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Components and Indicators of Digital Teacher Competency in Schools under the Provincial Administration Organization

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Abstract

In teaching management in modern times, teachers must have digital competence because nowadays digital platforms are being used in teaching and learning in a variety of ways. The objectives of this research aim to study the components and indicators of digital teacher competency in schools under the provincial administrative organization. The tools used to collect the data were the assessment form for the suitability of components and indicators, which was confirmed by seven experts. The results of the study showed that the components of digital teacher competency in schools under the provincial administrative organization are four components: (1) digital literacy; (2) use of digital tools and media; (3) problem-solving using digital tools; and (4) digital adaptation and transformation. Overall, each element is the most appropriate. The components and indicators of digital literacy are best suited. The digital tool and media use components and indicators are the most appropriate. The components and metrics for problem-solving with digital tools are optimal. The elements and indicators of digital adaptation and transformation are most appropriate.

Keywords: Digital teacher competency, Digital literacy, Digital tools, Digital adaptation, Digital transformation

1. Introduction

Learning management in the 21st century places great emphasis on the use of information and communication technology in conjunction with learner-focused pedagogical methods that are consistent with the nature of the material and the nature of the learner, so teachers in this era must have not only content knowledge and pedagogy knowledge but also knowledge of the application of technological knowledge (Mishra & Koehler, 2008; Nuangchalerm, 2020; Nithitakkharanon & Nuangchalerm, 2022). Teachers must be able to combine these three areas of knowledge and choose to use them accordingly. That is, in addition to the instructor knowing the material to be taught, the instructor must also know what teaching methods should be used to be consistent with the content and appropriate for the group of learners (Albrahim, 2020; Chang et al., 2020). The instructor must know about the technology to choose the technology to suit the content and teaching methods prescribed by the instructor (Dostal et al., 2017).

During a world of digital transformation, information plays an important role. Learners can access and build knowledge on their own. The design of learning to support learning, therefore, uses the creation of an environment for knowledge creation through the interaction, between the learner and the subject of knowledge, between learners, and between learners together. The design of the study covers information preparation, interaction with knowledge in the form of various forms of multimedia, as well as simulation of virtual environments to create an atmosphere. Interactions with instructors and groups of learners together can be conducive (Prachagool et al., 2022).

Through communication in coordinated and time-sensitive dimensions, as well as the provision of virtual simulation materials to provide information to the learner's wishes. To further respond to learning to solve problems in context (Akarawang et al., 2016). It's called mixed media in the real world. In addition, advances in digital technology and internet networks. It has also linked everyday devices that use digital as a base to send and store data on the Internet. It's called the Internet of Things and big data (Shadroo & Rahmani, 2018; Sestino et al., 2020). Digital learning is expanded to enable knowledge to be invoked at any time. Place as intended for solving problems in the world. Reality at the moment of need, according to the concept of visual intelligence (Illuminating Science Concept). It is a learning that uses thinking, insight, knowledge, and self to solve complex problems.

The researchers, as school administrators, foresee the need to change attitudes and concepts of school management to keep up with the changing situation. Flexible school management is ready to develop educational institutions to meet the quality standards of education and the national education plan in line with the national strategy. It affects the quality and standard of education of learners. We recognize the need to empower digital teachers based on elements and indicators, which will affect the development of teacher teaching and learning in today's era. To maximize efficiency with students and the quality of education, we are interested in developing digital teacher empowerment programs in schools affiliated with the provincial

administration, consisting of 4 components: (1) digital cognition, (2) use of digital tools and media, (3) problem-solving with digital tools, and (4) digital adaptation and transformation. So that this research aims to study the elements and indicators of digital teacher competency. When the teachers are developed by digital competency programs, they will be able to do so. Teachers will have the knowledge, abilities, skills, and attributes to become digital teachers competency refers to a teacher's understanding of the basics of work. Of computer informatics, learners and planning learning management using ICT, and teacher competence. To use information and communication technology as a tool to access, manage, integrate, and evaluate. Create information and communicate so that learning management is effective. Feelings and feelings Teachers' need for the use of information and communication technology in a meaningful way promotes and encourages the correct use of information and communication technology in terms of ethics. Law and cultural society consist of 4 components. Effectively organize teaching and learning with students.

