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Promoting Digital Literacy: Assessing Teacher's Readiness in Utilizing Information and Communication Technology for Learning in Rural Area

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Abstract

This research aims to evaluate and ascertain the readiness of teachers to utilize Information and Communication Technology (ICT) in educational settings, with a particular focus on rural environments. By examining teachers' preparedness in employing ICT, the study sheds light on the unique conditions and phenomena associated with technology use in learning activities in rural areas. The methodology adopted for this research is a descriptive qualitative approach, using a case study design focused on the island of Belitung. The study involves 12 classroom teachers from three elementary schools in Badau Village as research subjects. Data were gathered through interviews and document analysis, employing thematic analysis techniques for data interpretation. To ensure the validity of the data, techniques of technical and source triangulation were used. The findings indicate six themes regarding the teachers' readiness to use ICT, including teachers' proficiency in operating laptops/computers, and their capability to plan, select, and integrate ICT tools for educational and administrative purposes. Additionally, skills in collaboration, using the internet, and leveraging other advanced applications are deemed crucial. The study also reveals that teachers need to comprehend their roles and functions in adapting to ICT developments, thereby aligning their readiness with the standards of professional teacher competency. The study highlights the need for teachers to understand their roles in ICT adaptation, aligning with professional competency standards. These insights provide a framework for future research, policymaking, and practice enhancement in educational ICT, aiming to improve educational quality and effectiveness in the digital age.

Keywords: *digital literacy, teacher, professional competence, rural area, education*

Introduction

The rapid advancement of ICT in society should ideally bolster the quality of Human Resources. Chai & Kong (2016), in their analysis of five articles centered on education and 21st-century ICT development, highlighted the importance of equipping educators with professional skills to meet the challenges of modern learning, which heavily emphasizes technological proficiency. While ICT's evolution in education has had numerous positive effects, Fitriah & Mirianda (2019) observed a lag in the corresponding development of human resources that can adapt to these changes in learning activities. Adlin (2019) noted that not all teachers are adept at using computers in the educational context, often limiting their use to personal tasks. Additionally, Fitriah & Mirianda (2019) and Hew & Tan (2016) reported that teachers perceive technology integration as a significant challenge due to the constant need to update their knowledge.

According to the Central Bureau of Statistics (2020), only 6.9% of elementary school teachers have received training in ICT, a figure that is notably lower than the percentages for junior and senior high school teachers. This suggests that elementary school teachers are not fully prepared to implement ICT in their teaching processes. Prajana & Astuti (2020) and Batubara (2017) argue that it is imperative for teachers to integrate ICT into their teaching methods to avoid falling behind in an increasingly digital era.

Fernández-Batanero et al. (2020) emphasized the critical role of ICT training in advancing teachers' professional growth for high-quality education. They highlighted digital skills as essential for improving both professional development and the quality of teaching and learning. The authors suggested that teachers require comprehensive training programs focused on enhancing their technological pedagogical content knowledge and the effective integration of ICT in educational settings. Training has a crucial role in maximizing the teachers' readiness in improving their teaching and learning skills (Asamoah, 2019; Chia & Kong, 2016; Paramita et al., 2023; Sillat et al., 2021 Tsybulsky & Levin, 2019).

Mastering teaching technology is essential for all teaching staff to optimize learning and better develop students' skills, as argued by Aspi & Syahrani (2022). Given that current students belong to generation 4.0 and are accustomed to digital technology, the responsibilities of teachers have become more challenging. Teachers must not only enhance their scientific and academic qualifications but also shift their mindsets from traditional patterns to embrace rapid technological advancements (Aspi & Syahrani, 2022; Pradana & Nasution, 2023). Rachmadtullah et al. (2020) highlight the pivotal role of elementary schools in the 4.0 industrial revolution era, emphasizing the need for adaptable teachers who can keep pace with 21st-century developments.

In this era of education 4.0, teachers bear significant responsibilities and must proficiently use digital technology in the learning process (Rachmadtullah et al., 2020). Munir, as cited by Adlin (2019), stresses that teachers should possess basic skills in ICT utilization, aligning with the ICT competency aspects outlined by The United Nations Educational Scientific and Cultural Organization (UNESCO). UNESCO (2018) delineates six key aspects of teachers' competencies: 1) Understanding of ICT, including awareness of government policies on implementing ICT in education, 2) Curriculum and assessment, involving the competency to incorporate ICT in curriculum development, 3) Pedagogic strategies in ICT, including the planning and preparation of learning, 4) Proficiency in using ICT tools for learning media and administrative support, 5) Organizational and administrative skills in employing ICT for learning management and understanding ICT ethics, 6) Professional learning, focusing on the use of ICT for self-development and professional growth.

