

# Analysis Of Tpack Ability Of Biology Teachers' Learning Media In High School Coastal Area Of Bintan District As A Form Of Support Towards Sdgs In The Field Of Education

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**Abstract.** This study aims to examine in depth and analyze the level of Technological Pedagogical Content Knowledge (TPACK) ability of biology teachers in Senior High Schools (SMA) in the coastal areas of Bintan Regency in designing, developing, and using learning media. Through quantitative analysis using the TPACK questionnaire instrument, this study attempts to obtain an accurate picture of the profile of TPACK ability of teachers in the area, so that it can be a basis for efforts to improve the quality of the learning media produced. The results of the study showed that the average TPACK ability of biology teachers in senior high schools in the coastal areas of Bintan Regency was in the good category, which was 80.34%, which had positive implications for achieving the Sustainable Development Goals (SDGs) in the field of Education.

## 1 Introduction

Ever since gaining independence, Indonesia has seen a steady rise in basic and secondary educational institutions. However, 75% of schools in several regions of Indonesia have not met the criteria for minimum education services and are also ranked among the bottom 10 countries in terms of performance on the Learning Curve index in 2013. Globally, the quality and standards of education in Indonesia ranks 64th out of 120 countries, according to a report from UNESCO. There is still a very high level of physical violence in the educational environment, with physical violence perpetrated by students against their peers, as well as the prevalence of sexual violence that often occurs in schools. Indonesia among the participating nations, the Sustainable Development Goals (SDGs) program will act as a cornerstone for raising educational standards globally in order to solve this issue. The Sustainable Development Goals (SDGs) initiative, which includes Indonesia among its member countries, will serve as a cornerstone for improving educational standards worldwide in order to address this problem.

The Millennium Development Goals (MDGs) were replaced by the Sustainable Development Goals (SDGs) program in 2015. Maintaining the achievement growth from the MDGs program is the aim of the SDGs. The SDGs offer practical answers to development conundrums by implementing the MDGs. With regard to the SDGs, all developed, developing, and impoverished nations now have equal roles to play. The Sustainable Development Goals (SDGs) are a set of objectives with education as their primary focus that aim to enhance social welfare and economic prosperity in a linked manner. To achieve sustainable development, education is very important. The progress of education in Indonesia

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can encourage the achievement of 17 SDGs, one of which is efforts to build a quality nation through decent and quality education [2].

Quality education can be realized by ensuring equal distribution of education, expanding learning opportunities for all, and encouraging educational equality to ensure that everyone has access to education and lifelong learning opportunities. Quality education can be realized if the people of a country can contribute and be involved in its development. Therefore, the government and society must collaborate and coordinate effectively to achieve the SDGs. Apart from that, the involvement of other parties is also needed, both directly in the educational sector and others. Creating quality individuals is the main goal of education. Therefore, quality education is considered an important foundation for all parties, including society [4].

Recently, the quality of education is still a serious topic of discussion. This is because the standard of education in Indonesia is still low and the condition of Indonesian education still has problems, even though people's access to education has increased. Even though Indonesian education is still seen as having a low quality, these issues include poor infrastructure, low quality instructors, and a lack of integration with nationalist beliefs, evidenced by Indonesia having the highest illiteracy rate compared to other countries. In Indonesia, 15% of children under the age of 15 are illiterate, and in other countries only less than 10% of young people are illiterate. Indonesia's current image shows that the quality of education in Indonesia is still far below what is planned in the SDGs. As a result, in this scenario, educational inequality is a major obstacle to achieving quality education. However, quality education must still be the goal of current sustainable development. One form of improving quality education is by solving the problems stated above, namely by improving the quality of teachers. Improving teacher quality is of course by increasing teacher competency one of which is by studying through the use of information technology. This is in line with the need that teachers be permitted to use ICT in the classroom in order to carry out tasks linked to the advancement of education [5]. This of course requires teachers to be technologically literate.

In the 21st century, professional teachers must prepare for the needs needed by students in the future. The results of studies regarding teacher leadership and policies in the era of globalization state that teachers must be adaptive so as not to miss various things. On the other hand, teachers must also master and understand the technology in the world of education [6]. Incorporating it into 21st century teaching and learning activities, teachers are urged to acquire and comprehend computer literacy and digital skills. Teachers' use of technology in the classroom has to be integrated with their fundamental scientific understanding and teaching skills. TPACK is the amalgamation of technical pedagogy, material knowledge, and talents [7]. TPACK includes optimizing TK used in teaching and learning activities in order to carry out integration of PK, PCK and PK into one unit that can provide a more interesting, efficient and effective teaching and learning process [8].

