Analysis Of 21st-Century Teacher Competency With Tpack (Technological Pedagogical Content Knowledge) In The Office Management And Business Services Expertise Program Throughout Surabaya

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Abstract

In Indonesia's education context, increasing teachers' TPACK skills is necessary. Teachers' ability to master learning technology must be increased through TPACK by examining the factors that influence the development of teachers' TPACK capabilities. Teachers who can optimize using technology to aid in education can create a classroom atmosphere that is more dynamic, interactive, and interesting for students. Learning with technology can also increase comprehension and understanding of subject matter, creating a more profound learning experience. Implementing TPACK is a supporting factor for developing 21st-century abilities, which is also essential for students. This research aimed to analyze the ability of teachers in the 21st century to implement TPACK as a significant framework in supporting teachers' ability to improve the overall quality of education in vocational high schools in the office management and business services expertise program throughout Surabaya. This research uses a quantitative descriptive research approach. Data collection in this research used questionnaires distributed offline to vocational high schools in the office management and business services expertise program throughout Surabaya. Implementing teacher's TPACK in the Office Management and Business Services Expertise Program throughout Surabaya was quite good, but further strengthening is needed to achieve optimal integration between technology, pedagogy, and content in the learning process.

Keyword: TPACK; teacher's skills; teacher of office management and business services.

1. Introduction

The TPACK framework is a construct that is useful in describing the complex connection among Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK) possessed by a teacher (Ait Ali et al., 2023). Using technology and pedagogy in a particular study context, teachers and educators must consider the dynamic differences and intersections between Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), and Technological Content Knowledge (TCK) (Schmidt et al., 2009). In Indonesia's education context, increasing teachers' TPACK abilities is necessary; through TPACK, it can be seen that teachers' abilities in mastering learning technology need to be improved by paying attention to what factors influence the development of teachers' TPACK competencies (Ulfah & Erlina, 2022). This is like applying technology pedagogical content knowledge (TPACK) in the context of Office Technology teachers, which is relevant in efforts to understand and optimize the use of educational game-based learning media, such as Quiziz. So, in this research, the Office Technology teacher at SMK Ketintang Surabaya used technology-based learning media, especially the Quizizz Educational Game, to show that using assessment learning media might increase student learning results (Citra & Rosy, 2020). As a result, employing evaluative learning media like Quizizz can increase student learning results in the Office Management and Business Services Expertise Program while strengthening teacher's competency in technology.

Teachers who can optimize using technology to aid in education can create a classroom atmosphere that is more dynamic, interactive, and interesting for students. Learning with technology can also increase comprehension and understanding of subject matter, creating a more profound learning experience (Sintawati & Indriani, 2019). Experience creating children’s educational computer games can improve the TPACK of Early Childhood Education/ECD pre-service teachers, strengthen their ability to use technology, pedagogy, and content for educational purposes, and improve the quality of children's learning by obtaining feedback and learning to use tools like PowerPoint and Paint (Sancar Tokmak, 2015). The integration of TPACK by university teachers in Karachi, both at public and private universities, has had a significant impact on teachers' technological proficiency in promoting students' digital citizenship and responsibility, as well as their ability to engage in professional development programs, indicating the need for appropriate training and resources. It is inadequate to support the integration of ICT in teaching with the need for curriculum development that utilizes TPACK and ISTE standards (Aslam et al., 2021). So from this phenomenon, the integration of TPACK by teachers, both at the early childhood education and university levels, has a positive impact on student learning by increasing understanding of technology, pedagogy, and content, as well as encouraging digital citizenship and student responsibility through the use of technological tools such as PowerPoint and Paint, emphasize the need for training, resources, and curriculum development that adheres to TPACK and ISTE standards.

