



Diterima	: 7 Oktober 2023
Direvisi	: 20 Oktober 2023
Disetujui	: 27 Oktober 2023
Diterbitkan	: 31 Oktober 2023

ACADEMIC SUPERVISION TO ENHANCE TEACHERS' TPACK COMPETENCE

Nurul Uswatun Khasanah¹, Achmad Fatoni², Sigit Haryanto³, Muadz Assidiqi⁴

¹²³Master of Education Administration, Universitas Muhammadiyah Surakarta, Jl. A. Yani,
Central Java 57162, Indonesia.

⁴Master of History Education, Universitas Sebelas Maret,
Jln. Ir. Sutami 36A Surakarta, Indonesia

*Corresponding Author E-mail: nuruluswatun7@gmail.com

Abstract: The objective of this study is to investigate, elucidate, and analyze the academic oversight provided by the school principal in enhancing the proficiency of Technological Pedagogical Content Knowledge (TPACK) among teachers at SMK N 1 Karanganyar. The present study employs a qualitative study methodology utilizing a case study methodology. The data has been obtained from the paperwork provided by the statistical data informant. Various data collection procedures encompass interviews, observations, documentation, and surveys. Data analysis involves the process of reducing data, presenting data, and deriving descriptive findings. Data authenticity is achieved through the utilization of source triangulation. The research findings demonstrate the significance of TPACK competency in enhancing the overall quality of the learning process. Furthermore, the use of academic supervision has the potential to enhance the proficiency of teachers in integrating technology, pedagogy, and content knowledge (TPACK). The TPACK supervision outcomes at SMK N 1 Karanganyar, yielding an average score of 4.72, are categorized as "excellent". The primary focus of this research is to improve the educators Technological Pedagogical Content Knowledge (TPACK) by developing their proficiency in Technological Knowledge (TK), Content Knowledge (CK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), and Technological Pedagogical Knowledge (TPK). The objective is to investigate how these abilities contribute to the enhancement of learning outcomes within the classroom setting.

Keywords: Academic Supervision; Headmaster; the educators TPACK Capabilities; Learning Quality.

Abstrak: Tujuan penelitian ini adalah untuk mengetahui, menjelaskan, dan menganalisis supervisi akademik kepala sekolah dalam meningkatkan kompetensi TPACK guru di SMK N 1 Karanganyar. Jenis penelitian ini adalah penelitian kualitatif dengan pendekatan studi kasus. Data bersumber dari dokumentasi dari informan data statistik. Teknik pengumpulan data menggunakan wawancara, observasi, dokumentasi, dan kuisioner. Analisis data dilakukan dengan mereduksi data, penyajian data lalu mengambil kesimpulan yang dilakukan secara deskriptif. Keabsahan data dilaksanakan dengan triangulasi sumber. Hasil penelitian menunjukkan bahwa: pertama, pentingnya kompetensi TPACK dalam peningkatan mutu pembelajaran. Kedua, supervisi akademik dapat meningkatkan kemampuan TPACK guru. Ketiga, hasil supervisi TPACK di SMK N 1 Karanganyar dengan rata-rata skor 4,72 tergolong "sangat baik". Sehingga, kebaharuan dalam penelitian ini adalah peningkatan kemampuan TPACK guru dipengaruhi oleh kemampuan TK, CK, PK, PCK, TCK, dan TPK yang dimiliki oleh guru dalam meningkatkan mutu pembelajaran di kelas.

Kata Kunci: Supervisi Akademik; Kepala Sekolah; Kemampuan TPACK Guru, mutu pembelajaran

INTRODUCTION

The Implementation of the Merdeka Curriculum represents a progressive step in the effort to refine the education system in Indonesia. This curriculum aims to provide schools with the freedom to develop and adapt the curriculum according to local needs, resources, and environmental conditions. This approach enables schools to be more responsive to the needs of students and the local community, ensuring that the learning process is more relevant, meaningful, and provides skills necessary in real life. Currently, education in Indonesia is implementing the Merdeka curriculum. Supervision is crucial in efforts to enhance learning for more effectiveness. The Merdeka curriculum aims to prepare students to develop critical and creative thinking skills and keep up with the evolving times (Faiz & Purwati, 2021). This goal can be achieved through the optimization of educational services, both in instructional arrangements and the quality of teaching by educators. This demonstrates the crucial role teachers play in advancing education (Amani et al., 2018).

