JPIS JURNAL PENDIDIKAN ILMU SOSIAL

p-ISSN: 1412-3835
e-ISSN: 2541-4569
VOL 35, NO.1, JUN 2025

ANALYSIS OF TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK) ABILITY OF PROSPECTIVE ACCOUNTING TEACHER STUDENTS

Nova Pratiwi[1], Nani Sutarni[2], Dadang Dahlan[3]
[1,2,3] Faculty of Economics and Business Education, Universitas Pendidikan Indonesia
email: vhapratiwi@upi.edu

ABSTRACT

This study aims to investigate Prospective Accounting teachers' Technological Pedagogical and Content Knowledge (TPACK) abilities. The population of this study was 133 Accounting Education students of Universitas PGRI Palembang in the academic year 2023/2024, with a sample of 70 students taken through purposive sampling. This descriptive quantitative research measured 7 TPACK indicators using a 29-item questionnaire. The data were analyzed using descriptive statistics (percentage) and converted to qualitative categories of TPACK ability. The findings showed that the TPACK ability of prospective accounting teachers was in a good category. The indicators with the highest mean scores were Technological Content Knowledge (TCK) and Technological Knowledge (TK). In contrast, the indicators with the lowest mean scores were Pedagogical Knowledge (PK) and Pedagogical Content Knowledge (PCK). The implications of this study emphasize the importance of improving TPACK skills, especially in the PK and PCK components, through optimizing lectures in educational courses through increasing the portion of teaching practices, such as simulations, micro-teaching, and lesson study, as well as training that focuses on classroom management and technology-based learning design. Improving TPACK skills will prepare future accounting educators to integrate technology, pedagogy, and content effectively in learning.

Keywords: *Technological pedagogical and content knowledge (tpack), prospective accounting teachers, prospective accounting teachers'*

Received: *21 Desember 2025*
Accepted: *11 Juni 2025*
Published: *21 Juni 2025*

p-ISSN: 1412-3835
e-ISSN: 2541-4569
VOL 35, NO.1, JUN 2025

INTRODUCTION

The world of education has changed significantly with the rapid development of technology. 21st-century learning requires technology to be integrated into the learning process to make it more interactive, efficient, and scientifically relevant (Demmanggasa et al., 2023; Huang, 2019). In this context, teachers are expected to improve their competence in using technology effectively in teaching; teachers are responsible for guiding students in managing information relevant to learning needs (Caena & Redecker, 2019). One of the frameworks to measure teachers' competence in technology, pedagogy, and content integration is the technological pedagogical and content knowledge (TPACK) (Dewi et al., 2024).

TPACK combines three main elements, namely content, pedagogical, and technological knowledge (Santos & Castro, 2021). Teachers' proficiency in TPACK can improve the quality of learning and provide more meaningful learning experiences for students (Musdar et al., 2023). In addition to mastering the subject (content), teachers must have the ability to teach the material effectively (pedagogy) and integrate appropriate technology to support the learning process (technology) (Rahma et al., 2024).

Mastery of TPACK by prospective accounting teachers is essent (Thomas & Chukhlomin, 2020). Accounting is one of the fields that continues to grow along with the development of information and communication technology. Many companies have adopted technology-based accounting systems, such as artificial intelligence (AI), blockchain technology, cloud computing, and accounting software (Juniardi, 2024). Mastery of TPACK for accounting teachers is limited to the ability to use technology in the learning process. It includes an understanding of how technology can be utilized to support accounting learning specifically (Masriyanda et al., 2024). Prospective accounting teachers with a good mastery of TPACK should be able to integrate accounting software into learning to help students understand accounting concepts and accounting practices more real and interactively.

Several previous studies have examined the importance of mastering TPACK for prospective teachers, including in accounting education. Research conducted by Kardiyem et al., (2022) and Nabila et al.,(2023) found that students who understand TPACK well will be better prepared to be effective teachers in the future, with the ability to integrate technology in teaching and create engaging learning experiences for students. Another study by Herizal et al., (2022) and Zulhazlinda et al., (2023) stated that the higher the TPACK ability of students, the better prepared they are in designing, managing, and implementing innovative and relevant learning processes that suit the needs of students in the digital era. Institutions that offer teacher education programs should be aware of the importance of TPACK for prospective teachers' learning and must emphasize mastery of technology, material content, and technology integration in the teaching process (Rahmadi, 2019).