The teacher is the main factor in learning success (Maharani et al., 2021). Teachers in the 21st era must master not only subject matter and teaching methods but also technology and its application in the teaching and learning process, considering advances in science, technology, and art in education, which emphasize the importance of teacher proficiency with a range of

electronic gadgets, both traditional and modern, to improve student learning outcomes (Rahmadi, 2019). Apart from that, implementing TPACK is also emphasized as a supporting factor for developing 21st-century abilities in students, which is vital for their adaptation to the global era and achieving the vision of a Golden Indonesia 2045

In this case, training for teachers has a significant influence on increasing teacher competency, especially in teaching in the areas of Office Management and Business Services expertise program. Investing in practical training is essential to ensure teachers have skills relevant to the demands of the times (Evarianty, 2023). Like the skills of 21st-century teachers, which emphasize learning that incorporates technology , teachers must also be able to master content or teaching materials, pedagogy, as well as teacher skills in mastering three components, namely, content, pedagogy, and technology (Selly, 2022). Technological Pedagogical And Content Knowledge (TPACK) was developed by (Mishra & Koehler, 2006), who explained that TPACK is a type of new understanding that teachers need to have in order to incorporate technology into learning (Rahmadi, 2019). So, to increase teachers' understanding of various aspects of learning, training is one aspect for teachers to understand and apply TPACK in learning.

From the phenomenon in Indonesia, there is an urgent need to improve teachers' TPACK (Technological Pedagogical Content Knowledge) abilities because, in this case, teachers' TPACK abilities are the central aspect of learning activities. So, in this research, the influence of TPACK on teachers, especially in the Office Management and Business Services expertise program, is the central aspect to be researched.

2. Literature Review

2.1 21st-Century Teacher Competency

In the era of the 21st century, there is a need to increase teacher competency. By improving the quality of competence, teachers can be better prepared to face the millennial generation. Increasing teachers' understanding of pedagogical competence can be obtained through awareness of the importance of mastering various pedagogical aspects and understanding pedagogical competence itself (Somantri, 2021). Teachers in the 21st era are not only expected to have the ability to teach and organize classroom activities effectively, but are also required to have the skills to build good connections between the school and the students environment, utilize technology to improve the quality of learning, and continuously reflect and improve teaching methods (Darling-Hammond, 2006). Based on the findings of research conducted by (Fikri et al., 2021) in the context of learning activities, teachers act as government implementers in schools by applying the 4C principles (Critical Thinking, Communication, Collaboration, Creativity). These four skills are an integral part of implementing learning models for the 21st century.

2.2 TPACK Competency

Research by (Nisa et al., 2024) states the implementation of technological pedagogical and content knowledge (TPACK) in education at the school level, impacting the learning process and results. Implementing TPACK in teaching can increase teacher creativity, enrich the experience of study students, and improve academic and non-academic performance. However, there are several implementation constraints, such as human resource limitations, facilities, and technology. To overcome obstacles, internal coaching and training are necessary

for teachers, focusing on developing TPACK capabilities and enhancing facilities and technology in the school base. This expected solution can help teachers integrate technology into learning, improve quality education, and create a more conducive student environment. Research conducted by (Ait Ali et al., 2023) also revealed that TPACK can help educators integrate technology, pedagogy, and content knowledge into courses and develop educational software. This framework is also helpful for faculty development in technology and pedagogy, which educators need to teach more effectively in the digital era. Research conducted by (Krisnaresanti et al., 2023) states that their findings on TPACK competency are expected to become the guide for study programs and lecturers in designing learning processes in various eye colleges, use supports appropriate TPACK with demands learning in the era of Society 5.0 and skills 21st century.