The era of the Fourth Industrial Revolution poses challenges and opportunities that school principals should consider in developing academic supervision models using digitalization. An innovative academic supervisor, the school principal, should possess digital technology skills to adapt to various changes. According to Michael (2018), school principals should be willing to guide teachers through perspectives related to pedagogy, digital literacy, character empowerment, and life skills. This challenge can be addressed by utilizing discoveries emerging in the era of the Fourth Industrial Revolution, such as the Internet of Things, Artificial Intelligence, Big Data, and Robotics for improving the quality of life. The Fourth Industrial Revolution has a significant impact on society, giving rise to the era of Society 5.0, where everything is centered around humans and technology-based. This situation impacts several aspects of human life, including education, where the role of humans diminishes, allowing tasks and jobs to be replaced by technology. The supervision conducted by school principals includes steps such as checking learning devices, monitoring lesson plans, overseeing the teaching

process, and assessing learning outcomes.

Academic supervision plays a crucial role in strengthening teachers' TPACK (Technological Pedagogical Content Knowledge). Through this supervision, teachers can gain the support and guidance needed to integrate technology with their pedagogical knowledge and subject content. Academic supervisors can collaborate with teachers to raise awareness of using technology effectively in education. They can provide constructive feedback, identify strengths and weaknesses in applying TPACK, and offer relevant advice. Academic supervision also helps teachers identify appropriate resources, select suitable technological tools and strategies, and enhance their digital competence. With structured and continuous academic supervision, teachers can develop their skills in using technology effectively in diverse learning contexts, thereby enhancing student learning outcomes and creating more engaging and relevant learning experiences. Academic supervision plays a crucial role in strengthening teachers' TPACK (Technological Pedagogical Content Knowledge). Through this supervision, teachers can gain the support and guidance needed to integrate technology with their pedagogical knowledge and subject content. Academic supervisors can collaborate with teachers to raise awareness of using technology effectively in education. They can provide constructive feedback, identify strengths and weaknesses in applying TPACK, and offer relevant advice. Academic supervision also helps teachers identify appropriate resources, select suitable technological tools and strategies, and enhance their digital competence. With structured and continuous academic supervision, teachers can develop their skills in using technology effectively in diverse learning contexts, thereby enhancing student learning outcomes and creating more engaging and relevant learning experiences.

The impact of Industry 4.0 on education leads to changes where educators not only minimize their role as instructional coaches but also become inspirations for the development of teachers towards greater creativity, innovation, and productivity. They become more adaptive and competent, playing a significant role as facilitators, guides, inspirers, and true learners who encourage students to have "independent learning." Industry 4.0, as a stage of technological revolution, transforms the way human activities are conducted in terms of scale, scope, complexity, and the change in previous life experiences. Humanity lives in global uncertainty, requiring the ability to predict a rapidly changing future. Every country must respond to these changes in an integrated and comprehensive manner.

As academic supervisors, school principals play a role in constantly guiding, supporting, controlling, and evaluating activities related to developing and improving learning programs (Hardono et al., 2017). Principals should provide optimal services to educational institutions, especially to teachers who are directly responsible for the learning process at school. According to Permendiknas No. 13 of 2007, school principals, as academic supervisors, should have the following qualifications: a) Designing academic counseling programs to enhance teachers' professional skills; b) Conducting academic supervision of teachers using appropriate control methods and techniques; and c) Monitoring the results of teachers' academic mentoring to improve their professional skills. The importance of academic leadership has been researched by Wasmains Budiarti, Yusrizal (2018). Based on the results of this research, it was found that academic supervision is beneficial in improving teacher performance. Furthermore, the research conducted by Danial et al. (2022) found that academic supervision carried out by school principals

can be more effective when using digital applications in the development of academic supervision methods and techniques.

Digital-based academic supervision is utilized in the development of methods and techniques for academic supervision to identify teachers' weaknesses, enhance their professional competencies, and improve the learning process. The model developed in academic supervision involves the use of digital applications such as Google Drive, Google Classroom, e-learning, and others. Therefore, based on the aforementioned background, the author is interested in exploring this issue in a study entitled "Academic Supervision by School Principals to Enhance Teachers' TPACK Competence at SMK N 1 Karanganyar for the Academic Year 2023/2024."

