JPPIPA 10(12) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Analysis of Teacher Competence in Integrating Technology in The Learning Process in Banggai District

Wahyuni Wijayanti[1*], Lukman A. R. Laliyo[2], Rustam I. Husain[3], Muhammad Rifai Katili[4], Maryam Rahim[5], Masri Kuadrat Umar[6]

[1] Master of Educational Technology Program, Postgraduate, Gorontalo State University, Gorontalo, Indonesia
[2] Department of Chemistry Education, Faculty of Mathematics and Natural Science, Gorontalo State University, Gorontalo, Indonesia
[3] Department of School Teacher Education, Faculty of Education, Gorontalo State University, Gorontalo, Indonesia
[4] Information Systems Study Program, Department of Informatics, Faculty of Engineering, Gorontalo State University, Gorontalo, Indonesia
[5] Department of Guidance and Counseling, Faculty of Education, Gorontalo State University, Gorontalo, Indonesia
[6] Department of Physics Education, Faculty of Mathematics and Natural Science, Gorontalo State University, Gorontalo, Indonesia

Received: September 11, 2024
Revised: November 22, 2024
Accepted: December 25, 2024
Published: December 31, 2024

Corresponding Author:
Wahyuni Wijayanti
yuniwijaya250@gmail.com

DOI: 10.29303/jppipa.v10i12.9708

Abstract: The integration of technology in education not only trains learners to think critically and analyze information in depth, but also encourages them to become innovators and problem solvers. Local government and education stakeholders in Banggai district continue to improve teachers competencies in integrating technology in learning through various training programs. This research was conducted in education units in Banggai Regency. In this study, researchers used a type of quantitative research with a survey method. The sampling technique in this study will use cluster sampling technique. The sampling technique resulted in 690 respondents. This study uses the Rasch Model. From the results of the study, it was found that the competence of teachers in integrating technology in the learning process in Banggai Regency in terms of 8 sections obtained an average value from the highest to the lowest consecutively starting from Challenges in Technology Use of 1.57, Technical Skills of 0.43, Technological Knowledge of -0.04, Technological Pedagogical Knowledge of -0.06, Professional Development and Collaboration -0.08, Pedagogical Knowledge of -0.08, Content Knowledge of -0.32, and Effectiveness of Technology Use of -0.71. This indicates that teachers in Banggai district have a fairly high competency to integrate technology in learning.

Keywords: Rasch ModelIntegrating Technology; Teacher Competence.

Introduction

Technology use in the classroom fosters more lively interactions between students and their professors as well as between students. Effective communication and collaboration are facilitated by tools like video conferencing, discussion boards, and collaboration applications. Discussion boards let students share ideas and receive prompt response, while collaboration tools let students work in groups even when they are spread out geographically. By simulating in-person classroom interactions, video conferencing offers a virtual face-to-face experience that boosts participation and interpersonal communication. All of this helps to improve collaboration and communication skills, which are essential in the more worldwide workplace of the future. Furthermore, these tools give students the digital abilities they need to adjust to the labor market (Johnson et al., 2019; Straub & Rummel, 2020).

Technology enables more personalized learning by using adaptive learning software, which can adjust teaching materials and methods according to the needs and abilities of individual learners (Dabbagh & Kitsantas, 2012; Hattie & Donoghue, 2016).

Technology integration in education makes it possible to employ interactive media, such movies, animations, and simulations, which improve learning and make it easier to grasp. While simulations provide

How to Cite:
Wijayanti, W., Laliyo, L. A. R., Husain, R. I., Katili, M. R., Rahim, M., & Umar, M. K. (2024). Analysis of Teacher Competence in Integrating Technology in The Learning Process in Banggai District. *Jurnal Penelitian Pendidikan IPA*, *10*(12), 10934–10944. https://doi.org/10.29303/jppipa.v10i12.9708

students the chance to engage with virtual models and conduct experiments in a secure setting, videos and animations aid in the visual presentation of knowledge. By making learning more enjoyable and participatory, educational games help improve student engagement (Gee, 2003; Mayer, 2003).

Technology facilitates accurate learning data collection and analysis, allowing teachers to monitor learners' progress in real-time. Digital learning management systems and analytics tools provide deep insights into learner performance, such as time spent on tasks and success rates in quizzes. With this data, teachers can adjust teaching strategies, evaluate curriculum effectiveness, and make timely interventions to support learners who require additional guidance or more complex challenges

Incorporating technology into the classroom fosters creativity and problem-solving skills in addition to teaching students how to think critically and thoroughly evaluate material. Students may work together on challenging tasks and come up with innovative solutions by using a variety of technological tools, such as design platforms and programming applications. To thrive in a workplace that is becoming more and more digitally connected, they must be able to assess data sources, make judgments based on facts, and adjust to rapid technological change. As a result, incorporating technology into the classroom not only gets students ready for new challenges, but it also makes the educational system more flexible and accessible (Chang et al., 2022; Ober et al., 2021).