2. Methodology

Researchers study the principles concept, and theories from relevant documents, textbooks, and research both at home and abroad, and then collect analytical data. We synthesized data to obtain elements and indicators of digital teacher performance in schools affiliated with provincial administrative organizations. Get components and indicators, including (1) Digital cognition: 1) Cognition Identify data requirements Find information from digital tools; 2) Understand, organize, process, analyze, and interpret digital data; 3) Cognition compare and evaluate the reliability of data and its sources, critically; 4) Understanding of digital rights and responsibilities; 5) Having a good understanding of digital communication; 6) Having an understanding of digital security; 7) Having an understanding of etiquette in a digital society; 8) Understanding digital commerce; 9) Understanding of digital law. (2) Using digital tools and media: 1) Digital technology can be used in new ways to build knowledge and innovate; 2) Can use programs on the Internet. In information and information management; 3) Able to apply technology for the development of thinking learners Advanced creative aspects of creating new pieces Communication for assessment and measurement of learning outcomes; 4) Can protect the device digital content and understanding digital risks and threats; 5) Protect personal information and privacy from digital tools and media; 6) Be able to use and protect yourself from damage, share personal information from digital tools and media; 7) Health risks and threats to the body and mental well-being can be avoided while using digital tools and media; 8) Be able to protect yourself and others from harm while using digital tools and media (such as cyberbullying). (3) Problem-solving with digital tools: 1) Technical problems can be identified solve problems using digital tools and media; 2) Digital tools can be used to help analyze problems; 3) Digital tools can be used to prevent problems; 4) Digital tools can be used to help plan solutions; 5) Be able to identify the information needs needed to solve the problem; 6) Digital tools can be used to help evaluate solutions; 7) Identify applications that can help solve problems successfully; 8) Be able to identify, evaluate, select and use digital technologies that are possible to respond to solve a given task or problem; 9) Be able to seek opportunities for self-improvement to keep up with digital evolution. (4) Adapting and digital transformation: 1) Accept and understand the regulations governing the

use of digital technology; 2) Have a code of conduct for using digital technology for creative collaboration; 3) Plan, evaluate and reflect on the safe use of digital technology without infringing on the rights of others; 4) Have initiative, and participate in reinvention. Learn to produce on society and digital technology culture; 5) Contribute to society through the use of public and private digital services; 6) Have your own and others' privacy data managed on digital tools and media; 7) Have an understanding of copyright and licenses, information and digital content; 8) Seek opportunities to energize yourself For participatory citizenship through appropriate digital technology; 9) Share information and knowledge with others through appropriate digital technology tools and media.

Tools used to collect information, and assessment of the suitability of elements and indicators. Collection of analytical data, synthesis, principles concepts, and theories from documents, textbooks, and research. Then employed content analysis, statistics used in research, averages, and standard deviations.

Confirmation of elements and indicators by a total of 7 luminaries, tools used to collect data, assessments of the suitability of elements, and indicators of digital teacher competency. In schools affiliated with the provincial administrative organization. Setting the criteria to 5-grade levels range by level between 5 and 1 means that there is a highest and lowest reasonableness of the components and indicators of digital teacher competence in schools affiliated with the provincial administration.

The scores and analyze the mean and standard deviation of comments and indicators of digital teacher competence. In schools affiliated with the provincial administrative organization, the mean) standard deviation is analyzed and compared with the interpretive criteria. An average of 4.51-5.00 (highest), 3.51-4.50 (high), 2.51-3.50 (medium), 1.51-2.50 (low), 1.00-1.50 (lowest) means that there is a reasonableness of the components and indicators of digital teacher competency.

3. Result

Components and indicators of digital teacher competency in schools affiliated with provincial administrative organizations comprised of 7 luminaries, as shown in Table 1.

