



# Biology Learning Management Contain Using Character Education With T-PACK Through Project Based Learning (PBL) Model

Pujianti Pujianti<sup>✉</sup>, Kardoyo Kardoyo, Yuli Utanto

Universitas Negeri Semarang, Indonesia

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### Abstract

The purpose of the study was to determine the planning, organization, implementation, evaluation, and learning outcomes of biology with character education with Technological Pedagogical Content Knowledge (T-PACK) approach through PBL model at SMAN 8 Semarang. Covid-19 virus has spread to infect almost all countries in the world. Learning management studies show the need for state readiness in the case of a pandemic in the direction of education. Learning management during covid-19 pandemic was carried out with Project Based Learning (PBL). One of the learning managements that applied was T-PACK model. Based on the results of the previous research, there was very little research on T-PACK development related to character education. The approach in this study was interdisciplinary qualitative with phenomenological approach. The design research was case study. Informants are 2 biology teachers. The technique of checking the validity of the data using Degree of Trust (Credibility), Transferability, Defendability, and Certainty (Confirmability). Data that has been collected from in-depth interviews with informants was processed and then data analysis was carried out. The stages of data analysis have 4 main components, namely data collection, data reduction, data presentation, and drawing conclusions. The results showed that the planning, organization, implementation, evaluation, and learning outcomes of biology contained character education with the T-PACK approach through PBL model. The results of this study are expected to be source and study material in increasing knowledge about management of biology learning with character education with help of T-PACK through the PBL model.

<sup>✉</sup>Correspondence Address :

Jl. Kelud Utara 3 Kampus Pascasarjana UNNES, Semarang, Indonesia  
E-mail: antip7733@gmail.com

## INTRODUCTION

The World Health Organization (WHO) has declared the Corona virus a pandemic. Currently, the Covid-19 virus (Corona Virus Disease 2019) has spread to infect almost all countries in the world. Coronavirus disease 2019 (covid-19) caused by SARS-CoV-2 was first reported in Wuhan, China (Shereen, Khan, Kazmi, Bashir, & Siddique, 2020). This disease has infected more than one million people worldwide. WHO has listed covid-19 as a global pandemic, so officially the 2 current global pandemics are HIV/AIDS and covid-19 (Watkins, 2020). Learning management studies show the need for state readiness in the case of a pandemic in the direction of education (Abdulmir & Hafidh, 2020). The covid-19 pandemic has forced teachers and students to conduct distance learning, which applies to all levels of education. The situation with general education, especially in schools is different (Basilaia & Kvavadze, 2020). Learning management during the covid-19 pandemic is carried out with Project Based Learning (PBL). PBL is a constructive learning model that has the potential to empower high-level cognitive abilities.

One of the learning managements that applies pedagogical knowledge is Pedagogical Content Knowledge (PCK). The PCK model equipped with technology forms a Technological Pedagogical Content Knowledge (T-PACK) model (Suryawati, Linggasari, & Arnentis, 2017). T-PACK is a theoretical framework which is the development of Pedagogical Content Knowledge (PCK) (Hidayat, 2019). PCK was first initiated by Shulman in 1986. According to Shulman (1986), a teacher must master Pedagogical Knowledge (PK) and Content Knowledge (CK). The combination of PK and CK means that a teacher must not only master the content/material but also pedagogy in creating learning. This is stated in Law Number 14 of 2005 concerning teacher competence, namely teachers must have pedagogic, personality, social, and professional abilities (Sintawati & Indriani, 2019). The combination of PCK capabilities and technology

is referred to by Koehler, Mishra, & Cain (2013) as T-PACK.

T-PACK research on various content has been carried out by researchers abroad in English study programs (Baser, Kopcha, & Ozden, 2016), economics (Raman, 2014), Natural Sciences (IPA) (Canbazoglu-Bilici, Guzey, & Yamak, 2016; Ferghana, Saptono, & Wiyanto, 2019; Putriani & Sarwi, 2014), mathematics (Jang & Tsai, 2012; Restiana, 2018), and Social Sciences (IPS) (Cuhadar, 2018). T-PACK research in Indonesia has been carried out in mathematics (Listiawan & Baskoro, 2015), biology (Agustina, Yusron, & Muyassarah, 2018; Qudsiya, Widiyaningrum, & Setiati, 2018), and physics (Khoiri & Huda, 2017) study programs. According to Cross & Lepareur (2015) very little T-PACK research is related to character education. Based on the results of the research above, there is very little research on PCK development related to character education with experienced teacher subjects not pre-service and in-service teachers (Abidin, 2019).