Most teachers in Banggai district have become accustomed to using basic technologies such as projectors and computers to support their learning. However, the level of fluency and integration of technology in learning still varies among schools. Most teachers still face challenges in mastering more advanced technologies such as adaptive learning software, collaboration apps and online learning platforms that require deeper technical expertise.

Local government and education stakeholders in Banggai district continue to improve teachers' competencies in integrating technology in learning through various training programs, provision of better technology infrastructure and collaborative initiatives between schools, communities and the private sector. With continuous support and a strong spirit of collaboration, it is expected that teachers' competencies related to technology in learning in Banggai district will continue to improve, creating a more inclusive, innovative and globally competitive learning environment. Based on this background description, the researcher aims to see how teachers' competencies in integrating technology in the learning process in Banggai district.

Method

Both public and private elementary, junior high, high school, and vocational education institutions in Banggai Regency, Central Sulawesi Province, served as the sites of this study. The study was carried out in July and August of 2024. Researchers employed a survey approach in conjunction with a form of quantitative research in this investigation. Sugiyono (2016) asserts that the purpose of quantitative descriptive research is to characterize the current status of the study item or subject. Teachers from Banggai Regency in Central Sulawesi Province's primary, secondary, high, and vocational schools served as the study's samples. Cluster sampling will be the method used for sampling in this investigation. Groups or classes are randomly assigned as part of the cluster sampling approach (Azwar, 2011). 690 respondents were obtained using the sampling procedure.

The instrument used in this research is 48 items covering various aspects that include the use of technology to support, enhance and enrich the teaching and learning process considered in the integration of technology in learning. This questionnaire consists of 8 sections namely Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Professional Development Collaboration (PDC), Effectiveness of Technology Use (ETU), Technical Skills (TS) and Challenges in Technology Use (CTU).

This study uses the Rasch Model with the help of Wisnteps software version 3.73 where the data results are interpreted through the construct map, which is in the form of the interaction of statement items in the questionnaire given to respondents, in this case teachers in Banggai Regency. The Rasch Model uses score data per respondent (person) and score data per question item (item) together. These two scores become the basis that shows that the level of tendency of respondents in answering the given statement and the level of difficulty of the question items described in the construct map below (Figure 1).

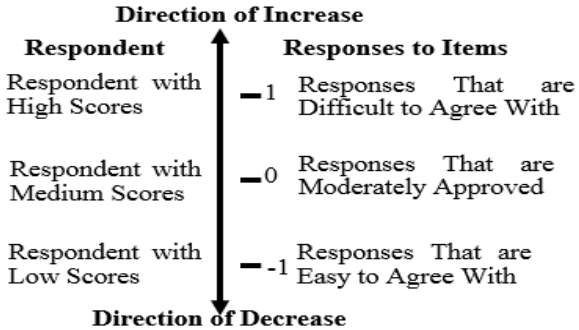

Figure 1. Measurement Construct Map
Source: (Sumintono & Widhiarso, 2015)

The construct map illustrated in Figure 1 shows two large parts, the left part explains the levels found in respondents, in this case the visible construct is the logit level of teacher competence in integrating technology in learning. Teachers with a high logit of competence in integrating technology in learning are located at the top, while teachers with a low logit level are located at the bottom. On the other hand, the right section contains information on respondents' responses to the statement items on teachers' competence in integrating technology in learning. The higher the item, the more difficult it is for respondents to answer, while the lower the item, the easier it is for respondents to answer. This means that the higher the position of the statement item, the higher the logit value obtained, which indicates that the quality of teacher competence in integrating technology in learning is less or not good enough.

Result and Discussion

The results of the research obtained from the interview process and the distribution of questionnaires to 690 respondents consisting of teachers working at the elementary, junior and senior high school levels, both public and private, obtained the following results.

Technological Knowledge (TK)

In section 1 technological knowledge there are 12 statement items with the following explanation.

1) *Teachers Able to Operate Computers Well*

From the measurement results item 1 is in a position between logit 0 and -1, meaning that this statement shows that it is easy for respondents to agree. This indicates that teachers in Banggai district are able to operate computers well.

2) *Teachers Feel Confident Using Educational Software*

From the measurement results, item 2 is in a position between 0 and -1, meaning that this statement shows that it is easy for respondents to agree. This indicates that teachers in Banggai Regency feel confident using educational software.

3) *Teachers are Accustomed to Using Digital Learning Platforms Such as Google Classroom or Moodle*

From the measurement results, item 3 is in a position between 0 and +1, meaning that this statement shows that it is quite difficult for respondents to agree. This indicates that teachers in Banggai district are used to using digital learning platforms such as Google Classroom or Moodle.

4) *Teachers Can Manage Classes Effectively Using Digital Learning Platforms*

From the measurement results, item 4 is in a position between 0 and +1, meaning that this statement shows that it is quite difficult for respondents to agree. This indicates that teachers in Banggai district can manage classes effectively using digital learning platforms.

