A MIXED-METHODS STUDY OF SCHOOL LANGUAGE TEACHERS' TECHNOLOGY INTEGRATION: ARE THEY COMPETENCE WITH TPACK IN ONLINE LEARNING ENVIRONMENT?

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ABSTRACT

Over the past few years, technology integrated into online learning has become a significant component of education in response to educational evaluation worldwide, especially in Indonesia. The current study aims to explore the TPACK levels of Javanese school teachers, identify integrated technologies-based media used by Javanese school teachers in online learning practices and learning assessment, and analyze the benefits and drawbacks of Javanese school teachers integrating technology in online learning. This study used a mixed-method design, combining quantitative and qualitative approaches. The participants were 330 Javanese school teachers from Central Java Province and Yogyakarta Special Region, Indonesia. The findings reveal that Javanese school teachers are more proficient in pedagogical knowledge, pedagogical content knowledge, and content knowledge than technological knowledge, technological content knowledge, technological pedagogical knowledge, and TPACK. Javanese School teachers have integrated various technologies into online learning. However, Javanese school teachers limited technological literacy affects the efficiency of online learning. In addition, this study also offers an overview of the knowledge and expertise of Javanese school teachers regarding technology mastery in online learning. Thus, this study suggests that policymakers facilitate Javanese school teachers to develop technological skills in transferring materials in online learning to support the current adapted curriculum.

Keywords: Indonesia, integrated technology, Javanese school teachers, online learning, TPACK.

INTRODUCTION

As a result of socio-educational development, technology integration in learning has become an integral and significant part of educational change around the world (Ahmadi, 2018; Akram et al., 2022; Eady & Lockyer, 2013; Hechter et al., 2012; Karchmer-Klein & Konishi, 2023; Paudel, 2021). In Indonesia,

this trend is also reflected in the response to the evolution of the education curriculum that triggers a transformation in teaching and learning approaches, particularly in Javanese language subjects at the primary to secondary school levels. The change in curriculum policy from the 2013 Curriculum to the independent curriculum has encouraged a shift to online learning methods to support student character-building projects at the school level. Several factors trigger this learning model's shift, including the limited time in face-to-face Javanese teaching activities. This condition encourages teachers to adapt online learning methods that can effectively meet the allocation of learning time by utilizing technology to improve the quality and accessibility of learning. Integrating technology in online Javanese language learning can facilitate limited face-to-face teaching in schools (Akram et al., 2021). In addition to providing face-to-face learning opportunities online, integrating technology in teaching improves teaching quality and develops students' skills, increasing motivation, knowledge, and information efficiently (Akram et al., 2021; Chen et al., 2018).

Despite the advantages of using technology in online learning environments, teachers face difficulties utilizing integrated technology in learning practices due to inadequate technological competence (Akram et al., 2022). In addition, the lack of preparation in utilizing practical pedagogical approaches to adapt technology is another challenge for teachers. Teachers are also reluctant to improve their pedagogical competencies and digital skills due to limited learning time. Therefore, some teachers only integrate technology in the online learning of the Javanese language. Several studies (Ariyani et al., 2022; Elmaadaway & Abouelenein, 2023; Fuad et al., 2020; Ginting et al., 2022; Juanda et al., 2021; Kartimi et al., 2021; Kiyici & OVEZ, 2021; Makawawa et al., 2021; Mourlam et al., 2021; Tamah et al., 2020) portrayed teachers' perceptions of TPACK in teaching in various fields in schools during online learning during the Covid times, but overlooked the perceptions of school teachers, especially Javanese school teachers about the level of technological knowledge and technology integrated media in learning and the benefits and drawbacks in online learning. It suggests a gap in the study that this study seeks to address. The following study issues are the primary focus of this study:

RQ1: What are TPACK levels of Javanese school teachers?

RQ2: To what extent do Javanese school teachers' integrated technology-based media in online learning practice and learning assessment?

R23: To what extent do Javanese school teachers benefit and drawback integrating technology in online learning?

By acknowledging Javanese school teachers' perceptions, this study would help to know the extent of their ability to master technology. The aim is to prepare Javanese teachers' competencies to be more technology literate. It is intended that the difficulties Javanese school teachers face in using technology can be identified and proper facilitation can be provided to support the current adapted curriculum.

LITERATURE REVIEW

Studies on Teachers' Levels TPACK

In recent years, studies on Technological Pedagogical Content Knowledge (TPACK) have received increasing attention in various teaching fields. Cakiroglu et al. (2023) assessed the TPACK of teachers from education faculties involved in emergency distance learning and showed that the teachers had a high level of knowledge regarding TPACK. This finding aligns with Saricoban et al. (2019), who mentioned that English as a Foreign Language (EFL) teachers have satisfactory competence in TPACK. Alharbi (2020) also indicated that EFL teachers' TPACK knowledge is generally high. However, an assessment by Jamieson-Proctor et al. (2010) of pre-service teachers in Australia found that although they had high confidence in Technological Knowledge (TK), confidence in TPACK was relatively low, suggesting a gap in their readiness to integrate technology effectively. It is similar to Cheng (2017) in Taiwan, where TK was higher compared to Pedagogical Understanding (PK) and Content Understanding (CK). Zeng (2022) reported that technological knowledge (TK) significantly influences the use of technology by foreign language teachers in the context of Chinese foreign language teachers in Australia. They are more confident in non-technology knowledge compared to technology-related knowledge.

In some countries, the educational context also influences the perception and understanding of TPACK. For instance, Nazari et al. (2019) showed that in Iran, experienced teachers scored higher in pedagogical knowledge and pedagogical content knowledge. On the other hand, Bingimlas (2018) reported that most teachers in Saudi Arabia have a moderate level of TPACK. In addition, Van Loi (2021) reported a moderate level of perception of TPACK among secondary school teachers in Vietnam, mainly related to the challenge of limited access to technology. Muhaimin et al. (2019) found that Indonesian teachers' perceptions of technology-based knowledge tended to be lower than non-technology knowledge. Surayya et al. (2021) showed that most EFL teachers in Indonesia have difficulties in applying TPACK in learning, possibly due to the technology integration constraints faced by senior teachers (Fuad, 2020). Apriandi et al. (2023) also showed that these difficulties are influenced by gender, age, and teaching experience. Consequently, they provide monotonous online learning (Ariyani et al., 2023). Although the teachers are considered to have understood TPACK, there is still a need to improve teachers' technology skills to support the online learning, especially for Javanese school teachers.

The Use of Integrated Technology-based Media in Online Learning

Integrating technologies in online learning has spread worldwide (Hoque et al., 2023; Richards, 2015; Rintaningrum, 2023). The COVID-19 pandemic significantly accelerated the adoption of integrated technologies in educational institutions. Recent research into the different types of integrated technologies school teachers use in online teaching has identified different outcomes, especially in language classes (Zhao, 2015). This study also recognizes the importance of using technology in the language classroom to help school teachers catch up and adapt to new learning styles (Islam et al., 2023). In line with these findings, Bond et al. (2018) concluded that educational institutions should seek to develop future professionals with problem-solving skills, enabling teachers to advance their professional talents by integrating technology into online learning. Not only teachers, but the use of technology can also inspire students, following previous research showing that technology-based instruction can increase students' motivation to learn (Lai & Tai, 2021). Teachers can also improve efficacy and efficiency in online learning by utilizing media-based technology.

