Integration of Technological Pedagogical Content Knowledge (TPACK) Learning Methods in The Learning Management System as An Effort to Improve Educator Competence

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Abstract

Educators as a type of profession are also required to have a certification of expertise. It is stated in Permendikbud No. 16 of 2007 that one of the competencies that must be possessed by an educator is proficiency in using information technology in the teaching and education process. The TPACK method is one method that is considered capable of boosting the competence of educators. The TPACK method can be optimally implemented if it is supported by good learning system management. Therefore, it is necessary to integrate the TPACK learning method with the learning management system. This study aims to describe the planning and design of the integration of the TPACK learning method into the management of the education system in Indonesia as an effort to increase the competitiveness of the workforce, especially workers in the education sector. The research method used is descriptive qualitative method with a literature study approach. The data used is secondary data derived from scientific publications. The results show that the core components of the TPACK method consist of technology, pedagogy, and content. These three components can intersect and synergize so as to create new conditions of understanding. TPACK requires educators to have a complete understanding related to technology operations and the use of technology in learning, demands to continue to develop pedagogical abilities, and increase educator competencies through increasing literacy and understanding of the field of study to be taught.

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INTRODUCTION

Globalization is one of the factors that has an impact on the high level of competition in the world. The occurrence of competition certainly has an influence on increasing competitiveness both in the form of comparative and competitive. This increase in competitiveness occurred in both the Natural Resources (SDA) and Human Resources (HR) sectors (Utama, 2003). This demand for increased competitiveness makes each country compete to be able to provide the best support for its resources. Increasing the competitiveness of resources is carried out in many ways and through various policies. Policies that can be taken by a country can be realized in the form of policies with actual technological improvements, providing access to people's innovation and creativity, increasing the competence of human resources, and increasing effectiveness and efficiency in various fields.

Since 2016 the Government of Indonesia has been trying to improve the competence of the existing workforce in Indonesia through various regulations, one of which is the Regulation of the Minister of Manpower of the Republic of Indonesia Number 3 of 2016 which explains the Indonesian National Work Competency Standards. The regulation provides rules that every workforce in Indonesia must be supported by competencies which include knowledge, field expertise, attitudes and skills as well as a professional work culture. Labor certification is declared valid and suitable for use if the certification comes from a Professional Certification Agency (LSP) accredited by the National Professional Certification Agency (BNSP), which is an independent institution.

Educators as a type of profession are also required to have certification in their field of expertise. Mentioned in Permendikbud No 16 of 2007 that one of the competencies that must be possessed by an educator is proficiency in using information technology in the teaching and education process (Ajizah & Huda, 2020). This is due to the ability of students today which cannot be separated from the existence of technology and information in their daily activities. Therefore, educators as figures who will provide knowledge and provisions for life are also required to be able to balance the characteristics of students who continue to experience development all the time. The use of technology in education is intended as an application of an educational model that is considered effective and efficient (Setiani, 2022).

Integration between Education System Management and appropriate learning models is mandatory. A nation can be called a strong nation when it can interpret a strong education system (Nafisah, 2022). The Techonological Pedagogical Content Knowledge (TPACK) method is referred to as one of the appropriate learning methods when integrated into the Management Education System that applies in Indonesia. TPACK is recognized as an effective learning method in increasing the integration between technological competencies, pedagogical abilities and content knowledge abilities (Ansyari, 2013). TPACK is also considered to have a competency framework that can create a new era of learning and the education system (Hariati, Ilyas, & Siddik, 2022). The TPACK Learning Method can only be implemented properly if it is integrated with the Learning Implementation Plan (RPP) (Safitri, Farida, Hasmidyani, Fatimah, & Alfiandra, 2022). Therefore, TPACK can be optimal if it is integrated with education system management because setting lesson plans is one of the domains of education system management.

Research on the integration of the TPACK learning model with learning system management is a framework that should have been implemented. This is related to increasing the competence of teaching staff which is assessed from the ability to master technology, the ability to understand pedagogy, and the ability to provide content that can be accessed by students. Research related to the use of TPACK has been carried out quite a lot. However, it is quite difficult to find research that discusses the correlation and integration between TPACK and education system management. This research has the intention of describing the planning and design of the integration of the TPACK learning method into the management of the existing education system in Indonesia as an effort to increase the competitiveness of the workforce, especially the workforce in the education

sector. The results of this study are expected to provide benefits to educators or administrators of the education system in Indonesia.