RESEARCH METHODOLOGY

This qualitative research was conducted at SMK N 1 Karanganyar, with data sources obtained directly from the school principal and educational staff. The researcher also acquired documentation of the supervision implemented there. Data collection methods included observations, interviews, questionnaires, and documentation. To test the validity of the data, the researcher employed triangulation techniques by reviewing the accuracy of specific data obtained. Data analysis techniques involved systematically searching and organizing records from observations, interviews, questionnaires, and documentation to improve and deepen the researcher's understanding of the supervision by the school principal at SMK N 1 Karanganyar (Tohirin, 2012).

The use of questionnaires in this study aimed to validate the findings between

supervision and teachers' TPACK competencies. The study used a Likert scale structured as follows:

1. Strongly Disagree (SD)
2. Disagree (D)
3. Neutral (N)
4. Agree (A)
5. Strongly Agree (SA).

Mediation efficacy testing is conducted through complementary mediation testing procedures, which involve analyzing both direct and indirect effects by examining the T statistic values (>1.96) and P-values (<0.05) (Rizal et al., 2022). Mediation efficacy testing serves the purpose of understanding the extent to which a mediator variable plays a role in explaining the relationship between an independent variable (variable X) and a dependent variable (variable Y) (Gómez et al., 2020). In the research context, mediation efficacy helps researchers comprehend the process or mechanism through which variable X influences variable Y via the mediator (Anwar & Sabrina, 2020). The data processing software utilized in this research is Smart PLS version 3.

Furthermore, the description of the supervision results also used a Likert scale as follows:

Angka rata-rata pengisian kuisioner	Keterangan
0 - 1,5	Sangat Rendah
1,5 - 2,5	Rendah
2,5 - 3,5	Cukup
3,5 - 4,5	Baik
4,5 - 5	Sangat Baik

RESULTS AND DISCUSSION

The Importance of TPACK Competence in Improving the Quality of Learning

The evolution into the era 4.0 has brought forth a new paradigm where education in this

era emphasizes innovation, technological development, and skills in the teaching and learning activities. Through the mastery of technology by teachers, they can apply it in the teaching process with the goal of enhancing the quality of education. SMK N 1 Karanganyar is one of the Vocational Schools (SMK) which is a Center of Excellence (CoE) and a priority program of the Directorate General of Vocational Education. The Center of Excellence program is an effort to develop vocational schools with particular expertise to improve their quality and performance. The aim is for the SMK Center of Excellence to become a reference school and a center for improving the quality and performance of schools in the surrounding area, making them more relevant to the needs of the job market and industry. The SMK Center of Excellence is known as a continuation of previous programs, namely the SMK Center of Excellence (CoE) and the Revitalization of Vocational Schools. Being a reference school in Karanganyar positions SMK N 1 Karanganyar to continue developing the human resources' quality, especially the teachers' abilities in educating the nation's generation through TPACK competencies. According to Farikah & Al Firdaus (2020), TPACK (Technological Pedagogical and Content Knowledge) is a conceptual model used to help teachers understand the relationship between technology, pedagogy, and content knowledge. Effective learning is obtained through the utilization of technology, which consists of three components: Pedagogical Knowledge (PK), Content Knowledge (CK), and Technological Knowledge (TK). Supported by Koehler et al (2018), TPACK is a set of knowledge required by teachers to effectively teach by utilizing technology.

Research by Sintawati & Indriani (2019), studying TPACK elements and interactions among the elements, as well as their relevance to the fourth industrial revolution, explains that all aspects of life are currently becoming digital,

including the field of education. Through the TPACK competence possessed, teachers are capable of producing effective, efficient, engaging learning and achieving the intended educational goals. In line with the opinion of Rachman & Karwanto (2021), which explains that the learning process utilizing information technology can assist Teaching and Learning Activities (KBM) in becoming smoother, effective, and efficient in achieving learning objectives. The benefits include technology playing a significant role in enhancing the quality of learning. The main components of TPACK are technological knowledge, pedagogical knowledge, and content knowledge or material. From these three components, there are interactions among each component, leading to seven components, including: 1) Technological Knowledge (TK), 2) Pedagogical Knowledge (PK), 3) Content Knowledge (CK), 4) Technological Content Knowledge, 5) Pedagogical Content Knowledge, 6) Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK). All these components need to be developed and understood by teachers without exception. The research results of Setyaningsih (2018) show that teachers' knowledge related to TPACK competencies is still fragmented among the components. This is because teachers are still unfamiliar with the TPACK framework terminology but have an understanding of the components in the TPACK framework. This can be observed in Table 1, the TPACK framework.