The use of technology in digital education has resulted in significant changes in the way to acquire and engage in the process of knowledge acquisition. Technology-based media is vital in this revolution. It includes information and communication technologies, allowing for a more dynamic and diversified teaching experience. Learning management systems such as Moodle, Schoology, and Google Classroom are required within online educational settings (Ariyani et al., 2022). In addition, programs like WhatsApp, Zoom, and Google Forms have been utilized to instruct students in Indonesian (Fuad et al., 2020). A similar trend may be seen in foreign language teaching, where Google Classroom is one of the most often used platforms (Moonma, 2021). Teachers in Indonesia employ a variety of electronic learning platforms to administer online education, encompassing WhatsApp, Zoom, Google Classroom, Edmodo, and additional tools (Tauhidah et al., 2021). In addition, research shows different preferences in platform use by region, with teachers in eastern Indonesia more likely to use Google Classroom and WhatsApp (Maru et al., 2022).

The utilization of Google Classroom, as an illustration, not only expedites the process of teaching and learning but also functions as a tool for evaluating the advancement of students via online assignments and quizzes, fostering active participation in online education (Hussaini et al., 2020). Nevertheless, the inclinations towards electronic learning platforms may differ across various regions of the globe. For instance, widely utilized platforms such as DingTalk, Tencent Meeting, and comparable alternatives are prevalent within China (Chen et al., 2020; Chen et al., 2020). Meanwhile, in other countries, such as India, platforms like Byjus, Vedantu, Whitehat, and Khan Academy have become an integral part of online education at the school level (Kansal et al., 2021). Similarly, in Ukrainian schools, some e-learning platforms are used in educational contexts, such as Accent (Monischool), Class Assessment, and others (Zhenchenko et al., 2022). The use of technology in the realm of online learning has bestowed upon teachers around the globe many options.

Meanwhile, technology-based media integrated into online assessment shows differences with online learning. For instance, Agung et al. (2019) reported that Google Forms is a good choice for teachers as it has advantages in activity, efficiency, and attractiveness for students, which can ease teachers' workload in assessment (Sari et al., 2020). In addition, Divayana et al. (2021) found that SEVINA & EDLink platforms

are one of the online assessment options in the context of online learning in Indonesia. Hidayad et al. (2023) suggest that Kahoot is an appropriate online assessment platform for EFL classes. It is in line with Kusuma (2022) noted the use of Kahoot as an online assessment tool by EFL teachers in rural schools in Indonesia. Aina & Ogegbo (2021) reported various teaching and assessment methodologies used on this platform, such as small group work, collaborative learning, case method, discussion posts, multiple-choice quizzes, chat, game activities, and open-ended questions.

Benefits and Drawbacks of Online Learning

Online learning has garnered substantial recognition as a feasible substitute for conventional in-person instruction, especially within online education. Despite the numerous benefits of online learning, it also entails certain disadvantages that necessitate careful contemplation. One of the principal advantages of virtual online learning lies in its adaptability and accessibility. As Mukhtar et al. (2020) discovered, online learning is a flexible and practical resource that empowers students to become self-directed learners. By participating in online discussions and activities, students can transcend geographical constraints and enjoy enhanced convenience and flexibility in their educational endeavors. Gilakjani (2014) has demonstrated the benefits of incorporating technology in language teaching and its positive effects. Technology incorporation into language teaching offers excellent chances for students and teachers to explore new things (Merzifonluoglu & Gonulal, 2018). Consistent with Rintaningrum et al. (2016), having access to technology at home makes it simpler for language learners to acquire the language. Additionally, with the aid of technology, language learners can locate various authentic materials that can help them advance their language proficiency (Clements & Sarama, 2003).

On the contrary, one primary drawback of online education is the lack of nonverbal indications. Within in-person interactions, nonverbal cues such as countenances, bodily gestures, and vocal inflections are pivotal in communication and comprehension. In online learning, these cues are often limited or absent, making it challenging to interpret and accurately perceive communication's emotions, intentions, and nuances (Picciano, 2017). The absence of physical presence and reliance can create a barrier to building personal connections and a sense of community. This lack of social presence may negatively impact motivation, engagement, and a sense of belongingness. Similarly, Sepulveda-Escobar & Morrison (2020) found that the lack of direct interaction with learners and sudden changes in setting affected the learning process. Engaging in online learning necessitates a reliable internet connection and appropriate technological infrastructure. Students with limited internet connections or face restrictions in accessing technology might encounter difficulties fully engaging in online discussions and tasks. Technical challenges can disrupt the interaction flow and hinder the learning experience (Hrastinski, 2008). In line with Kamal & Illiyan (2021), they encountered obstacles in online learning, such as technical constraints, difficulties in examinations, and online assessments.

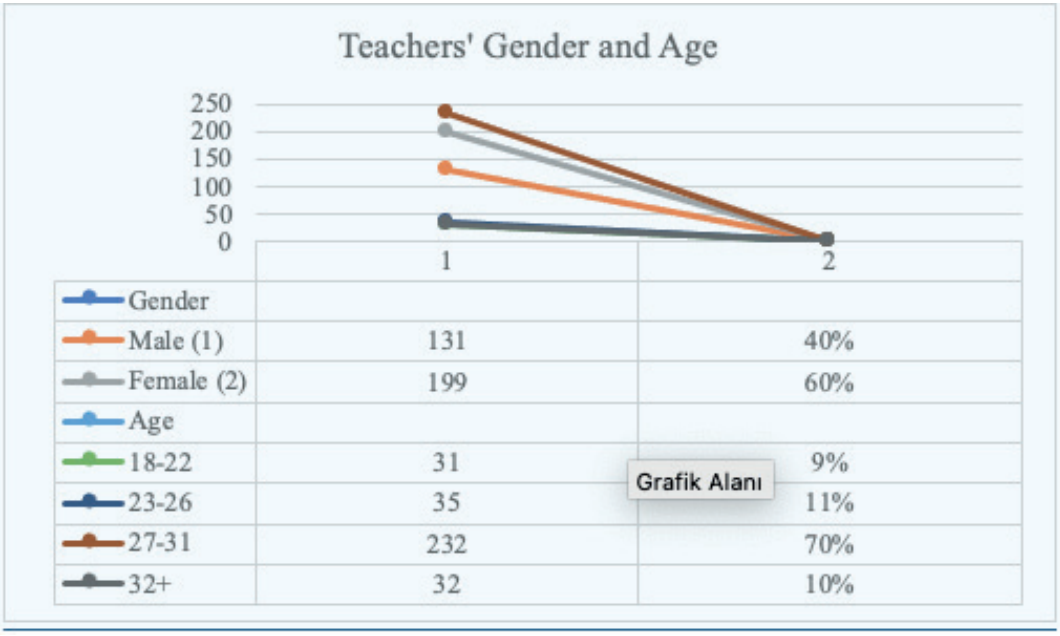
METHODS

This comprehensive research study used a mix method research design, combining a quantitative and qualitative approaches (Creswell, 1999). This research design effectively integrated the strengths of each method to offer a comprehensive understanding of the study topic. The study employed several clear steps, from preliminary research, instrument development, survey implementation in Central Java and Yogyakarta Special Region, data analysis and synthesis, and reporting of results, to ensure a systematic and holistic approach.

Participants

The subjects were Javanese school teachers in Central Java Province and Yogyakarta Special Region, Indonesia who were selected by random sampling. The data collection technique used a questionnaire distributed through the Google Form. The target subjects were 330 Javanese school teachers in primary schools, middle schools, high schools, and technical colleges, both public and private. The 330 Javanese school teachers were divided into 40% male and 60% female teachers. The age range of respondents ranged from 18 years to more

than 32 years, with 9% of teachers aged 18-22 years, 11% of teachers aged 23-26 years, 70% of teachers aged 27-31 years, and 10% of teachers aged more than 32 years. The demographic distribution of the research subjects is presented in Figure 1.