METHODS

This research is research using descriptive qualitative method. Research using descriptive qualitative methods Research using descriptive qualitative methods is a study that has the goal of obtaining in-depth research results (Sugiyono, 2009). In qualitative research the results obtained are not mathematically measurable but have a depth of meaning obtained from the respondents because the nature of qualitative research is emic not epic. This means that everything in the research must be based on what is felt and stated by the respondents, not just assumptions from the researcher. Qualitative research also emphasizes depth of meaning not generalizations (Yasin, 2021). This study also uses a literature study approach to obtain concepts and understanding related to the integration of TPACK into the management of learning systems and the impact on increasing competence in educators.

This research is part of a qualitative research using a systematic review approach. Systematic review is a method that identifies in-depth and comprehensive literature obtained through various methods from various research methods used related to research variables (Arksey, H., & O'Malley, 2005) Systematic review is a type of evidence synthesis in which broad or narrow research questions are formulated, and data directly related to the systematic review questions are identified and synthesized. Data was collected through a review of previous research literature. Then, it is concluded through deductive reasoning (general to specific)

This research is an in-depth study that takes 3 months starting from the research preparation period, data collection, data analysis process, to the process of drawing conclusions. Data collection is the observation period of this study. The data used is secondary data sourced from various scientific publications that have credibility standards. After data collection is carried out, data classification is carried out which aims to group data according to the characteristics of the data and in accordance with the research discussion. Next is data reduction, namely the process of eliminating or eliminating data that is considered less relevant or has a low correlation with the research theme and discussion in the study. The next process is the verification stage, namely the stage for reviewing the remaining data to ensure that the data obtained is data that is compatible with research and suitable for use in discussion. The final stage is the data presentation stage, namely the stage of displaying all data that meets the requirements for data use and is used as a discussion in research. The following will explain the research flow as follows

RESULTS & DISCUSSION

Technological, Pedagogical, and Content Knowledge (TPACK)

TPACK is a learning method that focuses on the integration between the ability to use technology, pedagogical abilities, and understanding of learning content. TPACK was first introduced by (Koehler & Mishra, 2009) where the concept of the TPACK learning method was built on the concept of the Pedagogical Content Knowledge learning method which was given additional forms of inclusion using technology. The TPACK concept offers good quality learning and can increase interaction between the three main components of education namely technology, pedagogy, and content (Sajan & S., 2018). The interaction of the three components has the goal of giving birth to secondary knowledge skills consisting of pedagogical-technology skills, content-pedagogical knowledge, and content-technology knowledge (Hariati, Ilyas, & Siddik, 2022). Therefore, in order to understand the TPACK concept as a whole, a complete understanding is also needed in terms of technology, pedagogy, and content.

Technology in TPACK is meant by understanding or knowledge of technology. Knowledge can be in the form of competence to operate software or the ability to understand and recognize hardware. This ability can be implemented in the ability of an educator to use technology to make presentations, adapt the use of the latest technology in the teaching and learning process and the flexibility of educators in implementing technology-based learning systems.

Pedagogy and pedagogy are two things that at first glance look the same but have slight differences. Pedagogy is more inclined to the art of an educator in teaching while pedagogy tends to lead to science for teaching. Pedagogy comes from the Greek which consists of paedos which means son and agogos which can be interpreted to educate, foster or guide. Indirectly it can be interpreted that pedagogy is someone who has the ability to foster, or educate to find the direction and purpose of a student's life. Indonesia has established National Education Standards (NES), one of which contains pedagogical competencies that must be mastered by an educator which includes the ability to understand students, the ability to design and implement learning, carry out evaluation of learning outcomes, and the ability to develop and actualize abilities. learners.

