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TECHNOLOGICAL PEDAGOGY AND CONTENT KNOWLEDGE: DIGITIZING 21ST CENTURY LEARNING

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Abstract

This study aims to determine the application of technological pedagogical and content knowledge (TPACK) by teachers in the implementation of Akidah Akhlak subject learning in class XI of Madrasah Aliyah. The research method used is descriptive-qualitative. Data collection in the study was carried out using observation, interview, and documentation techniques. Data validity was carried out using source triangulation and method triangulation techniques. The results showed that the application of TPACK in learning involves the use of technological devices, both non-digital and digital, such as laptops and LCDs, and that teachers are able to use PowerPoint, YouTube videos, and Google Classroom in creating learning materials. Teachers use technology in the classroom to manage learning practices and assess the learning process effectively and efficiently.

INTRODUCTION

Among the factors that influence learning and its success is teacher competence. Principally, teacher competence is the most important factor in improving the quality of education (Rahmat, 2019). Teachers are the main actors who plan and implement learning processes as well as assess students' performance and achievement. As an educator, a teacher is required to possess pedagogic skills, including the capacity to develop curriculum, syllabus, and lesson plan. The skills also entail the ability to design and arrange a structured program prior to the realization of learning teaching activities (Suyamto et al., 2020).

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In the preparation of learning, the lesson plans are devised based on the prevailing curriculum, namely the revised 2013 curriculum. As a facilitator in learning activities, teacher motivates and encourages students to improve their critical thinking. Teacher also determines which instructional strategies are the most effective and efficient for specific purposes. The revised 2013 curriculum, particularly, obliges teachers to integrate the 21st century skills in lesson plans (Mulyasa, 2019).

The 21st century skills that all teacher should master include the ability to facilitate and inspire students development by involving them in exploring the real world issues and solving problems using digital sources (Darmadi, 2018). Technological knowledge is important for both student and teacher to attain effective and efficient learning. The current Education 4.0 era allows the flexibility of learning as it is no longer restricted to specific space or classroom. Education 4.0 and the coming era of Society 5.0 emphasize the significance of learning using sophisticated information technology (Joenaidy, 2019).

The era of Society 5.0 requires educators to have the ability to use digital tools and technologies as well as to promote the 21st century life skills. The skills important for students are often called the 4C': creativity and problem solving, critical thinking, communication, and collaboration. To meet the demands of the era of Society 5.0, the learning carried out by teachers should be in accordance with the content of the subjects being taught through pedagogical, content, and technological approaches. The integration of technological, conceptual, and pedagogical mastery is the core o**f** *Technological Pedagogical and Content Knowledge* (TPACK) framework (Herizal et al., 2022).

Technological Pedagogical and Content Knowledge (TPACK) is actually an extension of Shulman's (1986) idea of Pedagogical Content Knowledge (PCK). It comes from the notion that learning entails content knowledge or knowledge related to material according to the respective discipline of knowledge, and at the same time, pedagogical knowledge or knowledge related to instructional strategies *(Shulman, 2019: 9)*. Mishra & Koehler (2009) recently put forward a new theory called Technological Pedagogical and Content Knowledge (TPACK) in which in addition to the components of content knowledge and pedagogical knowledge, this theory includes another core component, i.e., technological knowledge. The three components are integrated, generating four new knowledge: Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), and Technological Pedagogical and Content Knowledge (TPACK).

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Content knowledge (CK) is knowledge about the subject matter to be taught (Harris et al., 2009). Pedagogical knowledge (PK) is the knowledge about the practices and theories of teaching and learning, including the processes, objectives, strategies, methods, and assessments (Mishra and Koehler, 2006). Technology knowledge (TK) is the knowledge about types of technology, ranging from low technology (pencil and paper) to digital technology (the internet, digital video, software programs) (Mishra & Koehler, 2006). Pedagogical content knowledge (PCK) is the knowledge about how to teach particular material. Technological content knowledge (TCK) describes the knowledge required by teachers to represent material/content in a different way from the characteristics of conventional class. Technological pedagogical knowledge (TPK) is the knowledge of how teaching and learning can change when particular technologies are used in particular ways.

