TECHNOLOGY IN EDUCATION; TPACK AS AN APPROACH TO BECOMING A REVOLUTIONARY TEACHER IN THE DIGITAL AGE

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ABSTRACT

This study aims to analyze the readiness of educators as revolutionary teachers in the digitalization era through the TPACK (technology, pedagogy, content, knowledge) approach to Islamic Elementary School Teacher Education students and teachers at MI Al-Islamiyah Karanganyar Paiton. This study uses a qualitative approach with a case study type of research. Data collection techniques were carried out by interviews and observation. Data analysis techniques using data reduction, data presentation and drawing conclusions. The results of this study indicate that preparing to become a revolutionary teacher in the digital era takes several steps, namely; strengthening personal branding, increasing teacher competence TPACK and having tech savvy abilities. This research has implications with the use of the TPACK approach, can prepare themselves to become revolutionary teachers who are able to combine their knowledge with the rapid development of technology in this digital era.

Keywords: Technology in education; revolutionary teacher; TPACK approach.

INTRODUCTION

Information and communication technology is part of the aspect that marks the progress of the times in the order of human civilization which cannot be avoided and is very influential in world life in the 21st century era (Gazali & Pransisca, 2021). The development of information and communication technology sector as one of the products of changing times offers new things for education. (Iqbali, 2019). It can be understood that the information and communication technology sector is one of the products of changing times that offers new things to the world of education. adjustments to the use of information and communication technology in the learning process will certainly become a global demand that drags the world of education to be involved and adapt to technological evolution (Rozi & Jannah, 2022). This happens because of the aspects of attractiveness, effectiveness, and efficiency proposed by educational reforms with digital technology nuances (Hanik et al., 2022).

The use of technology in education is certainly very impressive for human sustainability in managing it (Salsabila et al., 2021). Because in today's modern era,

education is a one-way way to strengthen all human potential needs in an optimal and integrated manner (Nu'man et al., 2021). However, education that has been infiltrated by technology must be able to position itself with the flow of change so that it is not covered by negative changes that can affect the future of the nation's children (Nusa et al., 2021).

In the implementation of education, the existence of teachers is the spearhead as a subject that greatly influences the existence of education (Sari, 2021 & Sukarja, 2019). The teacher functions as a learning resource that plays a dominant role and is the highest authority in science (Suwarni et al., 2018). The importance of the role of a teacher has been proven by the Japanese empire during the war against the allies, where the two largest cities in Japan, namely Hiroshima and Nagasaki were bombed by the allies which killed most of the population. When disaster strikes, the emperor asks the most important thing at the time, which is "how many masters are left?" This proves the very large role of the teacher for the progress of a country (Akbar, 2021).

The appearance of a teacher characterized by excellence in nationalism, soul, faith, piety, mastery of science and technology, work ethic and discipline, insight into the future, career certainty, and physical and spiritual well-being are things that must be possessed by a revolutionary teacher (Mubarak et al., 2022). But apart from all that, being a revolutionary teacher is not just teaching or transferring knowledge, skills and technology an sich or just acting as a model for their students, but teachers must also act as communicators, learning resources, facilitators, guides, demonstrators, innovators. , and others (Baharun et al., 2020 & Hapsari & Fatimah, 2021).

Becoming a revolutionary teacher in this digital era is of course a big homework for an educator who must transform from a classical teacher into a smart technology teacher who can apply himself with artificial intelligence. It is not without reason that a teacher must be literate because in fact students are much more familiar with the developments in the world of technology today, lest the teacher's technological level is below the students' level, of course this will boomerang and reduce the degree of credibility as an educator. Revolutionary teachers need new resources to select appropriate learning content to improve student understanding and learning outcomes. An example of an appropriate pedagogical approach that can be used in 21st century education is Technology Pedagogy Content Knowledge (TPACK). Technology Pedagogical Content Knowledge (TPACK) is knowledge about how teachers can use technology in the teaching and learning process in

new ways (Farikah & Al Firdaus, 2020) and it is new knowledge that teachers must do to apply technology effectively according to learning needs (Rahmadi, 2019).