Previous research also shows that there is still a gap between the expected mastery of TPACK and that of prospective teachers (Tondeur et al., 2020). Most prospective accounting teachers studied have low TPACK abilities, especially in

effectively integrating technology into accounting learning (Perdani & Andayani, 2021). This gap can be caused by various factors, such as the lack of training in the study program, the lack of available technology facilities, or the lack of motivation of prospective teachers to integrate technology into learning.

Based on the empirical studies above emphasize that mastery of TPACK is an important aspect for prospective accounting teachers to integrate technology in accounting learning, design interactive ICT-based accounting learning, and convey accounting concepts with appropriate methods supported by technology. Mastery of TPACK will improve the quality of accounting learning, facilitate knowledge transfer, and increase attractiveness for students to prepare modern and skilled accounting graduates in the 21st century (Amalia, 2023). Therefore, this study aims to analyze the TPACK ability of prospective accounting teachers at Universitas PGRI Palembang.

The results of this study are expected to provide an overview of the readiness of prospective accounting teachers to face teaching challenges in the digital era and become evaluation material for accounting education study programs in improving the quality of learning. By understanding students' TPACK abilities, study programs can identify areas that need to be improved and design more effective curricula and learning strategies to prepare prospective accounting teachers to face challenges in the digital era. In addition, this study is also expected to contribute to the development of TPACK theory in the context of accounting education.

RESEARCH METHOD

The methodology used in this research is descriptive research with a quantitative approach. This research instrument is a closed questionnaire with a 5-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree) developed by Schmidt et al. (2009). The questionnaire consists of 7 indicators with a total of 29 statement items, namely: TK (7 items), PK (7 items), CK (3 items), TCK (1 item), TPK (5 items), PCK (1 item), and TPACK (5 items), which were specifically designed to measure the TPACK ability of pre-service teachers in the field of social science (Schmid et al., 2021). The research instrument was given to respondents via Google form on March 11, 2024; the maximum processing time was 60 minutes after the link was opened. The population of this study was 133 students of the Accounting Education study program at PGRI University Palembang in the 2023/2024 academic year; through purposive sampling technique, the sample was taken based on the criteria of students who had completed the micro-teaching program in the fifth semester, so that a sample of 70 students was obtained. Quantitative data analysis uses descriptive statistics to determine the percentage of responses for each statement (Sugiyono, 2019). Then converted into qualitative categories of TPACK ability based on the range of values, namely 1.00 - 1.80 very less, 1.81 - 2.60 less, 2.61 - 3.40 sufficient, 3.41 - 4, 20 good, and 4.21 - 5, 00 very good.

RESULTS AND DISCUSSION

RESULTS

The research findings show that prospective accounting teachers' Technological Pedagogical and Content Knowledge (TPACK) ability is in a good category in all indicators measured. The average results of descriptive statistical analysis for each indicator are shown in Table 1. below.

Table 1.
TPACK Ability of Prospective Accounting Teacher Students

No.	Indicator	Average	Category
1.	Technological Knowledge (TK)	3,67	Good
2.	Pedagogical Knowledge (PK)	3,42	Good
3.	Content Knowledge (CK)	3,60	Good
4.	Technological Content Knowledge (TCK)	3,81	Good
5.	Technological Pedagogical Knowledge (TPK)	3,57	Good
6.	Pedagogical Content Knowledge (PCK)	3,43	Good
7.	Technological Pedagogical and Content Knowledge (TPACK)	3,55	Good

Source: Processed Research Data (2024)

The table above illustrates the Technological Pedagogical and Content Knowledge (TPACK) Ability of Pre-Service Accounting Teachers in the Average Range of 3.42 to 3.81 with Good Categories for All Indicators. Of the seven indicators that comprise the TPACK ability of prospective accounting teachers, two indicators have the highest average value, namely the ability of technological content knowledge (TCK) and technological skills (TK). This shows that most prospective accounting teacher students already know how to use technology. Then, the lowest average value is in the ability of Pedagogical Knowledge (PK), which means that students and accounting education study programs need to optimize lecture activities in educational courses. The description of the average ability per component for each indicator is as follows.