5) *Teachers Understand the Importance of Maintaining Student Data Privacy and Security*

From the measurement results, item 5 is in a position close to logit -2, meaning that this statement shows that it is quite easy for respondents to agree. This indicates that teachers in Banggai district understand the importance of maintaining student data privacy and security.

6) *Teachers Always Apply Digital Ethical Practices in the Use of Technology*

From the measurement results, item 6 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district always apply digital ethical practices in the use of technology.

7) *Teachers Understand Various Digital Technology Tools That Can Be Used in Learning*

From the measurement results, item 7 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district understand various digital technology tools that can be used in learning.

8) *Teachers Understand How to Use Digital Technology to Create Interesting Learning Materials*

From the measurement results, item 8 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district understand how to use digital technology to create interesting learning materials.

9) *Teachers Know How to Access and Use Digital Education Resources*

From the measurement results, item 9 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district know how to access and use digital education resources.

10) *Teachers Can Explain to Students How to Use Digital Technology for Learning*

From the measurement results, item 10 is in the right position at logit 0, meaning that this statement is quite

easy for respondents to agree with. This indicates that teachers in Banggai district can explain to students how to use digital technology for learning.

11) Teachers Have Adequate Access to Technology Devices at School

From the measurement results, item 11 is in a position between logit 0 and +1, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai district have adequate access to technology tools at school.

12) Teachers Feel the Infrastructure at School Supports the Use of Technology in Learning

From the measurement results, item 12 is in a position between logit 0 and +1, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai district feel that the infrastructure in schools supports the use of technology in learning.

From the results of the analysis above, it can be concluded that teachers in Banggai district have knowledge of technology which can be seen in the teacher's ability to integrate various aspects is very good. Technology integration in teaching and learning is influenced by an array of factors (Farjon et al., 2019; Spiteri & Rundgren, 2020), among which a fundamental component consists in teachers' knowledge for supporting these activities (Taimalu & Luik, 2019). Although knowledge does not operate in isolation, it is a core component for guiding action (Berliner et al., 2013). Knezek and Christensen (2015) found technological pedagogical knowledge to account for 30 percent of the variance of technology integration practices. In response to the new educational opportunities and demands introduced by digital technologies, Mishra and Koehler (2006) proposed an extension to the traditional pedagogical content knowledge framework of teachers' knowledge (Shulman, 1986, 1987) to include the specific domains of knowledge teachers require for teaching with technology.

Pedagogical Knowledge (PK)

Section 2 Pedagogical Knowledge has 6 statements analyzed by Winsteps 3.73 Software with the following explanation.

1) Teachers Master Various Effective Teaching Methods

From the measurement results, item 13 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district master various effective teaching methods.

2) Teachers Often Use Technology to Support Teaching Strategies

From the measurement results, item 14 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district often use technology to support teaching strategies.

3) Teachers Are Able to Manage Classes Well Including Using Technology for Classroom Management

From the measurement results, item 15 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district are able to manage the classroom well, including using technology for classroom management.

4) Teachers Feel Technology Helps in Classroom Management

From the measurement results, item 16 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district feel technology helps in classroom management.

5) Teachers Use Technology to Assess Student Learning Outcomes

From the measurement results, item 17 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district use technology to assess student learning outcomes.

6) Teachers feel digital assessment tools are more effective than traditional assessment tools.

From the measurement results, item 18 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district feel digital assessment tools are more effective than traditional assessment tools.

Pedagogic knowledge is an important part of competence for teachers in Banggai district which reflects how teachers integrate technology with education. Pedagogical knowledge is crucial for educators, including teachers and parents, in effectively guiding students' learning and development (Anwar, 2018; Rosyadi & Maknun, 2023; Uce, 2021). It encompasses understanding student characteristics, learning theories, curriculum development, and effective communication (Anwar, 2018). Pedagogical competence enables educators to create meaningful learning experiences, foster student potential, and adapt to changing educational demands (Rahayu & Muhtar, 2022; Rosyadi & Maknun, 2023). In the 21st century

teachers must develop creative and innovative thinking, understand students' psychological development, and possess broad knowledge to address educational challenges (Rahayu & Muhtar, 2022). Parents also play a vital role in children's education and should be equipped with pedagogical knowledge (Uce, 2021). Enhancing pedagogical competence requires awareness, understanding, and continuous improvement to create high-quality human resources capable of competing in the global dynamics of modern life (Rahayu & Muhtar, 2022).

Content Knowledge (CK)

Section 3, namely Content Knowledge, has 4 statements analyzed with the help of Winsteps 3.73 Software with the following detailed explanations.

1) *Teachers Have a Deep Understanding of the Subjects Being Taught*

From the measurement results, item 19 is in the right position at logit -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district have a deep understanding of the subjects they teach.