There are many phenomena that occur, there are still many students and teachers who often experience problems in the field and the most important thing is related to technology, especially in terms of the application of information and communication technology in planning, implementing, evaluating and managing education. This is because they have not been able to combine technology, teaching, scientific/technical content and communication in applying information technology science and the development and implementation of knowledge in their field of expertise. No exception also happened to PGMI students at Nurul Jadid Paiton University, Probolinggo and teachers at MI Al-Islamiyah. As a revolutionary teacher in this digital era, of course, he must be technologically literate and able to keep up with the rapid pace of technology in education as it is today, teachers who are clueless and tend to close themselves off will make their students behave understimate, because our prospective students are the 'Millennial Generation'. where they are close friends spending a lot of time on digital technology devices.

In response to this phenomenon, a teacher must always improve and update his or her quality according to the demands of the times so that he can understand the increasingly complex needs of students in the future and a teacher must also have Higher Order Thinking Skills which are important factors that can be applied in the learning process (Suardipa, 2018). Teachers in the learning process can vary the way of delivering material to their students by associating technology or things around them so that they can be utilized so as to shape the character of students who are able to communicate, think clearly, independently and be able to get along with other people. Revolutionary teachers are not teachers who are only able to convey material in an interesting way, nor are they teachers who are technologically proficient. Revolutionary teachers are teachers who have competence in harmony between technology, pedagogy, and material content.

In this case as a revolutionary teacher can apply a technology, pedagogy, content, knowledge (TPACK) approach which can combine aspects of knowledge (Knowledge/K), teaching methods (Pedagogy/P), learning materials (Content/C) and ICT (Technology/ T) (Murtafiah et al., 2022). Of course, it can be a solution to the above phenomenon that can be developed by the teacher in the learning process. TPACK is a framework that can

integrate the relationship between components of technology, pedagogy and knowledge content needed to support becoming a revolutionary teacher (Rahayu, 2019). TPACK consists of Technological Knowledge (TK) Pedagogical Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK) Technological Pedagogical Knowledge (TPK) Technological Pedagogical Content Knowledge (TPACK) (Amartya, 2022).

Many researchers have previously conducted research on TPACK, including that carried out by Lase (2022) that through the TPACK approach can improve student learning outcomes in Numbers material in the learning process by combining using the problem based learning (PBL) learning model. In addition, Patmisari et al (2021) also stated that through this approach a correlation test could be carried out between the use of the TPACK approach and the formation of student welfare (well-being).

In previous research, it has been described that the use of the TPACK approach can improve student learning outcomes and can test the correlation of the formation of student well-being. in the research that the researcher will examine has a different discussion but uses the same approach. Researchers will examine all aspects related to teacher competence and the steps to become a revolutionary teacher who is demanded to advance in the 21st century, of course this is something unique in this research because there has been no previous research discussing this topic. The importance of this research is to encourage teachers to further improve their quality by blending all their knowledge with current technological advances and teachers are not only oriented towards the classical learning process but must be directly proportional to the current situation so that there are no gaps in inequality and of course teachers are always ready with the development of the times that are entering the 5.0 era or what is called Society 5.0. Researchers hope that this research can provide literacy and renewal even though it uses the same approach.

Departing from these problems, the researchers focused on this research on how to become revolutionary teacher candidates in the digital era with a technology pedagogy content knowledge (TPACK) approach that is in accordance with the development of this modern era.

RESEARCH METHOD

In this study, researchers used a qualitative research approach with a case study type of research conducted at MI Al-Islamiyah Karanganyar Paiton Probolinggo. This research was conducted to examine readiness as a teacher regarding what steps should be taken with the development of the use of technology in education in the digitalization era through the TPACK (technology, pedagogy, content, knowledge) approach.