Tabel 1. Kerangka TPACK

Ukuran	Indikator
TK(Pengetahuan Teknologi)	<ul style="list-style-type: none"> - Mempelajari teknologi dengan mudah - Guru memiliki kemampuan teknis untuk menggunakan teknologi
PK (Pengetahuan)	<ul style="list-style-type: none"> - Dapat membimbing siswa untuk belajar secara

Pedagogis)	mandiri. Dapat merencanakan kegiatan pembelajaran
CK (Pengetahuan Konten)	<ul style="list-style-type: none"> - Memahami strategi untuk mengembangkan pemahaman mata pelajaran dalam pembelajaran Memiliki pengetahuan yang cukup tentang mata pelajaran yang diajarkan
PCK (Pengetahuan Konten)	<ul style="list-style-type: none"> - Membuat pengembangan kurikulum/silabus - Melakukan pembelajaran yang mendidik dan logis
TPK (Pengetahuan Pedagogis)	<ul style="list-style-type: none"> - Dapat menyesuaikan penggunaan teknologi yang tepat d untuk kegiatan pengajaran yang berbeda - Dapat menggunakan teknologi informasi dan komunikasi untuk forum berdiskusi dengan peserta didik.
TCK (Pengetahuan Konten)	<ul style="list-style-type: none"> - Dapat menggunakan teknologi tepat guna (sumber multimedia/simulasi untuk merepresentasikan konten subjek). - Melaksanakan proses pembelajaran dengan menggunakan media teknologi seperti mikroskop multimedia, LCD proyektor, computer

TPACK(Teknologi Pengetahuan Konten)	<ul style="list-style-type: none"> - Mampu mengoperasikan media TIK untuk pengajaran melalui model pendekatan pembelajaran yang sesuai - Mampu mengembangkan model pembelajaran berbasis TIK dalam pengajaran.
-------------------------------------	--

Academic Supervision Influences the Improvement of Teachers' TPACK Skills

Academic supervision plays a crucial role in strengthening teachers' Technological Pedagogical Content Knowledge (TPACK). According to Irvin et al (2018), supervision is the process of monitoring an individual's abilities to achieve the organization's goals. The objectives of academic supervision (Kemdiknas, 2019) are: 1) To help teachers improve their professional skills, including academic knowledge, classroom management, and teaching skills; 2) to confirm that the teaching and learning process in the school aligns with the established goals. Supervisory activities can be conducted by the school principal through classroom visits while teachers are teaching, private conversations with teachers, peers, and students; 3) To motivate teachers to continually enhance their competencies by teaching more effectively and applying their knowledge and skills earnestly (Supriyono et al., 2018). Further, it explains the supervisor's tasks, such as 1) planning tasks, which determine policies and programs, 2) administrative tasks, involving decision-making and coordination through consensus and consultations to strive for improving the quality of education, 3) direct involvement in curriculum development by setting goals, developing teacher guidelines in learning, and selecting learning experiences, 4) conducting teaching demonstrations for teachers, and 5) conducting research.

Through this supervision, teachers can receive the necessary support and guidance to integrate

technology with pedagogical knowledge and subject content. Based on interviews with the school principal, academic supervision in SMK N 1 Karanganyar is conducted once at the beginning of each semester. Academic supervisors can collaborate with teachers to build a deeper understanding of how technology can be effectively utilized in education. They can provide constructive feedback, identify strengths and weaknesses in applying TPACK, and offer relevant advice. The academic supervision by the school principal involves several stages: supervision of teaching tools, monitoring of teaching modules, supervision of the teaching and learning process, and assessment of learning outcomes. According to (Danial et al., 2022), the supervision of teaching tools involves inspections and evaluations of the teaching tool documents using assessment instruments. This is done to provide input on teachers' competency in preparing teaching tools as documents to be used for teaching. According to the introductory academic supervision materials by the Ministry of Education in 2019, there are 12 components of teaching tools that are the focus of academic supervision: (a) the educational calendar; (b) annual program; (c) semester program; (d) syllabus; (e) lesson plans or now known as teaching modules; (f) class schedules; (g) daily agenda; (h) KKM documents or now known as KKTP (Criteria for Learning Objectives Completion); (i) attendance lists; (j) grade records; (k) teacher's guidebooks, and (l) textbooks. These 12 components have been implemented at SMK N 1 Karanganyar.