TPACK is the basis of effective teaching activities with technology that requires an understanding of concepts using technology, pedagogical techniques that utilize technology constructively to teach content, knowledge of what makes concepts easy or difficult to learn and how technology can address problems faced by students, and knowledge of how technology can be used to build on existing knowledge (Mishra & Koehler, 2006).

Previous studies have discussed the integration of TPACK in learning, including Putriani & Sarwi (2014), Nevrita et al., (2020), and Suyamto et al., (2020). Nevertheless, most of them discussed general subjects, i.e., Biology and Physics. Ajizah & Huda (2020) investigated the abilities of Islamic Education teachers and the integration of information technology in learning, using a case study approach. Previous studies, however, have not discussed the implementation of TPACK in Islamic Education subjects. Therefore, the present study discusses the integration of TPACK in Aqidah Akhlaq as one of the subjects of Islamic Education.

The emphasis of this present study is to investigate teachers' knowledge on the relationship between pedagogical, content, and technology, since this understanding will be used to develop strategies, approaches, media, methods, and instructional techniques in accordance with the current curriculum. In addition, the analysis of knowledge about the content of TPACK in the Lesson Plan and the implementation of Aqidah Akhlaq is described in this paper.

RESEARCH METHOD

The present study is a qualitative descriptive study. This study was carried out in an Islamic senior high school, namely *Madrasah Aliyah Negeri 1 Sragen*, Sragen Regency,

Central Java. The methods used to collect the data were: interviews, observations, and documentation. Data triangulation was used to enhance the validity and credibility of research data by comparing the data obtained from observations with the data from interviews and documentation. Subsequently, the results of the interviews, observations, and documentation were analyzed using descriptive technique. The data analysis technique was the Miles and Huberman method with the steps of data reduction, data display, and conclusion drawing (Sugiyono, 2013).

RESULTS AND DISCUSSION

The integration of TPACK in learning was indicated by the results of documentation, observations, and interviews with several informants. Based on the results, TPACK was integrated directly to teaching and learning activities of Aqidah Akhlaq subject. The description of technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical and content knowledge (TPACK) integrated in the Aqidah Akhlaq class for 11th grade of Islamic senior high school is elaborated below.

Technological Content Knowledge (TCK) in the Aqidah Akhlaq Class for 11th Grade

Technological content knowledge (TCK) balances between the knowledge of technology and the knowledge of subject matter (content) in the context of the use of technology as a source and learning media. The integration of TCK in learning is demonstrated by the ability of teacher in understanding the material broadly, deeply, and thoroughly, and in presenting material attractively using Information and Communication Technology (ICT) media. TCK also implies the capacity of Aqidah Akhlaq teacher in selecting which technology is appropriate to materials being taught, using ICT or digital technology to strengthen the concept of a material, and incorporating the elements of digital technology into material appropriately.

The integration of technological knowledge (TK) in learning is demonstrated by the use of ICT, i.e., Google Classroom, YouTube, and PowerPoint, in learning. The parameter for this knowledge is teacher's ability and familiarity in using technology. Teachers with technological knowledge integrate ICT in the lesson plan, including the use of *PowerPoint* slide media, visual videos, the internet, specific software, LCDs, projectors, laptops, as well as non-digital technologies such as worksheets, books, markers and whiteboard.

The integration of content knowledge (CK) is demonstrated by teacher's rich understanding on the Aqidah Akhlaq-related materials, including the ability to develop knowledge and understanding of *sharia* (Islamic law), *tariqa* (a school/order of Sufism),

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haqiqa (spiritual truth), and *marifa* (final mystical knowledge), smoothly and systematically. Regarding CK, teachers must possess the ability to acknowledge the learning objectives that involve the expected learning outcome, namely students are able to explain and communicate the function and position of the *sharia, tariqa*, *haqiqa*, and *marifa*. Learning teaching activities also include literacy activities through the presentation of *YouTube* videos and *PowerPoint* by teacher, as well as collaboration activities through the presentation of material by student groups. Teachers also convey the concept of *sharia, tariqa, haqiqa, and marifa* by dividing them into sub-contents.