Sources of information in this study were obtained from informants in zoom meeting seminars, PGMI students at Nurul Jadid Paiton University Probolinggo, Head of Madrasah MI Al-Islamiyah and several teacher councils as informant subjects because they were primary sources. Data collection techniques were carried out by interviews and observation. Based on the results of interviews and surveys conducted, researchers performed data analysis techniques consisting of data collection, data reduction, data presentation and analysis of conclusions. It is at this data reduction stage that the researcher tries to select, simplify and summarize the material during interviews and observations.

RESULTS AND DISCUSSION

**Knowledge Content Pedagogical Technology Approach (TPACK)**

Being a revolutionary teacher, of course, one must be prepared to have an open attitude towards technology which is running rapidly at any time. The teacher must be able to recognize technology as a bridge in delivering and monitoring learning outcomes which is a challenge and a future need in education. One of them teachers need to know what is TPACK?. TPACK is a complex interaction consisting of three main forms of knowledge: Content, Pedagogy, and Technology (Nugroho et al., 2019). TPACK is known in the research field as a framework for developing pedagogical content knowledge (PCK) which was first proposed by Shulman in 1986 where teachers must know pedagogical knowledge (PK) and content knowledge (CK). PCK interaction diagram as shown below.
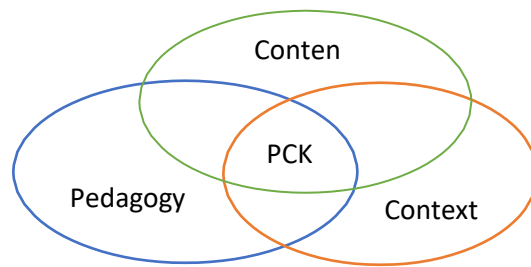
Figure 1. PCK Relationship

Based on Figure 1 it can be stated that pedagogical content knowledge (PCK) is a subset of content knowledge (C) and pedagogical knowledge (P). In other languages, it is a way of representing and formulating a topic so that it can be understood comprehensively. Pedagogical content knowledge (PCK) describes the relationship between basic content knowledge in teaching and the three domains needed and applied by teachers in classroom learning by considering the current situation.

Along with the rapid development of technology and entering the era of the Industrial Revolution 4.0, the ability to learn technology in learning is important for teachers and prospective teachers, so that PCK and technology are then combined to become TPACK which consists of 7 components of knowledge (Nevrita et al., 2020). The TPACK framework expands on Shulman's notion of Knowledge Content Pedagogy (PCK) as shown below.
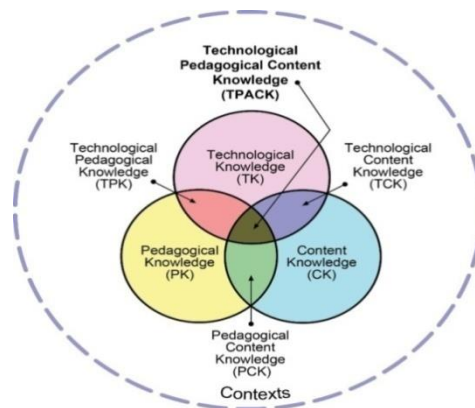
Figure 2. The seven components of TPACK (Maknun, 2022)

In Figure 2, the components in the TPACK approach are as follows:

First, Technological Knowledge (TK) or what is also called technological knowledge, namely knowledge about the basic elements of technology that can be used to support learning in the classroom. For example the use of software, event animation, internet access, molecular models, virtual laboratories and others (Baktiningsih et al.,

2020). Second, Content Knowledge (CK), namely knowledge of the subject matter contained in the curriculum (Dwi Kristanto et al., 2020). A teacher is expected to have this expertise in his teaching activities because content knowledge is very important in determining the way of thinking of each discipline he studies. Third, Pedagogy Knowledge (PK) explains in-depth knowledge related to teaching and learning theory and practice, including objectives, processes, evaluation of learning methods, strategies and others (Candra et al., 2020).

