



Application technological pedagogical content knowledge (TPACK) in learning Indonesian language at state Madrasah Aliyah in Banda Aceh City

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Abstract

TPACK is a learning framework that integrates technology knowledge, content knowledge, and pedagogical knowledge. The importance of implementing TPACK in current learning is because students from elementary to tertiary levels are very familiar with the use of technology. Teachers as educators have an important role in creating technology-based learning. However, the application of TPACK in learning is still considered complex by teachers. The purpose of this research is to describe planning, implementation and evaluation Technological Pedagogical Content Knowledge (TPACK) in Indonesian language learning at Madrasah Aliyah Negeri in Banda Aceh. The approach used in this study is a qualitative approach. The population of this research is all teacher's Indonesian language class X on State Aliyah Madrasah in Banda Aceh 3 in Banda Aceh City. The data collection techniques used in this research were observation, interviews and questionnaires. The data analysis process is carried out through data reduction, data presentation, and drawing conclusions. The research results show that the implementation of TPACK at MAN 1 Banda Aceh is considered very good, with teachers showing proficiency in mastering technology, pedagogy, and understanding the material. The school also provides supporting facilities. At MAN 2 Banda Aceh, the implementation of TPACK can be categorized as good, even though the teacher's ability to create digital content is limited. Meanwhile, the implementation of TPACK at MAN 3 Banda Aceh has also gone well, with the school providing supporting facilities and teachers having adequate capacity to use technology, although the intensity of use still needs to be increased.

Keywords: TPACK (Technological Pedagogical Content Knowledge), Indonesian Language Learning, Planning, Implementation, Evaluation

Introduction

Implementing TPACK is very important in today's learning. Students, from elementary school to university, are very familiar with the use of technology compared to students in the past (Arifin, 2013) ^[3]. Technology in the world of education aims to advance education as time goes by. In this case, teachers play an important role in creating technology-based learning.

Based on Law no. 14 of 2005 concerning Teachers and Lecturers, teachers are required to have four competencies, one of which is pedagogical competency (Hidayani, 2017) ^[5]. Pedagogical competence is the teacher's ability to manage learning in the classroom, including the use of technology (Agustina, 2015) ^[1]. Teachers must always improve various learning knowledge, including technology, to suit societal developments and student characteristics (Mulyasa, 2014; Maeng, 2013) ^[8, 6].

This encourages the development of the TPACK framework, which integrates technological knowledge, content knowledge, and pedagogical knowledge in learning (Oktaviana, 2021) ^[9]. The application of TPACK in learning is considered an action that can provide a new direction for teachers in integrating ICT into teaching and learning activities (Aviyanti, 2020:11) ^[4]. Madrasah Aliyah Negeri in Banda Aceh is an excellent school whose aim is to increase students' knowledge to continue their education at a higher level and to develop themselves in line with the development of science and technology.

Based on the results of initial observations at the Banda Aceh State Madrasah Aliyah, Technological Pedagogical Content Knowledge (TPACK) has been implemented at the Banda Aceh State Madrasah Aliyah but is very rarely used in the classroom, especially in Indonesian language subject matter and is only used for certain materials. After the author made initial observations at Madrasah Aliyah Negeri Banda Aceh and conducted interviews accompanied by interview guidelines, it turned out that in the learning process the teacher had implemented Technological Pedagogical Content Knowledge (TPACK), however, not all classes apply TPACK and it is only applied to certain subject matter so there are several classes whose scores are still low. By implementing TPACK in Indonesian language learning, students will be more interested and easier to understand the lesson material provided by the teacher.

The results of the thoughts above can be used as a basis for the research to be carried out, namely whether the learning process is successful or not can be proven from the role of the teacher when preparing the learning design in the classroom. To write about the global context of the development of a pattern of increasing teacher competence, which is often known as Technological Pedagogical Content Knowledge or "TPACK" in general, an educator is required to have comprehensive skills and extensive and holistic knowledge regarding material or content, science or pedagogy as well as maintaining technology in learning. Furthermore, Mishra and Koehler (2006: 1017) ^[7] stated that

TPACK is a framework that introduces the complex relationship between three types of knowledge, namely technology, pedagogy and content, so it is important for teachers to implement technology-based learning in the classroom.