	1	2
Gender		
Male (1)	131	40%
Female (2)	199	60%
Age		
18-22	31	9%
23-26	35	11%
27-31	232	70%
32+	32	10%

Figure 1. Teachers' gender and age

Regarding school level, 9.39% of the participants were elementary school teachers, 40.61% were junior high school teachers, and 50.00% were a combination of high schools, and technical colleges teachers. Figure 3.2 shows the distribution of teachers' length of teaching the Javanese language at each school level. Most of the teachers in this study have been teaching for 3-10 years, with a percentage of 35.2% teachers teaching for 3-5 years and 35.5% teachers teaching for 6-10 years. The rest, 21.8% of teachers, have been teaching for 1-2 years, fresh graduates who have not taught for one year are 5.5%, and senior teachers who have taught for more than ten years are 2.1%. The number of participants who have been teaching for more than three years certainly impacts the pedagogical ability of teachers in teaching Javanese, especially with the challenges of the times that require teachers to integrate technology into Javanese language learning.

	< 1 year	1-2 year	3-5 year	6-10 year	10+ year
Elementary School	5	15	2	6	3
Junior High School	4	28	48	51	3
Senior High School	9	29	66	60	1
Percentage	5,5%	21,8%	35,2%	35,5%	2,1%

Figure 2. Schools and years of teaching

Research Instrument

The 33 items in the study's questionnaire, which were created based on teacher TPACK indicators, had four response scales: strongly disagree, disagree, agree, and highly agree. The statements were modified based on the findings from the questionnaire developed by (Schmidt et al., 2009). Meanwhile, four open-ended statements relating to Javanese school teachers' opinions on Javanese language online learning were adapted from the study and literature (Fuad., 2020; Prior et al., 2016; Shulman, 1986).

Validiy and Reliability

The study instruments were tested for validity and reliability. Validity was tested using the Pearson correlation formula, and all statement items were considered valid because the correlation value was more significant than the r table value at the 0.05 significance level with a sample size of 330. Furthermore, the instrument's reliability was tested using Cronbach's Alpha formula. The resulting values show that each questionnaire item has a value of more than 0.6, which indicates that the questionnaire used is reliable. Before conducting confirmatory factor analysis (CFA), the data verified for validity and reliability were tested for factor eligibility using KMO and Bartlett's Test. KMO values of more than 0.5 and Sig (significance) values of less than 0.05 indicate that the data are eligible for factor analysis.

Data Analysis

The analysis of close statements from the online questionnaire was quantitatively examined using the CFA approach. In order to determine whether there is a correlation between the TPACK variables, the Pearson correlation test was also performed using SPSS version 23.0. Meanwhile, the open-ended questions in the questionnaire were qualitatively examined, with the data being condensed to obtain representative themes, which were then displayed in a table and omitted from the conclusion.

FINDINGS

TPACK Levels of Javanese School Teachers

The results of Javanese school teachers' TPACK skills in online learning have a positive trend by measuring seven TPACK variables. Pedagogical knowledge, pedagogical content knowledge, and content knowledge are the variables that have the most positive trend compared to other TPACK variables. It shows that Javanese school teachers are more expert in mastering the material and can manage the class in delivering effective Javanese language materials. On the other hand, variables concerning technological skills, be it technological knowledge, technological content knowledge, technological pedagogical knowledge, and TPACK, still require further skill development because they have a higher negative tendency (Disagree-Strongly Disagree < 17.1%). It must be noted that teachers have a positive tendency to master theories and how to deliver subject matter but lack mastery of technology to present material, develop students' knowledge related to Javanese language material, and master technology to teach Javanese language more effectively. Mastery of Javanese language materials tends to be more optimistic than mastery of technology because most of the respondents in this study have been teaching for more than three years, so they have a lot of experience and teaching expertise in their fields.

On the other hand, related to mastery of technology, Javanese school teachers find it challenging to develop various types of learning media that utilize technology. The teachers feel that they do not have enough time to explore their abilities, so most of them only use the material in the form of PowerPoints that have been designed in previous years, whereas to support the online learning process where not all material can be taught during the specified lesson hours, technology plays a vital role so that learning can be conditioned optimally. It is reinforced by policies related to the Indonesian Minister of Education and Culture target, which targets increasing technology mastery for teachers. Digital literacy must be a particular concern so that Javanese school teachers want to learn quickly to face technological challenges in the era of disruption 4.0 and education 5.0.

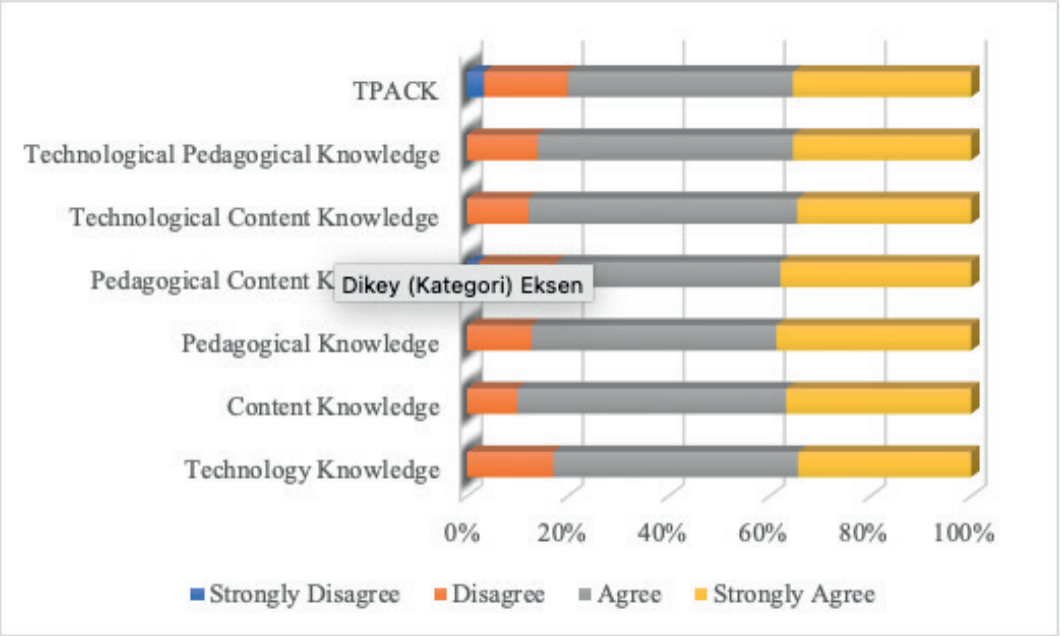


Figure 3. The trend of the variable levels of Javanese school teachers' TPACK

The questionnaire of understanding the mastery of technology manifested in understanding TPACK consists of 33 statement items. Based on Table 1, each TPACK component has factor loading, and judging from the results of Cronbach's Alpha reliability value, which is more than 0.6, the instrument used looks valid and reliable to be used as a research instrument. However, some items have commonalities extraction values of less than 0.5, which indicates that some items do not represent the measured TPACK factors.