Based on the introduction, the researcher will research with the title Biology Learning Management Loaded with Character Education With Technological Pedagogical Content Knowledge (T-PACK) Through Project Based Learning (PBL) Models at SMAN 8 Semarang. Research place at SMAN 8 Semarang as one of SMANs that conducted online learning with TPACK which contained character education. The purpose of the study was to determine the planning, organization, implementation, evaluation, and learning outcomes of biology with character education with the T-PACK approach through the PBL model at SMAN 8 Semarang. The results of this study are expected to be source and study material in increasing knowledge about management of biology learning with character education with help of T-PACK through the PBL model.

## METHODS

The approach used in this study is an interdisciplinary qualitative approach with a phenomenological approach. The design of this

research is a case study with a phenomenological approach. Data source primary such as planning, organizing, implementing, evaluating, outcomes, facilities, and infrastructure. Data source secondary such as syllabus and RPP, online learning schedule (e-learning). Methods used informant, non participant, and document analysis. Data collection techniques used interviews, observation, and documentation. Informants are 2 biology teachers in SMAN 8 Semarang. The technique of checking the validity of the data in the study was carried out based on several criteria, namely the Degree of Trust (Credibility), Transferability, Defendability, and Certainty (Confirmability). In this study, data that has been collected from in-depth interviews with informants is processed and then data analysis is carried out. The analytical method used is the method of content analysis (content analysis) or content study. The stages of data analysis have 4 main components, namely data collection, data reduction, data presentation, and drawing conclusions. This model is often referred to as an interactive model, meaning that the analysis is carried out in the interaction of four interrelated components.

## RESULTS AND DISCUSSIONS

### **Biology Learning Planning Containing Character Education Using The T-PACK Approach Through the PBL Model at SMAN 8 Semarang**

#### **Selecting and implementing learning models**

The selection and application of learning models by teachers serves to help students obtain information, ideas, skills, values, critical thinking skills and self-actualization. Therefore, the position of the teacher as an educator is to teach students how to learn to create a learning climate that allows students to improve their learning abilities more easily and effectively.

Based on the results of the observation of Biology learning practices for class XII Semester 2, the teacher applies the PBL learning model how to learn by linking the context to real life practices, with the skills of students making

reports on making conventional biotechnology products in the form of videos with a base learning project learning model that is shown on The teacher's presentation slides provide problems on how students can complete assignments regarding reports on making conventional biotechnology products in the form of videos given.

The teacher applies the learning model with concept learning. Directing students to think logically on abstract things, applying concepts to new problems, then students analyzing and designing to conduct several experiments on related material. The learning model by the teacher in the practice of learning can be seen in the teacher's RPP document on the use of the learning model/approach/method.

The informants already know the management of e-learning (online) learning during the covid-19 pandemic. Following are the results of interviews with informants:

*"Yes"* (Informant 1)

*"Know"* (Informant 2)

#### **Selecting and determining the learning approach**

The learning approach is one of the characteristics of the teacher's pedagogical knowledge in learning, which is illustrated from the psychological background and the teacher's pedagogical background in choosing the method to be used. The learning process in the 2013 high school curriculum is carried out using a scientific approach. The learning process touches 3 domains, namely, attitudes, knowledge, and skills.

In the results of observations of Biology learning in class XII teacher growth practicum using a scientific approach in learning practice by presenting an experiment, through base learning learning (PBL) Project learning about growth, students are required to be able to explain the characteristics of growth and development, identify internal factors that affect growth, identify external factors that affect growth, explain the impact of lack/excess of factors that affect growth, explain the variables of external factors that affect growth. Then collect

information from the answers of several students and then look for patterns to form conclusions.

*"Yes, making lesson plans, preparing laptops, cellphones, internet"* (Informant 1)

*"Yes"* (Informant 2)

### **Selecting and implementing learning strategies that are applied to learning practices**

The selection and application of strategies in teacher learning practices is one component of pedagogical knowledge, namely the special method used by the teacher which is adapted to the characteristics of the learning material. An active learning strategy by presenting problems or questions, ideas that can be solved in groups or individually, then the teacher instructs students to apply the material that has been learned in class to be practiced alone at home.

Observations on the practice of learning Biology class XII teachers' strategies in learning practices, namely by activating students with various activities in the learning process. The teacher's strategy in learning practice is to activate students by providing projects/assignments in the learning process. Thus, it can be concluded that the strategies used by teachers in learning practices in the biology class are more likely to activate students (Student Center) so that the learning process is more effective and efficient in accordance with the learning objectives.