2) *Teachers can explain concepts with the help of technology*

From the measurement results, item 20 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district can explain concepts with the help of technology.

3) *Teachers Able to Link Content with Relevant Technology Applications*

From the measurement results, item 21 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district are able to link content with relevant technology applications

4) *Teachers Often Use Technology Examples to Explain Subject Matter*

From the measurement results, item 22 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district often use technology examples to explain subject matter.

An educational teacher must know the teaching materials given to his students, with the use of technology allowing teachers in Banggai district to correlate teaching materials with actual problems. As new advanced technologies have come to our classrooms, there is increased interest in the essential roles and qualities of teacher knowledge bases necessary for successful technology integration(So & Kim, 2009)

Technological Pedagogical Knowledge (TPK)

Technological Pedagogical Knowledge is section 4 which consists of 6 statement items with the following explanation

Teachers Always Include Technology in Lesson Plans

From the measurement results, item 23 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district always include technology in lesson plans.

Teachers Design Learning Activities Involving the Use of Technology

From the measurement results, item 24 is in the right position at logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district design learning activities that involve the use of technology.

Teachers Use Technology to Encourage Active Student Participation

From the measurement results, item 25 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district use technology to encourage students' active participation.

Teachers Feel Technology Helps Students Be More Engaged in Learning

From the measurement results, item 26 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district feel that technology helps students be more involved in learning.

Teachers Often Try New Technology to Improve Learning

From the measurement results, item 27 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district often try new technology to improve learning.

Teachers Feel Comfortable Innovating with Technology in Teaching

From the measurement results, item 28 is in a position close to logit +1, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai district feel comfortable innovating with technology in teaching.

The results of the statements about pedagogical technology knowledge all have positive values, which

means that the pedagogical technology knowledge of teachers in Banggai sub-district is good. The use of technology in the teaching process is in line with the following statement (Tonderu et al., 2012) how teachers are being prepared to use and integrate technology into their programs. Teacher education programs must work to better infuse technology throughout the entire teacher education program and across different subject areas. To address these needs, rather than focusing on how to use technology, teachers must learn about how technology can be used to support novel ways of teaching and learning.

*Professional and Development Collaboration (PDC)*Section 5 is Professional and Development Collaboration which consists of 6 statement items with the following explanation

Teachers Often Attend Educational Technology Training

From the measurement results, item 29 is in a position close to logit +1, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai Regency often attend educational technology training.

Technology Training Attended Helps Improve Teacher Competence

From the measurement results, item 30 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district agree that the technology training attended helps improve teacher competence.

Teachers Share Good Practices in the Use of Technology with Colleagues

From the measurement results, item 31 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district agree that teachers share good practices in the use of technology with colleagues.

Teachers often collaborate with other teachers to improve the use of technology

From the measurement results, item 32 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district often collaborate with other teachers to improve their use of technology.

Teachers are Committed to Continuously Learning About New Technology in Education

From the measurement results, item 33 is in a position close to logit -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district agree that they are committed to continuing to learn about new technology in education.

Teachers Often Seek the Latest Information About Educational Technology

From the measurement results, item 34 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district often seek out the latest information about education technology.

The gap in teacher knowledge and skills related to technology is a fundamental problem (Iswanto et al., 2023) As an educator, teachers must have a lot of knowledge related to their expertise. Especially in this digital era, training in educational technology is an obligation for a teacher to make the learning process more interesting. (Hendrarti et al., 2023). Workshops and in-depth training are crucial tools in addressing this urgent need. They are not only a platform to improve technical knowledge, but also a place where lecturers can understand how to direct the potential of technology to enrich teaching strategies (Febrian et al., 2023). Through this activity, teachers are expected to play an active role in designing innovative curricula, improving interaction with students, and responding to the dynamics of change in the world of education. As a response to today's challenges, this activity is a concrete step towards shaping education in accordance with the demands of the times. In the context of education, the close relationship between teachers, students and parents has a very significant role (Santoso et al., 2023). The collaboration of these roles affects the quality of education, students' academic and social development, and the success of educational programs in schools. Principals, teachers and parents each have unique roles and responsibilities in achieving educational goals (Anggraini et al., 2023). Therefore, an in-depth understanding of their collaborative roles is essential to improve the effectiveness of the education system (Santoso et al., 2015).

Effectivness of Technology Use (ETU)

Effectiveness of Technology is the 6th section which consists of 6 statement items with the following explanation.

The Use of Technology in the Classroom Increases Student Motivation

From the measurement results, item 35 is in a position close to logit -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district agree that the use of

technology in the classroom increases student motivation.

Teachers See Students More Excited When Using Technology in Learning

From the measurement results, item 36 is in a position close to logit -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district agree that students are more excited when using technology in learning.

The Use of Technology in Learning Improves Student Learning Outcomes

From the measurement results, item 37 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district agree that using technology in learning improves student learning outcomes.