Table 1. Responses of frequency and loading factor of TPACK questionnaire

No	Questionnaire Components	Frequency Response				Factor Loading	Cronbach's Alpha	Communalities
		SD	D	A	SA			
	Technology Knowledge (TK)							
1	I know how to handle technical difficulties in the classroom.	0	41	135	154	0.568	0.923	0.323
2	I can use technology easily.	0	58	173	99	0.934	0.894	0.873
3	I remain up-to-date with new technologies that matter to me.	0	52	124	154	0.742	0.905	0.55
4	I like to try new technology.	0	49	182	99	0.667	0.914	0.445
5	I am quite knowledgeable about several technologies.	0	68	174	88	0.85	0.899	0.722
6	I am technically capable of using the technologies.	0	50	181	99	0.904	0.899	0.817
7	I have quite a few opportunities to work with various technologies.	0	77	154	99	0.8	0.905	0.639
	Content Knowledge (CK)							
8	I am knowledgeable enough in Javanese subject.	0	11	220	99	0.711	0.879	0.505
9	I usually apply scientific thinking.	0	33	176	121	0.999	0.662	0.999
10	I use a range of methods and techniques to deepen my grasp of Javanese material.	0	55	132	143	0.792	0.821	0.628
	Pedagogical Knowledge (PK)							
11	I am aware of how to evaluate the work of students in a classroom.	0	11	165	154	0.811	0.948	0.658

12	I can modify my teaching based on what the students currently understand or don't understand.	0	55	154	121	0.852	0.944	0.727
13	I am able to modify my teaching methods for various students.	0	77	132	121	0.937	0.941	0.878
14	I have several approaches to evaluate students' learning.	0	55	154	121	0.836	0.946	0.699
15	I am capable of utilizing a variety of teaching strategies in the classroom.	0	55	176	99	0.904	0.944	0.817
16	I am knowledgeable about the understanding and misunderstandings of students.	0	11	176	143	0.79	0.952	0.625
17	I know how to arrange and organize the class.	0	33	165	132	0.906	0.943	0.821
	Pedagogical Content Knowledge (PCK)							
18	I may choose efficient teaching strategies to direct students' learning and Javanese thinking.	11	88	143	88	0.958	0.444	0.917
19	I can choose a useful teaching strategy to direct students' literacy-related thinking and learning.	11	44	165	110	0.856	0.479	0.732
20	I may modify my teaching methods based on the students' understanding to help them think critically and learn Javanese.	0	22	132	176	0.341	0.9	0.117
	Technological Content Knowledge (TCK)							
21	I am familiar with the technology I can use to study and practice Javanese language materials.	0	44	165	121	0.887	0.935	0.787
22	I can choose the most useful technology to comprehend Javanese language content.	0	44	176	110	1	0.862	0.999
23	I am aware of how to set up and run the lesson while utilizing technology to help students understand the Javanese language curriculum.	0	33	187	110	0.879	0.94	0.773
	Technological Pedagogical Knowledge (TPK)							
24	I can choose technologies to help me teach effectively.	0	44	165	121	0.855	0.903	0.731
25	I am able to choose technology that improves student learning.	0	55	154	121	0.792	0.918	0.627
26	I have given the impact of technology on my teaching style in the classroom a lot of thought thanks to programs in teacher education.	0	33	154	143	0.852	0.907	0.726
27	I consider using technology in the classroom thoughtfully.	0	66	187	77	0.837	0.907	0.701
28	I can modify how I use technology to fit various educational activities.	0	33	176	121	0.885	0.898	0.783
	Technological Pedagogical Content Knowledge (TPCK)							
29	I may teach a suitable subject by utilizing Javanese resources, technology, and teaching strategies.	11	66	110	143	0.968	0.939	0.936
30	I can choose teaching tools that will improve what I teach, how I teach it, and what the students learn.	11	44	187	88	0.76	0.957	0.577
31	I am able to apply the integration techniques I learned in my classroom courses for content, technology, and teaching methods.	11	77	121	121	0.955	0.941	0.912
32	I can help others plan how material, technology, and instructional strategies will be used in my school and/or district.	11	66	154	99	0.9	0.938	0.811
33	I can choose a piece of technology to improve a piece of content.	11	22	165	132	0.875	0.945	0.766

According to Table 1, the values for the Extraction Sums of Squared Loadings for the seven factors examined—TK, CK, PK, PCK, TCK, TPK, and TPCK—show that there is only one-factor variance among the seven factors. Meanwhile, the Eigenvalues show that TK has the most significant contribution, amounting to 58.456% of the overall factor. This result shows that knowledge of technology is essential for Javanese school teachers to learn more effectively by using technology to support learning.

From the correlation test results, despite TK contributing the most to teachers' TPACK skills, each TPACK variable has a positive relationship, including TK, CK, PK, PCK, TCK, TPK, and TPCK variables. It can be seen from the Sig value <0.01, which means that each variable is related. Generally, the correlation coefficient between factors with a score of more than 0.5 can be interpreted as a positive form of correlation between factors. The TK variable has a moderate correlation with the CK, PCK, TCK, TPK, and TPCK variables and has a strong correlation with the PK variable. The CK variable has a moderate correlation with the TK, PCK, TCK, TPK, and TPCK variables and strongly correlates with the PK variable. The PK variable strongly correlates with the TK, CK, PCK, TCK, and TPK variables and has a moderate correlation with the TPCK variable. PCK variable has a moderate correlation with TK and CK variables and strongly correlates with PK, TCK, TPK, and TPCK variables. The TCK variable has a moderate correlation with TK and CK and has a strong correlation with PK, PCK, TPK, and TPCK variables. The TPK variable has a moderate correlation with the TK and CK variables and has a strong correlation with the PK, PCK, TCK, and TPCK variables. The TPCK variable has a moderate correlation with the TK, CK, and PCK variables and has a strong correlation with the PCK, TCK, and TPK variables. Thus, it can be concluded that TPACK variables are interconnected and support each other.

Table 2. Correlation of TPACK components

	TK	CK	PK	PCK	TCK	TPK	TPCK
TK	1	0.653	0.888	0.578	0.643	0.643	0.517
CK	0.653	1	0.713	0.614	0.559	0.501	0.579
PK	0.888	0.713	1	0.704	0.718	0.737	0.618
PCK	0.578	0.614	0.704	1	0.821	0.855	0.897
TCK	0.643	0.559	0.718	0.821	1	0.883	0.851
TPK	0.643	0.501	0.737	0.855	0.883	1	0.905
TPCK	0.517	0.579	0.618	0.897	0.851	0.905	1

The Integrated Technology-based Media Used in Online Learning Practice and Learning Assessment

The use of technology and internet access are highly supportive in increasing the effectiveness of online classes organized by Javanese school teachers to support learning time. Various types of media, applications, and learning platforms are used to teach and learn online. Figure 4.1 shows 16 types of Javanese language media, applications, and learning platforms teachers use during Javanese language learning. Most of the Javanese school teachers who were respondents in the study used PowerPoint as the primary media to deliver Javanese learning materials. The YouTube platform is the second most used media to strengthen students' understanding of Javanese language materials. It is not surprising because students need to get many examples and illustrations of material that is more interesting and easily accessible independently to support Javanese language learning at home. The Google Classroom platform ranks third as technology teachers widely use to share materials and provide assignments to students.

Platforms like Moodle that can be developed as a learning website and have various benefits are less attractive to Javanese school teachers. It can happen because not all schools develop learning websites that can be accessed and used by teachers and students to support the learning process in the classroom. In addition, the ability of Javanese school teachers to develop new learning media that is interesting and according to the characteristics of students also looks still low by looking at the percentage of the use of media Canva, Adobe Photoshop, Adobe Flash, Macromedia Flash, Corel draw, Prezi, including Instagram which incidentally is one of the trending social media accounts among students. Of the sixteen media, only some types of familiar media are often used by Javanese school teachers, while others are rarely used.