Furthermore, Fourth, Pedagogical Content Knowledge (PCK), which is flexible knowledge that is formed when the teacher interprets the subject matter, looks for various ways to present it, adjusts and modifies teaching materials to suit the background knowledge of students. PCK creates linkages between curriculum, pedagogy, and evaluation. This element was the starting point for the emergence of TPACK initiated by Koehler & Mishra (Oztay & Boz, 2022). In short, it can be stated that PCK is knowledge that represents content knowledge and applies pedagogical strategies to make certain content/topics easier for students to understand (Wardani, 2022). Fifth, Technological Content Knowledge (TCK), namely knowledge of how technology can create new images of certain materials, including mastery of basic knowledge about technology and learning content (Habibi et al., 2022). Sixth, Knowledge of Technology Pedagogy (TPK) is knowledge of how various technologies can be used in teaching and using technology (Furqon Arbianto et al., 2019). Seventh, Technology Pedagogy Content Knowledge (TPACK) is an integration of technological knowledge, pedagogical knowledge and content knowledge, including how pedagogical and technological approaches to certain content can facilitate student learning (Reski & Sari, 2020).

Revolutionary Teacher in the Digital Age

The current era of education has been affected by the industrial revolution 4.0 or what is called education 4.0, which is the main feature of education that utilizes cyber systems and takes place continuously without space and borderless boundaries. Nowadays, it is a big challenge for a teacher in the digital era to prepare skills and mentality to have an advantage in entering a global competitive advantage.

In this digital era, being a teacher is not only enough to have pedagogic knowledge and professional knowledge, but also must have the mentality of a revolutionary teacher. Revolutionary teachers are teachers who are oriented towards fundamental and

comprehensive changes. The meaning of a revolutionary teacher is a teacher who in his heart, mind and soul has the power to break into great changes to break down the existing order to carry out reforms.

Revolutionary teachers have distinctive characteristics that distinguish them from ordinary teachers, including; First, teachers must always learn to improve their quality. This means that a teacher must always hone his knowledge in order to balance the abilities of his students who are millennial generations whose figures are proficient with the digital world. Second, the teacher must always make updates. For example, from the point of view of the learning process in the classroom both in terms of approaches, methods and strategies. Third, the teacher is on standby all the time. This means that even though students' technological advances are progressing faster and faster than their teachers, a teacher has his own wisdom in providing an understanding of science and technology to his students by accompanying them so they are able to use their heart and reason wisely in utilizing information technology. This role is the true definition of a teacher which will never be replaced and replaced by modern technology that is so advanced.

Steps to Become a Revolutionary Teacher in the Digital Age

As a revolutionary teacher of 21st century learning, its main goal is to strengthen students' learning abilities and support their development into lifelong, active and independent learners (Tarihoran, 2019). Being a teacher, of course, must understand and master the intellectual curiosity of students, be able to identify and solve problems and know how to do something new and better than before. In order to realize being a revolutionary teacher in this modern era which awakens the teacher's awareness of the obligation of lifelong learning and in harmony with the rapidly developing pace of digital technology development, special steps are needed to become a revolutionary teacher candidate in the coming years:

1. Strengthening Personal Branding

Teacher personal branding is a strengthening effort made by the teacher concerned in showing a positive self-image to someone who is the target. A teacher will display a number of strengths and uniqueness that is not found in any teacher. This will certainly make people know the teacher based on his strengths and goodness. There are so many benefits of the importance of personal branding for teachers, one of which strengthens credibility.

Fiture 3. Zoom Meeting Hi-Tech (Personal Branding)

In Figure 3, about how personal branding for students and teachers must have different uniqueness which includes competence, standard and style. For example, being a teacher who can create unique content with the help of technology in every learning process so that teaching in class will be developed well with students and indirectly incorporate technology, content and pedagogy which are part of TPACK, this will certainly be a unique style. separate for the teacher and will be attached to the soul of the students that they have a unique teacher with a different style from other teachers, of course this will be a characteristic image of the teacher.