What is called content in TPACK is knowledge about content. The point of this point is that educators must understand learning content as well as the framework of thinking and concepts that exist in a subject. Each subject has certain characteristics that are different from one another (Rahayu, 2020). The ability to understand learning content will increase the effectiveness of learning because the delivery of learning material will be more in line with the direction and objectives of learning. Delivery of learning material will be more efficient because it will directly target the subject matter and logic of thinking of a subject so that it does not require long-winded and off-target delivery. The ability to understand learning content will determine the peculiarities of thinking from a field of study. An overview of the interactions between the three elements can be seen in Figure 1.
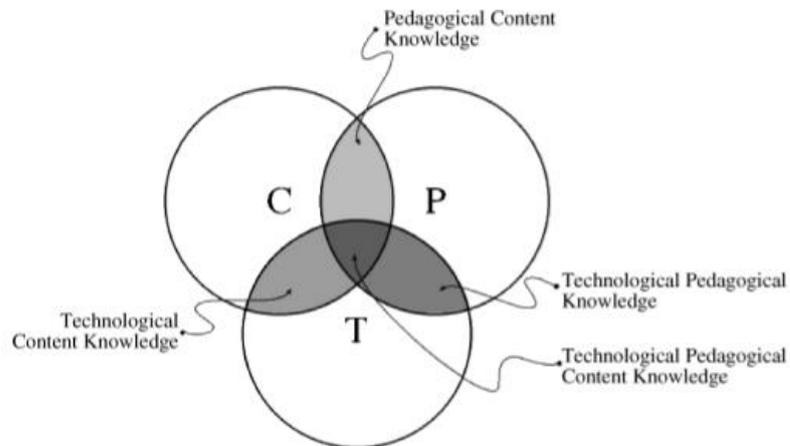
Figure 1. TPACK Venn Diagram

TPACK can be measured by assessing a person's abilities based on the TPACK framework. The majority of the measurement objects are educators who are at the formal, non-formal or informal level of education. TPACK measurement is known to have several benefits. First, the TPACK measurement can provide an overview of an educator's ability to master the knowledge component. Second, the results of the TPACK measurement can be used as a reflection of the material for providing education and training for prospective educators. Third, the impact of technology integration in education can be determined. TPACK measurements were carried out using several methods such as measurements based on personal reports, open questionnaires, performance appraisals, interviews, and observations (Rahmadi, 2019).

Learning System Management

Management is commonly known as a matter that overshadows governance, how to organize, and allocate resources. Management basically has a function consisting of planning, regulation, action, and supervision. The system is something that has a functional series that has one specific purpose (Wasitohadi, 2014). Thus, management of the education system can be defined as a way to carry out management or procedures carried out to organize a functional series that has the same goal, namely to improve and develop the education sector. The education system has different characteristics from other order systems. In the management of learning systems there are several components that must be involved and have a significant impact on the results of implementing system management. The first component is student achievement, the second is student behavior, and the last is the attitude of the teaching staff.

The first component has a close relationship with the second component. Student behavior is considered as something that has a considerable influence on student achievement. In this regard, there are several aspects that are considered to have an influence on the potential for increasing student achievement. First is student involvement, namely the total amount of time spent by a student to be able to fulfill an academic content. The second is coverage, namely the total amount of

content that can be covered by a student. The last is success, namely the level of how well a student performs in dealing with daily assignments or exams.

The third component is the attitude of the teaching staff. This teacher behavior includes the readiness of a teacher to carry out learning in class, management which is enabled to exercise control over each student's actions, and instructions that aim to provide learning guidelines for students. Therefore, an educator is required to have the ability to carry out planning, management, and teaching that can facilitate the components that exist in a student's soul related to aspects of student involvement, student inclusion, and student success.

Learning system management is a medium for educators and students to be able to reach agreement on goals and jointly achieve increased competence and ability. One of the real forms of learning system management is the existence of a curriculum. Curriculum is a series of ideas, written planning, and implementation in the teaching and learning process that can produce learning outputs. The definition of curriculum itself is very broad and has great diversity. However, basically the curriculum has 4 main components consisting of objectives, content/material, method of implementation, and assessment/evaluation

The success of educational goals certainly cannot be separated from good management of the education system. Governance and regulatory methods are needed so that educational resources can function optimally so that they can fulfill the main goals of education (Mahrus, 2021). One of the efforts to optimize the education system is to integrate effective learning methods with learning system management. Curriculum and learning are basically two things that have one unit and are difficult to separate. Based on this, the relationship between the management system and the learning method can be classified into several types of relationships consisting of;

1. The Dualistic Relationship Model

This model separates the learning system from the learning method so that the learning method as input in the management of the education system does not appear to have a contribution and no correlation can be seen between the two components. This relationship is a relationship in which the learning system and learning methods stand alone. Therefore, this model is called a dualistic model because it can be identified that there is a tendency for the two components to develop independently without regard to the influence between components.