Table 2.
Average Score of Technological Knowledge (TK) Component

No.	TK Ability Aspect	Average	Criteria
1.	Ability to solve technical problems	3,74	Good
2.	Ease of learning the technology	3,50	Good
3.	Technology development literacy	3,79	Good
4.	Intensity of technology use	3,96	Good
5.	Knowledge of the types of technology	3,64	Good
6.	Technical ability to operate technology	3,47	Good
7.	Employment opportunities with various forms of technology	3,57	Good

Source: Processed Research Data (2024)

Technological Knowledge (TK) ability is a measure of technological literacy that refers to knowledge of various technologies, ranging from low-level technologies such as paper and pen to digital technologies such as the Web, digital video,

interactive whiteboards, and software programs. Based on the table above, the highest average of respondents answered the components of the intensity of technology use and the ability to keep up with the latest technological developments. This result aligns with the fact that the respondents are part of the millennial generation; the average age of respondents is 20 years old, which is very close to technology.

Table 3.
Average Score of Pedagogical Knowledge (PK) Component

No.	PK Ability Aspect	Average	Criteria
1.	Ability to conduct learning evaluation	3,49	Good
2.	Ability to adjust teaching techniques according to students' cognitive	3,50	Good
3.	Ability to adjust teaching style according to student heterogeneity	3,53	Good
4.	Evaluate learning in various ways	3,44	Good
5.	Using various learning models	3,61	Good
6.	Able to measure understanding and address student misconceptions	3,07	Simply
7.	Able to organize and maintain classroom management	3,31	Simply

Source: Processed Research Data (2024)

Pedagogical Knowledge (PK) ability is teaching knowledge related to teaching methods and processes and includes knowledge of how to manage classes, assess and develop curriculum, and how students learn. From the table above, the component that shows the highest average value is the ability of prospective accounting teachers to use various learning approaches in teaching. What should be of concern to the study program organizing the education of prospective teachers is the habituation of students in terms of managing the understanding and misconceptions students face.

Table 4.
Average Score of Content Knowledge (CK) Component

No.	CK Ability Aspects	Average	Criteria
1.	Have sufficient knowledge of Economics and Accounting	3,56	Good
2.	Able to use scientific thinking in the field of Economics and Accounting	3,64	Good
3.	Strategize in developing an understanding of economics and accounting	3,59	Good

Source: Processed Research Data (2024)

Content Knowledge (CK) is about the material being studied/taught. Teachers should be knowledgeable about the content they will teach and how the nature of that knowledge differs for different content areas. The ability component that has the highest average in the aspect of respondents' ability to use scientific thinking in social sciences (Economics and accounting). This illustrates that most respondents already have the ability in the field of accounting as a sub-science of the field of study that will be taught to students.

Table 5.
Average Score of Technological Content Knowledge (TCK) Component

No.	TCK Ability Aspect	Average	Criteria
1.	Know various supporting technologies for conducting studies in economics and accounting	3,81	Good

Source: Processed Research Data (2024)

Technological Content Knowledge (TCK) is a set of technological content knowledge that refers to how technology can be used to create new representations of certain content. In this construct, the items in the questionnaire cover only one dimension, namely knowledge of the technology used to understand and conduct studies in the social sciences (economics and accounting). This shows that prospective teachers already know the various technologies that can be used in teaching accounting, according to the average response given in good criteria.