On the other hand, using technology is essential in the online learning process and learning assessment. The media and platforms teachers use are Google Form, Kahoot, Quizizz, Wordshare, Wonderwall, Proprof, and MsOffice. Of the seven different learning assessment media, applications, and platforms, most Javanese school teachers (63.03%) use Google Forms as the most accessible and easy-to-use mode of Javanese learning assessment. Ms. Office ranks as the second most used learning assessment technology, at 23.64%. Quizizz game application ranks third as an assessment platform used by Javanese school teachers, at 7.88%. Quizizz, with more accessible features and more stable internet network access than Kahoot, makes it a game application more widely used by Javanese school teachers as an assessment technology for learning Javanese. Other types of game applications such as Wonderwall, word share, and Porprof are still rarely used by Javanese school teachers, even though these applications tend to provide more varied types of assessment games than Quizizz and Kahoot, which require a subscription to be able to optimize various features in them.

Benefit and Drawbacks of Javanese School Teachers in Online Learning

The questionnaire given to Javanese school teachers included open-ended questions that gathered information on the benefits and drawbacks of employing technology in online learning. The Javanese school teachers' response data related to the benefits and drawbacks of using technology written down are then reduced to be grouped into several representative statements, which are illustrated in Table 3.

Table 3. Benefits and drawbacks in Javanese language online learning

Characteristics	Javanese School Teachers' Responses
Benefits	Technology-based media can make it easier for students to learn anytime and anywhere without being limited to space and learning hours in the classroom, so that lessons that are sometimes forced to be reduced do not become a problem for teachers to complete the delivery of material outside the set lesson hours.
	Students can explore various Javanese language material information more efficiently and widely through various websites independently, primarily due to the limited Javanese language textbooks provided by the school.
	The use of various technology-based media makes students and teachers not afraid of being outdated because both parties learn to develop themselves occasionally.
	It makes it easier for teachers to design lessons and administratively carry out the evaluation process.
	Technology makes it easy for teachers to automatically correct students' assignments and test results through the learning assessment platform provided.
	Students can learn according to their learning style, so that the absorption of knowledge and understanding of each student can be maximized.
	Students can learn to be disciplined in submitting assignments on time.
Drawbacks	Many Javanese lessons were not delivered due to time constraints.
	Teachers' limited ability to master technology (ICT) causes learning to occur less effectively.
	Not all students understand technology well, so teachers need sufficient ICT skills to guide students to learn using technology-assisted media.
	Lack of time for self-development due to tasks other than teaching.
	Not all schools have Wi-Fi network facilities, and not all students have enough data packages to access materials connected to the Internet.

Javanese language online learning implemented by most teachers in Indonesia, particularly in Central Java and Yogyakarta Special Region, is a responsive solution to the changing times and technology. Online learning has many benefits for teachers and students, as mentioned in Table 3. One of the benefits online learning offers is the flexibility of time and place. P5 activities that take up much time for Javanese lessons can be dealt with using the online learning model so that the truncated lesson hours at school can be replaced outside formal school hours with the help of technology. The existence of technology balanced with adequate mastery of ICT skills will also make it easier for teachers and students to access additional material with a broader perspective through the internet. The positive thing that will be obtained is students' increasing digital literacy skills so that they will not be afraid of being outdated. Technology, which is the primary determinant of online learning, can also be explored by teachers to provide various technology-based learning media that suit students' characteristics. Thus, students' understanding of the material can be optimized. Teachers can also more easily work on learning administration, starting from designing learning tools to conducting evaluations with the help of technology. In the end, online learning supported by good ICT skills will make the course of Javanese language learning one step ahead of the previous times.

Although it is a benefit, using technology in this online learning does come with certain implementation issues, which are stated in Table 3. One of the main drawbacks is the significant time limitation in implementing online learning. This is because not all students have good internet access, plus not all students come from middle to upper-middle-class families, so many object to having to buy a large amount of internet quota packages constantly. Another drawback comes from the limited human resources of teachers who want to learn to improve their ability to master ICT in learning. Teachers must be willing to learn technological literacy in order to help students use technology as a learning tool. The low ability of teachers to master ICT will undoubtedly have an impact on the ineffectiveness of the learning process.

DISCUSSIONS

This study highlights Javanese school teachers' perceptions of technology integration related to TPACK in the online learning environment. This study investigates 330 Javanese school teachers who used modern technology in their online classes to explore their perceptions. The findings indicate that Javanese school teachers' perceptions have positive trends in pedagogical knowledge, pedagogical content knowledge, and content knowledge rather than technological knowledge, technological content knowledge, technological pedagogical knowledge, and TPACK. In contrast with recent studies, teachers are more confident in their non-technology knowledge than in technological knowledge (Cakiroglu et al., 2023; Muhaimin et al., 2019; Nazari et al., 2019; Santos & Castro, 2021). These findings contrast with some scholars who found that only TK is higher compared to PK and CK (Cheng, 2017; Jamieson-Proctor et al., 2010; Mashhadi et al., 2023; Zheng, 2022). These findings suggest that teachers have a positive tendency to master the theory and how to deliver the subject matter but lack the technology to present the material, develop students' knowledge related to Javanese language materials, and master the technology to teach Javanese more effectively. However, teachers' skills in integrating technology into online learning still need to be improved.

The lack of technology mastery among Javanese language school teachers significantly negatively impacts Javanese language online learning. It is reflected in the survey results showing that Javanese language teachers prefer using learning applications such as PowerPoint, YouTube, and Google Classroom in delivering materials to their students. This choice is because these three media are considered the easiest to use, are well-known by teachers, and do not require extensive data quotas. It aligns with Ariyani et al. (2022) and Fuad et al. (2020), who found Google Classroom as the dominant platform for delivering materials in Lampung Language and Indonesian Language lessons. Teachers widely use the Google Classroom platform for its ease of use, stability, and rich features that meet various learning criteria, such as assignments, quizzes, and end-of-semester exams. It contrasts to Zhenchenko et al. (2022), who found media use in Ukrainian schools such as Accent (Monischool), Class Assessment, and others. In contrast, Kansal et al. (2021) reported that schools in India use media such as Indian platforms like Byjus, Vedantu, Whitehat, and Khan Academy.

Meanwhile, Javanese school teachers also use integrated technology-based media for online learning assessment of the Javanese language, namely Google Forms, Kahoot, Quiz, Wordshare, Wonderwall, Proprof, and Ms. The findings show that Google Forms is still considered the most practical tool to assess students'

learning outcomes during online learning because it simplifies the process of compiling results from all students. Similarly, Agung et al. (2019) assessed that learning assessment using Google Forms is a good choice for teachers because it has advantages in activity, efficiency, and attractiveness for students. In this case, teachers do not feel the need to assess learning outcomes manually, especially if the questions given are in the form of multiple choice. In other words, using Google Forms lightens the teacher's workload regarding assessment (Sari et al., 2020). In contrast, Divayana et al. (2021) found that SEVINA & EDLink platforms are one of the online assessment options in Indonesia's online learning context. Hidayad et al. (2023) showed that Kahoot is an appropriate online assessment platform for EFL classes. Kusuma (2022) noted the use of Kahoot as an online assessment tool by EFL teachers in rural schools in Indonesia.