2. Relationship Models

This model explains that there is a relationship between management of the education system and learning methods. This linkage only occurs in some parts in the sense that not all parts of the component become part of other components but are only related to some parts. The description of the relationship between learning management systems can be illustrated by a Venn diagram.

3. Concentric Relations Model

This relationship is a relationship in which all parts of one component are part of another component. In this relationship model one component is the basis or foundation of the other components. Therefore, in this relationship between components that are interdependent with each other.

4. Cycle Relationship Model

This model describes a reciprocal relationship between the learning system

and learning methods. Learning system management is the basis for implementing learning methods. In this relationship there is a separate position between the 2 components, but the relationship between the two is very close. If described, the relationship between the two components in this model is like the relationship between two wheels on a motorbike which are separate in layout but have relationships and dependencies that cannot be separated from one another.

The relationship between TPACK and learning system management is known to have a related relationship. In the sense that the existence of learning management systems and learning methods has intersections in several parts that can influence one another. TPACK integration in learning system management is an ideal condition that should be achieved. TPACK basically does not only focus on using learning systems from offline to online but also becomes a means of developing the competence and abilities of both educators and students.

Currently the teaching and learning process does not only focus on providing theory but also is a collaboration between theory and practice. Academic material can include pedagogic academic material and academic material in fields of study or areas of professional expertise (Quddus, 2019). One of the integration efforts between learning system management and learning methods is to create regulations that can support this. The TPACK method will encourage educators to increase their understanding of educational technology. TPACK is one of the solutions to integrate knowledge and skills. TPACK is a reference or framework for thinking of a learning model that involves learning systems and learning methods.

TPACK consists of three main components that are developed, namely knowledge related to learning content or better known as Content Knowledge (CK). Knowledge of this learning content requires an understanding of the segmentation of learning materials, the flow of thinking in the field of study, and the components of learning in the field of study. An educator is expected to have the expertise to understand and recognize content so that this ability can represent ways of thinking and content of material from each field of study. Educators' mistakes in understanding the flow of thinking in a field of study can have an impact on errors in teaching students (Nasution et al., 2021). Therefore, the integration between the TPACK method and the learning system will encourage educators to be more competent in the field of study being taught. Therefore, the TPACK method requires connection or integration with the management of the education system because the TPACK method requires opportunities for self-development. The education system is a medium for TPACK to be able to develop themselves so that the role of the TPACK method in improving teacher competence can also be realized.

The next focus of TPACK development is pedagogical knowledge or known as Pedagogy Knowledge (PK). It is appropriate for an educator to have the ability to teach and educate. The ability to teach and educate must also be accompanied by the ability to manage and regulate class conditions so that an effective and efficient teaching and learning process can be created. Pedagogical knowledge is essentially an understanding of material and theory related to the teaching and learning process (Irdalisa, 2018). The pedagogical knowledge component consists of teaching and learning processes, learning methods,

classroom learning strategies, as well as assessment and evaluation of teaching and learning processes. TPACK facilitates the pedagogical ability of educators to continue to develop. The TPACK method requires educators to be able to continue to innovate so that classroom conduciveness during the teaching and learning process is maintained. An educator who does not have the ability to develop pedagogical abilities will not be able to achieve learning objectives. In order for the pedagogical abilities of an educator to develop, the TPACK method must be integrated with the education system. It can be interpreted that when there is integration between TPACK and the education system, the pedagogical development of teaching staff can be further developed by conducting collaborative learning with the use of technology.

The focus of the last TPACK method is technological knowledge. At this time there are still many educators who have difficulty using technology as a learning medium. The use of technology is basically very varied starting from the use of simple technology to the latest technology such as the use of digital technology. The use of technology in learning systems requires compatibility between developing technology and the abilities or knowledge of educators. Currently, the touch of technology is increasingly accessible so that learning by utilizing technology should be prioritized. The TPACK method is a method that considers the presence of technology. Therefore, the TPACK method includes technology as one of the components in the method elements. Learning systems always experience development from time to time. Since the Covid-19 pandemic occurred in 2020-2021 the teaching and learning process has developed with the touch of distance learning technology. Even though the effectiveness of online distance learning is still in doubt, at least there have been developments and updates in teaching and learning methods. Teaching and learning activities are no longer limited to conventional methods.

The integration between TPACK and learning system management can produce several conditions. The implementation of the results of TPACK integration can at least be classified into 3 conditions. The results of the integration between TPACK can be seen as contained in Table 1.