Table 6.
Average Score of Technological Pedagogical Knowledge (TPK) Component

No.	TPK Ability Aspect	Average	Criteria
1.	Ability to choose learning support technology	3,70	Good
2.	Ability to choose technology to support student learning	3,36	Good
3.	The teacher study program gives the necessity to think deeply about the effectiveness of using learning technology.	3,73	Good
4.	Think critically about the use of technology in learning	3,57	Good
5.	Adaptability in the use of technology for various learning activities	3,47	Good

Source: Processed Research Data (2024)

Technological Pedagogical Knowledge (TPK) is a set of technological pedagogical knowledge that refers to knowledge of how different technologies can be used in the classroom and an understanding that technology can change how teachers teach. The competency component with the highest average score in this aspect results from the teacher education program taken by respondents that has shaped them into teachers who can think more deeply about how technology affects the learning approaches used in the classroom. This ability leads prospective teachers to explore the art of teaching combined with rapid technological advances. However, on the other hand, some respondents still have obstacles in choosing and determining the appropriate technology to support certain learning situations.

Table 7.
Average Score of Pedagogical Content Knowledge (PCK) Component

No.	PCK Ability Aspects	Average	Criteria
1.	Ability to select effective learning models to improve students' thinking and learning capacity in economics and accounting	3,43	Good

Source: Processed Research Data (2024)

Pedagogical Content Knowledge (PCK) refers to the teacher's ability to select and use appropriate instructional approaches to facilitate students' critical thinking and learning processes in social science subjects, especially economics and accounting. The average score for this criterion is 3.43, with a good rating. This shows that, in general, teachers' ability to select and use practical instructional approaches to guide students' thinking and learning processes in economics and accounting subjects is at a good or satisfactory level.

This ability is essential for a teacher in the social sciences, especially economics and accounting, because both subjects require a strong understanding of concepts and the ability to analyze and apply these concepts in real situations. Teachers can facilitate students' critical thinking, improve their understanding, and promote meaningful learning by choosing the right teaching approach, such as problem-based learning, group discussions, or case studies.

Table 8.
Average Score of Technological Pedagogical and Content Knowledge (TPACK) Components

No.	TPACK Ability Aspects	Average	Criteria
1.	Ability to conduct learning that collaborates economics and accounting, technology, and learning models	3,41	Good
2.	Ability to select classroom-applicable technologies that support content, methods and student heterogeneity	3,71	Good
3.	Using a model that collaborates content, technology and mastered learning models	3,50	Good
4.	Have the ability to help others to correlate learning models, content and technology in the learning environment.	3,50	Good
5.	Able to choose technology that supports learning content	3,60	Good

Source: Processed Research Data (2024)

Technological Pedagogical Content Knowledge (TPACK) refers to the knowledge teachers need to integrate technology into their instruction in various content areas. Teachers intuitively understand the complex interactions between the three basic knowledge components (CK, PK, TK) and learning content using appropriate pedagogical and technological methods.

In general, all assessed aspects of TPACK proficiency had mean scores between 3.41 and 3.71, with the criterion of "good." This indicates that the teachers are skilled in integrating technology, content, and pedagogy into learning. However, there are still some specific aspects that need to be improved. In today's digital era, where technology is important in improving learning quality and student engagement, teachers must master TPACK. When teachers master the components of TPACK, they can design and implement learning that is more efficient, interactive, and relevant to student's needs and current technological trends.

DISCUSSION

This study investigated the Technological Pedagogical and Content Knowledge (TPACK) abilities of prospective accounting teachers at Universitas PGRI Palembang. The results showed that the TPACK ability of prospective accounting teachers was in a good category, with an average ranging from 3.42 to 3.81. These results align with several previous studies examining the TPACK abilities of prospective accounting teachers in accounting education, economics, and other social sciences. For example, research conducted by Ulya et al., (2023) on prospective accounting teacher students found that their TPACK ability was good enough. This study also revealed that the Technological Knowledge (TK) and Content Knowledge (CK) components had the highest average scores, in line with research Krisnaresanti et al., (2023), which stated that the two components of TK and CK were more prominent in the results of measuring TPACK ability. Pedagogical Knowledge (PK) is the component with the lowest average value, similar to the findings in this study.

