

# Implementation of TPACK-Based Project Based Learning (PjBL) Model to Increase Learning Motivation of Class X Students of Taruna Terpadu Vocational School

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## Abstract

*The purpose of this study was to determine the Project Based Learning (PjBL) learning model based on Technological Pedagogical and Content Knowledge (TPACK) in increasing the learning motivation of class X students of SMK Taruna Terpadu. This research is a type of PTK research conducted in two cycles using the spiral model by C. Kemmis and MC. Taggart. The research subjects were students of class X of SMK Taruna Terpadu with a total of 30 students. The data collection technique in this study used a comparative descriptive method by comparing the results from pre-cycle to cycle II. The results of the action showed that students who were very happy with PjBL learning reached 100%, students who were motivated to follow the learning reached 100%, students who felt they added insight with the PjBL model reached 100%, students who were curious about the PjBL learning model reached 97%, and students who were eager to follow learning with the PjBL model reached 93%. From this data, it can be seen that the impression of students towards the PjBL model is that almost all students in one class are motivated to follow PjBL-based learning that is applied in teaching and learning.*

**Keywords:** PjBL Model, TPACK, Learning Motivation.

## INTRODUCTION

The aim of learning Indonesian for students is to develop Indonesian language skills according to their abilities, needs and interests, while for teachers it is to develop students' Indonesian language potential, as well as being more independent in determining language teaching materials according to the conditions of the school environment and students' abilities (Noor, 2018). Apart from that, the aim of using good language is to get to know each other's personal, cultural and intellectual qualities. Good communication is very necessary to interact with friends, because it will be easy to work together to do the task well. Learning Indonesian at school is expected to help students get to know themselves, their culture and the cultures of other people, express ideas and feelings, participate in communities that use the language and discover and use the analytical and imaginative abilities that exist within them (Mubaroq, 2018).

Indonesian language education is directed at improving students' ability to communicate in Indonesian well and correctly, both orally and in writing, as well as fostering appreciation for the literary works of Indonesian people. According to Mulyani Sumantri, the high school/vocational school age period of 15-17 years is an important and even fundamental stage of development for the success of further development. The development of social emotional relationships and the existence of normative ethical awareness in children of this age are strong characteristics at middle school age. Positive and productive social competencies will develop at this age, such as the ability to cooperate, competence, tolerance, kinship and so on (Zubaidah, 2016). Involvement in group life (collaboration or cooperation) for middle school age children is an interest

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and concern. It is normal for class teachers to face many problems in teaching and learning activities regarding the implementation of learning.

Effective learning is when students are able to understand the material presented and can implement it in everyday life (Shah, 2019). So far, the learning carried out in many schools cannot be said to be effective, because the results obtained by students are only theory and memorization which will be lost at any time. Learning activities carried out in the classroom are still centered on the teacher (teacher center). Students just sit quietly listening to what the teacher explains. Their activities are writing material and memorizing concepts presented by the teacher. Students are less active and creative in learning activities, so they will get bored and bored resulting in a lack of optimal knowledge (Ngereja et al., 2020). To achieve national education goals, appropriate learning strategies and models are needed. One of the teachers' desires in teaching is to create an active and creative atmosphere for students during the learning process so that it can increase students' learning motivation. One learning model that can be used by teachers is the Project Based Learning (PjBL) learning model.

According to (Žerovnik & Nančovska Šerbec, 2021) said with long-term activities that involve students in designing, making and displaying products to solve real world problems. Thus, the Project Based Learning (PjBL) learning model can be used as a learning model to develop students' abilities in planning, communicating, solving problems and making the right decisions regarding the problems they face (Rahman et al., 2019).

This model can also be combined with Technological Pedagogical and Content Knowledge (TPACK). To achieve learning goals and minimize any obstacles to achieving learning goals, innovation is needed in the learning process, one of which is integrating technological, pedagogical and content knowledge in the learning process or also called TPACK-based learning.

