruent with the objectives. Revisions were performed before proceeding with the pilot testing.

6. The survey questionnaire has undergone pilot testing for reliability using Cronbach's Alpha Coefficient with the non-sample group of 30 primary school teachers (Boonchom Srisa-ard, 2002, p. 100). The reliability of the questionnaire was 0.99, which demonstrated adequate reliability. The questionnaire was then revised and completed for further data collection.

Data Gathering Procedures

The researcher requested necessary permissions from the Graduate School of Sakon Nakhon Rajabhat University to school directors working in primary schools in the Northeast. ←Rewrite The questionnaire forms were distributed to 375 school directors in selected schools for data collection and collected via mailing, email, LINE, and Google forms, and in person. Out of 375 distributed questionnaires, 375 were returned. Thus, the return rate was 100 percent. Thereafter, the completed questionnaires were collected, and the responses were tabulated, analyzed, and interpreted. The responses have been treated with confidentiality.

Data Analysis and Procedures

The data gathered were subjected to descriptive and inferential analysis as follows:

1. Data collected from document analysis and expert interviews were done through content analysis to determine the congruence of the collected data concerning the components of digital-era leadership of primary school teachers in the Northeast and the development methods.

2. The data collected from a survey questionnaire was analyzed using frequency, percentage, mean, and standard deviation.

Phase 2 Model ~~Construction and~~ Development.

In this phase, the model was constructed/developed. The development of the model was divided into two steps: the construction of a model development and a developed model confirmation by nine experts.

Research Instruments

The research instrument in this phase was an assessment of the appropriateness and possibilities of the developed model. ←Rewrite

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Research construction and quality of research instruments

1. The data collected from Phase 1 on digital–era leadership and methods for developing digital–era leadership were summarized as the important issues.

2. The research framework was formulated, and connections drawn of a model for developing digital–era leadership of primary school teachers in the Northeast.

3. The detailed documents used in the development process were created and designed for supporting the activities covering the development of digital–era leadership of primary school teachers in the Northeast.

4. The data ~~gathered~~ concerning the digital–era leadership of primary school teachers in the Northeast were arranged and summarized for further revision by the thesis advisors.

5. The developed model, handbooks, and documents for developing digital–era leadership for primary school teachers in the Northeast were proposed to assess the consensus level among nine experts on the model appropriateness.

Phase 3 Model Efficiency.

The steps of the model efficiency phase were processed into two steps: an experimental stage and summary results after the model implementation.

Target Group

The target group involved 20 volunteer teachers from 15 primary schools under Sakon Nakhon Primary Educational Service Area Office 2.

The construction and quality of research instruments.

The construction and quality of research instruments in this phase were as follows:

1. The appropriateness of the developed model assessed by nine experts as a whole was at the highest level ($\overline{\square}$ =4.67).

2. Further adjustments to the developed model were made according to experts' recommendations before considering any further implementation.

3. The implementation results were then summarized on key areas of digital–era leadership of primary school teachers in the Northeast.

Research instrument

The research instrument in this phase was the model for developing digital–era leadership of primary school teachers in the Northeast.

Data Collection Procedures

1. The developed model was implemented with 20 primary school teachers from 15 schools under the 5th Basic Education Network Center in Phannanikhom District, Sakon Nakhon Province.

2. After the model implementation, the results were summarized and written for the completed research report for further publication.

Data Analysis

The effectiveness Index (E.I.) was analyzed.

Findings

1. The demographical characteristics of the respondents were analyzed. Supporting tables and figures were provided. Table 1 indicated that the gender composition of the 375 respondents, 301 (80.27 percent) reported their gender as female. Regarding the educational background or equivalent, 63.73 percent of respondents had completed bachelor's degrees. Considering the employment status of the respondents, Table 1 showed that 37.60 percent of respondents were employed for less than ten years. Table 1 also indicated that 49.87 percent of 187 participating teachers were from medium-sized schools as described in Table 1.