Another study conducted by Nabila et al., (2023) on prospective economics teacher students at Siliwangi University also found that their TPACK ability was in the high category. Research Guntari & Jatmika, (2023) emphasizes the importance of developing TPACK skills for teachers in facing the challenges of an increasingly digital and technology-integrated world of education. Also, for prospective teachers, research Dewi & Pahlevi, (2023) states that TPACK ability has a positive relationship with readiness to become a teacher in the digital era. Furthermore, research conducted on 211 accounting education students of the State University of Malang showed that their TPACK ability was in the high category. This study also explored factors that influence TPACK ability, such as experience using technology, perceptions of technology, and support from educational institutions.

The findings from this study and previous research indicate that, in general, prospective teachers have good or high TPACK ability. However, this study found that there are still certain areas that need to be improved, especially in the Pedagogical Knowledge (PK) and Technological Pedagogical Knowledge (TPK) components in line with research recommendations Amalia, (2023) and Ramdani et al., (2023) pedagogical knowledge (PK) obtained with a low average score, there needs to be more intensive efforts in training students to improve their mastery in pedagogical aspects in order to prepare them to become competent teachers. This indicates the need for further efforts from teacher education institutions in accounting and economics to improve pedagogical abilities and the integration of technology with pedagogy in prospective teachers to prepare learning activities and facilitate differences that exist in students, such as activeness and cognitive level (Nuraisyiah et al., 2024). This improvement can be done through curriculum improvement, more intensive learning practices, and support in the form of adequate facilities and training (Turmuzi & Kurniawan, 2021).

The TPACK skills of prospective teachers need to be improved to prepare them to become competent teachers in integrating technology, pedagogy, and content

effectively in the learning process (Aladawiya & Fidhyallah, 2023). Improving TPACK skills is essential to ensure that prospective teachers can design and implement learning that is effective, interactive, and relevant to student needs, as well as the latest technological developments in accounting, economics, and other social sciences (Handayani et al., 2024). Thus, technology is crucial in improving teachers' ability to deliver effective learning.

CONCLUSION

Based on the discussion described, the TPACK ability of prospective accounting teachers is in a good category. The indicators with the highest mean scores are Technological Content Knowledge (TCK) and Technological Knowledge (TK), which show that prospective teachers have good knowledge of using technology. Indicators with the lowest mean scores are Pedagogical Knowledge (PK) and Pedagogical Content Knowledge (PCK), so efforts are needed to improve students' pedagogical abilities. The implications of this study emphasize the importance of optimizing lectures in educational courses by increasing the portion of teaching practices, such as simulations, micro-teaching, and lesson study, as well as providing intensive training that focuses on classroom management and technology-based learning design. The campus is also expected to provide technology-based learning laboratory facilities to comprehensively support the development of students' pedagogical abilities.

REFERENCES

Aladawiya, R., & Fidhyallah, N. F. (2023). Microlearning Videos Through Technological, Pedagogical, and Content Knowledge: The Lens of User Experience. *Jurnal Pendidikan Ekonomi, Perkantoran, Dan Akuntansi*, *4*(2), 226–232. https://doi.org/10.21009/jpepa.0402.19.

Amalia, L. (2023). Penguasaan Technological Pedagogical and Content Knowledge (Tpack) Mahasiswa. *Sasangga: Journal of Education and Learning*, *1*(1), 26–35. https://doi.org/10.70345/sasangga.v1i1.7.

Caena, F., & Redecker, C. (2019). Aligning Teacher Competence Frameworks to 21st Century Challenges: The Case for the European Digital Competence Framework for Educators (Digcompedu). *European Journal of Education*, *54*(3), 356–369. https://doi.org/10.1111/ejed.12345.

Demmanggasa, Y., Sabilaturrizqi, M., Kasnawati, K., Mardikawati, B., Ramli, A., & Arifin, N. Y. (2023). Digitalisasi Pendidikan: Akselerasi Literasi Digital Pelajar melalui Eksplorasi Teknologi Pendidikan. *Community Development Journal: Jurnal Pengabdian Masyarakat*, *4*(5), 11158–11167. https://doi.org/10.31004/cdj.v4i5.22045.