Table 1. The appropriateness of the components of digital teacher competency in schools affiliated with the provincial administration

Component	$\overline{X}$	S.D.	Appropriateness level
1. Digital cognition	4.71	0.49	Highest
2. Using digital tools and media	4.71	0.49	Highest
3. Problem-solving with digital tools	4.57	0.53	Highest
4. Digital adaptation and transformation	4.71	0.49	Highest
Average	4.68	0.50	Highest

From Table 1, luminaries have their opinions on the components of digital teacher competency in schools under the provincial administrative organization in each component as follows: 1) Digital cognitive; 2) The use of digital tools and media at the highest level; 3) Solve problems with digital tools; 4) Digital adaptation and transformation at the highest level and overall composition the level of suitability is at the highest level.

Table 2. Appropriate levels of indicators of digital teacher competency in schools affiliated with the provincial administrative organization

Indicator	$\overline{X}$	S.D.	Appropriateness level
1. Have knowledge and understanding, identify data requirements, find information from digital tools	4.86	0.38	Highest
2. Understand, organize, process, analyze, and interpret digital data	4.57	0.53	Highest
3. Have knowledge and understanding, critically compare and evaluate the reliability of data and its sources	4.57	0.53	Highest
4. Understanding of digital rights and responsibilities	4.86	0.38	Highest
5. Knowledge and understanding of digital communication	4.86	0.38	Highest
6. Knowledge and understanding of digital security	4.86	0.38	Highest
7. Knowledge and understanding of etiquette in the digital society	4.86	0.38	Highest
8. Knowledge and understanding of digital commerce	4.43	0.79	High
9. Knowledge and understanding of digital law	4.86	0.38	Highest
Average	4.75	0.46	Highest

According to Table 2, the luminaries commented on the indicators of the digital cognitive component. By separating each indicator, it was found that the indicators with the level of suitability ranked 1 were 1) Knowledge and understanding. Identify information needs search for information from digital tools; 4) Have knowledge and understanding of rights and responsibilities in the digital age; 5) Have knowledge and understanding of communication in the digital age; 6) Have knowledge and understanding of digital security; 7) Knowledge and understanding of etiquette in digital society; 9) Knowledge and understanding of digital law. The indicators with the second level of suitability were 2) Understanding, organizing, processing, analyzing and interpreting digital data; 3) Have knowledge and understanding. Compare and assess the credibility of information and sources of information. Critically, the index with the third level of suitability is the index 8) Having knowledge and understanding of digital commerce. Overall, the indicators were at the highest level of suitability.

Table 3. Appropriate levels of digital teacher competency elements in schools affiliated with the provincial administration as a whole and list of digital tooling and media components

Indicator	$\overline{X}$	S.D.	Appropriateness level
1. Digital technology can be used in new ways to build knowledge and innovate	4.71	0.49	Highest
2. Can use programs on the internet for information and information management	4.86	0.38	Highest
3. Able to apply technology for the development of learners, advanced thinking, creativity, and creation, new communication, assessment, and measurement of learning outcomes	4.71	0.49	Highest
4. Can protect the device's digital content and understand digital risks and threats	4.57	0.53	Highest
5. It can protect personal information and privacy from digital tools and media	4.57	0.53	Highest
6. Be able to use and protect yourself from damage, share personal information from digital tools and media	4.57	0.53	Highest
7. Health risks and threats to physical and mental well-being while using digital tools and media	4.57	0.53	Highest
8. It can protect yourself and others from harm while using digital tools and media	4.57	0.79	Highest
Average	4.64	0.53	Highest

According to Table 3, luminaries commented on the indicators of the components of using digital tools and media separately. It was found that the indicators with the level of suitability in rank 1 were 2) Able to use programs on the internet network, in managing data and information. The indicators with the second level of suitability were 1) The ability to use digital technology in new ways to create knowledge and create innovation; 3) Able to apply technology for the development of learners in advanced thinking creativity on the creation of new workpieces communication assessment and measurement of learning outcomes. Indicators that have a level of suitability in rank 3 are 4) Able to protect equipment, digital content and understand the risks and digital threats; 5) Can protect personal information, and privacy from tools and digital media; 6) Be able to use and protect yourself, from damage and sharing personal information from digital tools and media; 7) Can avoid health risks and threats to their physical and psychological well-being while using digital tools and media; 8) Can protect themselves and others from harm while using digital tools and media. Overall, the metrics were at the highest level of appropriateness.