*"External factors, such as internet quota, make it difficult to monitor students"* (Informant 1)

*"No"* (Informant 2)

### **Selecting and applying learning methods**

The teacher gives a few minutes for students to explain the characteristics of growth and development, identify internal factors that affect growth, identify external factors that affect growth, explain the impact of deficiency/excess of factors that affect growth, explain the variables of external factors that influence growth.

*"Schools have been provided but the internet network is still constrained because many teachers use it for that teacher buy their own*

*internet quota so that KBM runs smoothly"*

(Informant 1)

*"Yes, the school supports it"* (Informant 2)

### **Selecting and applying learning techniques**

Learning techniques are one part of pedagogical knowledge. Learning techniques are ways of implementing specific methods in the classroom. The learning technique used by Biology teachers in the classroom is by presenting the problems found by the students and then discussing the solutions/solutions together in class. The results of observations of Biology learning, the teacher at the beginning gave motivation to students and the teacher made a presentation to check attendance. The results of observations of Biology class learning, teachers in the learning process, namely by giving projects, students are able to describe the results of the projects they have made.

The informants have planned in planning online e-learning learning).

*"Completing the lesson plans, preparing learning media"* (Informant 1)

*"RPP, laptop, cellphone, etc"* (Informant 2)

Teacher as an educator also acts as a manager in the classroom, should be able to make a good lesson plan. Teacher planning biology learning with character education with the help of T-PACK through the PBL model consists of determining learning objectives and preparing all learning tools such as (e-learning online classes, PBL, schedules, curriculum, syllabus, lesson plans, prota, and promissory note).

Learning management has an important role in every educational unit because it will determine the quality of education itself. Management is indispensable in learning, without exception learning biology (Bochari, 2017). As a planner, the teacher can diagnose the needs of students as learning subjects, formulate the objectives of the learning process activities, and determine the learning strategies adopted to realize the goals that have been formulated (Majid, 2012). Hosnan (2014) said that mature learning plan must have written plan in the form of a syllabus and lesson plan (RPP) which refers

to content standards. The preparation of the syllabus and lesson plans is adjusted to the learning approach used.

**Biology Learning Organizing with Character Education Using The T-PACK Approach through the PBL Model at SMAN 8 Semarang Teacher's ability to manage class**

Classroom management is one part of pedagogical knowledge, namely activities that are planned and deliberately carried out by teachers, with the aim of creating and maintaining optimal conditions so that the teaching and learning process is expected to run effectively and efficiently so that learning objectives are achieved. The results of observations of Biology class learning, teachers in learning practices to create a conducive learning atmosphere by encouraging active students to do exercises to create appropriate programs given by the teacher, manage classes in an environment where students are allowed to use Android because in learning program material it can be practiced in android.

*"From school"* (Informant 1)

*"School and teacher initiative"* (Informant 2)

**Manage class effectively with technology**

Effective classroom management with technology is one part of the teacher's Technological Pedagogical Knowledge (TPK) produce effective and efficient classes with technology by ensuring learning objectives to be achieved, determining where and how the technology can be used effectively, and by maximizing its role as a transfer of knowledge, value reference and motivator for students. The results of observations on Biology learning, teachers manage classes effectively with online quizzes. Teachers provide opportunities for students to use personal androids to support learning Biology material in class. Effective classroom management is technology-based (laptop/ computer/android) but the teacher still directs and guides so that the use of technology by students can be used according to the needs of learning practices.

*"Adjusting the schedule from school"*

(Informant 1)

*"Adjusting"* (Informant 2)

**Using Learning Management System (LMS) in learning practice**

The use of the Learning Management System is one part of the teacher's Technological Pedagogical Knowledge. The use of LMS/online applications such as Google Classroom is only used during assignments, in daily test assessments or on paper. The LMS, google classroom, and other applications in online learning practices.

*"Maybe there is but I don't know about it"*

(Informant 1)

*"None"* (Informant 2)

In biology learning management, character education with the help of T-PACK through the PBL model is organizing and implementing. At this stage, the teacher manages the state of the classroom when the online learning process (e-learning) takes place using the prepared plans. Teachers must be able to unite various elements of learning, starting from students, educators and science itself (Bochari, 2017).

**Biology Learning Implementation with Character Education Using the T-PACK Approach through the PBL Model at SMAN 8 Semarang**

**Using of digital devices (laptops, LCD projectors, printers, scanners, etc.) by teachers**

The results of observations by researchers in learning, teachers can operate computers, laptops and LCDs and projectors in the classroom. Based on observations, the teacher can use hardware such as laptops and projectors in learning only when researchers make LCD observations in class.

