e-ISSN 2963-2870
Vol 5 2024

PREPARING TEACHERS FOR THE FUTURE: INTEGRATING TECHNOLOGY AND PEDAGOGY IN PROFESSIONAL DEVELOPMENT

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Abstract

The skills that students must have to succeed in facing the development of the 21st century are learning skills (creative thinking, critical thinking, collaboration, and communication), literacy skills (information literacy, media literacy, and technology literacy), and life skills (flexibility, leadership, initiative, productivity, and social skills). To equip students with these skills, teachers need to be well prepared. Teachers need to be prepared to master these skills so that they can be transferred to students. In connection with these demands, teachers need to be prepared to be able to meet challenges and opportunities by developing the skills needed by students to be able to succeed in the future. This article will present the integration of technology in the planning, implementation, and evaluation of instruction and efforts that can be made to prepare teachers to meet the challenges faced and the opportunities available through teacher participation in professional development programs. Through the integration of technology into instruction, teachers should be proficient in using various digital devices and platforms to improve the quality of instruction. This is related to the level of digital literacy. In addition, teachers should be able to integrate technology into lesson plans to create student engagement in learning and develop meaningful learning experiences. Teachers also need to teach students how to use technology to solve problems and think critically. Through continuous professional development, teachers are encouraged to always update their insights by always following the latest trends and research in the field of Education. In addition, teachers need to receive professional guidance to be able to convince them that the changes they make are in accordance with the expected demands. In addition, teachers also need to be given the opportunity to participate in professional communities with colleagues where they can share ideas and best practices. This theoretical study is expected to be the basis for determining indicators for measuring teacher digital literacy and efforts that can be made to develop and improve these skills through professional development programs.

Keywords: 21st Century Skills, Professional Development, Technology Integration

1 INTRODUCTION

The 21st century skills that students must have to be able to compete and succeed in their careers in the information age are grouped into three categories, namely Learning Skills, Literacy Skills, and Life Skills (Stauffer, 2021). Learning Skills relate to the abilities needed to be able to adapt and improve the modern work environment, such as critical thinking, creativity, collaboration, and communication. Literacy Skills relate to the ability to evaluate reliable sources and information, such as information literacy, media, and technology. Meanwhile, Life Skills relate to personal and professional qualities in everyday life, such as flexibility, leadership, initiative, productivity, and social skills. To equip students with these skills, teachers need to be well prepared. Teachers need to be prepared to master these skills so that they can be transferred to students. In connection with these demands, teachers need to be prepared to be able to meet challenges and opportunities by developing the skills needed by students to be able to succeed in the future.

Literacy skills are often abbreviated as IMT Skills (Information, Media, and Technology Skills) where each focus on a different component of digital understanding. Literacy Skills include the ability to understand facts, images, statistics, and data; the ability to understand methods and sources of information publication; and an understanding of the machines that make the Information Age possible. Digital literacy refers to the ability to access, manage, evaluate, integrate, create, and communicate information individually or collaboratively in a networked, computer-supported, and web-based environment for learning, working, or leisure. These abilities are needed to be able to interact with others in the digital environment, use information appropriately, and create new ideas and products collaboratively.

Dudeney and Hockly (2016, in Akayoglu, 2020) defines digital literacy as an individual's ability to know how to operate digital technology and to use it safely, wisely and productively, as well as awareness of the social practices of appropriate use of new technology.

More specifically, Zhi-Jiang (2020) defines the didactic technology competence of teachers as the digital literacy skills of teachers in using digital devices and their application in the learning process. Further explained are three levels of didactics, namely (1) the relationship between teachers, students, and subject matter; (2) digital didactic design, as well as (3) learning development, curriculum development, and training for teachers. By having the ability to use digital technology that includes the right knowledge, skills, and attitudes, teachers are expected

to be able to manage information, communicate it, and develop materials to overcome learning problems (Julaeha, 2024). Teachers are expected to be able to modify existing digital materials to suit the learning context they face.

This article focuses on the study of (1) dimensions of digital literacy to measure teachers' digital literacy related to pedagogical and professional competencies, (2) indicators of teachers' digital literacy in the field of teaching and self-development, and (3) programs to facilitate the development of improving teachers' digital literacy.

2 METHODOLOGY

This article is a theoretical study of teachers' digital literacy. Therefore, the method used is to review various expert views and previous research results regarding the dimensions and indicators of teachers' digital literacy.

3 FINDINGS AND DISCUSSION

In accordance with the purpose of this article, the presentation of findings and discussions focuses on the dimensions and indicators of teacher digital literacy as well as teacher digital literacy development programs.

3.1 Dimensions dan Indicators of Teachers' Digital Literacy

Zhi-Jiang (2020) groups digital literacy into the dimensions of information literacy, computer-based literacy, communication literacy, media literacy, and attitude to technological innovation. Meanwhile, Akayoglu et al. (2020) categorizes digital literacy into two perspectives, namely technical skills and functional skills. Technical skills relate to the ability to use digital devices while functional skills relate to the ability to use digital devices for professional and personal purposes. By having both categories of skills, teachers who have digital literacy can use technology and digital devices for various purposes, including communicating with others, solving learning problems using digital applications, creating digital content for learning, and using various sources of information (Suciati & Rosita, 2024) both for learning purposes and for self-development.