3. Material and Method

This research uses a descriptive quantitative research approach. This research was conducted using scientific calculations from vocational school teachers throughout Surabaya with the Office Management and Business Services expertise program. From the data collection results on the number of vocational school teachers in the Surabaya Business Services Office Management expertise program at the East Java Province Education and Culture Service, the total population in this study was 132 teachers. The sample size was 99 teachers, which was determined using the Proportionate Stratified Random Sampling technique using the Slovin formula method (Shell, 2019), namely:

$$n = \frac{\mathrm{N}}{1 + \mathrm{N}e^2}$$

$$n = \frac{132}{1 + 132.5\%^2}$$

$$n = \frac{132}{1 + 0{,}33}$$

$$n = \frac{132}{1{,}33} = 99$$

3.1 Design Study

Data collection in this research used questionnaires distributed offline to vocational schools throughout Surabaya with the Office Management and Business Services expertise program and online via google form. Data processing and analysis uses descriptive statistical analysis, namely determining the percentage of teacher responses to each questionnaire question. The questionnaire was developed with a Likert scale with a choice of 5 answers, namely STS (Strongly Disagree), TS (Disagree), N (Neutral), S (Agree), and SS (Strongly Agree). The questionnaire developed in this research has 50 questions that will be filled in by Office Management and Business Services teachers at vocational schools throughout Surabaya. That questionnaire was adopted and developed from previous research.

Table 1 TPACK Question Instrument

Indicator	Item No	Source
CK *(Content Knowledge)*	1,2,3,4,5	(Krisnaresanti et al., 2023); (Schmid et al., 2020)
PK *(Pedagogical Knowledge)*	6,7,8,9,10,11	
TK *(Technology Knowledge)*	12,13,14,15,16,17,18,19, 20, 21,22,23,24,25,26	
PCK *(Pedagogy Content Knowledge)*	27,28,29,30,31,32	
TCK *(Technology Content Knowledge)*	33,34,35,36,37	
TPK *(Technology Pedagogy Knowledge)*	38,39,40,41,42,43	
TPACK *(Technology Pedagogy Content Knowledge)*	44,45,46,47,48,49,50	

3.2 Data Analysis

Data analysis was also done by categorizing the values obtained for each TPACK Indicator. Before the questionnaire is distributed to respondents, the instrument is tested first to measure its validity and reliability. An instrument's validity and reliability values are influenced by the subject being measured, the instrument user, and the instrument itself. Thus, validity and reliability must be tested before the instrument is used. The questionnaire's threshold if it is valid and reliable is r count > r table with a significance level of 0.05. However, if r count < r table, the questionnaire is invalid and unreliable (Anwar, 2009). A valid and trustworthy instrument will yield valid and trustworthy data, which will result in conclusions that fairly depict the actual circumstances. A valid and trustworthy instrument will yield valid and trustworthy data, which will result in conclusions that fairly depict the actual circumstances (Yusup, 2018). The data analysis was carried out after the respondents' data was collected. In this research, descriptive statistical analysis techniques are used to analyze data by describing the data that has been collected and drawing general conclusions.

Table 2 TPACK Score Grouping Criteria

Score	Formulas	Range	Classification
5	$X_i + 0.6\ SB_i < X$	4.21 – 5.00	Very Good
4	$X_i + 0.6\ SB_i < X < X_i + 1.8\ SB_i$	3.41 – 4.20	Good
3	$X_i - 0.6\ SB_i < X < X_i + 0.6\ SB_i$	2.61 – 3.40	Enough
2	$X_i - 1.8\ SB_i < X < X_i - 0.6\ SB_i$	1.81 – 2.60	Not Good
1	$X < X_i - 1.8\ SB_i$	0 – 1.80	Very Not Good

Source : (Trisnawati et al., 2021)

Based on this table, researchers can assess which category teachers' mastery of TPACK at vocational school in Office Management and Business Services expertise program throughout

Surabaya falls into. The data analysis stage was carried out after the respondents' data was collected. In this research, descriptive statistical analysis techniques are used to analyze data by describing the data that has been collected and drawing general conclusions.