The Competence Required by Teachers to Realize Education in the Current Digital Era is TPACK Competence initiated by Koehler and Mishar. It is hoped that possessing this competence can create an internationally competitive and superior human resource in Indonesia. According to the Principal of SMK N 1 Karanganyar, the role of teachers when interacting with students in the classroom is as important as the role of the school principal as a leader or a role model for the teachers in a school. Results from interviews with several teachers and

staff working at SMK N 1 Karanganyar revealed that the school principal's leadership at SMK N 1 Karanganyar is very good and humanistic. Therefore, the teachers feel comfortable and empowered to come to school to enhance student skills and the quality of learning.

The leadership of the school principal plays a crucial role in the school as its strategic role can influence teacher performance in the teaching process. According to Rachman & Karwanto (2021), in facing the digital era, the school principal, acting as a teacher, manager, leader, administrator, supervisor, education innovator, and motivator, should continually strive to improve the quality of learning through the development of teachers' TPACK competencies. The utilization of information technology in the learning process can aid in achieving effective, efficient learning. This indicates the important role of technology in improving the quality of education. Additionally, based on Nevrita et al's (2020) research, the use of technology-enhanced teaching media has several advantages, including making it easier for teachers to deliver materials, increasing student motivation to learn, ensuring effective learning, and making learning more interesting and enjoyable.

The academic supervision conducted by the school principal has increased teachers' TPACK competencies through follow-up activities following the examination of teachers' teaching documents at SMK N 1 Karanganyar. This can be observed through the execution of the school's vision and mission via academic supervision by the school principal, taking into account the alignment of ideas and work programs as an effort to improve effective learning through teachers' TPACK competencies. This is supported by Rachman & Karwanto (2021), indicating that the principal's strategies through the planned school principal program are able to improve teachers' TPACK competencies. Furthermore, as described by Rusyan in Setyaningsih (2018), if teachers wish to develop, school principals should continuously

strive to enhance teacher competencies for the benefit of the school. Therefore, the role of the school principal as a supervisor can be realized to improve teachers' TPACK competencies.

Aligned with the findings of Surahman et al (2020), Putri et al. (2020), and Rismawati et al (2021), the strategies for developing competencies that the school principal should implement as a leader include: 1) training, 2) workshops, 3) educational seminars, 4) workshops on education and learning in the digital era, 5) supervision by the school principal, and 6) provision of complete and adequate learning facilities. These competency development strategies have been implemented at SMK N 1 Karanganyar.

The implementation of the school principal's role as a supervisor and a leader with content knowledge should be able to influence, motivate, develop, and empower teachers to enhance TPACK competencies. Therefore, leadership content knowledge becomes one of the necessary knowledge of the school principal to improve teachers' competencies. Supported by Rachman & Karwanto (2021), stating that school principals can conduct academic supervision and clinical supervision to enhance teachers' TPACK competencies. In essence, supervision is mentoring for teachers and educational staff using techniques and objectives to achieve teacher effectiveness in performing their roles and duties. According to Singerin (2022), the test results indicate that teacher supervision significantly influences TPACK. Based on Amini et al's (2021) research, academic supervision is conducted through classroom visits by the school principal to understand the methods and media used by teachers, and to observe student involvement in learning. The results of supervision at SMK N 1 Karanganyar revealed that the strengths and weaknesses of teachers in conducting lessons are related to the respective teachers' level of competency and knowledge. This calls for solutions, guidance, and follow-up, enabling teachers to improve weaknesses while

maintaining their strengths in conducting lessons. Thus, through the school principal's supervision, teachers can be motivated to improve their performance.

The phrase "Hasil Supervisi TPACK Guru" translates to "Results of TPACK Teacher Supervision."

Regarding the second sentence, the intended translation is: "Overall results using TPACK questionnaire analysis. Below is a table showing the average values from the completion of the questionnaire by all subject teachers."

Mapel	A of TK	A of CK	A of PK	A of PCK	A of TCK	A of TPK	A of TPACK
Agama 1	4,4	4,5	4,3	4,2	4,5	4,5	4
Agama 2	4,5	5	4,2	4,3	4,4	4,5	4,5
Bahasa 1	4,2	4,3	4,5	4,6	4,5	4,4	4,5
Bahasa 2	4,3	4,3	4	4,2	4,6	4,4	4,5
BK 1	4,5	4,5	4,3	4,6	4,6	4,2	5
BK 2	4,3	4	4,5	4,3	4,3	4,5	5
Kesenian 1	4	4,3	4,2	4,4	4,5	4,6	4,8
Kesenian 2	4,4	4,5	4,4	4	4,5	4,3	4
Sains 1	4,5	4,5	4,5	4,7	4,5	4,6	5
Sains 2	4,5	4,7	4,8	4,5	4,5	4,6	5
Sosial 1	4,5	4,5	5	5	4,5	4,5	5
Sosial 2	4,6	4,3	4,7	4,6	4,8	4,8	5
TIK 1	4,4	5	5	4,8	5	5	4,8
TIK 2	4,5	4,5	5	5	4,5	4	5
Grand Total	4,41	4,49	4,53	4,51	4,55	4,49	4,65