A teacher's personal branding is defined as something built by the teacher personally to create a good brand or image. A teacher who has long been known as Oemar Bakri's army is a figure to be admired and emulated, an unsung hero who is one of the agents of social change. In simple terms, the goal or aspiration of a teacher is to be able to market himself through his skills by carrying out a reputation for quality personality in his daily life, this is what a revolutionary teacher needs to do in order to have added value.

2. Improving Teacher Competency TPACK

Teacher's competency or teacher competence is the ability of a teacher to carry out his duties and obligations properly and responsibly (Ivan Fanani Qomusuddin & Ubun Bunyamin, 2020). The teacher as a learning agent (learning agent), namely the teacher acts as a facilitator, mover, motivator, and learning engineer for students. Of course, as a prospective teacher, you must first understand what teacher competence is as regulated in the Law of the Republic of Indonesia number 14 of 2005 article 8, that teacher competence is divided into 4 competencies as shown in the picture below.
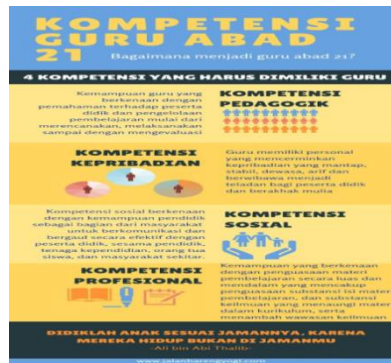
Figure 4. 4 Teacher competence

Based on Figure 4, teacher competence consists of: First, personality competence, which includes (the teacher must have a solid and stable personality, the teacher must have a mature, wise, authoritative and noble personality, and set an example). Second, pedagogic competence which includes (teachers must be able to understand students in more depth, carry out learning designs and evaluations, and empower students as actualization of various potentials of students in the sense of being a facility provider). Third, social competence which includes (teachers must be able to communicate politely, be empathetic, have an inclusive attitude, act objectively, and be able to adapt in their place of work with diverse cultures). Furthermore, professional competence includes (teachers must be able to master material and concepts, develop material creatively with reflective action, and use technology in communication and self-development).

Teacher competence in the 21st century is not only enough to know the skills or knowledge of how to use the right material for teaching materials or Pedagogic Content (PCK), but in this era it is also marked by important technological interrelationships for prospective teachers, so TPACK offers a concept that changes the concept of PCK. , where Content Knowledge is complemented by Technological Knowledge. It is; Content Knowledge (CK) which is aligned with Permendiknas No. 16 of 2007 concerning teacher qualification and competency standards and mastery of the material. Pedagogic Knowledge (PK) related to teacher teaching methods and strategies which is one of the competency standards. Technology Knowledge (TK) is related to basic knowledge of technology which becomes additional knowledge for teachers so they can prepare themselves to adapt to millennial generation students. Technological Content Knowledge (TCK), namely knowledge about the relationship between technology

and material, for example, usually learning resources or content using books are now developing in the form of soft files with various formats. Technology Pedagogic Knowledge (TPK) related to the use of technology which can provide many advantages for educators in assisting teaching, including; giving credibility to teachers, facilitating access to learning, adding information in learning. For example using an internet search for learning resources, using GC/LMS for PJJ. Pedagogical Content Knowledge (PCK) is related to appropriate teaching methods and in accordance with the characteristics of students so that they can be well received. Technology Pedagogy Content Knowledge (TPACK) which refers to the knowledge needed to integrate technology to support student content learning.

3. Have Tech Savvy Abilities

In this digital era, having the ability in the field of technology is certainly a must, especially for an educator or prospective teacher for the Digital Native generation, who are demanded to be above their students in terms of technology. One of them is having Tech Savvy Skills, Tech Savvy or what is also called technological literacy is the ability to utilize technology to achieve certain goals, including in the world of education (Taufiqurrahman & Junaidi, 2021).