The contribution of ICT-based learning media in the Aqidah Akhlaq class is represented by the media tool in the classroom. Aqidah Akhlaq is a compulsory subject in the Islamic schools *(madrasas)* that also promotes and develop students' creative, critical, and logical thinking. Therefore, it is important to update and modify the presentation of the material, preventing monotonous and uninteresting teaching and learning activities. The integration of ICT media in learning can help students in understanding the content or learning materials. In addition, the use of technology and related media assists teachers to convey the subject matter to students.

The use of ICT-based learning media includes the use of LCD, projector, laptop, and computer software with *Microsoft PowerPoint* and *YouTube* videos. During the Aqidah Akhlaq class, teacher delivered the material using presentation slides. When students faced difficulties in understanding specific material, teacher re-explained the material immediately and re-display the slides. Learning media successfully attracted the students to pay attention and participate in class.

Saeful et al., (2020) reported the effectiveness and efficiency of *PowerPoint* multimedia in learning. *PowerPoint* is one of the most widely used applications in presenting learning materials. It is proven to be more effective than other methods since it accommodates all types of students, whether visual, auditory, and kinesthetic types.

The optimization of learning using *YouTube* videos has been investigated by Baihaqi et al., (2020). Such media motivates students to learn and engage with the material. The use of *YouTube* media greatly assist teachers in the teaching and learning process as teachers can directly play *YouTube* in class and students can re-play it at home to improve their understanding. Nevertheless, teacher must be able to relate learning medium with student activities. Prior the learning activities, teacher should set learning steps to achieve the objective of learning, instead of being distracted by the media. The preparation and development of learning using specific media are essential steps to ensure the achievement

of learning objectives. The use of *YouTube* as a learning media seems to be simple, yet teachers must be attentive to situate students in a constructive and convenient classroom, preventing any possible obstacles.

The integration of technology in learning practices is one of the teacher's efforts in improving learning practices. The presence of technology in learning, however, requires the role of teacher to manage technology as a means of achieving learning goals. The students use a technology learning context to practice collaboration for solving complex, multi-disciplinary issues.

Technological Pedagogical Knowledge (TPK) in the Aqidah Akhlaq Class for 11th Grade

The integration of Technological Pedagogical Knowledge (TPK) in learning is identified from the use of ICT facilities to support the implementation of learning models and methods and the active role of ICT as learning media. Nevertheless, the lesson plan does not reflect the component of pedagogical knowledge in which it does not include learning approaches, methods, or models. According to the prevailing regulation, the lesson plan only consists of one sheet plan. Yet the lesson plan incorporates the core activities of learning that promote the literacy approach and 4C (critical thinking, collaboration, communication, creativity). Principally, the core activities attempt to improve students' skills regarding the 21st century skills needed for 21st century education in the current digital era in accordance with the revised edition of the 2013 curriculum. So the teacher is able to choose to adjust the approach, learning media and evaluation.

TPACK in the Aqidah Akhlaq class had been tailored according to the revised 2013 curriculum as the national education standard. Meanwhile, the instructional strategies were equipped with several technological features and the presentation of real pictures, aimed to enhance students' understanding of material. Students were required to visualize the material presented in the Aqidah Akhlaq class. The contribution of ICT-based learning media as the realization of TPACK in teaching and learning activities is obvious. It suggests the implementation of new technology in learning, for both students and teachers, in today's digital era. The use of ICT application, e.g., *Google Classroom*, has been designed to make it easier for students to learn anywhere and anytime. In the Aqidah Akhlaq class, the development of effective classroom management was demonstrated by the use of online application *(Google Classroom)* by teacher to distribute assignments and by students to submit assignments, including pre-test and post-test. Nevertheless, teacher continuously directed and guided students to utilize the application according to learning needs.