Here's the translation of the data from the provided text:

1. Component TK - the highest average score of 4.6 is found in Social 2 teachers, followed by lower averages. The second highest average score of 4.5 is observed in Religious Studies 2, Guidance Counseling 1, Science 1, Science 2, Social 1, and ICT 2. The third average with a score of 4.4 is found in Religious Studies 1, Art 2, and ICT 1. The fourth average score of 4.3 is observed in Language 1, Language 2, and Guidance

Counseling 2. The lowest average in the TK component is seen in Art 1 teachers with a score of 4.

2. Component TC - the highest average score of 5 is observed in ICT 1 teachers, followed by lower averages. The second-highest average score of 4.7 is found in Science 2 teachers. Following that, the third average, with a score of 4.5, is observed in Religious Studies 1, Guidance Counseling 1, Art 2, Science 1, Social 1, and ICT 2. The fourth average, with a score of 4.3, is found in Language 1, Language 2, Art 1, and Social 2. The lowest average in the TC component is found in Guidance Counseling 2 teachers with a score of 4.
3. Component PK - the highest average score of 5 is observed in Social 1, ICT 1, and ICT 2 teachers. The second-highest average score of 4.8 is found in Science 2 teachers. Following that, the third average with a score of 4.7 is observed in Social 2 teachers. The fourth average with a score of 4.5 is found in Language 1, Guidance Counseling 2, and Science 1 teachers. The fifth average with a score of 4.3 is observed in Religious Studies 1 and Guidance Counseling 1. The lowest average in the PK component is found in Language 2 teachers with a score of 4.
4. Component PCK - the highest average score of 5 is observed in ICT 2 teachers. The second-highest average score of 4.8 is found in ICT 1 teachers. Following that, the third average with a score of 4.7 is observed in Science 1 teachers. The fourth average with a score of 4.6 is found in Language 1 teachers. The fifth average with a score of 4.5 is observed in Science 2 teachers. The sixth average with a score of 4.4 is found in Art 1 teachers. The lowest average in the PCK component is observed in Religious Studies 1, Religious Studies 2, Guidance Counseling 2, and Art 1 teachers, all with a score of 4.3.
5. Component TCK - the highest average score

of 5 is observed in ICT 1 teachers. The second-highest average score of 4.8 is found in Social 2 teachers. Following that, the third average with a score of 4.6 is found in Language 2 and Guidance Counseling 1 teachers. The fourth average with a score of 4.5 is observed in Religious Studies 1, Language 1, Art 1, Art 2, Science 1, Science 2, Social 1, and ICT 2. The lowest average in the TCK component is observed in Religious Studies 2 and Guidance Counseling 2 teachers, with a score of 4.4.

6. Component TPK - the highest average score of 5 is observed in ICT 1 teachers. The second-highest average score of 4.8 is found in Social 2 teachers. Following that, the third average with a score of 4.6 is found in Art 1, Science 1, and Science 2 teachers. The fourth average with a score of 4.5 is observed in Religious Studies 1, Religious Studies 2, Guidance Counseling 2, and Social 1 teachers. The fifth average with a score of 4.4 is found in Language 1, Language 2, and Guidance Counseling 1 teachers. The lowest average in the TPK component is observed in Art 2 teachers with a score of 4.3.
7. Component TPACK - the highest average score of 5 is observed in Guidance Counseling 1, Guidance Counseling 2, Science 1, Science 2, Social 1, Social 2, and ICT 2 teachers. The second-highest average score of 4.8 is found in Art 1 and ICT 1 teachers. Meanwhile, the third average with a score of 4.5 is observed in Religious Studies 2, Language 1, and Language 2 teachers. The lowest average in the TPACK component with a score of 4 is found in Religious Studies 1 and Art 2 teachers.