Correspondingly, the Ministry of Education and Culture, in the regulation of the Minister of National Education Number 16 of 2007, has defined ICT teacher competency standards under Professional Competency Number 24, which emphasizes 'utilizing information and communication technology to communicate and develop oneself'. Therefore, possessing ICT skills in learning is an integral aspect of a teacher's competence, particularly in terms of professional development. This fundamental skill is crucial in assessing the readiness of teachers in elementary schools.

Prawiradilaga (2016) emphasized the transformative potential of teachers skilled in using ICT. These teachers can integrate these competencies into their teaching methods, thereby promoting positive learning behaviors. A critical characteristic of such educators is their adeptness at using ICT in ways that are tailored to the specific needs, competencies, characteristics of their students, and the resources available (Hariyanta et al., 2022; Tondeur et

al., 2018). Moreover, these teachers excel in applying these skills within collaborative learning environments, significantly enriching the educational process. This skill set is particularly beneficial in remote or rural areas throughout the archipelago.

Syahid et al. (2021) pointed out that there is still a need for improvement in ICT skills among elementary school teachers in rural areas. This study conducted in three elementary schools in Badau village, revealed the distinctive characteristics and identity of the village. The research findings provide valuable insights into the current state and challenges of technology use in educational activities in such settings. These insights are instrumental in raising awareness about the importance of ICT and enhancing its application in learning processes.

Methods

This study was conducted using a descriptive qualitative research methodology with a case study approach. This type of research as aiming to gain a deep understanding of a phenomenon by exploring the experiences and perspectives of participants through descriptive techniques (Kristanto, 2018; Lichtman, 2023; Sari et al., 2022). The focus was on a specific subject of inherent interest: the use of ICT in rural areas, with a particular emphasis on the island of Belitung. The primary objective of this research was to provide a comprehensive overview of teachers' readiness in utilizing ICT, with data being presented and described as observed.

Research Design

The research spanned from April to November 2022, with fieldwork in schools conducted from October 2 to November 2, 2022. The study involved three elementary schools: Public Elementary School 1 Badau, Public Elementary School 2 Badau, and Public Elementary School 3 Badau. These schools are situated in the hamlets of Badau I, II, and Kelekak Datuk, within the village of Badau, in the Badau sub-district of Belitung Regency, with the postal code 33451, in the Belitung Islands Province (refer to Figure 1).

Figure 1. Location of Badau Village on Belitung Island

The figure illustrates that Badau village is situated in proximity to Tanjung Pandan city. As one of the 49 villages in the Belitung regency, Badau village serves as the capital of the Badau sub-district and spans an area of 8,330 hectares. It boasts various transportation routes, facilitating accessibility through different modes of transportation.

Participants

The study's subjects comprised elementary school teachers, specifically homeroom teachers from both lower and upper classes, drawn from three different elementary schools. Selection involved a random assignment of two teachers from each class level, without any specific qualifications guiding the choice. In total, twelve teachers participated in the study, representing the collective teaching staff of the three elementary schools in Badau village, as detailed in Table 1.

Table 1. Data of Research Subject

No	Name	Gender	Age	Teaching period
1	AS	F	56	33 years
2	GH	F	53	30 years
3	MA	F	42	18 years
4	UU	F	36	13 years
5	NA	F	58	35 years
6	NI	F	54	31 years
7	YA	F	51	28 years
8	YI	F	43	20 years
9	EG	M	31	8 years
10	KI	F	50	27 years
11	NR	F	52	29 years
12	RH	F	55	33 years

The focus of the research was on Information and Communication Technology (ICT) in Learning. This area is increasingly recognized for its critical role in modern educational practices, particularly in fostering the development of 21st-century skills. The study aimed to explore how ICT contributes to and enhances various learning models in a contemporary educational context.

