Pakistan Journal of Life and Social Sciences

www.pjlss.edu.pk

RESEARCH ARTICLE

The Development of a Digital Literacy Model for Thai Education

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ARTICLE INFO	ABSTRACT
	Learning in the 21st century to prepare for the digital age of Thai society entails acquiring management concepts, strategies and guidelines to find ways to develop the Thai educational system to be ready for the changing socio-familial trends of the next generation. It is also an educational development guideline and national development based on state policies about the digital economy, which is a significant policy for future socio-economic, scientific and technological development. Presenting a knowledge development guideline or an educational package to children and youths should focus on literacy, cultivating interpersonal relationship skills, and personal and social responsibilities. If they have acquired such knowledge, attitudes, and skills, outputs could occur in learners in enhancing their potential and abilities to plan, summarise, use skills to control equipment and devices and apply intellectual processes to their lives. These components would lead to dynamic educational developments and changes according to global circumstances, enabling Thai citizens to become more prepared for future changes. It is also for those involved in education to be ready to maintain their institutions' status in simultaneity with technological advancement. They should also be philosophically aware of the foundation to improve curricula in consistency with a rapidly digitizing society so as not to fall behind.

INTRODUCTION

Article 65 of the Thai Constitution designates national strategies as the goals for sustainable national development, serving as a comprehensive framework for congruent and integrated planning. This pursuit aims to realize the objectives of the 20-year national Strategy (2018-2037), envisioning the Kingdom "as a stable, wealthy, sustainable and developed country driven by development based on the Sustainable Economy Philosophy". The third Strategy relates to the growth and promotion of human resource competencies with development guidelines that can drive educational reform concerning the expansion of digital literacy and skills for the Fifth Generation "5G" Age. The strategy specifies that future Thais be human beings with physical, mental and intellectual readiness equipped with lifelong learning capabilities and 21st-century skills. They are expected to be highly skilful, innovative, critical, entrepreneurial, moral, ethical, responsible for society, and healthy with a focus on potential development throughout their lives. Crucially, the strategy designates the learning process reform in response to changes in the 21st century, with an emphasis on fostering inquisitiveness and curiosity in the individual. Learning processes should be designed to facilitate the development of 21st-century skills, with teachers changing their role from "knowledge providers" to "learning coaches or facilitators" to enhance efficiencies or educational administration systems in all levels and types to achieve the minimum standards of schools. A lifelong learning system must be developed to manage training methods based on high-quality and flexible competencies through various mechanisms. Thailand should be positioned as an active participant

in the Southeast Asian region and global community, and its citizens should know their roles and responsibilities in society. A foundation should be laid to accommodate learning through digital platforms that focus on digital skill enhancement, knowledge screening skills, technological exploitation in conjunction with the values of quality learning and communication development, and the creation of an educational system for academic excellence at the international level (Ministry of Education, 2018).

The 2017-2030 National Education Plan is an important blueprint for educational reform that accommodates the 20-year National Strategy. The primary goal for the formulation of the National Scheme of Education is to provide a framework for the goals and directions of national education management by "providing every Thai citizen equal access to quality education". Furthermore, an efficient educational management system must be developed with a competent workforce consistent with labour market needs and national development. This National Education Plan specifies six strategies in congruence with the 20-year National Strategy. The second strategy is relevant to digital literacy development for the 5G Age: workforce development and production, research, and innovation to enhance national competitiveness. The ultimate goal is for a workforce with essential skills and competencies per labour market needs and national social-economic development. Educational institutions and management agencies must produce graduates with specialized expertise, conducting research and development to create new knowledge and innovations with economic output and value addition. The third strategy concerns reaching the potential of people of all ages and creating a knowledge-based society. The goals are as follows: 1) the retention of fundamental 'Thai characteristics' along with the qualifications necessary for the 21st century; 2) an international standard of skills, knowledge and know-how for their profession, thereby subsequently improving their quality of life and reaching their potential; 3) academic institutions at all levels being able to organize educational activities based on their curricula with quality; 4) quality resources, textbooks, innovations and media, readily available without temporal and spatial limitations; 5) efficient and objective evaluation of students and institutions; 6) internationally standardized personnel- teachers, professors and administrators; and 7) competent and up-to-standard academic personnel. The fourth strategy is to create academic opportunities and equality. The goals are as follows: 1) equal access to quality education for all learners; 2) an increase in academic opportunities via digital technology for people of all ages; and 3) educational information technology and personal data systems being complete, accurate and current for educational management planning, evaluation, follow up, and reporting. The sixth strategy is about the effective development of the educational management system. The goals are as follows: 1) educational structures- roles and management systems- being flexible, transparent and accountable; 2) efficient and effective educational management systems leading to high scholastic quality and standards; 3) all social sectors participating in educational management in accordance with local and popular needs; 4) laws and resource management accommodating differences in learners, schools, and labour needs of the country; and 5) a fair, morale-boosting and accountable administrative system so educational can work to their full potential (Ministry of Education, 2020). It can be summarized that the second strategy is about building a workforce with the necessary skills and competencies in accordance with labour market needs and the socio-economic development of the country. The third strategy concerns developing the potential of people of all ages and creating a knowledge-based society with a more transparent and standardized administration. The fourth strategy is the provision of educational opportunities and equality through technology for people of all ages. The sixth strategy is the improvement of the educational administration efficiency for the administration to become efficient and effective, to boost their morale, and so they could reach their full potential. All these strategies must work in parallel and are crucial for digital literacy development in the 5G era.