Technological Pedagogical and Content Knowledge (TPACK) is a teacher's knowledge about how to facilitate student learning of specific content through pedagogical and technological approaches (Madjid et al., 2017; Mansour et al., 2024; Prastiyan et al., 2023). Implementation of the TPACK-based PjBL learning model is an important and interesting thing as proven by several previous studies. Teaching and learning activities carried out in schools are still centered on the teacher (teacher center). Students are more passive and listen to the delivery of information from the teacher. Students who tend to be passive and do not have the enthusiasm to learn will result in many of the students' results in the form of learning outcomes being below the KKM, including Indonesian language subjects. The Indonesian language subject is one of the subjects tested at ASPDBK. Therefore, researchers think about how to increase students' motivation so that they are motivated to take part in Indonesian language learning. The author tries to implement learning methods that activate students more. Learning activities are centered on students (student center). The teacher here is only a facilitator and motivator.

Researchers take a project-based learning model because this learning model is a learning model that uses projects/activities as media. Projects carried out by students are carried out individually or in groups and carried out in a certain time in collaboration to produce a product that will be presented. Students carry out projects in a collaborative, innovative and unique manner that focuses on solving problems related to students' lives (Jam et al., 2016). By using this learning model, it is hoped that students will be motivated to participate in optimal learning, especially Indonesian language subjects and have good writing skills. Therefore, the author is interested in conducting a research entitled Implementation of the TPACK-based Project Based Learning Model to increase learning motivation in Class X Students of the Integrated Taruna Vocational School. This research focuses on Indonesian language lessons.

The low motivation of students in participating in Indonesian language learning is proven by the results of the questionnaire given by the teacher to students, namely about their impressions of participating in Indonesian language learning. Based on the background of the problem that the author has described, research was created that focused on implementing the TPACK-Based Project Based Learning (PjBL) Model to Increase the Learning Motivation of Class X Students at the Integrated Taruna Vocational School.

## **LITERATURE REVIEW**

Implementing a TPACK-based Project-Based Learning (PjBL) model can significantly enhance student learning motivation. Project-based learning involves students in constructing knowledge by solving real-world problems, fostering skills in questioning, investigating, analyzing data, drawing conclusions, and reporting findings (Kokotsaki et al., 2016). This approach aligns with problem-based learning and emphasizes active engagement with complex academic content (Zhang & Ma, 2023). By integrating technology, pedagogy, and content knowledge, the TPACK model enhances student learning outcomes (Susilawati & Khaira, 2022). TPACK-based learning tools have been shown to optimize learning and improve critical thinking skills (Nurtjahyani et al., 2022).

The TPACK framework is crucial for teachers to integrate technology effectively into the curriculum, enhancing their knowledge and skills in this integration (Helsa et al., 2022). Studies have shown that TPACK-based learning can strengthen students' character by integrating values relevant to learning objectives and basic competencies (Chotimah et al., 2022). Furthermore, the application of PjBL allows students to build knowledge in real contexts, fostering critical thinking, problem-solving, and independent work (Sauri et al., 2022).

Incorporating TPACK into project-based learning can improve students' mastery of concepts, critical thinking skills, and motivation (Fazilla & Nurdin Bukit, 2024). The TPACK-based blended learning approach, rooted in progressivism education philosophy, reflects the evolving nature of education (Sudipa et al., 2022; Žerovnik & Nančovska Šerbec, 2021). Additionally, the TPACK model supports instructors in designing technology-enhanced courses, enhancing teaching practices (Baytiyeh & Elbassuoni, 2021).

Overall, the synthesis of TPACK with project-based learning not only enhances student learning outcomes but also fosters critical thinking, problem-solving skills, and motivation. By integrating technology, pedagogy, and content knowledge effectively, educators can create engaging and impactful learning experiences for students.

### **Project Based Learning Learning (PjBL)**

Project-Based Learning is a learning approach that pays attention to understanding. Students explore, assess, interpret and synthesize information in a meaningful way. Active learning is closely related to creative individuals. Individual creativity can bring out student creativity as a result of completing their learning with certain projects (Žerovnik & Nančovska Šerbec, 2021). Creative behavior results from a serious enthusiasm for learning. Project-based learning is an active type of learning that involves students independently with the criteria that this learning will also increase students' thinking skills towards metacognition such as critical thinking about projects that will be worked on through problems found by students.