The table indicates an average age of over 40 among the subjects, with the youngest being 31 years old (male) and the oldest at 58 years. Most have been teaching for more than 20 years, suggesting a balanced distribution in terms of age, teaching experience, and gender.

Data Analysis

The data analysis uses the thematic technique by analyzing the data through the identification of patterns or finding themes with the following stages: introduction, coding, finding themes, defining, and labeling themes to reporting. Then, the researcher prepares the

code based on the interview transcripts made verbatim. Next, the researcher combines the codes that have the same meaning into one group. The groups of codes are made into sub-themes. The sub-themes will be included in the same group. After finding the sub-themes, the researcher can find the main theme. The next step is defining and labeling the theme and having the reporting stage.

According to Braun & Clarke states that thematic analysis is a method used to analyze date through pattern identification or find a theme through the data that has been found to see related patterns and explain the extent to which a phenomenon occurs through the eyes of researchers (Heriyanto, 2018).

Results and Discussion

Professional Skill: Teacher's ability to operate a laptop or computer

The interviews and documentation process show that teachers more often use laptops in completing their tasks. A teacher named UU said: "I often use a laptop for making learning administrative stuff" (UU, female, 36).

The laptops are for personal needs or learning activities. It seems that in operating the laptop, the teachers have been able to do file management and use some applications such as Microsoft Word, Excel, and PowerPoint. Mrs. NR said:" I usually use Microsoft Word for making files, and I can also operate Microsoft Excel" (NR, female, 55).

However, their familiarity with PowerPoint is limited to basic functions, and they have not yet become active users of this software. Additionally, their laptop usage predominantly involves file management tasks. This is corroborated by YI, a 43-year-old female teacher, who emphasized the importance of organizational skills in digital file management: "Files need to be systematically moved or copied to specific folders or flash drives. They should be categorized by type within a folder before being transferred to a drive." This statement underscores a focused use of laptops for organizational purposes rather than for diverse educational applications.

Nindya and Dafit (2022), asserted that a teacher's technological skills begin with their proficiency in operating laptops or computers. Further, Nindya and Dafit emphasizes the necessity for teachers to be knowledgeable in implementing computer-assisted learning methods.

Professional Skill: the use of ICT tools as a learning requirement and learning administration

The ICT tools can support learning activities and help the teachers with their personal needs such as making learning administration. It seems that the teachers mostly use laptops, cell phones, and speakers. Also, Mr. EG said: "Usually I use infocus or shoot screens, and I use a tablet for direct learning" (EG, male, 31).

Besides learning needs, they also use ICT tools like laptops for completing administrative tasks, as YI said: "Indeed, I am not very good at using IT tools. It is only for administrative needs I operate the laptop to link it with my lesson plans" (YI, female, 43).

The teachers who use ICT in learning have good professional competence so they can present a combination of ICT tools not only to meet administrative needs but present them to the students in the learning process (Figure 2).

Figure 2. Learning activities in class using ICT

Figure 2 shows that the teachers use ICT tools in the learning process. The tools include infocus, laptops, and speakers. They already apply ICT learning in the class. They already know how to operate the ICT tools properly, especially for teaching and learning. This is following Aspi & Syahrani (2022) who stated that the teachers in the current ICT era must not only teach but also manage to learn. This implies that they must create challenging and creative learning conditions for the students. Teachers must also motivate the students, and use multimedia, multi-methods, and multi-sources to achieve learning objectives (Susanti et al., 2020).

Professional skill: the teachers do the planning, selection, and combination

Teachers need to utilize ICT in preparing the learning process. The steps start with selecting teaching materials and learning methods that are appropriate to the students' characteristics (Amalia, 2020). This follows previous findings that the teachers have carried out professional skills through planning, selection, and combination activities. Mrs. NA said, "Yes, we have prepared and read the materials first. We study the theme and apply it to the lesson linked to learning activities. We use the ICT-based learning method and teaching aids. We need to prepare them" (NA, female, 58).

The teachers have carried out planning activities and media selection based on basic competence-identified materials and students' characteristics as well as a combination of the use of media, learning resources, and teaching materials. Mrs. RH said: "So we should apply

the learning media that the students can easily understand because they have different thoughts and characters" (RH, female, 55).

This is in line with Supriatna (2021) and Sulthon et al. (2021) that the development of learning media that does not go through the stages of good design will have negative impacts on the effectiveness of the media in achieving learning objectives.