Table 4. Appropriateness levels of digital teacher competency in schools affiliated with provincial administrations as a whole and list of problem-solving elements with digital tools

Indicator	$\overline{X}$	S.D.	Appropriateness level
1 Technical problem can be identified, solve problems using digital tools and media	4.43	0.79	High
2 Digital tools can be used to help analyze problems	4.43	0.79	High
3 Digital tools can be used to prevent problems	4.57	0.53	Highest
4 Digital tools can be used to help plan solutions	4.71	0.49	Highest
5 It can identify the need for information needed to solve the problem	4.71	0.49	Highest
6 Digital tools can be used to help evaluate solutions	4.71	0.49	Highest
7 Can identify applications that can help solve problems successfully	4.43	0.79	High
8 Be able to identify, evaluate, select and use possible digital technologies to the response to solve a given task or problem	4.57	0.53	Highest
9 Able to seek opportunities for self-improvement to keep up with digital evolution	4.57	0.53	Highest
Average	4.57	0.60	Highest

According to Table 4, luminaries commented on the indicators of the components of digital solutions. By separating each indicator, it was found that the indicators with the level of suitability ranked 1 were 4) able to use digital tools to help plan problems; 6) Able to use digital tools to help assess problem-solving. The indicators with the second level of suitability were 3) the ability to use digital tools to prevent problems; 8) the ability to identify, evaluate, select and use possible digital technologies in response to solving the task or problem specified; 9) Can seek opportunities for self-improvement to keep up with the digital evolution. The indicators with the level of suitability in the 3rd rank were: 1) Able to seek opportunities for self-development. To keep up with the digital evolution; 2) Can use digital tools to help analyze problems; 7) Can identify applications that can help solve problems successfully. Overall, the indicators were at the highest level of suitability.

Table 5. Appropriate levels of digital teacher competency elements in schools affiliated with the provincial administration as a whole and list of digital adaptation and transformation elements

Indicator	$\overline{X}$	S.D.	Appropriateness level
1 Accept and understand the regulations governing the use of digital technology	4.71	0.76	Highest
2 Have a code of conduct for the use of digital technology for collaboration in creatively	4.86	0.38	Highest
3 Plan, evaluate and reflect on the use of digital technology without infringing on the rights of others	4.86	0.38	Highest
4 Have initiative, participate in reinvention, and learn to produce on society and digital technology culture	4.86	0.38	Highest
5 Contribute to society through the use of public and private digital services	4.71	0.49	Highest
6 Managing one's and others' privacy information on digital tools and media	4.71	0.49	Highest
7 Have an understanding of copyright and licensing information and digital content	4.86	0.38	Highest
8 Seek opportunities to empower yourself for participatory citizenship through appropriate digital technologies	4.57	0.53	Highest
9. Share information and knowledge with others through tools and the right digital technology media	4.71	0.49	Highest
Average	4.76	0.47	Highest

According to Table 5, luminaries have an opinion on the indicators of digital transformation and adaptation components. By separating each indicator, it was found that the indicators with the level of suitability ranked 1 are: 2) Have ethics in using digital technology; 3) Planning, evaluating, and considering the safe use of digital technology without violating the rights of others; 4) Have the initiative to participate in the invention Learn to produce on digital technology society and culture; 7) Have an understanding of copyright and license of information and digital content. The indicators with the level of suitability in the 2nd rank are: 1) Accept and understand the regulations in the use of digital technology; 5) Contribute to society through the use of public and private digital services; 6) Manage the privacy of oneself and others on digital tools and media; 9) Share Information and knowledge with others through appropriate digital technology tools and media. The index with the level of suitability in the 3rd rank was 8) Seeking opportunities to create self-empowerment, for participatory citizenship through appropriate digital technologies and the overall level of the

indicators was at the highest level of suitability.