4. Results

4.1 Validity Test

The instruments utilized in this study will first be assessed for validity with a temporary sample of 35 to establish whether all of them were valid or invalid. If the instrument was valid, respondents can proceed to complete the questionnaire. If the statement was not legitimate, it was removed from the instrument. The temporary sample size was 35, and the r table was 0.334 at a significance level 0.05. The formula for determining validity was if r count > r table. The validity test for a temporary sample of 35 yielded the following result:

Table 3 Validity Test Results

Items	Total Pearson Correlation	Test Results
X1	0.413	Valid
X2	0.773	Valid
X3	0.666	Valid
X4	0.558	Valid
X5	0.854	Valid
X6	0.552	Valid
X7	0.512	Valid
X8	0.637	Valid
X9	0.638	Valid
X10	0.501	Valid
X11	0.535	Valid
X12	0.807	Valid
X13	0.744	Valid
X14	0.695	Valid
X15	0.631	Valid
X16	0.723	Valid
X17	0.761	Valid
X18	0.768	Valid
X19	0.763	Valid
X20	0.774	Valid
X21	0.212	Invalid
X22	0.780	Valid
X23	0.629	Valid
X24	0.554	Valid
X25	0.682	Valid
X26	0.725	Valid
X27	0.756	Valid
X28	0.733	Valid

X29	0.735	Valid
X30	0.678	Valid
X31	0.740	Valid
X32	0.590	Valid
X33	0.726	Valid
X34	0.774	Valid
X35	0.819	Valid
X36	0.722	Valid
X37	0.526	Valid
X38	0.703	Valid
X39	0.546	Valid
X40	0.588	Valid
X41	0.779	Valid
X42	0.818	Valid
X43	0.487	Valid
X44	0.738	Valid
X45	0.869	Valid
X46	0.697	Valid
X47	0.766	Valid
X48	0.725	Valid
X49	0.728	Valid
X50	0.733	Valid

Source: Result of SPSS Data Processing by Researchers (2024)

Table 3 shows that the r count for statement item in number 21 was 0.212, less than the r table of 0.334. So, the statement in number 21 was invalid and must be deleted from the instrument. Meanwhile, all other item statements were valid and proven by the table data above and SPSS test results.

4.2 Reliability Test

This study will be assessed for reliability to determine whether the questionnaire is consistent when measurements are repeated using the same questionnaire. The temporary sample size was 35 participants, and the decision to use Cronbach's Alpha for the reliability test was based on (Sujarweni, 2014) perspective that Cronbach's Alpha number greater than 0.6 indicates that the questionnaire was credible. The following were the result of the reliability test.

Table 4 Reliability Test Result

Reliability Statistics

Cronbach's Alpha	N of Items
,975	50

Table 4 shows that the Cronbach Alpha result was 0.975 > 0.6, which means that the questionnaire was reliable.

4.3 Descriptive Statistical Analysis Test

Table 5 Descriptive Statistical Analysis Test Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CK	270	2	5	4,15	,668
PK	322	2	5	4,17	,590
TK	809	1	5	4,25	,706
PCK	324	3	5	4,17	,584
TCK	270	3	5	4,31	,583
TPK	324	3	5	4,25	,575
TPACK	375	3	5	4,16	,658
Valid N (listwise)	266				

Source: Result of SPSS Data Processing by Researchers (2024)

1. This data's Content Knowledge (CK) can be defined as having a minimum value of 2, a maximum value of 5, an average value (Mean) of 4.15, and a standard deviation of 0.668.
2. This data's Pedagogical Knowledge (PK) may be characterized as having a minimum value of 2, a maximum value of 5, an average value (Mean) of 4.17, and a standard deviation of 0.590.
3. The data indicates that the minimum value of Technological Knowledge (TK) was 1, the maximum value was 5, the average value (Mean) was 4.25, and the standard deviation of the Content Knowledge (TK) data was 0.706.
4. The data on Pedagogical Content Knowledge (PCK) can be characterized as follows: the minimum value was 3, the maximum value was 5, the average value (Mean) was 4.17, and the standard deviation was 0.584.
5. This data's Technological Content Knowledge (TCK) may be characterized as having a minimum value of 3 and a maximum value of 5, as well as an average value (Mean) of 4.31 and a standard deviation of 0.583.
6. The data on Technological Pedagogical Knowledge (TPK) can be characterized as having a minimum value of 3 and a maximum value of 5. The average value, or Mean, of the TPK data was 4.25, while the standard deviation was 0.575.
7. The data on Technological Pedagogical Content Knowledge (TPACK) has a minimum value of 3, a maximum value of 5, an average value of 4.16, and the standard deviation of Technological Pedagogical Content Knowledge (TPACK) data was 0.658.