As a constructivist learning, project based-learning provides learning in real problem situations for students so that it can produce permanent knowledge. Project-based learning in concept (Boss & Krauss, 2022) is a model that can organize projects in learning. Project based-learning provides opportunities for a student-centered, more collaborative learning system, where students are actively involved in completing projects independently and working together in teams and integrating real and practical problems (Boss & Krauss, 2022). The goals to be achieved by students are very diverse, for example thinking skills, social skills, psychomotor skills and process skills. The learning curriculum aims to improve the quality of imagination and creativity; acquire human values, develop one's potential, develop critical thinking, and develop a committed and responsible person. The learning focus of the project lies in the core concepts and principles of a study discipline, involving students in investigations to solve learning problems, giving students the opportunity to autonomously construct their own knowledge by producing real products. (Trisdiono et al., 2019) explains that project learning is identical to science-based learning as carried out by scientists.

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individuals. Individual creativity can bring out student creativity as a result of completing their learning with certain projects (Kahar et al., 2022). Project-based learning is an active type of learning that involves students independently with the criteria that this learning will also increase students' thinking skills towards metacognitive thinking such as critical thinking about projects that will be carried out through problems found by students (Wijayati et al., 2019).

This project-based learning is authentic, this learning will indirectly involve students in constructive investigations. The hope is that through autonomous learning, student responsibility can be better and students' creative ideas can emerge, because when working on projects they will definitely be different in their work compared to traditional projects or conventional learning (Warr & West, 2020). Students in project-based learning have autonomy in inquiry, responding to questions from complex problems, or challenges, practicing skills in collaboration, communication and critical thinking (Ngereja et al., 2020). Students who are involved in the project as a whole will choose a topic, decide on an approach, conduct experiments, draw conclusions and communicate the results of the project they have worked on.

### **Technological Pedagogical and Content Knowledge (TPACK)**

Mishra and Koehler (2006) introduced technical pedagogical content knowledge for the first time: Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. The term which became known as TPACK (Technological, Pedagogical, Content Knowledge) is a framework for designing new learning models through a combination of three main aspects, namely technology, pedagogy, and content or material knowledge. The TPACK model provides a new framework for integrating technology into the classroom and a way to manage classrooms to provide the best learning experience for students using technology (Kurniawan et al., 2024; Lubis et al., 2022; Prastiyan et al., 2023). This is a theory developed to explain what information teachers need to effectively teach their students and use technology. Developed in 2006 by Mishra and Matthew J. Koehler, the TPACK framework focuses on Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), providing a productive approach to a variety of problems teachers face (Elmaadaway & Abouelenein, 2023; Mansour et al., 2024). The TPACK framework explains how content (the material to be taught) and pedagogy (how the teacher delivers the material) should be the basis for effective technology integration. This is important because the technology applied must be able to deliver content and support pedagogy to improve student learning experiences. According to the TPACK framework, certain technological tools (hardware, software, applications, related information literacy practices, etc.) are well suited to teaching and leading students to a better and stronger understanding of the subject (Rahmawati et al., 2019). The three types of knowledge, namely TK (Technological Knowledge), PK (Pedagogical Knowledge) and CK (Content Knowledge), are replicated through the TPACK framework. Technical pedagogical knowledge (TPK) describes the relationships and interactions between technical assistance and specific pedagogical practices; Pedagogical content knowledge (PCK) describes the relationships and interactions between pedagogical practices and specific learning goals; and Technology Content Knowledge (TCK) explains the relationship and interaction between technology and learning objectives (Nantha et al., 2024). This triangular area then forms TPACK, which describes the relationship between these three areas.

### **METHOD**

This research was carried out on 30 students in class The data collection techniques used are: (a) Tests, observation and documentation. The instruments used in this research were: observation sheets, questionnaires and documentation. Observation sheets are used by researchers as a guide for making observations or observations in order to obtain accurate data in observations. Observation sheets are also used to monitor and evaluate each action so that observation activities cannot be separated from the context of the problem and research objectives. The questionnaire is used to see how much motivation students have for learning from the actions they have been given. The results of the questionnaire were analyzed to find out how much motivation students had for learning after being given action.