The digital literacy development plan for state employees and personnel of the Secretariat Office of the Ministry of Education (2009-2022) was formulated under the guidelines to accommodate and

change to a digital government according to relevant state policies. It is consistent with the 20-year socio-economic digital development plan (2017- 2036), the operation plan for strategic state workforce development and creation for digital Thailand (2018-2022), and the educational digital plan of the Ministry of Education (2018- 2021), enabling the plan to become more concrete with precise operations. It is expected to improve the digital skills of administrators and enhance their performance and capabilities. It will also strengthen their administrative levels to prepare for the advent of digital organizations. There are plans to develop the digital literacy of learners, administrators, teachers, educational personnel, and state employees regarding essential knowledge, media production and exploitation, awareness training on digital technology security, and other knowledge relevant to their jobs and responsibilities. The digital skills of administrators are specified for the change to digital government to generic skills, which consist of four components: capability, knowledge, experience, and qualifications. Capability is the main component, while the rest are supplementary components for individuals to perform their expected roles and behaviours (Ministry of Education, 2019). Five learning dimensions and seven skill sets should be promoted to develop digital dexterity. The first dimension is technological knowledge and exploitation, comprising one skill set: digital literacy skill set. The second dimension is understanding policies, laws, and standards, comprising one skill set: digital governance, standards, and compliance. The third dimension is digital exploitation for application and development, including two skill sets: digital technology and digital process and service design. The fourth dimension is digital exploitation for planning, management, and organizational leadership, comprising two skill sets: project and strategic direction and digital leadership. The fifth dimension is digital exploitation for creativity, comprising one skill set: digital transformation. Three basic skill sets should be developed. They include the digital literacy skill set in the first dimension, the digital technology skill set, and the digital governance, standard and compliance skill set in the second dimension. State employees must digitally improve themself with the '70:20:10' learning and development pattern. This means they learn by themselves and from work 70%, from others and coaching 20%, and from training 10% (Boonkhantinat, 2019).

Digital skills for Thai education

We are in a knowledge-based society where workers must be knowledgeable and adept. They must also be inquisitive and ever-curious. Consequently, the 21st-century skill set that an individual should possess includes information technology use, communication, and IT mastery. Additionally, Thailand has changed its vision to the 'Thailand 4.0' model, focusing on improving communication-telecommunication structures and the internet in all areas of the country- to drive the economy and society with innovations (Mesinthree, 2016). The change in local and international contexts due to the rapid progress of digital technology and internet communication has resulted in grassroots interest in technological creation, exploitation, and communication. Digital information has been used, adopted, and copied in various forms. They are then posted and shared, which can be done at homes, offices, schools, or public places. Those involved in such activities are expected to know relevant laws and appropriateness. However, it has been found that digital information exploitation and dissemination have been conducted without realizing moral and legal ramifications. This is because digital media is powerful in driving knowledge acquisition and social mobility. Hence, they should understand digital media as receivers, senders, users, and administrators, as well as the working process with information technology and emotional management when using online social media. This understanding is generally referred to as digital literacy. Therefore, digital literacy is an important topic in the context where information technology has changed individuals to work faster and easier, enabling them to access online databases, listen to music, watch movies, and send or disseminate information to others with ease. These have brought about urgent challenges to formulate social norms in marketing, legal framework, social structures, standardization, or rules of appropriate behaviours in digital contexts. They have not been widely perceived, especially in the

instructional contexts at various levels. Furthermore, correct concepts regarding perception, exploitation, dissemination, copyrights, and academic ethics in digital contexts have not been created. It is revealed that there has not been clear digital literacy standardization that could be used as a norm for education and instruction in Thailand.