Despite the integration of technology-based media used by Javanese school teachers, Javanese language learning is ineffective in the long run-in supporting government programs in building student character due to the lack of teacher-student interaction. The teaching approach implemented in Javanese language online learning is less interactive and tends to focus on unilateral delivery of materials. Most Javanese school teachers only deliver materials through PowerPoint, video links, or quizzes sent through WhatsApp, without adequate online interaction. Direct interaction between teachers and students utilizing the Zoom feature is minimal. The lack of online interaction through features such as Zoom can be caused by several factors, one of which is the relatively expensive internet costs. It can be a major obstacle, especially for students or individuals with financial limitations. This approach may not be optimal for language learning, especially Javanese, as languages require interactive exercises, active conversations, and immediate feedback for effective development. This lack of direct interaction has a negative impact on the learning process, as students get less opportunity to ask questions, discuss, or get direct feedback from the teacher. It can also reduce students' motivation and engagement in online Javanese language learning. Similarly, Sepulveda-Escobar & Morrison (2020) found that the lack of direct interaction with learners and sudden background changes affect the learning process.

The implemented approach is due to the drawbacks faced by Javanese school teachers in designing learning media with new technology and several other issues such as time constraints, limited human resources, students' lack of understanding of ICT, limited time for self-development, limited internet access, plagiarism, and the difficulty of measuring students' psychomotor competencies. In contrast, Fuad et al. (2020) stated that online learning is highly dependent on the signal and connection of each user, where not all areas have a good signal, so communication does not work. Technical challenges can disrupt the interaction flow and hinder the learning experience (Andiyan et al., 2021; Dewi et al, 2021; Dutta & Smita, 2020; Hrastinski, 2008). However, online learning does not always provide problems or drawbacks. Conversely, various benefits can be obtained in online Javanese language learning, including flexibility, access to information, self-development, efficient learning, automatic correction, and student discipline. Consistent with Mukhtar et al. (2020) found that online learning is a flexible and practical resource that allows students to become independent students. However, student independence built by teachers in online learning in the absence of face-to-face interaction that only relies on delivering materials and assignments via WhatsApp can have several impacts that need to be considered. One of the impacts is the lack of opportunity to interact directly with teachers and classmates, which may hinder the development of student's social skills and communication abilities. Furthermore, the absence of comprehensive oversight and guidance by teachers can challenge certain students to comprehend the subject matter or accurately fulfill their assignments. Consequently, further endeavors are imperative to uphold the caliber of virtual education, including utilizing a more engaging educational platform and allocating time for online discourse and consultation with instructors. Hence, pursuing Javanese language learning online can yield substantial benefits for teachers and students in enhancing their proficiency.

CONCLUSION AND LIMITATION

This study examines Javanese school teachers' perceptions of integration technology related to TPACK in online learning environments in Indonesia, particularly in Central Java and Yogyakarta Special Region. The quantitative findings illustrate that the perceptions of Javanese school teachers manifest a positive inclination in three fundamental aspects: pedagogical knowledge, pedagogical content knowledge, and content knowledge, in contrast to three dimensions of technological knowledge: technological content knowledge, technological pedagogical knowledge, and TPACK. The results also show that teachers' ability to integrate

technology is still limited, with most technology use still limited to the primary level. The qualitative results illuminate the fact that the utilization of online education in the Javanese language has proven ineffective due to the deficiency in virtual engagement between teachers and students. Implementing online learning in Javanese still has drawbacks related to the teaching approach used by most Javanese school teachers. It is also influenced by the lack of knowledge of Javanese school teachers regarding integrating technology into online learning. Nevertheless, online Javanese language learning can help overcome the shortage of lesson hours in conventional classes.

The acknowledgment of the limitations that exist in this study is crucial for the researchers. This study specifically focused on the perceptions of Javanese school teachers in the Central Java and Yogyakarta Special Region. This demographic limitation could potentially impact the results of this study for teacher populations in other regions of Indonesia. While previous research has examined online education in Javanese, our findings highlight an unresolved issue. Based on the results, the absence of online involvement between teachers and students in the Javanese language context might lessen its effectiveness. Moreover, implementing TPACK and technology integration in the online Javanese language classroom presents additional challenges. It is only feasible for some teachers to deliver lessons with technology integration effectively. Therefore, this limitation underscores the need for further research to develop teaching methods prioritizing more direct interaction between teachers and students, ultimately improving the online Javanese language learning experience. Continuous training for teachers in schools is necessary to optimize the use of technology and promote more effective online interaction. This study is also recommended for further examination to assist Javanese language teachers in schools with the structured utilization of TPACK alternatives. Consequently, developing alternative approaches to teaching within the Independent Curriculum is highly recommended.

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REFERENCES

Agung, B., Syaefulloh, S., Ridwan, I. M., Mamun, A. M. H., Sumpena, D., & Zakiah, Q. Y. (2019). Google Form-Based Learning Assessment. In *3rd Asian Education Symposium (AES 2018)*, 529-531. https://doi.org/10.2991/aes-18.2019.118

Ahmadi, D. M. R. (2018). The use of technology in English language learning: A literature review. *International journal of research in English education*, *3*(2), 115-125. https://doi.org/10.29252/ijree.3.2.115

Aina, A. Y., & Ogegbo, A. A. (2021). Teaching and Assessment through Online Platforms during the COVID-19 Pandemic: Benefits and Challenges. *Journal of Education and e-Learning Research*, *8*(4), 408-415.

Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. *Frontiers in psychology*, *13*, 920317. https://doi.org/10.3389/fpsyg.2022.920317

Akram, H., Aslam, S., Saleem, A., & Parveen, K. (2021). The challenges of online teaching in COVID-19 pandemic: A case study of public universities in Karachi, Pakistan. *Journal of Information Technology Education. Research*, *20*, 263. https://doi.org/10.28945/4784

Akram, H., Yingxiu, Y., Al-Adwan, A. S., & Alkhalifah, A. (2021). Technology integration in higher education during COVID-19: An assessment of online teaching competencies through technological pedagogical content knowledge model. *Frontiers in psychology*, *12*, 736522. https://doi.org/10.3389/fpsyg.2021.736522

Alharbi, A. A. M. (2020). The Degree of Teaching Knowledge for Saudi EFL Teachers: An Investigation for Madinah EFL Teachers' Perceptions Regarding TPACK Framework. *English Language Teaching*, *13*(10), 99-110.

Andiyan, A., Rusmana, D., Hari, Y., Sitorus, M., Trinova, Z., & Surur, M. (2021). Disruption of oT in Adapting Online Learning during the Covid-19 Pandemic. *International Journal of Early Childhood Special Education,* 13(2).

Apriandi, D., Retnawati, H., & Abadi, A. M. (2023). Mathematics teachers' TPACK in online learning during the COVID-19 pandemic based on demographic factors. *International Scientific Electronic Journal*, 63 (3), 637-650. https://doi.org/10.32744/pse.2023.3.38

Ariyani, F., Fuad, M., Suyanto, E., & Muhammad, U. A. (2023). Lampung language online learning during the covid-19 outbreak: How are the teacher's TPACK skills? *International Journal of Instruction (IJI)*, *16*(1), 311-332. https://doi.org/10.29333/iji.2023.16118a

Bingimlas, K. (2018). Investigating the level of teachers' Knowledge in Technology, Pedagogy, and Content (TPACK) in Saudi Arabia. *South African Journal of Education*, *38*(3). https://doi.org/10.15700/saje.v38n3a1496

Bond, M., Marin, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: student and teacher perceptions and usage of digital media. *International Journal of Educational Technology in Higher Education*, *15*(1). https://doi.org/10.1186/s41239-018-0130-1