The reason the researcher chose a case study at the State Madrasah Aliyah school in Banda Aceh was because the school is a state school where students must be familiar with the use of technology which continues to develop. So, teachers play an important role in implementing TPACK-based learning activities so that students develop and become accustomed to technology in the world of education today. These reasons make researchers interested in conducting research related to how TPACK is implemented in learning by class teachers at State Madrasah Aliyah schools in Banda Aceh.

Based on the analysis of relevant previous research, several important things can be concluded. Research conducted by Amrullah (2021) focuses on competency Technological Pedagogical Content Knowledge (TPACK) certified classroom teacher as an educator in Malang City, and the results show that the teacher's TPACK competency is in the very good category. Research conducted by Wardani *et al.* (2022) focuses on the analysis of the implementation of TPACK in learning implementation plans in elementary schools, and the results show that the implementation of TPACK in the RPP at SDN 01 Ngadilangkung is included in the good criteria. Meanwhile, research conducted by Ulfa (2023) is development research that focuses on developing Lampung script learning materials based on 2D animation media by implementing TPACK, and was carried out in three MIN schools in Bandar Lampung.

Based on this analysis, it can be seen that previous studies have had different focuses in studying the implementation and development of TPACK. The research that will be carried out by the author focuses on how to apply TPACK in Indonesian language learning at the Banda Aceh State Madrasah Aliyah. Thus, this research has a different contribution from previous research and can enrich studies regarding the implementation of TPACK in learning.

Method

The approach used in this study is a qualitative approach. The research population is all research subjects. The population of this study were all class X Indonesian language teachers at Madrasah Aliyah Negeri in Banda Aceh. The data collection techniques used in this research were observation, interviews and questionnaires. The data analysis technique used is a non-interactive qualitative research method (analysis). The data analysis process is carried out through data reduction, data presentation, and drawing conclusions.

Research results and discussion

1. Research result

a. TPACK based learning planning

An educator must have adequate skills and a lot of knowledge. understand teaching material or content, master pedagogical knowledge so that you can apply technology in learning. The implementation of learning will be good and effective if the preparation or planning is good. The following is instrument data in the form of observations of learning planning carried out by Indonesian language teachers at the three Madrasah Aliyah schools which are the objects of research.

Table 1: TPACK Based Learning Planning Observation Instrument

No	Aspek TPACK	MAN 1 Model	MAN 2	MAN 3
1	Teachers have the skills to prepare learning plans in the form of technology-based teaching modules.	SB	B	B
2	Teachers prepare materials and other technology-based teaching resources that will be implemented during learning	SB	B	SB
3	Teachers have expertise in using computer technology tools in arranging all learning administration	SB	B	SB
4	Teachers are able to compile and download teaching materials, both self-made and downloaded via the internet.	SB	B	B
5	Teachers are able to design and design evaluations in the form of applications such as kahoot, quiz and Google form dll	SB	B	B
6	Teachers have skills in compiling question grids using computer devices	SB	SB	SB
7	Teachers are able to create and use videos and animations that are applied during learning	SB	SB	B
8	Teachers can plan appropriate and technology-based strategies, techniques and approaches	SB	B	B
9	Teachers are able to design technology-based learning models	SB	B	B
10	Able to design learning flows by collaborating with digital-based learning techniques	SB	SB	B
11	Teachers are able to prepare assessment rubrics using computer devices	SB	B	B
12	Able to make technology-based remedial plans	SB	B	B

Based on the results of interviews conducted, it is known that Indonesian language teachers at MAN Banda Aceh have excellent abilities in preparing technology-based learning plans:

1. MAN 1 Banda Aceh teachers use Google Drive to create teaching modules. They created some of the modules independently and others in collaboration with the teacher community. This shows their ability to utilize technology to prepare teaching materials.
2. MAN 1 and MAN 3 Banda Aceh teachers not only use textbooks, but also take material from digital sources such as newspapers, social media and online

articles. This proves their deep capabilities Technological Content Knowledge (TCK) to present richer learning material.