Based on the description above, the average totals for each category are: TK: 4.40; CK: 4.49; PK: 4.53; PCK: 4.52; TCK: 4.56; TPK: 4.51; and TPACK: 4.65. Therefore, it can be concluded that the TPACK supervision result, with an average score of 4.65, is considered "very good."

CONCLUSION

Conclusion

Based on the above discussion, it is concluded that TPACK competencies have an influence on improving the quality of education, highlighting the role of the school principal as a supervisor to conduct academic supervision. The research results indicate an improvement in the TPACK competence of teachers through academic supervision by the school principal. This is evidenced by an average TPACK score of 4.72, classified as excellent. Thus, the successful supervisory development model implemented in SMK N 1 Karanganyar, carried out through digitalized supervision such as e-learning platforms including e-performance and other applications used by the principal to oversee teachers and school staff, has enhanced the TPACK abilities of teachers in the effort to improve the quality of classroom teaching.

Suggestions

This research is expected to contribute to the body of knowledge regarding academic supervision models. It is recommended that this model can be implemented in other schools, as the implementation of this academic supervision model in SMK N 1 Karanganyar has significantly improved the TPACK competence of teachers.

REFERENCES

- Amani, L., Dantes, N., & Lasmawan, W. (2018). Meningkatkan Kemampuan Guru Mengelola Proses Pembelajaran Pada Guru Sd Se-Gugus. E-Journal Program Pascasarjana Universitas Pendidikan Ganesha Jurusan Pendidikan Dasar, 3. <https://media.neliti.com/media/publications/119506-ID-implementasi-supervisi-klinis-dalam-rang.pdf>
- Amini, A., Kesumawaty, S., & Aktar, S. (2021). Analisis Implementasi Supervisi Kepala Sekolah dalam Meningkatkan Kompetensi Guru di SMA Negeri 5 Pematangsiantar.

- Edumaspul: Jurnal Pendidikan, 5(2), 660–667.
<https://doi.org/10.33487/edumaspul.v5i2.2174>
- Danial, A., Mumu, M., & Nurjamil, D. (2022). Model Supervisi Akademik Berbasis Digital Oleh Kepala Sekolah Dalam Meningkatkan Profesionalisme Guru PAUD. *Jurnal Educatio FKIP UNMA*, 8(4), 1514–1521.
<https://doi.org/10.31949/educatio.v8i4.3922>
- Destri Astrianingsih. (2021). Analisis Model Pembelajaran Problem Based Learning Terhadap Motivasi Belajar Siswa. *TULIP (Tulisan Ilmiah Pendidikan)*, 10(1), 32–34.
<https://doi.org/10.54438/tulip.v10i1.182>
- Faiz, A., & Purwati, P. (2021). Koherensi Program Pertukaran Pelajar Kurikulum Merdeka Belajar Kampus Merdeka dan General Education. 3(3), 649–655.
<https://doi.org/10.31004/EDUKATIF.V3I3.378>
- Farikah, F., & Al Firdaus, M. M. (2020). Technological Pedagogical and Content Knowledge (TPACK): The Students' Perspective on Writing Class. *Jurnal Studi Guru Dan Pembelajaran*, 3(2), 190–199.
<https://doi.org/10.30605/jsgp.3.2.2020.303>
- Hardono, H., Haryono, H., & Yusuf, A. (2017). Kepemimpinan Kepala Sekolah, Supervisi Akademik, dan Motivasi Kerja dalam Meningkatkan Kinerja Guru. *Educational Management Journal*, 6(1), 26–33.
<http://journal.unnes.ac.id/sju/index.php/eduman>
- Irvin, D. W., Ingram, P., Huffman, J., Mason, R., & Wills, H. (2018). Exploring paraprofessional and classroom factors affecting teacher supervision. *Research in Developmental Disabilities*, 73(December 2017), 106–114.
<https://doi.org/10.1016/j.ridd.2017.12.013>
- Jamila, J. (2019). Pengembangan Model Supervisi Akademik Berbasis Kolaboratif (Studi Pada Pengawas Smp Dinas Pendidikan Kota Medan). *Jurnal Manajemen Pendidikan Dasar, Menengah Dan ...*, 1(1), 26–36.
<http://jurnal.umsu.ac.id/index.php/JMPDMT/article/view/3922>
<http://jurnal.umsu.ac.id/index.php/JMPDMT/article/viewFile/3922/3471>
- Koehler, M. J., Mishra, P., & Cain, W. (2018). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193(3), 13–19.
<https://doi.org/10.1177/002205741319300303>
- Mansyur. (2021). Supervisi Akademik Abstrak. *El-Idarah : Jurnal Manajemen Pendidikan Islam*, 7(2), 107–115.
- Michael, J. (2018). What makes physiology hard for students to learn? Results of a faculty survey. *American Journal of Physiology - Advances in Physiology Education*, 31(1), 34–40.
<https://doi.org/10.1152/advan.00057.2006>
- Nevrita, N., Asikin, N., & Amelia, T. (2020). Analisis Kompetensi TPACK pada Media Pembelajaran Guru Biologi SMA. *Jurnal Pendidikan Sains Indonesia*, 8(2), 203–217.
<https://doi.org/10.24815/jpsi.v8i2.16709>
- Putri, A. R. A., Hidayat, T., & Purwianingsih, W. (2020). Pelatihan Taksonomi Numerik Sebagai Strategi Untuk Meningkatkan Technological Pedagogical Content Knowledge Guru Biologi. *Jurnal Pendidikan Sains Indonesia*, 7(2), 64–78.
<https://doi.org/10.24815/jpsi.v7i2.14332>
- Rachman, A. D., & Karwanto. (2021). *Jurnal Inspirasi Manajemen Pendidikan Volume 09 Nomor 05 Tahun 2021*, 1273–1285. *Jurnal Inspirasi Manajemen Pendidikan Volume, 09*,