Digital literacy for Thai education

Digital literacy can be divided into four main parts: use, understanding, creation, and efficient access to digital technology. Use refers to the technical dexterity necessary for the internet and computer use. The skills and abilities related to "use" cover from fundamental techniques such as word processors, web browsers, email, or other communication devices to advanced techniques for access and acquisition of knowledge, such as search engines, online databases, or new technology like cloud computing. Understanding refers to a skill set that enables learners to understand and assess digital contexts and media to decide what to do and find online. The skill set is essential to train children to grasp as fast as possible before exposure to the online world. It also includes awareness of network technology's impacts on learners' behaviours, perspectives, beliefs, and feelings about their surrounding world. Moreover, understanding prepares learners for the knowledge-based economy, where they develop IT management skills to search for, assess, and exploit information technology efficiently for communication, collaboration, and problem-solving. Creation refers to the ability to produce content and communicate efficiently through various forms of digital media. Creation with digital media is more than just knowing how to use lexical processing programs or write emails. It also includes adapting what is created for diverse contexts and audiences. It also covers the ability to create and communicate with rich media, e.g., pictures, videos, and sounds, and the ability to participate in Web 2.0 efficiently and responsibly, such as blogs, sharing pictures and videos, and various forms of social media. Access refers to accessing and exploiting digital technology and information as a foundation for development and economic growth. Learners are required to understand and access the internet through various channels, as well as the advantages and disadvantages of each channel, to use search engines to search for needed information from the internet efficiently. In addition, they must understand and apply various forms of digital media for their current work (Office of the Ministry of Higher Education, Science, Research and Innovation, 2020).

Thus, if the Minister of Education wishes to implement the online teaching policy, the government must urgently conduct workshops for administrators and teachers to manage and conduct online classes. This is because suitable online classroom management for each subject strand has different goals and limitations. Experts are required to provide practical and feasible guidelines. Alternatively, a professional learning community for each strand should be established to provide practical online classroom guidelines. Another guideline is that the government must establish a coordinating online curriculum, and school administrators act as coordinators to assist students in accessing the online teaching and learning system. Those unable or not ready to access online classes must be cared for to prevent learning disruption. Other types of learning channels must be simultaneously provided to them. The provision of communication devices and high-speed internet systems in a short time could be risky and expensive, and it might not be consistent with actual needs or could create more problems later on. Agencies overseeing and supervising school work should be flexible in certain circumstances, not forcing learners to self-study online to cover all curriculum objectives. As well as not forcing schools to prepare documents for assessing educational quality like normal situations (Suwan, 2020).

The production and development of a digital workforce are crucial mechanisms for bringing the country into the global society where countries drive their socio-economic systems mainly by digital technology. Rapid digital changes have obliged educational management to urgently produce and develop a digital workforce by changing learning processes, curricula, and assessment methods

based on digital technology, where learners and teachers can access various teaching and learning approaches without temporal and spatial limitations. This equips the workforce with knowledge, skills, and competencies consistent with labour market needs and national development. The workforce must be knowledgeable and able to create and use digital technology wisely for their professions and daily life activities according to the international standards of the Fifth Generation (5G). This age of communication does not only include mobile phones but also the Internet of Things (IoT). This IoT technology requires more than smartphones to connect with the internet. The 5G devices could transfer data more efficiently, which include virtual reality (VR) and Augmented Reality (AR) for watching movies or playing video games via VR devices. Using 5G devices can provide more supreme experiences than smartphones. More importantly, AR takes three-dimensional virtual pictures into the real world through cameras and has them processed to make them three-dimensional, superimposed with the same real pictures. Pictures or videos must be taken from Cloud Computing, making 5G have a role in transferring the data onto the screens without delay. Therefore, watching videos, playing games, or listening to music in the 5G era are without disruptions. This is similar to the rapid changes from analogue to digital to robotic eras, making digital technology influential over the livelihoods and job performances of the state sector, which is the principal agency for national development. It is thus imperative to adapt in accordance with changing contexts to prevent culture shock due to technological transition and risks due to inappropriate technological uses, for instance, loss of privacy, security in life and property, data theft, or cyber-attack. Consequently, digital literacy is a fundamental digital skill that could assist job performances, communications, and collaborative work in the form of "work less but get more impacts" and create value co-creation and economy of scale. It is also used as a tool to help personnel learn and improve themselves in order to grow professionally. The term "literacy" is traditionally related to calculation, listening, speaking, reading, writing, and critical thinking. The aim is to develop learners to become thinkers in order to be able to participate in society with efficient methods. These skills are only a part of the ability to participate in a digital society (Office of the Ministry of Higher Education, Science, Research and Innovation, 2020).