3. MAN 1 and MAN 3 Banda Aceh teachers also demonstrate expertise in using technological devices, such as Microsoft Excel, to organize learning administration effectively. Meanwhile, MAN 2 Banda Aceh teachers also have good digital skills by utilizing copy-paste learning administration data.
4. Indonesian language teachers at MAN 1 Banda Aceh have excellent skills in downloading and creating teaching materials, such as Observation Results

- Report (LHO) texts related to the school environment to facilitate students' understanding. Meanwhile, Indonesian language teachers at MAN 2 and MAN 3 Banda Aceh have good skills in downloading teaching materials from the internet, although they more often use teaching materials from textbooks.
5. Indonesian language teachers at MAN 1 Banda Aceh have excellent skills in designing and designing learning evaluations using applications such as Kahoot, Quizz, and Google form. Teachers at MAN 2 and MAN 3 Banda Aceh also use this application, but only during mid-term or final semester exams.
 6. The three Indonesian language teachers in Banda Aceh have excellent skills in compiling question grids using computer devices. Teachers at MAN 2 and MAN 3 Banda Aceh even sent question grids to students via groups WhatsApp before the test.
 7. The three Indonesian language teachers in Banda Aceh are very good at using videos and animations in learning. Teachers at MAN 1 Banda Aceh use AI applications to create videos and animations, while teachers at MAN 3 Banda Aceh use the VN Video and Capcut applications to create learning videos.
 8. The ability of Indonesian language teachers at MAN 1 Banda Aceh in planning appropriate and technology-based learning strategies, techniques and approaches is very good. The teacher prepares teaching modules that include various strategies, techniques and approaches that are adapted to the subject matter. For example, for material related to intrinsic elements of literature, the teacher opens the lesson by showing a short film via infocus media. Meanwhile, Indonesian language teachers at MAN 2 and MAN 3 Banda Aceh also have a similar module, but they only apply it without compiling it themselves.
 9. In terms of designing technology-based learning models, Indonesian language teachers at MAN 1 Banda Aceh are able to do this for certain teaching materials that are considered difficult or require more understanding from students. In contrast, Indonesian language teachers at MAN 2 and MAN 3 Banda Aceh only follow the learning model provided in the module.
 10. In terms of the ability to design learning flows by collaborating with digital-based learning techniques, the Indonesian language teachers at the three MANs were able to do it well. Even though they have

designed the learning flow in the teaching module, they adapt it to the students' conditions and choose the right learning techniques, including using digital devices such as cellphones or tablets.

11. Indonesian language teachers at MAN 1 Banda Aceh have excellent skills in compiling assessment rubrics using laptop devices. The assessment rubric is made in table form, adapted to the material being taught. Apart from that, the teacher also has good skills in making technology-based remedial plans, by preparing remedial questions using a laptop and sending them to students whose grades have not been completed via WhatsApp.
12. Indonesian language teachers at MAN 3 Banda Aceh also make their own assessment rubrics, but not for all teaching materials. Otherwise, the teacher follows the assessment rubric provided in the teaching module. For remedial planning, teachers at MAN 3 Banda Aceh provide other lower level questions to be done on paper for students whose grades have not been completed. Indonesian language teachers at MAN 2 Banda Aceh use assessment rubrics that are available in the teaching module, but sometimes revise questions according to students' abilities. The teacher also modified the rubric with modules taken from Google. For remedial planning, teachers at MAN 2 Banda Aceh provide other lower level questions to be done on paper for students whose grades have not been completed.

b. Implementation of TPACK based learning

The second stage in implementing TPACK is implementation. This stage is where the interaction between the teacher and students and the teacher takes place. Everything that has been designed in the planning stage will be put into practice by the teacher in implementing the lesson. Several things support the smooth implementation of TPACK-based learning, such as the presentation of technology-based teaching materials, technology-based delivery methods and learning strategies, and learning resources in a learning environment that supports the application of technology. Success in the learning and learning process can be determined by looking at the level of success of students in achieving educational goals. The following are several aspects observed in the implementation stage of implementing TPACK at MAN Banda Aceh.