*"Yes, usually this method is the easiest to use during a pandemic, but every teacher has a different method/method according to the situation"* (Informant 1) *"None"* (Informant 2)

### Utilization of the Internet as a learning resource

The internet makes it easier for teachers to prepare for teaching, assist the learning process, and process student values. The results of observations on the learning process using the internet, teachers in learning practices use the internet to develop materials. Biology is a science subject that requires practice, according to informant 1 practice at home according to health protocols and according to informant 2 practice is carried out at home.

*"Practice at home according to health protocols too"* (Informant 1)

*"At home"* (Informant 2)

### Developing learning tools

Learning tools are equipment for carrying out the learning process to achieve learning objectives, one example is the Learning Implementation Plan. RPP is a guideline for implementing the learning process to achieve certain Basic Competencies. The development of the Learning Implementation Plan is carried out by the teacher by developing each Basic Competence from various learning sources. In the RPP Core Competencies (KI) contains character education KI-1 and KI 2: Spiritual Attitude Competence, namely, "Living and practicing the teachings of the religion they adhere to". The formulation of the Social Attitude Competence is, "Showing honest, disciplined, responsible, caring behavior (mutual cooperation, cooperation, tolerance, peace), polite, responsive, and pro-active as part of the solution to various problems in interacting effectively with the environment.

The results of searching the RPP document for Biology subject for Class XII semester 2 can be seen in the learning materials used by the teacher in writing the Biology Esis Book.

*"Yes, character education must be applied, whether it's a pandemic or not"* (Informant 1)

*"Applied, for example, student discipline in following KBM"* (Informant 2)

### Using of Learning Management Systems (LMS) or online application platforms to support online learning

Using of the Learning Management System (LMS) or online application platform to support learning is one of the Technological Knowledge/Pedagogical Knowledge to support online learning practices. Teachers use LMS for learning by implementing applications according to their needs and making it comfortable for students. The use of LMS teachers by using google classroom for the learning process.

The results of observations in the biology learning process, teachers have used LMS in learning practices, just used a virtual lab and displayed several videos related to the material presented to students. and finally, after the Circular No. 4 of 2020 concerning the Implementation of Education Policies in the Emergency Period of Covid Diases 19 (Covid-19), teachers use Google Classroom for online and youtube learning. In class X Biology learning practices, teachers can use Google Classroom for learning.

Technological Knowledge ability of biology teachers use the internet to access youtube, Google classroom, google forums to support online learning. All Biology teacher lessons use the internet, especially when opening google classroom, online learning requires internet and schools have facilitated internet networks for learning needs.

*"Constraint; internet quota, unstable network, difficult to monitor students"* (Informant 1)

*"The problem is that children do not have quotas, school solutions provide quotes"* (Informant 2)

Teaching and learning activities such as learning curriculum, subject syllabus, lesson plan (RPP), mandatory and recommended books, student worksheets, assessment system, character education, and schedule of teaching and learning activities. According to informant 1 that Biology Learning Contains Character Education with Technological Pedagogical Content Knowledge (T-PACK) Through the Project Based Learning (PBL) Model, there are already rules made for all

teachers, while according to informant 2 there are no rules made.

If the teaching and learning process is viewed in terms of teacher activities, it can be seen that the teacher plays a prime role. Learning management functions as a decision maker related to planning, implementation and assessment (Majid, 2012). In biology learning management, character education with the help of T-PACK through the PBL model is organizing and implementing.

#### **Biology Learning Evaluation with Character Education Using the T-PACK Approach through the PBL Model at SMAN 8 Semarang**

Teacher's TPK is a framework in which teachers are required to become professional educators with the main task of educating, teaching, guiding, directing, assessing, and evaluating students in early childhood education units through formal education, basic education, and secondary education.

#### **Assessment of the learning process**

Assessment of the learning process is one part of the teacher's pedagogical knowledge carried out to assess the quality, activity, creativity, and involvement of students in learning, especially mental, emotional, and social involvement in the formation of competence and character of students. The teacher has a record of the child's attitude in the learning process, and the attendance of students in class. Skill assessment is taken from the daily value of students during learning and working on questions online. Assessment of the learning process is carried out by observation and reflection. Observations were made by the teacher when students were taking part in learning, asking questions, discussing, and doing other learning tasks. Assessment of the learning process by teachers in the biology class based on the 2013 Curriculum.

The ability of Pedagogical Knowledge (PK) teachers in the Biology class, teachers in the learning process are able to use various models, methods, approaches and assessments of the learning process in the classroom to evaluate

students' understanding, and teachers can understand students in building knowledge, skills and knowledge to organize students in learning.

*"Yes, to find out the benchmarks in learning"*

(Informant 1)

*"At the end of the chapter/end of the material"*

(Informant 2)

The learning evaluation that has been done by informant 1 is in the form of a post test using Google Classroom or Quipper. Informant 2 evaluates learning with written tests via WA and multiple choice via Quipper.