5. Discussion

Table 6 Score Grouping Criteria Results

No.	Component	Score	Classification
1.	Content Knowledge (CK)	4.15	Good
2.	Pedagogical Knowledge (PK)	4.17	Good
3.	Technological Knowledge (TK)	4.25	Very Good
4.	Pedagogical Content Knowledge (PCK)	4.17	Good
5.	Technological Content Knowledge (TCK)	4.31	Very Good
6.	Technological Pedagogical Knowledge (TPK)	4.25	Very Good
7.	Technological Pedagogical Content Knowledge (TPACK)	4.16	Good

The ability of teachers in the Business and Office Management Expertise Program throughout Surabaya in the Technological, Pedagogical, Content, and Knowledge components is balanced with the difference between good and very good results. This is evidenced by the mean value of Content Knowledge (CK) of 4.15, the mean value of Pedagogical Knowledge (PK) of 4.17, and the mean value of Technological Knowledge (TK) of 4.25. This indicates that knowledge related to integrating Material Technology in learning is superior to Material Content and Material Pedagogy. Based on the descriptive statistical analysis test results for each TPACK component from Business and Office Management Expertise Program teachers in Surabaya, there is no significant difference between one component and another.

The results in Table 6 of the CK (Content Knowledge) component show that teachers have good content knowledge, with a minimum score of 2, a maximum of 5, an average of 4.15, and a standard deviation of 0.668. This means that in general, teachers at SMKs throughout Surabaya can meet competency standards in selecting and delivering appropriate content to their students. The results are supported by research according to (Sarwa et al., 2020), in this digital era, teachers must be careful in selecting content to filter out invalid and harmful information. Overall, the content knowledge (CK) of teachers in the Business and Office Management expertise program in Surabaya is quite good, with a high average score indicating that they can master and filter relevant and valid content in the learning process. The results of the research in table 6 of the PK (Pedagogical Knowledge) component illustrate that teachers have good pedagogical knowledge with a minimum score of 2, a maximum of 5, an average of 4.17, and a standard deviation of 0.590. So, in this case it shows that teachers of the Office Management and Business Services Expertise Program in Surabaya can choose appropriate

teaching materials to achieve the expected essential competencies in accordance with the pedagogical framework. This statement is supported by research conducted by (Sarwa et al., 2020) which states that teachers must direct learning towards achieving competencies, not just acquiring knowledge. Overall, Pedagogical Knowledge (PK) of Office Management and Business Services Expertise Program teachers in Surabaya shows positive results, with an average score that reflects their ability to direct learning towards achieving student competencies well.