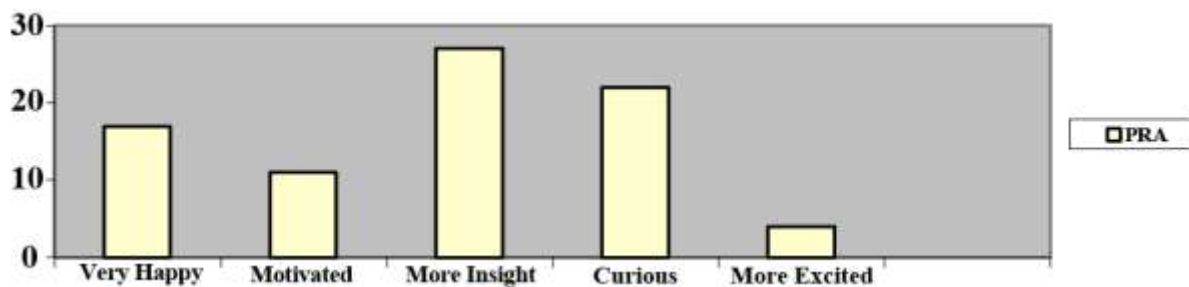
## RESULTS AND DISCUSSION

### Implementation of the Project Based Learning (PjBL) Learning Model

Learning activities using Project Based Learning (PjBL) were carried out on class students with different motivational backgrounds for learning Indonesian. There are only a few children who have high learning motivation, which is still 50% of the total number of students. Meanwhile, other students have an average level of motivation. The author's level of motivation for learning Indonesian in class

**Table 1. Recapitulation of Student Impression Questionnaire Results before participating in learning with the PjBL Model.**

No	Student's Initial Name	Very Happy	Motivated	Impression More Insight	Curious	More Excited
1	AD	-	-	-	-	-
2	AA	√	-	√	-	-
3	AMS	√	√	√	√	-
4	FA	-	-	√	-	-
5	FNQ	√	√	√	√	-
6	FQN	-	√	√	√	√
7	FR	-	-	√	√	-
8	FzA	√	√	√	-	-
9	FAA	√	√	√	-	-
10	GCW	√	-	√	√	-
11	HS	√	√	-	-	√
12	HAA	-	-	√	√	-
13	INA	√	-	√	√	-
14	MAP	√	-	√	√	√
15	MFA	√	√	-	√	√
16	MBD	-	-	√	√	-
17	MB	-	-	√	-	-
18	M. ANH	√	-	√	√	-
19	M. NF	√	√	√	√	-
20	M. UAG	√	-	√	√	-
21	NK	√	√	√	√	-
22	NZA	√	-	√	√	-
23	NANA	√	√	√	√	-
24	NAR	-	-	√	√	-
25	RAT	-	-	√	√	-
26	RFD	-	-	√	-	-
27	SZ	-	-	√	√	-
28	SRS	√	√	√	√	-
29	UAA	-	-	√	√	-
30	ZNK	√	-	√	√	-
Amount		17	11	27	22	4
Percentage		56%	36%	90%	73%	13%



**Figure 1.** Level of Student Motivation Before the TPACK-Based PjBL Model.

From the results of table 1 and figure 1 above, it can be concluded that 56% of students are very happy with Indonesian language lessons, 36% of students are motivated in taking lessons, 73% of students have the opinion

that Indonesian language lessons broaden their knowledge, students are curious with 73% Indonesian language lessons, and 13% students who are more enthusiastic about taking Indonesian language lessons. It can be concluded that the enthusiasm and learning motivation of class X students in taking Indonesian language lessons before the action was taken was still below 90%. Therefore, from the results of the pre-cycle activities above, the author takes action in the learning process.