Rusydiyah, E.F., Purwati, E., & Prabowo, A. (2020) used four digital literacy indicators in measuring teachers' digital literacy skills, namely basic competencies in information and communication technology (ICT), information literacy, media awareness, and computational thinking.

• Basic competencies in information and communication technology: related to a person's ability to understand how computers and their networks work to solve problems related to the limitations of various technological devices.

• Informational literacy: refers to a person's ability to formulate and analyse information critically and systematically.

• Media awareness: refers to the ability to access, analyse, evaluate, and communicate information in various formats. Knowledge, skills, and attitudes to act consciously, actively, and critically in the world of media are included in this indicator.

• Computational thinking: refers to the ability to formulate problems that can be solved through analysis using computers.

Skantz-Aberg, et al. (2022) put forward seven aspects of digital competence of professional teacher, namely (1) technological competence, (2) content knowledge, (3) attitudes to technology use, (4) pedagogical competence, (5) cultural awareness, (6) critical approach, and (7) professional engagement. Meanwhile, DigCompEdu (in Skantz-Aberg, et al., 2022), groups them into six competency areas, namely (1) professional engagement, (2) digital resources, (3) teaching and learning, (4) assessment, (5) empowering learners, and (6) facilitating learners' digital competence.

One of the indicators of professional competence that teachers must master is the ability to design and implement learning that refers to and utilizes technology in learning by using digital learning resources in instructional process. Teachers can use digital learning resources both in planning, implementing, and evaluating instructional process because this can make the instructional process more efficient (Avci, 2022).

By considering the various dimensions and indicators of teachers' digital literacy and linking them to teachers' pedagogical and professional competencies, here are the dimensions and indicators of teachers' digital literacy.

Table 1. Indicators for teaching digital literacy in relation to instructional procedures

Aspects of Digital Literacy	Planning	Implementing	Evaluating
Data and Information Literacy	• Find and select data, information, and digital content • Evaluate data, information, and digital content • Manage data, information, and digital content		
Communication and Collaboration	• Interact in using digital technology • Share data, information, and content through digital technology • Involve as a society through digital technology use • Collaboration through digital technology • Be aware of cyber etiquette • Be able to manage identity data in digital technology		
Creation of Digital Content	• Make digital content • Integrate and elaborate digital content • Understand copyright and license • Make instructional design through a program		
Security	• Protecting tools and digital content • Protecting self-identity • Protecting health and wealth • Protecting environment		
Problem-Solving	• Solving technical problems • Identify needs and respond to technology • Use digital technology creatively • Identify digital competence gap • Computational thinking		
Other Relevant Competence	• operate digital technology for a specific purpose • Interpret data, information, and digital content for a specific purpose		

3.2 Teacher Digital Literacy Development and Improvement Programs

Anis (2024) proposed four effective Teacher Professional Development programs to improve skills, encourage collaboration, and improve continuous professional development, as follows.

3.2.1 Individualized learning plans

This program is tailored to the unique characteristics of teachers including strengths and weaknesses and interests.

3.2.2 Online Courses and Workshops:

This program can be carried out in the form of online learning courses, which integrate various multimedia learning resources, interactive elements, and asynchronous participation, which provide opportunities for teachers to learn and explore according to their respective learning speeds and stages.

3.2.3 Collaborative Learning Communities:

This program provides space for teachers to engage in activities to share experiences and face collaborative problem-solving challenges. Learning communities are a vehicle for evaluating, reviewing, and sharing experiences to improve professional skills (Farisia & Syafi'i, 2024).

3.2.4 Coaching and Mentoring Programs:

In this program, teachers interact with experienced mentors or supervisors to obtain expected feedback, provide personal advice, and provide motivation.

In relation to various Teacher Professional Development programs, teachers are expected to be able to actively participate in various programs to develop and improve themselves professionally. Thus, teachers who are actively involved in various Teacher Professional Development programs will be able to improve their competence in integrating technology in professional self-development. Indicators that need to be used as a measure of teacher involvement in the Teacher Professional Development program are the level of teacher involvement in the Teacher Professional Development program and the benefits obtained by teachers in the Teacher Professional Development program.

4 CONCLUSION

The dimensions in the teacher digital literacy instrument include the use of digital technology in instructional processes and in professional development. The dimensions and indicators in teacher digital literacy include aspects: Data and Information Literacy, Communication and

Collaboration, Creation Digital Content, Security, Problem Solving, and Other Relevant Competencies that are linked to instructional procedures (Planning, Implementation, and Evaluation). Meanwhile, the dimensions of the teacher literacy development program include Individualized Learning Plans, Online Courses and Workshops, Collaborative Learning Communities, as well as Coaching and Mentoring Programs, with indicators of the level of teacher involvement in those programs and their benefits.

ACKNOWLEDGEMENTS

Universitas Terbuka

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