Trends of the 5G era and technology for Thai education

The 5G era has brought changes permeating every sector of society. Competition among educational institutions has taken place, especially on quality. The future of Thai education must be to an internationally recognized standard, in line with parents' need for their children to receive quality studies. Academic institutions are regarded as a social organization necessary for socio-economic development. The main objective of these institutions is to equip students with knowledge, intellectual abilities, skills, civility, morality, and ethics. Administrators must be given resources and mentoring to improve their performance and professional growth to achieve this. It is a development process that enables them to adapt to both internal and external changes as well as to enhance the growth of human resources in their schools and organizations at present and in the future. Thus, human resource development in schools is a part of management and a process of making personnel or agencies perform their jobs efficiently and effectively to achieve the organization's goals. Various activities must be conducted, including training, seminars, discussions or brainstorming. These activities are expected to bring about better competencies, knowledge, skills, positive attitudes toward their professions, ethics, morality, and engagement among personnel. The development is a process to improve higher and better performances of personnel. Leonard Nadler posited three aspects of personnel development:

1. Training enables personnel to have equal skills and changes.

2. Education makes them more qualified and brings about diverse competencies.

3. Development should be conducted on a regular basis for them to become successful professionally.

Therefore, digital literacy development for Thai education in the 5G era would enable new school administrators to become professionals in learning management. To produce a comprehensive digital literacy model, it is essential to know and understand the working processes of educational institutions.

Digital literacy concepts for Thai education

Bowden (2017) adapted the concept posited by Gilster (2017) and designated it into seven skills and competencies as follows:

1) The ability to formulate knowledge from correct information from various sources

2) The ability to retrieve with critical thinking to assess the information with caution on the accuracy and completeness of internet sources

3) The ability to read and understand disconnected and changing information

4) Awareness of the value of conventional tools in the context of the internet and media

5) Awareness of the importance of people networks as a source for advice and assistance

6) The ability to screen and manage received information

7) The ability to publicize and examine information media as equally as access to information

The analysis yields two skill and knowledge set groups from the above concept, as shown in the following figure.
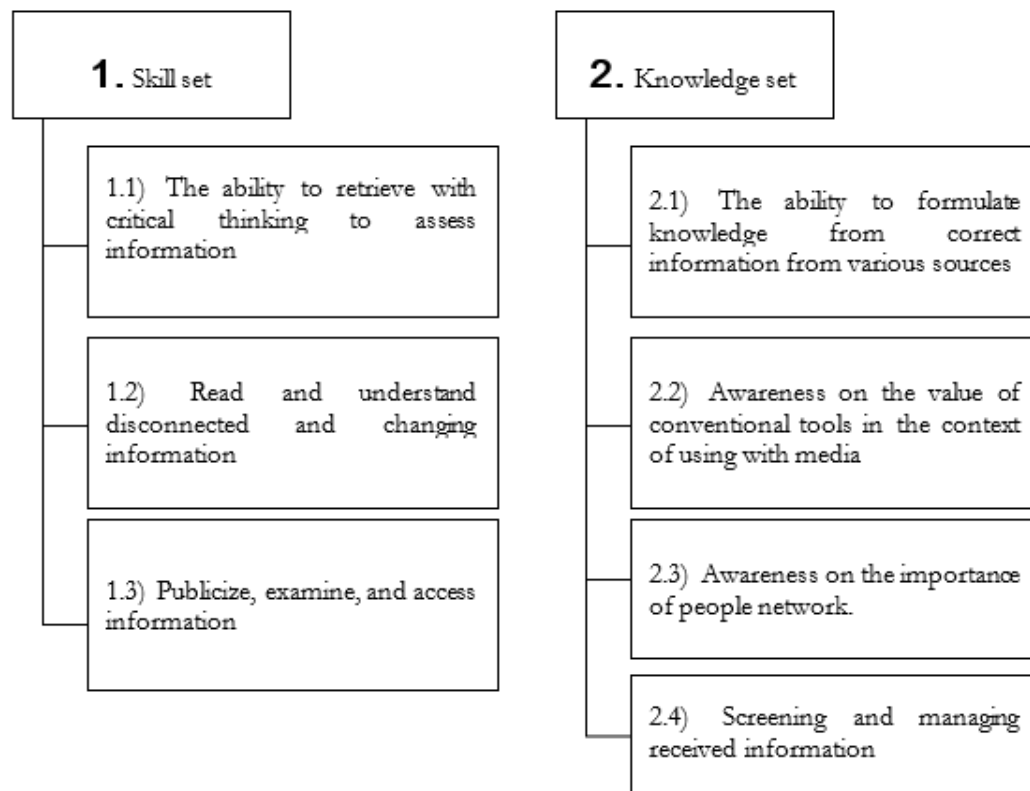
Figure 1: An analysis of the digital literacy concept of Bowden (2017)