A person who has tech savvy skills not only has knowledge but can also use his skills to take advantage of the latest technology, for example in terms of learning, as was done by PPL PGMI students regarding the discussion of material on how the process of growing from a green bean seed so that it becomes a sprout to become a perfect plant with assisted by animated learning videos. First, the teacher does not need to explain the process of growth and development of sprouts with a duration of days as proof, this alone is related to pedagogy and content. Second, the teacher has indirectly used technology with the help of the animated video and can minimize time well. So that in terms of Technological, Pedagogical and Content has been carried out in one stage. This is one example of the use of tech savvy that educators and prospective teachers must apply to their students, in order to create a landscape from the point of view of students that they have great teachers in teaching integrated with technology, so that the atmosphere of the teacher's pedagogical methods is classical and monotonous. fade away.

The results of this study indicate that the presence of TPACK (Technological Pedagogical and Content Knowledge) in teaching marks a new era and a process of

progress in the world of education. Educators who are able to master TPACK and integrate it with learning will present a comparison of different opinions with educators who have not been able to master TPACK and of course become supporters so that they become revolutionary teachers who can position themselves in a balanced way between the two. knowledge and technology.

CONCLUSION

Revolutionary teachers are educators who are prepared to teach the 21st century generation who must be equipped with technological capabilities that are integrated in learning. Through the TPACK approach, it can answer these challenges, so that educators have preparations when directly involved in the world of education as explained in the previous chapter about the steps that must be taken by an educator in the future. Education is expected to experience an increase in terms of its teaching staff which is the main key in the success of the world order of education.

This research has implications by using the TPACK approach, teachers can prepare themselves to become revolutionary teachers who are able to combine their knowledge with the rapid development of technology in this digital era so that education becomes better and more focused.

RECOMMENDATION

For future researchers, they can carry out research not only limited to theoretical knowledge through preparation steps as a revolutionary teacher through TPACK but also how to apply the abilities of students and teachers to apply TPACK in learning, for example applying the TPACK approach in implementing classroom learning, Field Experience Practice (PPL).) or in Micro Teaching courses.

REFERENCES

Akbar, A. (2021). Pentingnya Kompetensi Pedagogik Guru. *JPG: Jurnal Pendidikan Guru*, *2*(1), 23. https://doi.org/10.32832/jpg.v2i1.4099

Amartya, N. L. (2022). *Analisis pendekatan tpack pada materi KPK siswa kelas IV*. *1*(1), 20–25.

Baharun, H., Bali, M. M. E. I., Muali, C., & Munawaroh, L. (2020). Self-Efficacy Sebagai Media Peningkatan Profesionalisme Guru Di Madrasah. *Risâlah, Jurnal Pendidikan Dan Studi Islam*, *6*(2), 344–357. https://doi.org/10.31943/jurnal_risalah.v6i2.158

Baktiningsih, D., Reffiane, F., & Susanto, J. (2020). Peningkatan Aktivitas Dan Hasil Belajar Tema 4 Subtema 1 Melalui Pendekatan TPACK (Technology Pedagogy Content Knowledge) Pada Peserta Didik Kelas V SD Negeri 1 Jeketro Tahun Pelajaran 2020/2021. *Dimensi Pendidikan*, *16*(2), 85–97. https://doi.org/10.26877/dm.v16i2.7286

Candra, P., Soepriyanto, Y., & Praherdhiono, H. (2020). Pedagogical Knowledge (PK) Guru Dalam Pengembangan dan Implementasi Rencana Pembelajaran. *JKTP: Jurnal Kajian Teknologi Pendidikan*, *3*(2), 166–177. https://doi.org/10.17977/um038v3i22020p166

Dwi Kristanto, Y., Hariwangsa Panuluh, A., & Dian Atmajati, E. (2020). Development and validation of a test instrument to measure pre-service mathematics teachers' content knowledge and pedagogical content knowledge. *Journal of Physics: Conference Series*, *1470*(1). https://doi.org/10.1088/1742-6596/1470/1/012008

Farikah, & 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.