4. Discussion

Components and indicators of digital teacher competency in digital cognition. This is in line with the Office of the Digital Economic and Social Commission (2019). Digital Literacy refers to a person's ability to access it. There are 9 appropriate tools and technologies, including 9 competencies: 1) Digital rights; 2) Digital access; 3) Digital communication; 4) Digital safety; 5) Media and information literacy; 6) Digital etiquette; 7) Digital health; 8) Digital commerce, and 9) Digital law. The digital competency framework consists of digital literacy, meaning having the capacity to access it. Anisimova (2021) researched the digital literacy of future kindergarten teachers, consisting of 1) knowledge of information; 2) knowledge of computers; 3) knowledge of communication, and 4) knowledge of media. Reisoglu (2020) conducted a study on educational digital competence from the perspective of preschool teachers in Turkey. It found that preschool teachers needed digital training in action. To improve the quality of teaching and learning activities, including being a role model for students in the use of digital technology (Passey, 2021).

Components and indicators of digital teacher competence in the use of digital tools and media. The use of digital skills mean that a person can use various digital tools and technologies effectively, and diversely, and can be applied in more tasks, such as careers, education, and learning for self-development. It consists of 6 competency units 1) Computer usage; 2) Internet usage; 3) World processing usage; 4) Spreadsheets usage; 5) Presentation usage, and 6) Cyber security usage. Redecker (2017) researched the digital competency framework of faculty in Europe. In summary, the digital competence of faculty is responsible use. Passey (2021) studies digital technology and teacher well-being. Digital usage patterns, effective use of digital technology for teaching and learning, personal behavior in digital use.

Components and indicators of digital teacher competency in problem-solving with digital tools (Office of the Digital Economic and Social Commission, 2019). Problem-solving with digital tools, meaning that a person can identify needs and resources. It can make informed decisions about using the right digital tools according to their purpose and needs. It can coherently solve problems with digital tools. It consists of 5 competency units: 1) Solving technical problems; 2) digital reskill; 3) managing the digital environment; 4) creatively use in digital technologies, and 5) computational thinking. Reisoglu (2020) conducted a study on digital competence education from the perspective of preschool teachers in Turkey. The objective is to study teachers' opinions on digital literacy. In conclusion, preschool teachers need digital training to be put into practice. To improve the quality of teaching and learning activities, including being a role model for students in the use of digital technology. Online security and privacy digital solutions are available.

Digital cognition refers to the basic understanding of computer functioning and the use of ICT information in digital form. Digitalization of information in teaching and reporting effective planning for teaching and learning using ICT. Digital rights and responsibilities, digital access, digital communications, digital security, media and information literacy, digital society etiquette, digital health, digital commerce, and digital law. The use of digital

tools and media means having the ability to operate basic computers and equipment, as well as solve basic problems and maintain them. The use of software sets of office programs and tools, the use of the Internet and networked programs, as well as information and information management resources, and the application of technology to develop learners with advanced thinking skills and creativity (Ratheeswari, 2018; Rahmatullah et al., 2022).

Problem-solving with digital tools means the knowledge and ability to choose digital tools, develop and use digital tools, or solve technical problems by using technology to solve problems and use them creatively. Able to make informed decisions about digital tools based on their purpose and needs. It can coherently solve problems with digital tools (Caena & Redecker, 2019; Ferri et al., 2020). They can use technology creatively, solve technical problems, and can improve their performance to keep up with the world. Adapting and digital transformation means accepting and understanding the regulations governing the use of technology (Wijngaards-de Meij & Merx, 2018). It is planned and modeled for the safe use of technology. There is support for the right to access the use of technology in learning. Participation in innovating and learning production of new technologies. There is an ongoing assessment and reflection on the use of technology, and cooperation for the development of the use of technology in education (Henriksen et al., 2018; Putri et al., 2020). In conclusion, the results are consistent with government studies and research studies by both domestic and international academics. This can be applied to develop digital teacher capacity. Digital tools and media, problem-solving with digital tools, and digital adaptation and transformation.

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