Table 1. TPACK Integration Matrix

	Technology	**Pedagogy**	**Conten**
Technology	-	Technology Pedagogy Knowledge	Technology Content Knowledge
Pedagogy	Technology Pedagogy Knowledge	-	Pedagogy Content Knowledge
Conten	Technology Content Knowledge	Pedagogy Content Knowledge	-

It can be concluded that integration between TPACK components can produce 3 conditions because there are several conditions that are the same. The three conditions are Technology Pedagogy Knowledge, Technology Content Knowledge, and Pedagogy Content Knowledge. The meaning of each of the integration results is as follows:

1. *Technology Pedagogy Knowledge*

   This point shows the integration that occurs between technology and pedagogy. The role of technology in changing the art of teaching and learning is the main focus of this integration. The use of technology is considered to increase the active role of students in the teaching and learning process. In pedagogical technological knowledge there is a reciprocal interaction because technology can enrich the art of learning just as the art of learning can influence technological development. This knowledge has the potential to provide educators with choices about the use of appropriate and appropriate technology for use in the learning process. The integration of these two components can certainly motivate educators to innovate regarding the art of managing the classroom and the art of learning through the use of technology.

2. *Technology Content Knowledge*

   The integration between technology and content can be understood as a material that combines material in a field of study with technology. That is, the material or content in a field of study as well as the reasoning of a field of study is conveyed mediated by the existence of technology. In learning system management this can be implemented by compiling a digital-based curriculum. Nowadays it is common to find digital learning processes. Digitalization of education is no longer a discourse. Therefore, the TPACK method is a method that has the potential for high carrying capacity for the current era of digital learning. The impact of the existence of technology can be felt in increasing one's understanding of a material or problem after seeing or hearing a discussion of that material from a video. The integration of technology and content in the teaching and learning process automatically places demand on educators to be able to create interesting content so that students feel attractive in learning. The necessity to create interesting content indirectly requires educators to increase competence by fully understanding subject matter and increasing their ability to use the latest technology.

3. *Pedagogy Content Knowledge*

   The integration of these two components explains knowledge about the art of teaching and learning and understanding of the material or content of a field of study. This condition illustrates the importance of educators to understand the art of teaching and managing classes so that the delivery of teaching materials or learning processes can be accepted by students. The TPACK model encourages educators to improve their pedagogical abilities so that students can easily understand all the material being taught and think rationally in the field of study being studied. Therefore, the application of TPACK to the management of learning systems will have a positive impact on the competence of teaching staff. The TPACK method makes educators willing to study learning materials and learn new abilities so that the art of teaching and learning mastered by an educator is not monotonous. This will provoke the creativity of educators.

   These things can be indicated as the advantages of the TPACK method. The TPACK method is also a method that has the potential to increase the competence of educators. The TPACK method is also a method that has a high probability of being applied to learning systems in Indonesia. Other research

showing that TPACK has a positive relationship with increasing the competence of teaching staff has also been written by (Hidayati, Setyosari, & Soepriyanto, 2018) and (Widiana & Septianti, 2022).

CONCLUSION

Based on the discussion that has been described, it can be concluded that the TPACK method basically already has good components. Therefore, good media is needed so that the TPACK method can develop properly. The integration between the TPACK method and the management of the education system is intended so that TPACK can find a suitable platform so that it can develop properly. The main components of TPACK are technology, pedagogy and content. These three components can collaborate with each other so as to form a condition that can encourage educators to improve competence. Implementation of the TPACK method in learning systems at least requires educators to be able to have good competence in technology operations.

Educators must be able to follow technological developments and be able to replicate learning methods so that they suit the needs and desires of students in the teaching and learning process. In addition, educators are also required to be able to develop pedagogic abilities so that the teaching and learning process can be more attractive. Including having the ability to create various variations of delivery of material in learning. Educators are also required to have the ability to understand material, reason, and the components contained in a learning material or a field of study. Educators are required to continue to develop their abilities to better understand educational content or materials.

The implication of this research is to provide education about the concept of pedagogical content knowledge (TPACK) in learning management system as an effort to improve educator competency. The weakness of this study is that it only focuses on the learning system in the learning management system and increasing the competence of educators. It is hoped that further researchers will develop other variables related to the theme of education or other appropriate variables.

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