Table 1 Distribution of population groups included in the study

Demographical profile of respondents		Number (person)	Percentage
Gender			
1. Male		74	19.73
2. Female		301	80.27
	Total	**375**	**100**
Educational Background			
1. Bachelor's degree or equivalent		239	63.73
2. Master's degree or higher		136	36.27
	Total	**375**	**100**
Work experience			
1. Less than 10 years		141	37.60
2. 11-20 years		107	28.53
3. 21-30 years		60	16.00
4. 31-40 years		58	15.47
5. 41 years up		9	2.40
	Total	**375**	**100**
School Sizes			
1. Small-sized school		116	30.93
2. Medium-sized school		187	49.87
3. Large-sized school		72	19.20
	Total	**375**	**100**

2. The digital-era leadership of primary school teachers in the Northeast, as a whole, was at a high level ($\overline{X}$ = 4.19, S.D.= 0.69). When considering each aspect, the highest-level aspect was Literacy in Digital Technologies ($\overline{X}$ = 4.24, S.D.= 0.68), followed by Digital Skills and Knowledge ($\overline{X}$ = 4.20, S.D.= 0.66), Instructional Knowledge and Abilities ($\overline{X}$ = 4.16, S.D.= 0.69), and Digital Technology Abilities of Instruction ($\overline{X}$ = 4.15, S.D.= 0.71), respectively as described in Table 2.

Table 2 demonstrated mean ($\overline{X}$), standard deviation (S.D.), and the dimension range of components of digital-era leadership of primary school teachers in the Northeast, as a whole and each aspect.

No.	Components of digital-era leadership of primary school teachers	Statistical Value (N=375) Performance Level		Dimension
		$\overline{X}$	*S.D.*	
1	Instructional knowledge and abilities	4.16	0.69	high
2	Digital skills and knowledge	4.20	0.66	high
3	Digital technology abilities of instruction	4.15	0.71	high
4	Literacy in digital technologies	4.24	0.68	high
	Total	**4.19**	**0.69**	**high**

3. The model for developing digital-era leadership of primary school teachers in the Northeast as a whole was appropriate at the highest level ($\overline{X}$ =4.67, S.D.=0.40). When considering each aspect from high to low mean, the components were ranged in order as follows: principles ($\overline{X}$ = 4.89, S.D.=0.33), measurement and evaluation ($\overline{X}$ = 4.89, S.D.=0.33), objectives ($\overline{X}$ = 4.78, S.D.=0.44), a development process ($\overline{X}$ = 4.78, S.D.=0.44), contents ($\overline{X}$ = 4.33, S.D.=0.50), media and learning resources ($\overline{X}$ = 4.33, S.D.=0.50), respectively as described in Table 3.

Table 3 demonstrates the assessment result of the model appropriateness by experts

Categories	$\overline{X}$	*S.D.*	Level of Appropriateness
1. Principles	4.89	0.33	highest
2. Objectives	4.78	0.44	highest
3. Contents	4.33	0.50	high
4. Development process	4.78	0.44	highest
5. Media/Learning resources	4.33	0.50	high
6. Measurement and evaluation	4.89	0.33	highest
Total	**4.67**	**0.48**	**highest**

4. The effectiveness Index (E.I.) of the development of digital–era leadership of primary school teachers in the Northeast was assessed by 20 teachers. The pre–test scores before the development process were 200 scores compared to 340 scores after the post–test scores, with a total score of 400 ~~scores~~. The effectiveness Index (E.I.) was 0.70 or equaled 70 percent as described in Table 4.

Table 4 The effectiveness Index (E.I.) of the development of digital–era leadership of primary school teachers in the Northeast

scores	N	□ X	E.I.
Pre–development test	20	200	0.7
Post–development test	20	340	

Summary of Research Findings

The research findings were presented as per the research objectives.

1. The components of digital– era leadership of primary school teachers in the Northeast comprised four main components with 16 sub–components and 60 indicators as follows:

1.1 Instructional knowledge and abilities consisted of the following sub–components: 1) knowledge and experiences in teaching contents and methods, 2) mastery and understanding contexts of changes, 3) knowledge about educational psychology, 4) ability in curriculum administration and learning management, 5) ability for developing learners, 6) ability in learning management, and 7) ability in analyzing, synthesizing, and conducting research for learners' development.

1.2 Digital skills and knowledge comprised the following sub–components: 1) knowledge about information, 2) knowledge about media, 3) Knowledge about ICT, and 4) Knowledge and skills of being a digital citizen.

1.3 Digital technology abilities of instruction comprised the following sub–components: 1) digital technology literacy, and 2) digital technology understanding and utilization skills.

1.4 Literacy in digital technologies comprised the following sub–components: 1) being a citizen with responsibility, 2) being a citizen with participation behaviors, and 3) being a citizen focusing on a fair deal in society.

2. The model for developing digital– era leadership of primary school teachers in the Northeast consisted of 1) principles, 2) objectives, 3) contents, 4) a process development, 5) media/learning resources, and 6) measurement and evaluation.