The TK (Rechnological Knowladge) results show that the technological knowledge of Office Management and Business Services Expertise Program teachers is high, with a minimum score of 1, a maximum of 5, an average of 4.25, and a standard deviation of 0.706. These results indicate that teachers in the Office Management and Business Services Expertise Program in Surabaya have a good ability to use technology as a learning tool. Thus, from these results, teachers' technological knowledge (TK) is at a very good level, with an average score indicating that they can integrate technology into learning effectively and efficiently. And in research conducted by (Sarwa et al., 2020); (Aslam et al., 2021) stated that teachers must be able to integrate technology into learning to support their professional duties. The combination of knowledge in the Pedagogical Content Knowledge (PCK) component has an average value (Mean) of 4.17. The Technological Content Knowledge (TCK) component has an average value (Mean) of 4.31, and the Technological Pedagogical Knowledge (TPK) component has an average value (Mean) of 4.25. This means that the combination of Technological Content Knowledge component in learning is superior to the combination of Technological Pedagogical Knowledge and Technological Content Knowledge. Teachers in the Office Management and Business Services Expertise Program in Surabaya can teach learning materials well, understanding aspects of pedagogy that are unique to their field of study. Overall, the pedagogical content knowledge (PCK) of teachers in the Office Management and Business Services Specialization Program in Surabaya is quite good, reflecting their ability to effectively integrate content and pedagogical knowledge to teach various subjects. And based on the PCK theory by (Sarkim, 2015) states that this knowledge combines knowledge of general material and pedagogy, creating a unique knowledge structure for learning specific knowledge. The research results in Table 6 of the TCK components obtained a score of 4.31, which means it is very good. These results indicate that vocational high school teachers in the Office management and business services expertise program throughout Surabaya can utilize technology to support and strengthen their understanding of content in teaching. Overall, vocational high school teachers' content technology knowledge (TCK) in the Office management and business services expertise program throughout Surabaya is very good. This shows that they can integrate technology and content effectively, strengthening student learning. The results of this research align with research conducted by (Fuada et al., 2020) that TCK Theory emphasizes the importance of knowledge about how technology and content influence each other, enabling teachers to create multimedia and understand content concepts with the help of technology. From the research results on the TPK component, a score of 4.25 was obtained, which means very good. This shows that the ability of vocational high school teachers in the Office management and business services expertise program to utilize technology to improve teaching methods and improve student learning is very good. Additionally, vocational school teachers in the Office management and business services

expertise program can use technology in innovative ways to increase teaching effectiveness. This study's results align with the TPK Theory (Masruroh, 2022), which states that this knowledge involves understanding how technology can change teaching and learning. The Technological Pedagogical Content Knowledge (TPACK) component has an average result of 4.16, classified as good. This shows that the Technological Pedagogical Content Knowledge (TPACK) of vocational high school teachers in the Office management and business services expertise program throughout Surabaya has been proven to positively impact the learning process and outcomes, especially in the context of education. Based on research by (Nisa et al., 2024), implementing TPACK in elementary schools can increase teacher creativity, enrich student learning experiences, and improve academic and non-academic achievements. However, this implementation is often hampered by human resources, facilities, and technology limitations. In the context of teachers in the Office Management and Business Services Expertise Program across Surabaya, the TPACK (Technological Pedagogical Content Knowledge) framework becomes increasingly relevant. Teachers in these skill programs can use TPACK to design and implement more creative and effective teaching strategies. TPACK incorporates three main components: technological knowledge, pedagogical knowledge, and content knowledge. By utilizing these three components synergistically, teachers can create more engaging and meaningful learning experiences for students. This aligns with the findings of (Ait Ali et al., 2023), who showed that TPACK is effective in helping educators integrate technology, pedagogy, and content knowledge. Additionally, this framework supports the development of educational software that can facilitate the learning process. The implementation of TPACK allows teachers to be more flexible in using various tools and technologies to support learning, thus increasing student engagement and teaching effectiveness.