Teachers Believe that Technology Has a Positive Impact on Students' Academic Achievement

From the measurement results item 38 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district believe that technology has a positive impact on students' academic achievement.

Technology Helps Increase Student Engagement in Lessons

From the measurement results, item 39 is in a position close to logit -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai Regency agree that technology helps increase student engagement in lessons.

Students are more active in participating when using technology

From the measurement results, item 40 is in a position between logit 0 and -1, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai Regency agree that students are more active in participating when using technology.

The results of 6 statements about the effective use of technology have positive numbers, meaning that the use of technology in learning has a positive impact. This result is supported by the statement (Ali et al., 2024) by integrating technology into classroom teaching, we can improve learning efficiency, encourage active student participation, and create more engaging and relevant learning experiences. In essence, the role of technology in education is to improve the quality of teaching and learning and prepare students to face the challenges of the ever-growing digital world.

Technical Skills (TS)

Section 7 Technical Skills has 4 statement items measured with the following explanation.

1) *Teachers are able to overcome technical problems that arise during learning*

From the measurement results, item 41 is in a position close to logit 0, meaning that this statement is quite easy for respondents to agree with. This indicates that teachers in Banggai district are able to overcome technical problems that arise during learning.

2) *Teachers Feel Confident Solving Technology Problems Without Help*

From the measurement results, item 42 is in the right position at logit +1, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai district feel confident solving technology problems without assistance.

3) *Teachers Quickly Learn and Implement New Technology in Teaching*

From the measurement results, item 43 is in a position between logit 0 and +1, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai district are quick to learn and implement new technology in teaching.

4) *Teachers Feel Comfortable Adopting New Technology for Learning*

From the measurement results, item 44 is in a position close to logit 0, meaning that this statement is quite difficult for respondents to agree with. This indicates that teachers in Banggai district agree that they feel comfortable adopting new technology for learning.

The rapid development of this technology also has an impact on the quality of education provided by teachers to students due to the development of educational technology. Learning media is needed for students so that they can learn abstract and microscopic concepts so that theoretical learning can be more realistic. (Suaidah et al., 2023). Teachers' acceptance and adaption of technology into their courses is assumed to be influenced by a variety of characteristics, including their professional self-efficacy, age, education, and perception of the technology. In this regard, several studies have investigated how useful instructors' technical skills are for their own learning, planning lessons, and engaging in classroom activities (Foulger et al., 2017; Judson, 2006; Norris et al., 2003; Sugar et al., 2004; Zhu et al., 2013). With the use of technology in education, digital competence has become one of the important competencies that teachers need to master (Mathews, 2016; Moyo et al., 2022; Yu Zhao et al., 2021).

Teachers' digital competence refers to a set of skills that enable them to effectively use a variety of appropriate technologies to optimize the teaching process (Chadegani et al., 2013). However, in the realization of technology and digital competence, teachers are primarily expected to have digital literacy(Hutchison & Woodward, 2018; Zhang, 2023). Digital literacy can lead to teachers' professional development and empowerment, improve the quality of their education, and thus lead to confidence and mastery in using these technologies (Hamakali & Josua, 2023; Pérez-Escoda et al., 2019).

Challanges in Technology Use (CTU)

Section 8 has 4 statements describing Challange in Technology Use with the following description.

1) *Teachers Face Difficulties in Accessing the Internet at School*

From the measurement results, item 45 is in a position between logit +1 and +2, which means that this statement is difficult for respondents to agree with. This indicates that teachers in Banggai district almost never face difficulties in accessing the internet at school.

2) *Limited Technology at School Impedes the Use of Technology in Learning*

From the measurement results, item 46 is in a position close to logit +1, meaning that this statement is difficult for respondents to agree with. This indicates that teachers in Banggai district disagree that limited technology in schools hinders the use of technology in learning.

3) *Teachers Feel Lack of Support from School Parties in the Use of Technology*

From the measurement results, item 47 is in a position between logit +2 and +3, which means that this statement is very difficult for respondents to agree with. This indicates that there are almost no teachers in Banggai district who feel a lack of support from the school in the use of technology.

4) *Students Experience Difficulties in Using Technology Due to Lack of Access at Home*

From the measurement results, item 48 is in a position close to logit +1, meaning that this statement is difficult for respondents to agree with. This indicates that teachers in Banggai Regency disagree with the statement Students have difficulty using technology due to lack of access at home.