ICT for self-development: Collaboration

The teachers have conducted the ICT-based learning process independently. They create self-taught learning through videos on the internet and in collaboration with friends or colleagues in the Teacher Working Group. MA said: "We study it by ourselves independently. We have a teachers' group, so we can share" (MA, female, 42).

The experiences shared by MA reflect a proactive approach to professional development in the field of education. This approach, characterized by self-learning, collaboration, and adaptability, is essential in the context of modern educational challenges and opportunities. However, it also underscores the need for systemic support and recognition of these efforts at the institutional and policy levels to fully realize the potential of ICT-based learning in education.

This is following Budiman (2022) who found that teachers need support from their colleagues to develop better teaching strategies adjusted to the school environment. This means that the teachers' self-development also needs support from the surrounding environment and collaboration in improving self-quality and overcoming problems in learning.

ICT for communication: the use of the internet and the latest applications

The utilization of ICT in the learning process is also inseparable from the use of the internet. Affandi (2018) and Tondeur et al. (2017) stated that there are several ICT tools that teachers can use in learning, such as a) computers/laptops, b) LCD projectors, c) internet connection, and d) cell phones. All of them have been in line with previous findings that teachers should also utilize the internet, ICT tools, and the latest applications.

They have been familiar with the latest applications such as Youtube, Whatsapp, Google docs, and even Canva. This is similar to the statement of Mr. EG: "I have some latest PowerPoint templates. I use online applications such as Canva for graphic design learning" (EG, male, 31).

This statement shows that the teachers have reached the stage of knowing and even at the stage of applying and associating it in the learning.

ICT for Self-Development: Teachers' Roles and Functions in Preparing for ICT Development

Marlina (2018) identified several indicators of skills, one of which is problem-solving ability. The results indicate that the teachers have a clear understanding of their roles and functions in preparing for ICT development. They have been actively engaging in self-

development to keep pace with ICT advancements. One teacher, NI, a 54-year-old female, expressed this commitment: 'I keep on learning and do not stop here. If there is technical guidance or skills training related to ICT, I always join and register early. Sometimes, I am the oldest participant in the training.'

The efforts begin with quickly adapting to and accepting changes. The teachers engage in self-development through training and technical guidance, as illustrated in Figure 3. They also share their perceptions of innovative solutions for integrating ICT into learning, such as using smartphones in their schools. The aforementioned statement concludes that the teachers are capable of addressing problems associated with the rapid development of ICT.

Figure 3. The teachers participate in the training to improve their skills

Figure 3 illustrates that the teachers have participated in training for the independent curriculum, engaging in practical experiments on their laptops. This demonstrates their inextricable link with ICT in learning, highlighting the necessity for them to prepare for rapid changes and quickly adapt to ongoing ICT developments. Based on the data analysis, Figure 4 succinctly summarizes these research findings.
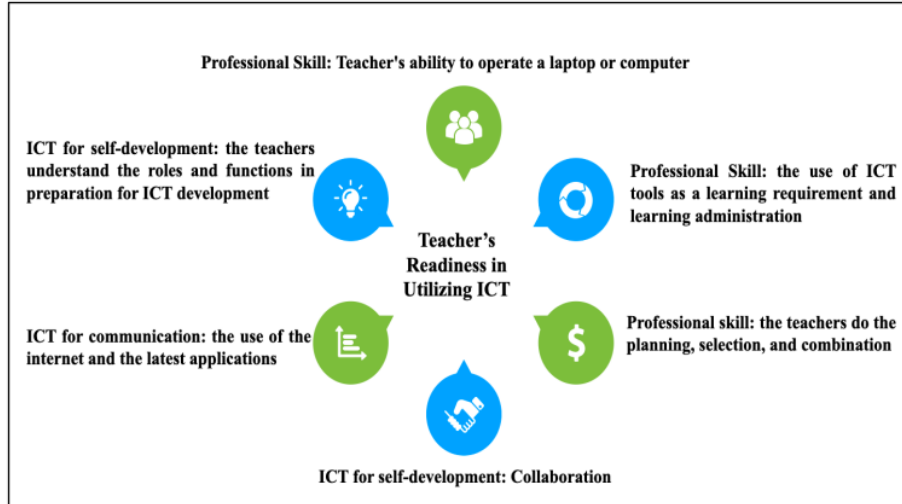
Figure 4. Main themes in the teachers' readiness to use the ICT

Figure 4 details the teachers' readiness to use ICT in learning in Badau village, concluding that: 1) teachers are proficient in operating laptops and computers, 2) they effectively plan, select, and combine resources, 3) they can use and operate ICT tools, 4) they are capable of collaboration, 5) they can utilize the internet and latest applications, and 6) they understand their roles and functions in preparing for ICT development.