Based on the results of a descriptive statistical analysis of each capability component, it can be seen that the Technological Content Knowledge (TCK) component has the highest average, namely 4.31, with a very good classification. This shows that the teachers' ability to integrate technology with learning content is very good. Mastering TCK allows teachers to choose and use the most appropriate technology to deliver learning materials, improving students' understanding of the content taught. For example, the use of simulation software for office management material can provide a more realistic practical picture for students. This means that the TCK component is superior to the other components. However, even though the average value of TCK is high, it is important to continue to improve this capability to keep pace with the rapid development of technology. On the other hand, Technological Pedagogical Content Knowledge (TPACK) is at an average position of 4.16. This indicates that teachers' ability to integrate technology, pedagogy, and content material is quite good. TPACK allows teachers to design teaching methods that are not only effective but also interesting for students. Nonetheless, these results show that there is still room for improvement. Strengthening the TPACK component can be achieved through training and workshops that focus on the use of technology in the context of effective pedagogy. Additionally, collaboration among teachers in sharing best practices can also help improve TPACK capabilities. It is important to ensure that each component in TPACK is well integrated so that the learning process becomes more holistic and comprehensive. So, the results of the analysis of teacher competence in the Office Management and Business Services Expertise Program in Surabaya are relatively balanced in

the Technological, Pedagogical, and Content Knowledge aspects, with slightly superior mastery of technology. Teachers in the Business and Office Management Expertise Programs in Surabaya have shown good ability in selecting and delivering materials, directing learning towards achieving competencies, and integrating technology in learning. The integration of technology and content knowledge (TCK) is the most prominent, showing teachers' ability to utilize technology to support content understanding. For example, the use of visual aids such as infographics and interactive videos has proven effective in improving student understanding. Overall, the implementation of TPACK among teachers in the Business and Office Management Expertise Program in Surabaya is quite good. However, it needs further strengthening to achieve optimal integration between technology, pedagogy, and content knowledge. Thus, teachers can continue to adapt to the changes and demands of the dynamic world of education, and improve the quality of learning provided to students. This recent research provides important insights into the capabilities and challenges faced by teachers in integrating these three components and offers a basis for more effective professional development in the future.

6. Conclusion, Implication, and Recommendation

6.1 Conclusion

The analysis of teacher competency in the Office Management and Business Services Expertise Program across Surabaya revealed that teachers' skills in Technological, Pedagogical, and Content Knowledge were relatively balanced, with a slight edge in technology mastery. The average Technological Knowledge (TK) score shows that teachers can integrate technology well in learning. Teachers with good content (CK) and pedagogical knowledge (PK) can select and deliver appropriate content and direct learning towards achieving competency. The combination of technology and content knowledge (TCK) was the most prominent, showing teachers' ability to utilize technology to support content understanding. Overall, implementing teacher's TPACK in the Office Management and Business Services Expertise Program throughout Surabaya was quite good, but further strengthening is needed to achieve optimal integration between technology, pedagogy, and content in the learning process.

6.2 Implication

This research analyzes the competence of 21st-century teachers using the TPACK (Technological Pedagogical Content Knowledge) approach in the Office Management and Business Service Expertise Program. With this research, it is essential to apply TPACK (Technological Pedagogical Content Knowledge) in learning to increase student understanding through technology engagement. This is based on increasingly rapid technological developments. Therefore, many fields compete to continue to upgrade themselves so as not to be left behind, one of which is the field of education. As time goes by, technology in the world of education has developed, where everything uses technology to make all work more accessible within the field of education, where the quantity of vocational high schools is currently being built proves that the educational technology in Indonesia is getting more and more advanced because vocational schools use tools and media to carry out learning at school. This technological progress must be balanced with the competence of teachers in the 21st

century so that they can adapt to technological advances. This research could provide insight and evaluation for the world of education in implementing learning in schools.

6.3 Recommendation

There are limitations to this research, as it only focuses on the Surabaya area. The population and sample taken in this research are vocational school teachers in the Office Management and Business Services Expertise program throughout Surabaya. Because this research only focuses on analyzing teacher competency with TPACK in the Office Management and Business Services expertise program in the Surabaya area, it is hoped that further research can cover a broader scope, namely all vocational high schools in the Office Management and Business Services Expertise Program throughout East Java to analyze teachers' TPACK (Technological Pedagogical Content Knowledge) competencies. Not only that, but the researcher also provided suggestions and input that further research could be carried out regarding the factors that influence teachers' TPACK in the Office Management and Business Services Expertise Program.

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