3. The Effectiveness Index (E.I.) of the model for developing digital–era leadership of primary school teachers in the Northeast revealed that: 1) The appropriateness of the developed model as a whole was at the highest level, and 2) The digital– era leadership of primary school teachers increased ~~improved at a~~ 70% more/higher than the pre–implementation ~~at 70 percent~~.

Research Discussion

1. The components of digital-era leadership of primary school teachers in the Northeast consisted of four components: 1) Instructional knowledge and abilities 2) Digital skills and knowledge 3) Digital technology abilities of instruction and 4) Literacy in digital technologies. Based on the findings above, the digital-era leadership of teachers is considered as behaviors or characteristics of teachers as leaders and followers in a modern society known as the knowledge, information or networked society because of rapid changes of information technology and globalization and a highly digitalized society. This is in line with Wirote Sanrattana's statement on digital Leadership (2014, p. 54). Societies in the 21st century are considered knowledge-based, information or networked societies. Therefore, leaders in this era or future era must have special characteristics, such as new attitudes, new skills, and new knowledge within limitations and opportunities of ICT. The effective utilization of ICT includes 3Cs: computer use, communication, and multimedia content, which are additional characteristics from having original good characteristics. This is also in line with the statements of Nutavoot Pongsiri (2017, pp. 20-23) that digital leadership in a digital economic era would have roles and duties in driving organizations differently from previous organizations in various dimensions, which is to say, leaders must integrate mixed factors as 3C consisting of Climate-Working environment, Culture-organizational culture, and Creative-creative thinking. It is also supported by Chevin Oonla-or (2020, pp. 117-118) that the characteristics of digital leadership must include communication support, information technology use.

The components of digital-era leadership of primary school teachers in the Northeast could be described in detail as follows:

Component 1 Instructional knowledge and abilities are key important characteristics because teachers must be able to teach to improve the self-learning process in order to change the behaviors to be better. This is in line with the Office of Basic Education Commission, Ministry of Education (2010, pp. 1-15) formulating a framework to assess teachers' competency. In addition, Thanompon Laohajaratsang's statement that " in this technology and communication era contains a range of information. ←Wrong structure Therefore, teachers' must-have skills would fit in the digital technology era as becoming C-Teacher (2013 cited in Passkorn Roungrong, 2021, pp. 3-4). Sukanya Chaemchoy (2017, p. 38) stated that teaches in a digital era should have seven characteristics as follows: 1) Coach, 2) Questioner, 3) Learning Designer, 4) Context Provider, 5) Educational Technology, 6) Quality Controller, and 7) Role Model.

Component 2 Digital skills and knowledge are also as important as Component 1 because digital skills and knowledge are must-have skills for teachers to apply into teaching practice to keep pace in a modern age. According to Ongjit Metthayapraphat (2014, online), teachers in the 21st century must be E-Teachers. In addition, Chantana Sansuck (2016) investigated components of digital leadership skills consisting of 1) Digital literacy-using digital technology to search, evaluate, use, share, and create content. 2) Digital vision-formulating strategies for using digital technology in work performance, 3) Public relation-supporting personnel to improve digital vision and

grow in a digital environment, 4) being leaders with a clear vision for supporting personnel effectively, 5) transferring digital vision to personnel for improving performance, 6) adaption–use new technologies to practice, 7) self–awareness–being able to predict situations that may affect self and others, and 8) cultural perception–communication and participation in performing tasks using digital technology. This is also in line with the Office of the Education Council, Ministry of Education (2019, p. 4) who suggest the roles of teachers should be adjusted to be as a bridge to connect the body of knowledge to students and to ensure that teachers understand changing of students' learning behaviors

Components 3 Digital technology abilities of instruction. Currently, using technologies in teaching and learning is not new or any unapproved evidence. However, using technology for effective teaching is still a process of continuously searching for better solutions which could be categorized into two aspects: 1) using technology to enhance new opportunities in education, 2) using technology to encourage learners' success. This is in line with the learning process based on the National Education Act B.E. 2542, where section 24 statement addresses the guidelines for the learning process in educational institutes and adheres to Chapter 9 Technology for education in section 65, encouraging the development of personnel to be as producers and education technology users and to obtain knowledge and ability and skills in producing and using technology appropriately, and effectively. It is also in line with the guidelines for Digital Literacy World–Class Standard School proposed by the Office of the Basic Education Commission (2010, p.6), which stated that teachers should be able to use the Internet for communication, searching information, conducting research, and job opportunity. Similarly, Jinnawat Pakotung (2018, p. 237) stated that learning management in the digital era should embed information technology and communication into practice and facilitate teaching and learning.