### **Results of Implementation of the Project Based Learning (PjBL) Learning Model**

In order to answer the problem of writing how to implement the TPACK-based Project Based Learning (PjBL) Model to increase the learning motivation of Class

- a. The ability to reinvent mathematical concepts
- b. The ability to create a mathematical model of a situation or everyday problem and solve it.
- c. Ability to apply mathematics meaningfully

The description of each student's level of motivation in learning Indonesian is as follows:

- a. Phase 1, Asking essential or basic questions;

Scientific approach (syntax 1, asking/questioning), the teacher provides questions that are essential or basic. Questions given by the teacher regarding the use of question words related to the text of the Proclamation of Independence of the Republic of Indonesia. These question words include: what, who, how, why, when, where. In this phase, students look for answers in the text in the student handbook. Students have been formed into discussion groups so that they have worked together from the beginning to the end. Each student is asked questions by the teacher so that the teacher knows the student's abilities in that KD. An example question is:

- 1) Make questions from the answers "The one who read the text of the Proclamation was Ir. Sukarno.
- 2) Make questions from the answers "The text of the Proclamation of Indonesian Independence was read on Jalan Pegangsaan Timur No. 56 Jakarta.
- 3) Students answer questions from the teacher orally.
- b. Phase 2, Designing project work;  
In this phase the teacher makes an example of a mind map design using a computer. The teacher explains the various designs that can be chosen, students can choose one according to their preferences.
- c. Phase 3, Developing project creation steps;  
In this phase, students in groups prepare steps for working on the project. The stages are:
  - 1) Students in groups study the text in the student book.
  - 2) Each group creates questions from the question words what, why, how, where, when, the answers to which are in the text, namely the event of the proclamation of Indonesian independence.
  - 3) Each group writes questions in the student's textbook.
  - 4) Each group made a mind map according to the results of their discussion, namely making questions using the question words what, why, how, who, when about the event of the proclamation of Indonesian independence.
  - 5) Each group is creative in making a mind map, they compete to make a mind map as good and beautiful as possible
- d. Phase 4, Conduct regular monitoring of student project development;  
In this phase the teacher carries out monitoring to find out the progress of the students' work. If something is not quite right, the teacher immediately directs how the project can be carried out appropriately according to the learning objectives.
- e. Phase 5, Assessing student work results;

In this phase the teacher assesses the students' projects. After the project is completed, one of the students representing their group comes forward to present the results of their work. When someone makes a presentation in front, students listen and then respond to the results of their friend's presentation. Various input and criticism from other groups, the group that presented took notes to be used as reference material to improve their work. After all group presentations, the teacher and students draw conclusions and strengthen the results of their work. The teacher provides an assessment by giving a post test sheet.

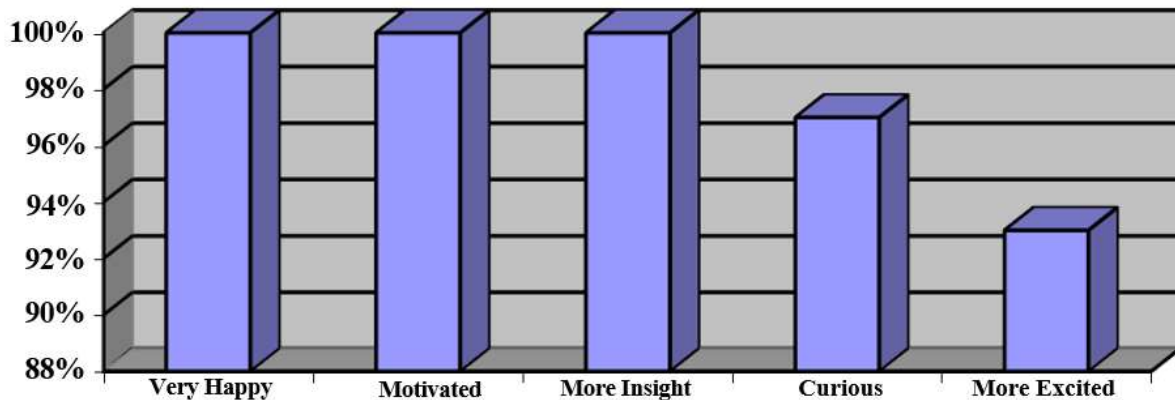
f. Phase 6, Evaluate the experience gained by students