From Figure 1, it is revealed that the concept is similar to that of Martin (2016), concluding that the aspects of digital literacy are synthetic ability and the ability to integrate information from different

sources. It was also found that what Gilster proposed was confirmed by many academics in that connections were made based on computer use, information:

1. Skillset: 1.1) The ability to retrieve with critical thinking to assess information. 1.2) Read and understand disconnected and changing information and 1.3) Publicise, examine, and access information.
2. Knowledge set: 2.1) The ability to formulate knowledge from correct information from various sources, 2.2) Awareness of the value of conventional tools in the context of using media, 2.3) Awareness of the importance of people networks and 2.4) Screening and managing received information.

Technological skills and competencies, and communication. The focus was on soft skills of information evaluation and knowledge collection together with a set of understanding and attitudes. Furthermore, Gilster proposed that there were four aspects to becoming digitally literate as follows. 1) Internet searching 2) Access and use of hypertext navigation 3) Knowledge assembly and 4) Content evaluation.

The Norwegian Education and Training Board (2016) specified fundamental digital skills and explained that they could use digital equipment to study social sciences, evaluate information searches, survey websites, analyze and assess information sources, be aware of good internet use, and select relevant information for needed academic topics. The skills also covered awareness of protecting privacy and intellectual property rights, application of internet use, respect for communication laws and norms, integrated uses of digital communication and tools, preparations, presentation and dissemination of information in multimedia forms to individuals and organizations domestically and internationally. From the abovementioned concept, it can be summarised that digital skills are divided into two skills and one knowledge set as follows.

Two skills
1) Skills in using digital devices, e.g., information search, website survey, integrated devices, device uses for information preparation, digital presentation, and dissemination in multimedia forms.
2) Critical or analytical skills, e.g., digital information assessment, analysis and evaluation of information sources, and selection of information related to topics.
Knowledge set
The knowledge set includes awareness of good internet use, awareness of the protection of privacy and intellectual property rights, application of internet use, and adherence to communication regulations and norms.

Nevertheless, Cordell (2015) proposed five aspects of digitally literate persons as follows:

1. They should be multi-skilled, including thinking processes and techniques required for searching, understanding, evaluating, creating, and communicating digital information.
2. They should be able to use various technologies and select them appropriately and efficiently to search for and access information, interpret the search results, and decide on the quality of retrieved information.
3. They should understand the relationship of information technology groups, lifelong learning, knowledge about personal rights, and appropriate stewardship of information.
4. They should be able to use skills, select suitable communication technology, and work with friends, colleagues, family members, and the general public.
5. They should be able to use their digital literacy to participate in civil activities, create movements and information, and take part in communities responsibly.

Cordell (2015) further pointed out that the above five aspects clearly overlapped between skills and knowledge sets, which could be categorized in the following table.