All statements from the aspect of challenges in the use of technology in Banggai district, both teachers and students, do not feel that there are serious obstacles. Because currently the development of telecommunications facilities in Banggai district is good. However, challenges in using technology in learning will always exist, especially in remote areas with minimal telecommunications facilities.many teacher education programs have not been preparing teacher candidates adequately to integrate technology, and many teachers in schools are reluctant to use technology for teaching and learning (David & Talbot, 1999; Fishman & Davis, 2006; Yong Zhao et al., 2002). One of reasons for this phenomenon is that student teachers have very little knowledge about effective technology integration, even after completing courses about instructional technology (Hew & Brush, 2007; Vannata & Beyerbach, 2000). Although technology courses have offered a variety of technological tools and provided opportunities to learn and practice technical skills, it has been pointed out that mere exposure to a number of technical tools does not necessarily mean that pre-service teachers can develop abilities to design successful, technology integrated lessons. Conversely, focusing solely on pedagogical issues without teaching foundational technical knowledge and skills may lead to difficulties in designing and delivering technology integrated instruction (Mehlinger & Powers, 2002). Taken together, these observations may indicate that there is a need to understand how teacher education programs could be designed and implemented to provide pre-services teachers with a balance between pedagogical knowledge and technological knowledge.

The results of the research analysis of teacher competence data integrating technology in learning in Banggai District in the 2024/2025 academic year as many as 690 respondents in terms of 8 parts of teacher competence obtained the average value (mean) of teacher competence integrating technology in learning in Banggai District can be seen in Table 1.

Table 1. Average Score of Each Section of Teacher Competency

Section	Code	Average Score
Challenges in Technology Use	CTU	1.57
Technical Skills	TS	0.43
Technological Knowledge	TK	-0.04
Professional Development and Collaboration	PDC	-0.08
Technological Pedagogical Knowledge	TPK	-0.06
Pedagogical Knowledge	PK	-0.08
Content Knowledge	CK	-0.32
Effectiveness of Technology Use	ETU	-0.71

From table 1 above, in the positive value section, it means that it has a higher value and means that it is

difficult for respondents to agree or in other words, teachers in Banggai Regency are suspected of disagreeing or strongly disagreeing with the statement items in the Challenges in Technology Use section. However, in the negative value section, it means that it has a low value and is easy to agree, in other words, teachers in Banggai Regency are suspected of agreeing or strongly agreeing with the items on the statement in the Technological Knowledge, Professional Development and Collaboration, Pedagogical Knowledge, Content Knowledge and Effectiveness of Technology Use sections. This indicates that teachers in Banggai district have a fairly high competence to integrate technology in learning.

Conclusion

From the results of the study, it was found that the competence of teachers in integrating technology in the learning process in Banggai Regency in terms of 8 sections obtained an average value from the highest to the lowest consecutively starting from Challenges in Technology Use of 1.57, Technical Skills of 0.43, Technological Knowledge of -0.04, Technological Pedagogical Knowledge of -0.06, Professional Development and Collaboration -0.08, Pedagogical Knowledge of -0.08, Content Knowledge of -0.32, and Effectiveness of Technology Use of -0.71. This indicates that teachers in Banggai district have a fairly high competency to integrate technology in learning.

Author Contributions
All authors have made significant contributions to completing this manuscript.

Funding
This research received no external funding.

Conflicts of Interest
The authors declare no conflict of interest.

References

Ali, M., Aini, M. A., & Alam, S. N. (2024). Integrating Technology in Learning in Madrasah: Toward the Digital Age. *INJOE Indoensian Journal of Education*, *4*(1), 290–304. Retrieved from https://www.injoe.org/index.php/INJOE/article/view/122

Anggraini, D. M., Asbari, M., Eka, I., Santoso, G., & Rantina, M. (2023). Strong Why: Menguatkan Logika Mengapa dalam Kehidupan. *JPT Jurnal Pendidikan Transformatif*, *2*(2), 11–14. https://doi.org/10.9000/jupetra.v2i2.154

Anwar, B. (2018). Kompetensi Pedagogik Sebagai Agen Pembelaran. *Jurnal Shaut Al-'Arabiyah*, *6*(2), 114–125.

Azwar, S. (2011). *Metode Penelitian* (Cetakan 12). Pustaka Belajar.

Berliner, D. C., Ca, R. C., & Lfee. (2013). *Handbook of Educational Psycology*. Routledge.

Chadegani, A. A., Salehi, H., Yunus, M. M., Farhadi, H., Fooladi, M., Farhadi, M., & Ebrahim, N. A. (2013). A Comparison between Two Main Academic Literature Collections: Web of Science and Scopus Databases. *ArXiv Preprint ArXiv:1305.0377*. https://doi.org/10.5539/ass.v9n5p18

Chang, C.-Y., Kuo, S.-Y., & Hwang, G.-H. (2022). Chatbot-facilitated Nursing Education: Incorporating a Knowledge-Based Chatbot Syses into a Nursing Training Program. *Journal of Education Technology & Society*, *25*(1), 15–27.