Component 4 Literacy in digital technologies. In the past decade, there have been rapid changes to media integration. This is consistent with Nithida Wiwatpanitch (2015) stated that media literacy was an important concept in the 21st century as information and communication technology within the digital era may happen much faster affecting the way how at–risk children and youths cope with overwhelming information. At–risk children and youths were not able to identify reliable sources of information or false information. In addition, traditional command–and–control organizational structures were not effective in this rapidly changing society. Therefore, it is necessary to support media users to be protected and obtain media literacy. This is in line with Nattakarn Sukolratanametee and Nuchaprapa Moksart (2019, p.32) who stated that media literacy could be defined as decoding media messages and utilization by using critical thinking and reasonings, identifying truth from opinions, and being able to assess the content quality and reliability. Similarly, Nuntiya Doungphummes and Nitida Saengsingkaew (2020, pp. 54–67) stated that the growth of advanced technology and various innovative inventions disrupted Thai society and eventually to everyday life in all dimensions.

2. The model for developing digital– era leadership of primary school teachers in the Northeast consisted of 1) principles, 2) objectives, 3) contents, 4) a development process, 5) media/learning resources, and 6) measurement and evaluation. This is in line with the study by Kompisit Sriboonruang (2015, pp. 103–104) which examined the model for developing administrators' leadership in information and communication technology in basic education schools in the Northeast. According to a study by Worakanyapilai Gaerahan (2007, p. 209),

the findings revealed that the model for developing instructional leadership of school administrators under the Office of Basic Education Commission in Educational Inspection Region 11 consisted of principles, objectives, development process involving an intensive workshop, actual practice settings, a field trip, and follow–up session. Similarly, a study by Siriporn Kunlasant (2014, pp. 206–207) revealed the model for developing teacher leadership in learning management in Educational Opportunity Extension Schools in the Northeast consisted of principles, objectives, contents, development process, measurement, and evaluation. This is also in line with a study by Rattiya Promsin (20016, pp. 255–256) stated that the model for developing teachers' leadership in primary schools under Educational Inspection Region 11 consisted of principles, objectives, contents, a development process, and measurement and evaluation.

3. The appropriateness of the developed model, as a whole, was at the highest level. The Effectiveness Index (E.I.) was higher than the pre–implementation with a mean of 70 percent. When considering the mean differences, teaches' digital–era leadership behaviors in learning management after the model implementation were higher than those of before at the 0.01 level of significance. This is in line with a study by Chaiya Pawabutra, Surat Duangchatom, and Sumattana Hansuri (2020, pp. 1–10). The findings revealed that the technology leadership of school administrators in a digital era after the model implementation as a whole was at a high level compared to the pre–implementation at a medium level. The percentage progress achieved at 25.80. The interview results showed a similar direction. In addition, after the knowledge testing on technology leadership, the scores of the participants attending the workshop for developing technology leadership for school administrators in a digital era were higher than those of before the implementation at the .01 level of significance. According to Komsit Sriboonrueng (2015, pp. 103–104), the study results indicated the information and communication technology leadership of school administrators as a whole was at a high level. The mean after the implementation was higher than that of before the implementation at the .05 level of significance. The mean after the follow–up session was higher than that of before at the .01 level of significance. Similarly, a study by Siriporn Kulasant (2014, pp. 206–207) found that teacher leadership improved after the model implementation. This is also consistent with a study by Rattiys Promsin (2016, p. 273) revealed that leadership of primary school teachers after the model implementation was higher than that of before the implementation at the .01 level of significance.

Recommendations

The following recommendations were offered for practitioners.

1. Primary school administrators should be able to use fundamental data of digital–era leadership of teachers in primary schools in the Northeast for teaching and learning management and develop education to achieve the highest effectiveness in the future. The digital–era leadership consisted of 1) Instructional knowledge and abilities, 2) Digital skills and knowledge, 3) Digital technology abilities of instruction, and 4) Literacy in digital technologies.

2. School administrators should provide workshops, self–learning in actual settings concerning leadership components.

3. School administrators should promote the application of the model for developing digital– era leadership of teaches in other schools.

Recommendations for further research

Based on the results of this study, some recommendations for further research were offed below.

1. The model for developing digital–era leadership of teachers in primary schools should be implemented in other regions.