Dewi, K. H. S., Sudiatmika, I. P. G. A., Rahardian, R. L., & Pradipta, I. M. (2024). Pengaruh Kompetensi Technological Pedagogical Content Knowledge (TPACK) Terhadap Keterampilan Guru SMK Dalam Merancang Perangkat Pembelajaran Berbasis Digital. *Journal on Education*, *6*(2), 13943–13953. https://doi.org/10.31004/joe.v6i2.5249.

Dewi, W. K., & Pahlevi, T. (2023). Investigasi Technological Pedagogical and Content Knowledge (TPACK) terhadap Kesiapan Menjadi Guru Mahasiswa Pendidikan Administrasi Perkantoran. *Edukatif: Jurnal Ilmu Pendidikan*, *5*(2), 1424–1439. https://doi.org/10.31004/edukatif.v5i2.5239.

Guntari, I. S., & Jatmika, S. (2023). Application of TPACK (Tecnological Pedagogical Content Knowledge) in Accounting Subjects at Vocational High School (SMK) Batik 1 Surakarta. *Cetta: Jurnal Ilmu Pendidikan*, *6*(4), 843–853. https://doi.org/10.37329/cetta.v6i4.2819.

Handayani, S., Hussin, M., & Norman, H. (2024). Evaluating Teaching Readiness Using the TPACK Model: Factor, Reliability and Validity Analyses for Indonesian Economics Teacher Candidates. *Perspektive Nauki i Obrazovania*, *68*(2), 679–698. https://doi.org/10.32744/pse.2024.2.41.

Herizal, H., Nuraina, N., Rohantizani, R., & Marhami, M. (2022). Profil TPACK Mahasiswa Calon Guru Matematika dalam Menyongsong Pembelajaran Abad 21. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, *6*(1). https://doi.org/10.58258/jisip.v6i1.2665.

Huang, R. (2019). *Educational Technology a Primer for the 21st Century*. Springer.

Juniardi, E. (2024). Peran dan Praktik Artificial Intelligence Akuntansi: Systematic Literature Review. *Jurnal Revenue: Jurnal Ilmiah Akuntansi*, *4*(2), 885–898. https://doi.org/10.46306/rev.v4i2.385.

Kardiyem, K., Kusmuriyanto, K., Aeni, I. N., & Susilowati, N. (2022). Examining the Global Competence and TPACK Development Model for Prospective Teachers in Accounting Economics. *Jurnal Pendidikan Progresif*, *12*(2), 741–750. https://doi.org/10.23960/jpp.v12.i2.202226.

Krisnaresanti, A., Ahman, E., & Disman, D. (2023). Profile of Technological Pedagogical Content Knowledge (TPACK) on Pre-Service Teachers in Higher Education. *Journal of Office Administration: Education and Practice*, *3*(3), 204–213. https://doi.org/10.26740/joaep.v3n3.p204-213.

Masriyanda, M., Fathurrahman, A., & Abrar, Y. (2024). Analisis Kesiapan Kerja Mahasiswa Akuntasi di Era 4.0 Melalui Variabel Keahlian Akuntansi dan Literasi Digital. *Jurnal Akuntansi Dan Keuangan (JAK)*, *29*(1), 93–103. https://doi.org/10.23960/jak.v29i1.2394.

Musdar, M., Susanna, S., Saputri, M., Nurulwati, N., & Fatmaliana, A. (2023). Analisis Pengetahuan TPACK Guru IPA SMP dan Fisika SMA Se-Aceh Barat Daya. *ORBITA: Jurnal Pendidikan Dan Ilmu Fisika*, *9*(2), 231–237. https://doi.org/10.31764/orbita.v9i2.15950.

Nabila, A., Solihat, A. N., & Gumilar, G. (2023). Pengaruh Technological Pedagogical Content Knowledge dan Persepsi Profesi Guru Terhadap Kesiapan Menjadi Guru. *Jurnal Riset Pendidikan Dan Pengajaran*, *2*(2), 240–258. https://doi.org/10.55047/jrpp.v2i2.500.

Nuraisyiah, N., Rijal, A., Hasyim, S. H., Nurjannah, N., & Azis, F. (2024). Peningkatan Keaktifan Siswa Melalui Technological Pedagogical Content Knowledge. *Jurnal Akademik Pengabdian Masyarakat*, *2*(3), 7–14. https://doi.org/10.61722/japm.v2i3.1281.