*"Post test with google classroom or quipper"*

(Informant 1)

*"Written test, via wa, multiple choice via quipper"* (Informant 2)

#### **Integrating technology in the assessment of the learning process**

The integration of technology in the assessment of the learning process is one part of the knowledge (Technological Pedagogical Knowledge) of teachers by utilizing android as a medium for assessing the learning process. Several applications on Android can be used in the assessment of the learning process, including Quiziz and Google Form. The integration of technology in Biology learning by using online applications that have been considered by teachers so that students are comfortable in using them. Assessment of the learning process by Biology teachers by collaborating with technology as a tool to provide questions, for effective students the teacher observes how students solve problems. The results of observations in class XII Biology learning, teachers use the Google classroom application and Quiziz to do pretest, assignment, and post-test.

*"Learning methods must be varied so that students are not bored. Internet quota, facilities and infrastructure"* (Informant 1)

*"After the KBM, the teacher gives a worksheet that is arranged systematically. There is no problem "* (Informant 2)

Evaluation of the learning outcomes achieved by students and the teaching and learning process contains an assessment of the learning outcomes or the learning process, to some extent both can be assessed as good. Assessment or evaluation is carried out through a review of the results obtained by students after participating in the teaching and learning process and through a review of the component sets that together make up the teaching and learning process (Lucenario, Yangco, Punzalan, & Espinosa, 2016). The main purpose of conducting evaluations in learning is to obtain accurate information about the level of achievement of instructional goals by students so that follow-up can be pursued (Daryanto, 2013).

**Biology Learning Outcomes with Character Education Using the T-PACK Approach Through the PBL Model at SMAN 8 Semarang Integration of digital technology to motivate student learning**

In addition to the integration of technology with the use of students' androids, assignments involving technology can enrich students with knowledge about the devices they use. The results of observations on the practice of learning Biology class XII, the teacher uses the Quiziz application for pre-test and post-test in order to motivate students to work on questions carefully and create a fun learning atmosphere for students because in the application there are features of student scores can be seen directly after working on the problem.

**Involvement of students in learning with technology**

The involvement of students in the practice of learning with technology is one part of the knowledge of Technological Pedagogical Knowledge (TPK) in which the teacher plays a role in providing direction so that the practice of learning with technology can activate students. Thus, the teacher must act as a facilitator who is

able to build interaction between teachers and students. The results of observations on the practice of learning Biology class XII, teachers use virtual lab applications for digital simulations. The use of android by students to operate learning practices.

*"Students work on googleclassroom and quipper. Not maximal"* (Informant 1)

*"The results are good, the analysis results/products are in accordance with the students' academic abilities. Everything is good and smooth"* (Informant 2)

To be able to produce meaningful learning, the teacher must choose the right learning model so that it becomes meaningful learning. Learning management during the covid-19 pandemic is carried out with PBL. PBL is a constructive learning model that has the potential to empower high-level cognitive abilities. Research results Rahmawati, Budiyanto, & Basori (2019) teachers must develop the T-PACK necessary for successful integration of educational technology. The positive impact is that teacher education has a positive effect on T-PACK.

Teachers can also be referred to as managers in the classroom so that teachers are responsible for good teaching services to students (Suryapermana, 2017). Schools as educational institutions that are also responsible for achieving national education goals need to improve the quality of their management, both regarding institutional management and learning management. Therefore, to support the implementation of quality teaching and learning activities, teachers must have knowledge of learning management (Siregar, 2012). The application of e-learning has the power to optimize learning and teaching, seen from the selection of methods to learning success (Irawan, 2015). On the other hand, this situation also creates its own problems, especially for subjects that require practice such as science (Sari, Windayani, Jihad, & Kuntadi, 2020).



## CONCLUSION

Biology learning management contain using character education with T-PACK through Project Based Learning (PBL) model biology where the planning includes selecting and implementing learning models, selecting and determining learning approaches, selecting and implementing learning strategies that are applied to learning practices, selecting and apply learning methods, and selecting and applying learning techniques. The organization includes the ability of teacher's ability to manage class, manage classes effectively with technology, and using Learning Management System (LMS) in learning practice. The implementation includes using of digital devices (laptops, LCD projectors, printers, scanners, etc.) by teachers, utilization of the internet as a learning resource, developing learning tools, and using of Learning Management Systems (LMS) or online application platforms to support online learning. The evaluation includes assessment of the learning process and integrating technology in the assessment of the learning process. The results include the integration of technology both software and hardware in learning practices and the involvement of students in learning with technology.

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