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Teacher's deep understanding on subject matter and the ability to actualize students' potential are the parameter of good pedagogical knowledge. Kadir (2014) explained that classroom management refers to activities that create and maintain optimal learning situations in the teaching and learning process. In addition to preparing learning materials, teachers are also tasked with creating, building, and maintaining the class as learning process aims to discover and improve students' innate talent and potential. Therefore, teachers must be able to prevent and address classroom distraction and disruption.

Tanjung and Nababan (2018) argue that the learning process can take place effectively if students actively engage and interact with the subject matter intensively. The involvement of students in learning potentially enhance the effectiveness of learning and improve students' thinking skills. In learning activities, teachers have the opportunities to recognize and develop students' talent and potential, critical and creative thinking skills, and problem solving skills, as well as to manage classrooms as learning environment, to provide feedback, and to create the surrounding environment a source of learning.

Integrating technology into learning practices, including in the assessment of learning process, is a part of Technological Pedagogical Knowledge (TPK). As the activities to evaluate learning, assessment is an important component in the learning process, served as a benchmark to determine student understanding. Meanwhile, Pedagogical Content Knowledge (PCK) in learning is shown by the ability of teachers to adapt material and to select appropriate learning approaches, models, and methods. The findings of the present study confirm Mishra & Koehler (2006) that the integration of knowledge and content in learning creates new knowledge, namely pedagogical content knowledge (PCK).

The findings of this study indicate that computer-based learning or ICT-based media in learning, particularly *PowerPoint* slide and *YouTube* video, becomes innovative and creative strategy that successfully attracts students to engage in fun learning activities. Regarding the learning objectives, such fun learning activities have a positive influence on improving the skills of students. The learning process using interactive videos is an alternative that can improve students' ability to understand the concept of a material (Cahyono & Hariyadi, 2021).

Technological Pedagogical and Content Knowledge (TPACK) in the Aqidah Akhlaq Class for 11th Grade

The integration of TPACK in the learning process of Aqidah Akhlaq subject for the 11th grade has been carried out appropriately by subject teacher. Teacher was able to integrate learning technology in the classroom as indicated by the use of projector and

laptop. Teacher was able to convey material using modern learning, i.e., *PowerPoint* and videos from the *Internet*. TPACK-based learning has a significant contribution in enhancing students' interest in the Aqidah Akhlaq class. ICT-based learning provides space for both students and teachers to explore their creativity and innovation in the learning teaching activities. They have opportunities to create a new, attractive learning.

Previous studies have discussed TPACK as an effort to optimize teacher competence. Baran et al. (2011) suggested that TPACK is an effective tool in exploring teacher competence regarding the use and mastery of technology in the learning process. With the rapid development of technology, teachers are required to update their technology skills and to adjust technological change to their classes. The role of information technology in schools is vital as it transforms the way teachers deliver learning material (content) in a variety of ways.

TPACK in the Aqidah Akhlaq class was initiated by the introduction of material by the teacher, followed by the display of material using *YouTube* video and *PowerPoint* slide operated via LCD, projector, and laptop, as the core activity. Subsequently, the teacher gave assignment and instructed the students to carry out and submit the assignment through *Google Classroom*. The lesson plan has comprised there domains of students' assessment: affective, cognitive, and psychomotor skills.

CONCLUSION

Technological content knowledge (TCK) is indicated by the capacity of teachers in using both digital and non-digital technology tools independently to improve their professionalism. Technological pedagogical knowledge (TPK) integrates teachers' pedagogical knowledge and technological knowledge in learning practices, including the use of digital and non-digital technologies in learning practice based on the needs of the classroom. Teachers are allowed to select the most appropriate instructional methods that will facilitate students to obtain information easily and develop their critical thinking skills at the same time. Technological pedagogical and content knowledge (TPACK) can be characterized by the integration of digital and non-digital technology by teachers in learning practices according to learning needs, classroom management with technology to improve the effectiveness and efficiency of learning practices, student involvement in learning practices that enables them to utilize technology tools and to develop their critical thinking skills, fun learning activities with the assistance of ICT-based media under the active supervision of teachers, the integration of technology in the assessment activities through the use of *Google Classroom* and other similar applications.

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