Table 1: Digital skill and knowledge sets (Cordell, 2015)

Skill set	Knowledge Set
1. Diverse skills, thinking processes and techniques required for searching, understanding, evaluating, creating, and communicating digital information.	1. Leveraging an array of technologies to search for and access information efficiently, interpret search results, and decide on the quality of retrieved information.
2. Skills in selecting suitable technology for communicating and working with friends, colleagues, families, and the general public	2. Understanding the relationship of information technology groups, lifelong learning, knowledge about personal rights, and appropriate stewardship of information
3. Digital skills for participating in civil activities, creating movements and information, and partaking in communities responsibly	

Digital literacy is a broad concept connecting relevant knowledge based on computer, information technology and communication skills. Furthermore, it requires social skills to assess information and knowledge about basic computer language.

Together, these become a knowledge set, understanding, and attitudes consisting of four components (Bowden, 2017).

1. Underpinning reflects required prior skills and computer knowledge. The latter is required to have more presently as well as the ability of social functions. Underpinning is a required basic skill before going toward digital literacy standardization, which comprises literacy and computer skills or communication and information technology knowledge.
2. Background knowledge about information is required. This is because information presentation was traditionally in the form of books, newspapers, magazines, academic journals, or personal reports. Thus, information users were required to be knowledgeable in order to access printed materials in the library. Previously, the printing and publishing chain started from writers to compilers to editors, publishers, bookshops or librarians, and library users. In the computer age, this chain has changed, but there has not been any straightforward replacement. Consequently, new knowledge of the information world of digital information is required for the advent of digital literacy. Such knowledge consists of the world of information and the nature of information sources.
3. Central competencies are a fundamental skill and competency set. It consists of six competencies: reading and understanding digital information, digital information creation and communication, basic information assessment, knowledge compilation, information knowledge, and media literacy.
4. Attitudes and perspectives are a connection between the new concept of digital literacy and the traditional literacy concept about 200 years ago. Simply having digital literacy is not enough since it requires an integrity framework together with education, which consists of independent learning and moral/social literacy.

Soby (2018) stated that digital competencies did not have clear concepts and there were three different concepts. First, the concept was related to fundamental skills in information technology and communication, such as word processing, spreadsheets, presentation programs, and internet search. Second, the concept was related to the four basic skills and the four cultural techniques. These were related to fundamental skills in communicative information technology, which were fundamental to professionals. Finally, the concept was based on modern educational integrated development with a

focus on wider digital competencies and expertise. Furthermore, Soby pointed out that digital competencies were related to knowing communicative information technology and digital literacy was based on media literacy, media studies, and the study of media.

From reviewing the above concept, it can be concluded that digital competencies consist of skills, knowledge, and attitudes, as detailed as follows.

1) Skills in using information technology and communication comprise skills in the use of information technology and communication; information literacy; compilation, storage and creation of knowledge; communication and publication of digital information and thinking process; critical thinking; or soft skills.
2) Knowledge necessary for the digital context includes the selection of diverse, suitable and efficient technology for information search and access, information presented via computers in various forms and sources, media literacy, digital information assessment, and academic ethics.
3) Suitable attitudes are required since good skills and knowledge may not make a person digital if his attitudes are inappropriate. Appropriate attitudes consist of positive awareness of internet use, protection of privacy and intellectual property rights of oneself and others, adherence to communicative regulations and norms, adherence to ethics and morality, and being good social members.

CONCLUSION

It is inevitable that digital educational content will replace conventional ones and key academic functions. Because of its statutory, unchanging nature, textbooks will become supplementary documents in fundamental theoretical subjects. The contents of science-based subjects such as computer science will constantly change, which can be accommodated by digital content as it can be quickly altered. Production of new, up-to-date versions of textbooks takes time and money; digital content allows anyone to learn anytime, anywhere, without the need to attend formal lectures, democratizing knowledge. Such content depends not only on readers but on new developments and forms to make them more convenient and intriguing to the reader.

Additionally, they will change the conventional printing market and become more digital in the future. Hence, Thai education should be aware of the importance and necessity of digital literacy. The decision to implement it as a guideline and an instrument for learning management, change the school administration paradigm, and implement modern and innovative learning management is another mechanism and method to improve school system development and higher performance. This could be in response to global changes, which would bring about better learning management and digital literacy in Thai education in the 5G era as the ultimate goal of education management. Therefore, developing a digital literacy model for Thai education could be used as the data for formulating problem-solving policies and improving educational management. The implementation of which fulfils the policies of improving the educational quality of schools and keeping up with 21st-century socio-cultural and economic developments.

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