Chen, S. Y., Hung, C. Y., Chang, Y. C., Lin, Y. S., & Lai, Y. H. (2018). A study on integrating augmented reality technology and game-based learning model to improve motivation and effectiveness of learning English vocabulary. In *2018 1st international cognitive cities conference (IC3)* (pp. 24-27). IEEE. https://doi.org/10.1109/IC3.2018.00015

Chen, T., Peng, L., Jing, B., Wu, C., Yang, J., & Cong, G. (2020). The impact of the COVID-19 pandemic on user experience with online education platforms in China. *Sustainability*, *12*(18), 7329. https://doi.org/10.3390/su12187329

Chen, T., Peng, L., Yin, X., Rong, J., Yang, J., & Cong, G. (2020b). Analysis of user satisfaction with online education platforms in China during the COVID-19 pandemic. In *Healthcare* (Vol. 8, No. 3, p. 200). MDPI. https://doi.org/10.3390/healthcare8030200

Cheng, K. H. (2017). A survey of native language teachers' technological pedagogical and content knowledge (TPACK) in Taiwan. *Computer Assisted Language Learning*, *30*(7), 692-708. https://doi.org/10.1080/09588221.2017.1349805

Clements, D. H., & Sarama, J. (2003). Strip mining for gold: Research and policy in educational technology—A response to "Fool's Gold". *AACE Review (Formerly AACE Journal)*, *11*(1), 7-69.

Cakiroglu, U., Aydin, M., Bahadir Kurtoglu, Y., & Cebeci, U. (2023). How instructors' TPACKdeveloped during emergency remote teaching: evidence from instructors in faculties of education. *International Review of Research in Open and Distributed Learning*, *24*(2), 162-188. https://doi.org/10.19173/irrodl.v24i2.7177

Creswell, J. W. (1999). Mixed-method research: Introduction and application. In *Handbook of educational policy* (pp. 455-472). Academic press.

Dewi, L. P. R. P., Juniarta, P. A. K., & Pratiwi, N. P. A. (2021). Challenges of EFL teacher in conducting online learning at SMA Candimas Pancasari. *Journal of Educational Study*, 1(3), 160-171.

Divayana, D. G. H., Adiarta, A., & Suyasa, P. (2021). Development of material contents and online assessment based on the SEVIMA EdLink platform for online learning of program evaluation subject during Covid-19 pandemic in Indonesia. *JOTSE: Journal of Technology and Science Education*, *11*(2), 498-512.

Dutta, S., & Smita, M. K. (2020). The impact of COVID-19 pandemic on tertiary education in Bangladesh: students' perspectives. *Open Journal of Social Sciences*, 8(09), 53. https://doi.org/10.4236/jss.2020.89004

Eady, M. J., & Lockyer, L. (2013). *Tools for learning: technology and teaching strategies', Learning to Teach in the Primary School.* Cambridge: Cambridge University Press.

Elmaadaway, M. A. N., & Abouelenein, Y. A. M. (2023). In-service teachers' TPACK development through an adaptive e-learning environment (ALE). *Education and Information Technologies*, *28*(7), 8273-8298. https://doi.org/10.1007/s10639-022-11477-8

Fuad, M., Ariyani, F., Suyanto, E., & Shidiq, A. S. (2020). Exploring teachers' TPCK: Are Indonesian language teachers ready for online learning during the covid-19 outbreak? *Universal Journal of Educational Research*, *8*(11B), 6091-6102. https://doi.org/10.13189/ujer.2020.082245

Fuad, M., Efendi, A., & Muhammad, U. A. (2020). The Use of Pepaccur Local Wisdom for Indonesian Literary Teaching Materials. *JPI (Jurnal Pendidikan Indonesia)*, 9(2), 213–223. https://doi.org/10.23887/jpi-undiksha.v9i2.22779

Gilakjani, A. P. (2014). A Detailed Analysis over Some Important Issues towards Using Computer Technology into the EFL Classrooms. *Universal Journal of Educational Research*, *2*(2), 146–153. https://doi.org/10.13189/ujer.2014.020206

Ginting, D., Fahmi, F., Barella, Y., Hasbi, M., Kadnawi, K., Rojabi, A. R., & Zumrudiana, A. (2022). Students' perception on TPACK practices on online language classes in the midst of pandemic. *International Journal of Evaluation and Research in Education (IJERE)*, *11*(4), 1995-2009.

Hechter, R. P., Phyfe, L. D., & Vermette, L. A. (2012). Integrating technology in education: moving the TPCK framework towards practical applications. *Education Research and Perspectives*, *39*(1), 136-152.

Hidayad, F., Umar, U., Agustin, A., Despita, D., & Purwanto, M. B. (2023). The effectiveness of online assessment platforms in efl classroom: a students'perception on using kahoot application. *Jurnal Scientia*, *12*(01), 87-97.

Hoque, M. S., Islam, M., Thurairaj, S., Zarina, M. P., & Farahdina, T. (2023, May). Flipped classroom pedagogy in higher education in EFL contexts: Findings and implications for further research. In *Forum for Linguistic Studies*, *5*(1), 91-102.

Hrastinski, S. (2008). What is online learner participation? A literature review. *Computers & Education*, 51(4), 1755-1765.

Hussaini, I., Ibrahim, S., Wali, B., Libata, I., & Musa, U. (2020). Effectiveness of Google classroom as a digital tool in teaching and learning: Students' perceptions. *International Journal of Research and Innovation in Social Science (IJRISS)*, *4*(4), 51-54.

Islam, M., Mazlan, N. H., Al Murshidi, G., Hoque, M. S., Karthiga, S. V., & Reza, M. (2023). UAE university students' experiences of virtual classroom learning during Covid 19. *Smart Learning Environments*, *10*(1), 1–16. https://doi.org/10.1186/s40561-023-00225-1

Jamieson-Proctor, R., Finger, G., & Albion, P. (2010). Auditing the TK and TPACK confidence of pre-service teachers: Are they ready for the profession?. *Australian Educational Computing*, *25*(1), 8-17.

Juanda, A., Shidiq, A. S., & Nasrudin, D. (2021). Teacher learning management: Investigating biology teachersâ€™ tpack to conduct learning during the covid-19 outbreak. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 48-59. https://doi.org/10.15294/jpii.v10i1.26499

Kamal, T., & Illiyan, A. (2021). School teachers' perception and challenges towards online teaching during COVID-19 pandemic in India: an econometric analysis. *Asian Association of Open Universities Journal*, *16*(3), 311-325.

Kansal, A. K., Gautam, J., Chintalapudi, N., Jain, S., & Battineni, G. (2021). Google trend analysis and paradigm shift of online education platforms during the COVID-19 pandemic. *Infectious Disease Reports*, *13*(2), 418-428. https://doi.org/10.3390/idr13020040

Karchmer-Klein, R., & Konishi, H. (2023). A mixed-methods study of novice teachers' technology integration: Do they leverage their TPACK knowledge once entering the profession?. *Journal of Research on Technology in Education*, *55*(3), 490-506. https://doi.org/10.1080/15391523.2021.1976328

Kartimi, K., Gloria, R. Y., & Anugrah, I. R. (2021). Chemistry online distance learning during the Covid-19 outbreak: Do tpack and teachers' attitude matter?. *Jurnal Pendidikan IPA Indonesia*, *10*(2), 228-240.

Kiyici, O. D., & OVEZ, F. D. (2021). Examination of technology acceptance and TPACK competencies of mathematics teachers who are involved in distance education practices during the pandemic process. *Journal of Educational Technology and Online Learning*, *4*(4), 805-821. https://doi.org/10.31681/jetol.1012204

Kusuma, I. P. I. (2022). EFL teachers' online teaching in rural schools during the COVID-19 pandemic: Stories from Indonesia. *Studies in English Language and Education*, *9*(1), 203-221.