Furqon Arbianto, U., Widiyanti, W., & Nurhadi, D. (2019). Kesiapan Technological, Pedagogical And Content Knowledge (Tpack) Calon Guru Bidang Teknik di Universitas Negeri Malang. *Jurnal Teknik Mesin Dan Pembelajaran*, *1*(2), 1. https://doi.org/10.17977/um054v1i2p1-9

Gazali, M., & Pransisca, M. A. (2021). DAN KOMUNIKASI BAGI GURU MADRASAH IBTIDAIYAH DALAM. *JURNAL ILMIAH GLOBAL EDUCATION*, *2*(1), 87–95.

Habibi, A., Razak, R. A., Yusop, F. D., Muhaimin, M., Asrial, A., Mukminin, A., & Jamila, A. (2022). Exploring the factors affecting pre-service science teachers' actual use of technology during teaching practice. *South African Journal of Education*, *42*(1), 1–11. https://doi.org/10.15700/saje.v42n1a1955

Hanik, E. U., Puspitasari, D., Safitri, E., Firdaus, H. R., Pratiwi, M., & Inayah, R. N. (2022). Integrasi Pendekatan TPACK (Technological, Pedagogical, Content Knowledge) Guru Sekolah Dasar SIKL dalam Melaksanakan Pembelajaran Era Digital. *JEID: Journal of Educational Integration and Development*, *2*(1), 15–27. https://doi.org/10.55868/jeid.v2i1.97

Hapsari, I. I., & Fatimah, M. (2021). Inovasi Pembelajaran Sebagai Strategi Peningkatan Kualitas Guru Di SDN 2 Setu Kulon Pendidikan Guru Sekolah Dasar , Universitas Muhammadiyah Cirebon. *Standarisasi Pendidikan Sekolah Dasar Menuju Era Human Society 5.0*, 187–194.

Iqbali, M. M. El. (2019). Implementasi Media Pembelajaran Berbasis Teknologi Informasi dan Komunikasi dalam Distance Learning. *TARBIYATUNA: Kajian Pendidikan Islam*, *3*(1), 29–40.

Lase, U. (2022). UPAYA MENINGKATKAN HASIL BELAJAR PESERTA DIDIK MELALUI MODEL PEMBELAJARAN PROBLEM BASED LEARNING (PBL) DENGAN PENDEKATAN TPACK PADA MATERI BILANGAN BULAT KELAS VII SMP NEGERI 3 SATU ATAP IDANOTAE KABUPATEN NIAS SELATAN. *Jurnal Penelitian, Pendidikan Dan Pengajaran*, *3*(1), 28–39.

Maknun, J. (2022). The Technological Pedagogical Content Knowledge (TPACK) Competence of Vocational High School Teacher. *Jurnal Pendidikan Teknologi Dan Kejuruan*, *28*(1), 63–75. https://doi.org/10.21831/jptk.v28i1.42624

Mubarak, A. F., Noor, W. N., Widat, F., Wafiroh, K., & Hayati, N. (2022). Upaya Guru dalam Membangun Kecerdasan Intrapersonal pada Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(4), 3782–3792. https://doi.org/10.31004/obsesi.v6i4.2124

Murtafiah, Syarif, M., & Dhieni, N. (2022). Pembinaan Berkelanjutan Profesional Guru PAUD melalui Program Microlearning dengan Pendekatan TPACK (Technological Pedagogical Content Knowledge) dalam Kurikulum Bermain. *Jurnal Pendidikan Tambusai*, *6*(2), 10113–10123.

Nu'man, A., Rozi, F., & Hendrik. (2021). Model Pembelajaran Cooperative Learning Tipe Tebak Kata Terhadap Hasil Belajar Siswa Mata Pelajaran AQIDAH AKHLAK. *AT-TA'LIM*, *20*(1), 54–64. https://doi.org/10.19109/jip.v3i2.1647

Nugroho, A. M., Wardono, Waluyo, S. B., & Cahyono, A. N. (2019). Kemampuan berpikir kreatif ditinjau dari adversity quotient pada pembelajaran TPACK. *PRISMA*, *2*(1), 40–45. https://journal.unnes.ac.id/sju/index.php/prisma/article/view/28862

Nusa, P. D., Sumarno, & Aziz, A. (2021). Penerapan Pendekatan TPACK Untuk Meningkatkan Aktivitas dan Hasil Belajar Peserta Didik Kelas III SD Negeri 1 Kemiri. *Jurnal Handayani*, *12*(1), 91–97.