In this phase the teacher distributes questionnaires to students about their impressions of the learning experience of the TPACK-based PjBL learning model that they have practiced. The results of the questionnaire are as follows:

**Table 2. Recapitulation of Student Impression Questionnaire Results after participating in learning using the PjBL Model.**

No	Student's name	Very Happy	Motivated	Impression More Insight	Curious	More Excited
1	AD	√	√	√	√	√
2	AA	√	√	√	√	√
3	AMS	√	√	√	√	√
4	FA	√	√	√	√	√
5	FNQ	√	√	√	√	√
6	FQN	√	√	√	√	√
7	FR	√	√	√	√	-
8	FzA	√	√	√	√	√
9	FAA	√	√	√	√	√
10	GCW	√	√	√	√	√
11	HS	√	√	√	√	√
12	HAA	√	√	√	√	√
13	INA	√	√	√	√	√
14	MAP	√	√	√	√	√
15	MFA	√	√	√	√	√
16	MBD	√	√	√	√	-
17	MB	√	√	√	√	√
18	M. ANH	√	√	√	√	√
19	M. NF	√	√	√	√	√
20	M. UAG	√	√	√	√	√
21	NK	√	√	√	√	√
22	NZA	√	√	√	√	√
23	NANA	√	√	√	√	√
24	NAR	√	√	√	√	√
25	RAT	√	√	√	√	√
26	RFD	√	√	√	-	√
27	SZ	√	√	√	√	√
28	SRS	√	√	√	√	√
29	UAA	√	√	√	√	√
30	ZNK	√	√	√	√	√
Amount		30	30	30	29	28
Percentage		100%	100%	100%	97%	93%

Based on table 2, students' impressions show that students who are very happy with PjBL learning reach 100%, students who are motivated to take part in learning reach 100%, students who feel they have broadened their insight with the PjBL model reach 100%, students who are curious about the model PjBL learning reached 97%, and students who were enthusiastic about participating in learning using the PjBL model reached 93%. From these data it can be seen that the students' impression of the PjBL model is that almost all students in one class are motivated to participate in PjBL-based learning which is applied in teaching and learning. Meanwhile, if a diagram is made it is as follows:



**Figure 2.** Student Motivation Level After TPACK-Based Pjbl Model.

The results of reflection on the TPACK-based Project Based Learning (PjBL) learning model are that weaknesses in learning before the TPACK-based PjBL model have been able to be corrected and have shown satisfactory results. Where the latest data that was collected was that students who were motivated to follow the PjBL learning model were above 90% of the number of class X students, namely 30 people. The author concludes that the TPACK-based Project Based Learning learning model in class X of the Integrated Taruna Vocational School really determines students' motivation in participating in learning.

### **Barriers and Supporters in Implementing TPACK-based Project Based Learning (PjBL)**

The obstacles faced in implementing learning by implementing the TPACK-based Project Based Learning (PjBL) model to increase student motivation include:

The time required for learning is longer, so that sometimes it takes up other learning time or is not covered by regularly scheduled teaching and learning hours.

Students' independence at the beginning of learning using the TPACK-based Project based Learning (PjBL) model is still low, so more teacher role is needed.

The supporting factors for implementing learning using the TPACK-based Project Based Learning (PjBL) model to increase the learning motivation of class X students at the Integrated Taruna Vocational School include:

Ease of obtaining learning media, because madrasas provide the laptops needed by students.

An IT-based learning model that makes students interested, especially needs to be supported by the creativity of students who psychologically currently like activities that use IT.

### **CONCLUSION**

Description of Indonesian language learning with Project Based Learning model based on Technological Pedagogical And Content Knowledge (TPACK) to increase learning motivation of class X students of SMK Taruna Terpadu seen from the categorization of students' abilities that have increased. Before learning with Project Based Learning based on Technological Pedagogical And Content Knowledge (TPACK), Indonesian language learning in the minimum good category has increased, namely from a motivation level of 50% before TPACK-based PjBL increased to 100% after implementing TPACK-based PjBL. For teachers, learning with the Project Based Learning model based on Technological Pedagogical And Content Knowledge (TPACK) is good enough to increase student learning motivation so that it can be an alternative in the learning process.



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