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, Social Media, and Self-Regulated Learning: A Natural Formula for Connecting Formal and Informal Learning. *The Internet and Higher Education*, *15*(1), 3–8. https://doi.org/10.1016/j.iheduc.2011.06.002

David, M., & Talbot, B. (1999). *Will New Teachers Be Prepared To Teach in a Digital Age? A National Survey on Information Technology in Teacher Education.*

Farjon, D., Smits, A., & Voogth, J. (2019). Technology Integration of Pre-Service Teachers Explined by Attitudes and Beliefs, Competency, Access, and Experience. *Computers & Education*, *130*, 81–93. https://doi.org/10.1016/j.compedu.2018.11.010

Febrian, W. D., Rubadi, Sjarifudin, D., Tahir, A. M. S., & Perwitasari, E. (2023). Approach Transformational Leadership: Organizational Goal & Employee Retention. *Journal of Economics Management Enterpreneur and Business*, *3*(1), 61–67. http://dx.doi.org/10.1504/IJLIC.2022.121252

Fishman, B., & Davis, E. A. (2006). *Teacher Learning Research and the Learning Sciences*. Cambridge University Press.

Foulger, T. S., Graziano, K. J., Schmidt-Crawford, D., & Slykhuis, D. A. (2017). Teacher Educator Technology Competencies. *Journal of Technology and Teacher Education*, *25*(4), 413–448. Retrieved from https://site.aace.org/tetc/

Gee, J. P. (2003). What Video Games Have to Teach Us About Learning and Literacy. *Computers in Entertainment (CIE)*, *1*(1), 1–20. http://dx.doi.org/10.1145/950566.950595

Hattie, J. A. C., & Donoghue, G. M. (2016). Learning Strategies: A Sythesis and Conceptual Model. *NPJ Science Learn*, *1*(1), 1–13. http://dx.doi.org/10.1038/npjscilearn.2016.13

Hendrarti, B. G., Iswanto, J., Tohawi, A., Subekan, & Dianto, A. Y. (2023). Pengaruh Fluktuasi Harga

Cabai Rawit dan Dampaknya pada Daya Beli Konsumen di Pasar Wage Nganjuk. *Jurnal Kolaboratif Sains*, *6*(11), 1595–1600. https://doi.org/10.56338/jks.v6i11.4651

Hew, K. F., & Brush, T. (2007). Integrating Technology Into K-12 Teaching and Learning: Current Knowledge Gaps and Recommendations for Future Research. *Educational Technology Research and Development*, *55*, 223–252. http://dx.doi.org/10.1007/s11423-006-9022-5

Hutchison, A. C., & Woodward, L. (2018). Examining the Technology Integration Planning Cycle Model of Professional Development to Support Teachers' Instructional Practices. *Teacher College Record*, *120*(10), 1–44. http://dx.doi.org/10.1177/016146811812001002

Iswanto, J., Subekan, Sa'Diyah, D. F., Mastur, & Tohawi, A. (2023). trategi Pemasaran yang Efektif: Meningkatkan Omzet Penjualan Roti dalam Tinjauan Hukum Ekonomi Islam di Mawaddah Bakery Bandar Lor Kediri. *Journal on Education*, *5*(4), 17807–17813. https://doi.org/10.31004/joe.v5i4.4775

Johnson, L., Becker, A., Estrada, V., & Martin, S. (2019). *Technology Outlook STEM+ Education 2013-2018: An NMC Horizon Project Sector Analysis* (Austin (ed.)). The New Media Consortium.

Judson, E. (2006). How Teachers Integrate Technology and Their Beliefs About Learning: Is There a Connection? *Journal of Technology and Teacher Education*, *14*(3), 581–597.

Knezek, G., & Christensen, R. (2015). The Will, Skill, Tool Model of Technology Integration: Adding Pedagogy as a New Model Construct. *International Association for Development of the Information Society*.

Mathews, S. A. (2016). Using Digital Participatory Research to Foster Glocal Competence; Constructing Multimedia Projects as a Form of Global and Civic Citizenship. *Journal of Social Studies Education Research*, *7*(2). Retrieved from http://jsser.org/index.php/jsser/article/view/170

Mayer, R. E. (2003). *The Cambridge Handbook of Multimedia*. Cambridge University Press.

Mehlinger, H. D., & Powers, S. D. (2002). *Technology and Teacher Education: A Guide for Educators and Policymakers*.

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teacher College Record*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Moyo, R., Ngidi, S., Koai, M., & Lemeko, P. (2022). Online Teaching and Learning Experiences of Higher Education Lecturers and Students in the COVID-19 Era: A Leap to Digital Pedagogies? *JCVE Journal of Culture and Values in Education*, *5*(1), 23–42. http://dx.doi.org/10.46303/jcve.2022.4

Norris, C., Sullivan, T., Poirot, J., & Soloway, E. (2003). No Access, No Use, No Impact: snapshot surveys of educational technology in K# x2013; 12. *Journal of Research on Technology in Education*, *36*(1), 15–27.