If educators are able to make the most of the different learning resources available to them, learning will be engaging, productive, and efficient—that is, it will be enjoyable rather than tedious. Knowledge of how to utilize technology to communicate ideas in a way that improves the learning experience for students is the foundation of TPACK. Technology content/pedagogy correlation is demonstrated by TPACK. Nevertheless, the way the three are integrated or combined is what matters. TPACK is ultimately a framework for educational professionals who try to package and develop learning models to achieve learning goals through better processes. Knowledge of technology, pedagogy and content/information materials must be obtained by teachers [9]. Teachers' TPACK expertise in these domains has to be evaluated in order to evaluate the pedagogical, content, and technological quality of learning media. Specifically, how effectively instructors in coastal locations may be supported by TPACK teaching tools to ascertain the makeup of instructors'

TPACK competencies, it is imperative to look at the TPACK potential of teacher media in coastal regions. This will help achieve the SDGs in the area of education in addition to raising the caliber of the instructional materials made available by teachers in each local school. Previous studies on biology instructors were place at Tanjungpinang City. This research is a continuation of previous research using the same instrument that researchers have created to measure the ability of TPACK learning media, the TPACK instrument is a very valid learning media for science and biology teachers [10], researchers will conduct research for Biology teachers in the coastal areas of Bintan district. So far, researchers have never conducted research in the coastal areas of Bintan Regency, but researchers feel it is very necessary to conduct this research so that researchers also know the condition of Biology teachers' TPACK in Bintan Regency.

## 2 Method

This study is a quantitative descriptive one that was conducted by gathering information from biology and science instructors in five coastal regions of Bintan Regency using TPACK questionnaire. In this study, 14 instructors were included in the sample. Descriptive analysis was employed to provide an explanation for the data gathered for this study. This is carried out without extrapolating the study's findings. The 5-point Likert scale was used to analyze the TPACK ability data.

$$NP = \frac{R}{SM} \times 100\%$$

NP: The percent value sought  
R : Score obtained  
SM: Maximum score

The average TPACK profile score will be interpreted and determined by the criteria in table 1:

**Table 1.** Score Interpretation Criteria

TPACK Profile Score	Criteria
81%-100%	Very good
61%-80%	Good
41%-60%	Pretty good
21%-40%	Not good
0%-20%	Very Not Good

## 3 Result and Discussion

To investigate the TPACK skills of biology teachers in high schools in the coastal area of Bintan Regency, this study takes a quantitative method. A questionnaire with 29 statements measuring 7 TPACK features was used to gather data. Using the straightforward technique

in table 1, data analysis was done to get a complete picture of the teacher's TPACK profile. In Table 2, the analysis's findings are displayed as percentages and average scores.

**Table 2** Results of Analysis of TPACK Capabilities in Learning Media for High School Biology Teachers in the Coastal Area of Bintan Regency

No	Aspect	Average	Percentage	Criteria
1	Technological Knowledge (TK)	3.33	83.48	Very good
2	Pedagogical Knowledge (PK)	3.30	82.60	Very good
3	Content Knowledge (CK)	3.24	80.95	Good
4	Pedagogical Content Knowledge (PCK)	3.25	81.25	Very good
5	Technological Content Knowledge (TCK)	3	75	Good
6	Technological Pedagogical Content Knowledge (TPACK)	3.18	79.64	Good
7	Technological Pedagogical Content Knowledge (TPACK)	3.19	79.64	Good
Total		3.21	80.34	Good

As seen in Table 2, the proportion of Bintan Regency biology teachers' TPACK ability in learning media reaching a good standard is 80.34%. The proportions of Pedagogical Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), Technical Knowledge (TK), and Pedagogical Knowledge (PK) fall into the Very Good category. The data indicates that high school biology instructors' TPACK skills in learning media are up to par, according to the study's findings. Technical knowledge, pedagogy knowledge, content knowledge, pedagogy content knowledge, technical content knowledge, and pedagogy technical content knowledge are all held to a high level. The results of previous research show that biology teachers at coastal high schools in Tanjungpinang City can use TPACK learning materials effectively with a percentage of 76.9% meeting the Good criterion [11]. Where the Pedagogical Content Knowledge (PCK) aspect has the highest proportion, namely 80.34% Good criteria. Meanwhile, the four components of the research findings in Bintan Regency TK, PK, CK, and PCK all fall into the very good category. Thus, there have been substantial changes between Bintan Regency and Tanjungpinang City. According to earlier research, using the TPACK approach to teaching can enhance students' learning results since it allows teachers to choose engaging and unique learning sources that complement their own teaching methods. Based on research results, learning is more efficient if teachers are fluent in Pedagogical Technology and Content Knowledge (TPACK) in the learning media they choose [12]. This is also consistent with research showing that using the TPACK method can enhance learning outcomes for students [13]. Applying the TPACK technique to the analysis of observation data throughout the learning process improves student learning results. One method that you, as a teacher, might incorporate technology into your lessons is by using programs like Microsoft PowerPoint. The TPACK method supports teachers in enhancing student learning outcomes and motivating students to meet learning objectives during the learning process. Given the proficiency of high school biology instructors in Bintan's coastline region, who set high standards for using the TPACK approach with educational materials, Bintan district teachers have contributed to helping improve the SDGs in the education sector in the Bintan region in particular and the coastal region. Riau Islands in general.

## 4 Conclusion

The conclusion of this research is that high school biology teachers in the coastal areas of Bintan Regency can use TPACK learning tools with the elements of Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), and Pedagogical Content Knowledge (PCK) are in very good criteria, while Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Pedagogical Technology Pedagogical Content (TPACK) are in good criteria. This suggests that biology teachers in high schools in the coastal regions of Bintan Regency are adept at using TPACK as an instructional aid. Consequently, educators in the coastal region of Bintan have enhanced the SDGs related to education by utilizing these talents.

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