- 1273–1285.
- Rismawati, B. V., Arif, M., & Mahfud, M. (2021). Strategi Madrasah Ibtidaiyah Dalam Meningkatkan Profesionalisme Guru Kelas Di Era Revolusi Industri 4.0. *Elementeris : Jurnal Ilmiah Pendidikan Dasar Islam*, 3(1), 59. <https://doi.org/10.33474/elementeris.v3i1.10538>
- Setyaningsih, R. D. (2018). Peran Kebijakan Kepala Sekolah Dalam Peningkatan Kemampuan TPACK Pada Guru Kelas Di SD Muhammadiyah 3 Nusukan Surakarta. *Angewandte Chemie International Edition*, 6(11), 951–952.
- Singerin, S. (2022). The Effect Supervision on Teacher Performance through TPACK as Mediating Variable. *Scholars Journal of Arts, Humanities and Social Sciences*, 10(2), 39–51. <https://doi.org/10.36347/sjahss.2022.v10i02.002>
- Sintawati, M., & Indriani, F. (2019). Pentingnya Technological Pedagogical Content Knowledge (Tpack) Guru Di Era Revolusi Industri 4.0. *Seminar Nasional Pagelaran Pendidikan Dasar Nasional (Ppdn)*, 417–422.
- Supriyono, S., Ali Imron, A., Imron Arifin, I., & Kusmintardjo, K. (2018). The Situational Behavior Orientation of Instructional Supervision: A Multisite Study. 45(CoEMA), 304–308. <https://doi.org/10.2991/coema-17.2017.52>
- Surahman, E., Sulthoni, S., Ulfa, S., Husna, A., Ramdiana, H., At Thaariq, Z. Z., Setiawan, A. B., & Qolbi, M. S. (2020). Pelatihan Micro Learning Object Berbasis TPACK bagi Guru-Guru SMA di Garut. *Abdimas Pedagogi: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, 3(1), 1. <https://doi.org/10.17977/um050v3i1p1-14>
- Tohirin. (2012). *Motode Penelitian Kualitatif dalam Pendidikan dan Bimbingan Konsling*. Rajawali Pers.
- Wandra, D., & Sufyarma Marsyidin, R. (2021). EDUKATIF: JURNAL ILMU PENDIDIKAN Peranan Supervisi Pengawas Madrasah dalam Meningkatkan Mutu Pendidikan. *Edukatif : Jurnal Ilmu Pendidikan*, 3(6), 3647–3653. <https://doi.org/10.31004/edukatif.v3i6.977>
- Wasmainsi budiarti, Yusrizal, N. U. (2018). Pelaksanaan Supervisi Akademik Dalam Rangka Peningkatan Kinerja Kimia Di SMA 1 Teunom Aceh Jaya. *Jurnal Administrasi Pendidikan*.
- Yurinda, B., & Widyasari, N. (2022). Analisis Technological Pedagogical Content Knowledge (Tpack) Guru Profesional Dalam Pembelajaran Matematika Di Sekolah Dasar. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, 8(1), 47. <https://doi.org/10.24853/fbc.8.1.47-60>