Lai, C., & Tai, C. P. (2021). Types of social media activities and Hong Kong South and Southeast Asians Youth's Chinese language learning motivation. *System*, *97*, 102432. https://doi.org/10.1016/j.system.2020.102432

Luo, S., & Zou, D. (2022). A systematic review of research on technological, pedagogical, and content knowledge (TPACK) for online teaching in the humanities. *Journal of Research on Technology in Education*, 1-15. https://doi.org/10.1080/15391523.2022.2139026

Mashhadi, A., Kassim Kadhum, A., & Gooniband Shooshtari, Z. (2023). Exploring Technological Pedagogical Content Knowledge among Iraqi High School English Teachers: A Comparative Study during the COVID-19 Pandemic. *Iranian Journal of Applied Language Studies*, 15(1), 141-154. https://doi.org/10.22111/IJALS.2023.45855.2356

Makawawa, J. C., Mustadi, A., Septriwanto, J. V., Sampouw, F., & Najoan, R. A. O. (2021). Primary school teachers perception of technological pedagogical content knowledge in online learning due to Covid 19. *Jurnal Prima Edukasia*, *9*(1), 86-96.

Maru, M. G., Tamowangkay, F. P., Pelenkahu, N., & Wuntu, C. (2022). Teachers' perception toward the impact of platform used in online learning communication in the eastern Indonesia. *International Journal of Communication and Society*, *4*(1), 59-71.

Merzifonluoglu, A., & Gonulal, T. (2018). Review of Digital language learning and teaching: Research, theory, and practice. *Language Learning and Technology*, *22*(1), 65–68. https://doi.org/10.4324/9781315523293

Moonma, J. (2021). Google Classroom: Understanding EFL Students' Attitudes towards Its Use as an Online Learning Platform. *English Language Teaching*, *14*(11), 38-48.

Mourlam, D., Chesnut, S., Strouse, G., DeCino, D., Los, R., & Newland, L. (2021, March). Did they forget? Understanding teacher TPACK during the COVID-19 pandemic. In *Society for Information Technology & Teacher Education International Conference* (pp. 1616-1622). Association for the Advancement of Computing in Education (AACE). https://doi.org/10.28945/4626

Muhaimin, M., Habibi, A., Mukminin, A., Saudagar, F., Pratama, R., Wahyuni, S., ... & Indrayana, B. (2019). A sequential explanatory investigation of TPACK: Indonesian science teachers' survey and perspective. *JOTSE*, *9*(3), 269-281. https://doi.org/10.3926/jotse.662

Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. *Pakistan journal of medical sciences*, *36*(COVID19-S4), S27. 10.12669/pjms.36. COVID19-S4.2785

Nazari, N., Nafissi, Z., Estaji, M., & Marandi, S. S. (2019). Evaluating novice and experienced EFL teachers' perceived TPACK for their professional development. *Cogent Education*, *6*(1), 1632010. https://doi.org/10.1080/2331186X.2019.1632010

Paudel, P. (2021). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *International Journal on Studies in Education (IJonSE)*, *3*(2). https://doi.org/10.46328/ijonse.32

Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning*, 21(3), 166-190.

Prior, D. D., Mazanov, J., Meacheam, D., Heaslip, G., & Hanson, J. (2016). Attitude, digital literacy, and self-efficacy: flow-on effects for online learning behavior. *The Internet and Higher Education*, 29, 91–97. https://doi.org/10.1016/j.iheduc.2016.01.001

Richards, J. C. (2015). Technology in Language Teaching Today. *Indonesian Journal of English Language Teaching*, *10*(1), 18–32. https://doi.org/10.25170/ijelt.v10i1.1506

Rintaningrum, R. (2023). Technology integration in English language teaching and learning: Benefits and challenges. *Cogent Education*, *10*(1). https://doi.org/10.1080/2331186X.2022.2164690

Rintaningrum, R., Aldous, C., & Conway, R. (2016). I find it easy to learn english when. *Jambi International Seminar on Education 1 (JISE),* 14–21.

Santos, J. M., & Castro, R. D. (2021). Technological Pedagogical content knowledge (TPACK) in action: Application of learning in the classroom by pre-service teachers (PST). *Social Sciences & Humanities Open*, 3(1), 100110. https://doi.org/10.1016/j.ssaho.2021.100110

Sari, A., Iswahyuni, D., Rejeki, S., & Sutanto, S. (2020). Google Forms as an EFL assessment tool: Positive features and limitations. *Premise: Journal of English Education and Applied Linguistics, 9*(2), 231-250. https://doi.org/10.24127/pj.v9i2.3037

Saricoban, A., Tosuncuoglu, I., & Kirmizi, O. (2019). A technological pedagogical content knowledge (TPACK) sssessment of pre-service EFL teachers learning to teach English as a foreign language. *Journal of Language and Linguistic Studies*, *15*(3), 1122-1138. https://doi.org/10.17263/jlls.631552

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, 42(2), https://doi.org/https://doi.org/10.1080/15391523.2009.10782544

Sepulveda-Escobar, P., & Morrison, A. (2020). Online teaching placement during the COVID-19 pandemic in Chile: challenges and opportunities. *European Journal of Teacher Education*, *43*(4), 587-607. https://doi.org/10.1080/02619768.2020.1820981

Shidiq, A. S., & Yamtinah, S. (2019). Pre-service chemistry teachers' attitudes and attributes toward the twenty-first century skills. In *Journal of Physics: Conference Series*, 1157 (4), 042014. IOP Publishing.

Shulman, L. S. (2013). Those who understand: Knowledge growth in teaching. *Journal of Education*, *193*(3), 1-11. https://doi.org/10.1177/002205741319300302

Surayya, S. A., Asrobi, M., & Farizi, Z. (2021). Scrutiny on Indonesian EFL teachers' willingness to understand and implement the TPACK in VLE. *Journal of Education Technology*, *5*(4), 645-653. https://doi.org/10.23887/jet.v5i4.40986

Tamah, S. M., Triwidayati, K. R., & Utami, T. S. D. (2020). Secondary school language teachers' online learning engagement during the COVID-19 pandemic in Indonesia. *Journal of Information Technology Education: Research*, *19*, 803-832.

Tauhidah, D., Jayanti, U. N. A. D., Rahmasiwi, A., Pamungkas, R., & Saifulloh, A. (2021). Utilization of e-learning platforms by lecturers during the COVID-19 pandemic in Indonesia. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *7*(3), 198-207. https://doi.org/10.22219/jpbi.v7i3.16816

Van Loi, N. (2021). VIETNAMESE high-school teachers'perceptions of TPACK in teaching English as a foreign language. *European Journal of Education Studies*, *8*(4). http://dx.doi.org/10.46827/ejes.v8i4.3693

Zeng, Y. (2022). Analysing Teacher Knowledge for Technology Use among Secondary Teachers Teaching Chinese as a Foreign Language (CFL) in Australia. *Journal of Curriculum and Teaching*, *11*(2), 15-28.

Zhao, Y. (Ed.). (2015). *Research in Technology and Second Language Learning: Developments and Directions*. Information Age Publishing.

Zhenchenko, M., Melnyk, O., Prykhoda, Y., & Zhenchenko, I. (2022). Ukrainian E-Learning Platforms for Schools: Evaluation of Their Functionality. *International Review of Research in Open and Distributed Learning*, *23*(2), 136-150. https://doi.org/10.19173/irrodl.v23i2.5769