Perdani, B. U. M., & Andayani, E. S. (2021). Pengaruh Kemampuan Technological Pedagogical Content Knowledge (TPACK) terhadap Kesiapan Menjadi Guru. *Jurnal Pendidikan Akuntansi Indonesia*, *19*(2), 99–115. https://doi.org/https://doi.org/10.21831/jpai.v19i2.46021.

Rahma, F. I., Yumnah, S., & Rokim, R. (2024). Analisis Kemampuan TPACK (Technological, Pedagogical, and Content Knowledge) Guru Matematika melalui Rencana Pelaksanaan Pembelajaran. *Dawuh Guru: Jurnal Pendidikan MI/SD*, *4*(1), 31–46. https://doi.org/10.35878/guru.v4i1.1087.

Rahmadi, I. F. (2019). Technological Pedagogical Content Knowledge (TPACK): Kerangka Pengetahuan Guru Abad 21. *Jurnal Pendidikan Kewarganegaraan*, *6*(1), 65–74. https://doi.org/10.32493/jpkn.v6i1.y2019.p65-74.

Ramdani, R., Surani, D., & Fricticarani, A. (2023). Analisis Kemampuan Technological Pedagogical Content Knowledge (TPACK) Guru Normatif SMK Negeri 11 Pandeglang. *Jurnal Inovasi Pendidikan Dan Teknologi Informasi (JIPTI)*, *4*(2), 175–188. https://doi.org/10.52060/pti.v4i2.1401.

Santos, J. M., & Castro, R. D. R. (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/https://doi.org/10.1016/j.ssaho.2021.100110.

Schmid, M., Brianza, E., & Petko, D. (2021). Self-reported Technological Pedagogical Content Knowledge (TPACK) of Pre-service Teachers in Relation to Digital Technology Use in Lesson Plans. *Computers in Human Behavior*, *115*, 106586. https://doi.org/10.1016/j.chb.2020.106586.

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), 123–149. https://doi.org/10.1080/15391523.2009.10782544.

Sugiyono, P. D. (2019). Metode Penelitian Pendidikan (Kuantitatif, Kualitatif, Kombinasi, R&D dan Penelitian Pendidikan). *Metode Penelitian Pendidikan*, *67*.

Thomas, M., & Chukhlomin, V. (2020). Supporting Faculty Development in Technology-Enhanced Accounting and Business Education: A TPACK-Powered, Competence-in-Action Framework. *Journal of Accounting and Finance*, *20*(7), 139–153. https://doi.org/10.2139/ssrn.3634713.

Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2020). Enhancing Pre-service Teachers' Technological Pedagogical Content Knowledge (TPACK): A Mixed-Method Study. *Educational Technology Research and Development*, *68*(1), 319–343. https://doi.org/10.1007/s11423-019-09692-1.

Turmuzi, M., & Kurniawan, E. (2021). Kemampuan Mengajar Mahasiswa Calon Guru Matematika Ditinjau dari Technological Pedagogical and Content Knowledge (TPACK) pada Mata Kuliah Micro Teaching. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5*(3), 2484–2498. https://doi.org/10.31004/cendekia.v5i3.881.

Ulya, A., Lubis, I., & Sukiman, S. (2023). Konsep Technological Pedagogical and Content Knowledge dan Analisis Kebutuhan dalam Pengembangan Perangkat Pembelajaran. *Ideguru: Jurnal Karya Ilmiah Guru*, *8*, 208–215. https://doi.org/10.51169/ideguru.v8i2.501.

Zulhazlinda, W., Noviani, L., & Sangka, K. B. (2023). Pengaruh TPACK Terhadap Kesiapan Menjadi Guru Profesional Pada Mahasiswa Pendidikan Ekonomi Di Jawa Tengah. *Jurnal Pendidikan Ekonomi (JUPE)*, *11*(1), 26–38. https://doi.org/10.26740/jupe.v11n1.p26-38.