2. It is recommended to conduct a similar study at a secondary school level.

3. It is recommended to conduct a study on factors affecting the development of digital–era leadership of primary school teachers and a school's quality of education.

4. It would be worthwhile to examine leadership in other aspects following education management in school contexts.

References

Boonchom Srisa–ard. (2002). *Basic Research*. (7th ed.). Bangkok: Chomromdek Printing.

Chaiya Pawabutra, Surat Dungchatom, and Sumattana Hansuri. (2020). Technological Leadership Development Model for School Administrators in the Digital Age. *Journal of Educational Administration and Leadership, 9*(33), 1–11.

Chantana Sansuck. (2016). *Leadership*. (3rd ed.). Bangkok: Tripple Group Printing.

Chevin Oonla-or. (2020). Digital Era Leadership for Educational Administrators. *College of Asian Scholars Journal. 10*(1), 117-118.

Constitution of the Kingdom of Thailand. (2017). *The Royal Thai Government Gazette. Vol.* 134, Chapter 40 A, 6 April 2017.

Jinnawat Pakotung. (2561). *Leadership in digital era for professional school administrators.* Ubon Ratchathani: Faculty of Education Ubon Ratchathani Rajabhat University.

Komsit Sriboonrueng (2015). *A Model for Developing ICT Management of Educational Technology Leadership of School Administrators under the Office of Basic Education Commission in the Northeast*. Unpublished Thesis. PhD. Sakon Nakhon Rajabhat University: Sakon Nakhon.

Ministry of Education. (2005). *The National Education Act (No.2) B.E. 2542 (2002), B.E. 2545 (2005), and (No.3) B.E. 2553 (2010).* Bangkok: E.T.O. printing

Nattakarn Sukolratanametee and Nuchaprapa Moksart. (2019). *Youths' Social Media Literacy, an Important citizenship skill in democratic society. Bangkok*: Research and Development Department of King Prajadhipok's Institute.

Nutavoot Pongsiri. (2017). Digital Leader in Digital Economy Era. *HR Society Magazine*, *15*(172), 20–23.

Nithida Wiwatpanitch. (2015). A Development of Social Media Literacy Skills. *Journal of Graduate Studies Valaya Alongkorn Rajabhat University*, *9*(3), 209–219.

Nuntiya Doungphummes and Nitida Saengsingkaew. (2019). Media, Information and Digital Literacy: "Concept" and "Tool" for Developing Media Literate Children and Youths Citizenship. *Journal of Communication Arts Review*, *24*(3), 54–67.

National Strategy. (2018). *The Royal Thai Government Gazette. Vol.* 135, Chapter 82 A, 13 October 2018.

Office of the Basic Education Commission. (2010). *Teacher Competency Assessment Manual,* Retrieved from http://www.tmk.ac.th/teacher/capasity.pdf

Office of the National Economic and Social Development Council. (2017). *The Twelfth National Economic and Social Development Plan (B.E. 2560–2564).* Bangkok: NESDC.

Office of the Education Council, Ministry of Education. (2019). *Reports on Performance Guidelines for Creating and Promoting Teachers' Digital Literacy.* Bangkok*:* Prickwan Graphic.

Ongjit Metthayapraphat. (2014*). Characteristics of Thai teachers in the 21st Century*. Retrieved from http://www.slideplayer.mcu.ac.th/?p=162.

Passkorn Roungrong. (2013). *Educational Technology and Thai Teachers in the 21st Century. Retrieved from* https://hooahz.wordpress.com/tag/%E0%B8%84%E0%B8%A3%E0%B8%B9/

Rattiya Promsin. (2016). *A Model for Developing Teacher Leadership in Primary Schools under the Office of Education Region 11.* Thesis. PhD. Sakon Nakhon: Sakon Nakhon Rajabhat University.

Siriporn Kulasant. (2014). *A Model for Developing Teacher Leadership in Learning Management in Educational Opportunity Extension Schools in the Northeast.* Thesis. PhD. Sakon Nakhon: Sakon Nakhon Rajabhat University.

Worakanyapilai Kaerahan. (2007). *Transformational Leadership of Administrators Affecting Organizational Climate of Schools.* Thesis. PhD. Sakon Nakhon: Sakon Nakhon Rajabhat University.

Waro Phengsawat. (2007). *Educational Research. Sakon Nakhon*: Faculty of Education, Sakon Nakhon Rajabhat University.

Wirote Sanrattana. (2014). *Leadership: Theory and Contemporary Perspectives. Bangkok:* Thipwisut Printing.