Ober, T. M., Brenner, C. J., Olsen, A., Homer, B. D., & Plass, J. L. (2021). Detecting Patterns of Engagement in a Digital Cognitive Skills Training Game. *Computers & Education*, *165*(104144). https://doi.org/10.1016/j.compedu.2021.104144

Rahayu, R., & Muhtar, T. (2022). Urgensi Kompetensi Pedagogik Guru Dalam Menghadapi Transforasi Pendidikan Abad 21. *Jurnal Basicedu*, *6*(3), 5708–5713. http://dx.doi.org/10.31004/basicedu.v6i4.3117

Rosyadi, R., & Maknun, J. (2023). Pentingkah Pedagogik Dalam Pendidikan Arsitektur: Metode Pembelajaran Studio Perancangan Arsitektur). *MESA (Teknik Mesin, Elektro, Teknik Sipil, Teknik Arsitektur)*, *7*(1), 1–11. https://doi.org/10.35569/ftk.v7i1.1958

Santoso, G., Muchtar, S. Al, & Abdulkarim, A. (2015). Analysis SWOT Civic Education Curriculum for Senior High School Year 1975-2013. *Jurnal Civicus*, *15*(1). https://doi.org/10.17509/civicus.v15i1.2073

Shulman, L. S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Education Researcher*, *15*(2), 4–14.

Shulman, L. S. (1987). Knowledge and Teaching:Foundations of the New Reform. *Harvard Educational Review*, *57*(1), 23.

So, H.-J., & Kim, B. (2009). Learning About Problem Based Learning: Student Teachers Intrgrating Technology, Pedagogy and Content Knowledge. *Austrasian Journal of Educational Technology*, *25*(1), 101–116. https://doi.org/10.14742/ajet.1183

Spiteri, M., & Rundgren, S.-N. (2020). Literature Review on the Factors Affecting Primary Teachers' Use of Digital Technology. *Technology Knowledge and Learning*, *25*(1), 115–128. https://link.springer.com/article/10.1007/s10758-018-9376-x

Straub, S., & Rummel, N. (2020). Promoting Interaction in Online Distance Education: Designing, Implementing and Supporting Collaborative Learning. *Information and Learning Science*, *121*(5/6), 251–260. http://dx.doi.org/10.1108/ILS-04-2020-0090

Suaidah, Surahman, A., Permata, Gunawan, R. D., Febriyansyah, R., & Fahrizal, M. (2023). Pelatihan Pembuatan Game for Education bagi Guru dan Siswa SMKN 7 Bandar Lampung. *JPKM Jurnal Pengabdian Kepada Masyarakat*, *4*(1), 39–46.

http://dx.doi.org/10.23960/jpkmt.v4i1.110

Sugar, W., Crawley, F., & Fine, B. (2004). Examining Teachers' Decisions to Adopt New Technology. *Journal of Educational Technology & Society*, *7*(4), 201–213.

Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. PT. Alfabet.

Sumintono, B., & Widhiarso, W. (2015). *Aplikasi permodelan RASCH Pada Assessment Pendidikan*. (Edisi 1). Trim Komunikata.

Taimalu, M., & Luik, P. (2019). The Impact of Beliefs and Knowledge on the Integration of Technology Among Teacher Educators: A Path Analysis. *Teaching and Teacher Education*, *79*, 101–110. http://dx.doi.org/10.1016/j.tate.2018.12.012

Tonderu, J., Roblin, N. P., Braak, J. Van, Fisser, P., & Voogt, J. (2012). Technological Pedagogical Content Knowledge in Teacher Education: in Search of a New Curriculum. *Educational Studies*, *39*(2), 239–243. http://dx.doi.org/10.1080/03055698.2012.713548

Uce, L. (2021). Urgensi Pembekalan Pedagogik Keapda Orang Tua. *Bunayya Jurnal Pendidikan Anak*, *7*(1), 54–67. http://dx.doi.org/10.22373/bunayya.v7i1.9289

Vannata, R. A., & Beyerbach, B. (2000). Facilitating a Constructivist Vision of Technology Integration among Education Faculty and Preservice Teachers. *Journal of Research on Computing in Education*, *33*(2), 132–148. http://dx.doi.org/10.1080/08886504.2000.10782305

Zhang, J. (2023). EFL Teachers' Digital Literacy: the Role of Contextual Factors in Their Literacy Development. *Frontiers in Psychology*, *14*(1153339). https://doi.org/10.3389/fpsyg.2023.1153339

Zhao, Yong, Pugh, K., & Byers, J. L. (2002). Conditions for Classroom Technology Innovations. *Teacher College Record*, *104*(3), 482–515. https://doi.org/10.1111/1467-9620.00170

Zhao, Yu, Llorente, A. M. P., & Gomez, M. C. S. (2021). Digital Competence in Higher Education Research: A Systematic Literature Review. *Computers & Education*, *168*(104212). https://doi.org/10.1016/j.compedu.2021.104212

Zhu, C., Wang, D., Cai, Y., & Engels, N. (2013). What core competencies are related to teachers' innovative teaching? *Asia-Pasific Journal of Teacher Education*, *41*(1), 9–27. http://dx.doi.org/10.1080/1359866X.2012.753984