Petko et al. (2018) investigated the relationship between school and teacher readiness in integrating educational technology, using a structural equation model for analysis. The findings indicate that a school's readiness for ICT significantly enhances teacher readiness, emphasizing the crucial role of teacher preparedness in effective ICT utilization in classrooms. The success of educational technology is dependent on teacher readiness, which is influenced by the school's preparedness (Suárez-Rodríguez et al., 2018; Wangid et al., 2018). This underscores the significance of teacher readiness in effectively leveraging digital technology for educational purposes (Kriswanto et al., 2023).

Moreover, educators have consistently demonstrated a high level of professional competence in their personal growth, underscoring their dedication to perpetually enhancing their skills and understanding (Kerckaert et al., 2015; Paramita et al., 2023). This commitment to self-improvement is in harmony with the principle that experiences wield a significant impact on one's preparedness. The knowledge and skills acquired through such self-development endeavors play a crucial role in fostering teacher readiness (Wu et al., 2022). By engaging in continuous learning and professional development, teachers are able to stay abreast of the latest educational trends, methodologies, and technologies (Chen & Tsai, 2021). This not only enriches their teaching repertoire but also ensures that they remain relevant and effective in their instructional practices. Consequently, the experiences gleaned from ongoing self-improvement are instrumental in shaping teachers who are well-equipped, adaptable, and responsive to the dynamic nature of the educational landscape.

Dzaky et al. (2020) and Hasibuan (2021) argue that teacher competence is one of the key factors influencing learning objectives and education in schools. However, teacher competency is not standalone; it is shaped by factors like educational background, experience, and the duration of teaching. Competency development is a deep process of mastering the skill set needed for life domains (Drossel et al., 2017). Therefore, it can be inferred that skills are interrelated with competence. Competence is defined as the ability to perform tasks effectively based on skills, knowledge, and work attitude.

Conclusion

The teachers' readiness to utilize ICT in learning at Public Elementary School in Badau Village, Belitung demonstrates alignment with the standards for teacher ICT competency. This readiness is evident in various aspects: the ability to operate a laptop/computer, plan, select, and combine resources, use ICT tools for learning and administrative purposes, collaborate with others, utilize the internet and latest applications, and understand their roles and functions in adapting to ICT developments. As such, their skills are in accordance with ICT professional competency standards, particularly in using ICT for communication and development.

However, the journey towards complete ICT integration in education is met with both challenges and support systems, categorized into internal and external factors. Internally, age has emerged as an inhibiting factor. Older teachers may find it more challenging to adapt to new technologies compared to their younger counterparts. This generational gap in tech-savviness can limit some teachers' ability to operate and integrate ICT effectively in their teaching methods. Externally, economic constraints pose a significant challenge. Limited financial resources can impede the acquisition of necessary technology and infrastructure, which is fundamental for effective ICT integration. Additionally, the current state of facilities and infrastructure may not adequately support the technological needs of a modern classroom. On the supportive side, internal factors such as the teachers' motivation and commitment to continual learning play an essential role. This intrinsic drive is a key determinant in the successful adoption of new technologies and teaching methods. Teachers who are eager to learn and adapt are more likely to overcome challenges and utilize ICT effectively.

External support is also crucial, primarily coming from the school management. This includes providing necessary resources, training, and a supportive environment that encourages and facilitates the use of ICT in teaching. The management's role in fostering an ICT-friendly atmosphere cannot be understated, as it significantly impacts teachers' ability to integrate technology into their teaching practices effectively. In conclusion, while the readiness and competency of teachers at the Public Elementary School in Badau Village, Belitung, in using ICT align with professional standards, the journey is multifaceted and influenced by various internal and external factors. Addressing these factors is crucial for the sustained and effective integration of ICT in education.

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