Oztay, E. S., & Boz, Y. (2022). Interaction between pre-service chemistry teachers pedagogical content knowledge and content knowledge in electrochemistry. *Journal of Pedagogical Research*, *6*(1), 245–269. https://doi.org/10.33902/jpr.2022.165

Patmisari, P., Permatasari, W., & Muhibbin, A. (2021). Penggunaan Pendekatan Technological Pedagogical And Content Knowledge (Tpack) Dalam Pembentukan Student Well-Being. *Jurnal Pendidikan Kewarganegaraan*, *8*(2), 132–142. http://www.openjournal.unpam.ac.id/index.php/PKn/article/view/12286

Rahayu, A. dan D. W. (2019). Analisis Komponen TPACK Guru SD sebagai Kerangka Kompetensi Guru Profesional di Abad 21. *Jurnal Basicedu*, *3*(2), 524–532.

Rahmadi, I. F. (2019). Technological pedagogical content knowledge (TPACK) Kerangka Pengetahuan Guru Abad 21. *Jurnal Pedidikan Kewarganegaraan*, *6*(1), 65–74. https://doi.org/10.1007/978-94-007-7308-0_5

Reski, A., & Sari, K. (2020). Analisis Kemampuan TPACK Guru Fisika Se-Distrik Merauke. *Jurnla Kreatif Online*, *8*(1), 1–8.

Rozi, F., & Jannah, F. (2022). Strategi Penilaian Pembelajaran Daring dengan Penggunaan E-Learning di Masa Pandemi. *Fondatia*, *6*(1), 32–51. https://doi.org/10.36088/fondatia.v6i1.1646

Salsabila, U. H., Wati, R. R., Masturoh, S., & Rohmah, A. N. (2021). peran teknologi pendidikan dalam internalisasi nilai-nilai pendidikan islam dimasa pandemi. *Jurnal Pendidikan Indonesia*, *2*(1), 127–137.

Sari, N. (2021). kepemimpinan kepala madrasah berbasis islami dalam menciptakan karakter peserta didik di madrasah ibtidaiyah. *Alignment: Journal of Administration and Educational Management*, *4*(2), 266–274.

Suardipa, I. P. (2018). Guru Sebagai Agen Inovator Berbasis Higher order thinking skills. *Purwadita*, *2*(2), 73–83.

Sukarja, W. (2019). Penggunaan Model Pembelajaran Make a Match Sebagai Upaya Meningkatkan Prestasi Belajar Agama Hindu. *Mimbar Ilmu*, *24*(3), 338. https://doi.org/10.23887/mi.v24i3.21468

Suwarni, D. I., Kurniasih, S., & Rostikawati, R. T. (2018). Penerapan model pembelajaran think-talk-write (TTW) dan demonstrasi reciprocal untuk meningkatkan hasil belajar ekosistem Siswa SMP PGRI Suryakencana Cileungsi Kabupaten Bogor. *Jurnal Pendidikan Ilmiah*, *3*(3), 90–95.

Tarihoran, E. (2019). Guru dalam pengajaran abad 21. *Jurnal Kateketik Dan Pastoral*, *4*(1), 46–58. blob:http://e-journal.stp-ipi.ac.id/393f7271-9934-4891-ab16-b6f5cf42a9a7

Taufiqurrahman, T., & Junaidi, J. (2021). Pembelajaran Berbasis Proyek (Project-Based Learning) untuk Mengembangkan Keterampilan Abad 21. *INCARE, International Journal of Educational Resources*, *02*(02).

Wardani, H. K. (2022). TECHNOLOGY PEDAGOGY CONTENT KNOWLEDGE (TPACK) (ANALISIS KONSEP & MODEL PEMBELAJARAN). *Basa*, *2*(1), 32–47.