Table 2: Instruments for Implementing TPACK-Based Learning

No	Aspek TPACK	MAN 1 Model	MAN 2	MAN 3
1	Teachers prepare students physically and psychologically by greeting and giving greetings and ice breaking digital based	SB	SB	B
2	The teacher conveys learning objectives and activity plans for individual, group work and doing Observations displayed via in focus	SB	SB	SB
3	Teachers motivate students by playing videos or images that are related to everyday life	SB	B	B
4	The teacher explores students' knowledge through trigger questions according to the video/image displayed	SB	SB	SB
5	The teacher masters and presents learning material according to the videos/images displayed	B	B	B
6	Teachers apply technology-based learning strategies, techniques and approaches that have been designed	B	B	B
7	Teachers link the material with other relevant knowledge, developments in science and technology, and real life with digital-based media	SB	B	B
8	Teachers carry out learning according to the flow that has been designed by applying HOTS learning and 21st Century (4C) skills	SB	B	B
9	Teachers master the learning material and present it very well in digital form according to	B	B	B

	the learning objectives			
10	Teachers can access the internet well	SB	SB	SB
11	Teachers involve students in using technology-based learning media	SB	SB	SB
12	Teachers demonstrate skills in using diverse and technology-based learning media	B	B	B
13	Teachers carry out evaluation activities both in groups and individuals using various technology-based assessment techniques	SB	SB	SB
14	Teachers use technology-based assessment rubrics	SB	B	B
15	Teachers carry out reflection with students by utilizing technology	SB	B	B

Based on the results of interviews conducted, it is known that Indonesian language teachers at MAN Banda Aceh have very good abilities in Implementation of TPACK Based Learning:

1. Teachers prepare students physically and psychologically by greeting, greeting and conducting digital-based ice breaking. All teachers do this initial stage well. Ice breaking is done to eliminate boredom, train creative thinking, train teamwork, increase self-confidence, and increase concentration. The forms of ice breaking used include movements, songs, word games, or playing videos made by students. Ice breaking is usually done at certain class times, such as Indonesian after the break or before noon, or in the first hour if necessary.
2. The teacher conveys learning objectives and activity plans, both individual, group work and observation, by displaying them through infocus. This was done well by Indonesian language teachers at MAN 1, MAN 2, and MAN 3 Banda Aceh. Teachers always use focus in every lesson to present learning objectives and activity plans, both in individual form, group work and observation. The madrasah has also provided various facilities and media to support technology-based learning, such as internet networks, focus in each classroom, and digital classes. In this way, teachers and students can easily access and utilize technology for learning purposes.
3. Indonesian language teachers at MAN 1 Banda Aceh are considered very good at using digital learning media. They choose the newest learning videos that are related to students' daily lives. Teachers at MAN 2 and MAN 3 also show learning videos according to the teaching module, even though they only use videos that are already available. Teachers at MAN 1 Banda Aceh must adapt learning videos to the conditions of students who are critical and understand digital technology. They also often broadcast live drama performances using video.
4. The Indonesian language teachers at the three madrasas were also very good at applying trigger questions after showing videos or pictures. These trigger questions can stimulate students' thinking and direct them to the material to be studied. This can be seen from the enthusiasm of students in participating in learning.
5. In terms of mastery of learning material adapted to the videos/images displayed, teachers at MAN 1 Banda Aceh are considered to have very good abilities. They often update the latest learning videos to suit the abilities of students in Olympic classes. Meanwhile, teachers at MAN 2 and MAN 3 are also good in this aspect, even though they only use videos/images available in books or files. Overall, madrasah supervisors expressed pride in the implementation of TPACK (Technological Pedagogical Content

- Knowledge) carried out by teachers in the three madrasas.
6. Indonesian language teachers at MAN 1 Banda Aceh can very well apply the strategies, techniques and technology-based learning approaches that have been designed. The teacher quickly adapted this to the students' conditions. Meanwhile, teachers at MAN 2 and MAN 3 Banda Aceh also apply technology-based strategies, techniques and approaches, but they are not perfect.
 7. Indonesian language teachers at MAN 1 Banda Aceh can very well relate the material to other relevant knowledge, developments in science and technology, and real life with digital-based media. Teachers at MAN 2 and MAN 3 Banda Aceh are also good at linking teaching material with other relevant knowledge, but all three-use digital-based media to deliver the material.
 8. Indonesian language teachers at the three madrasas have implemented HOTS learning and 21st Century (4C) skills, but teachers at MAN 1 Banda Aceh can implement it very well. Teachers at MAN 2 and MAN 3 Banda Aceh have also implemented this aspect, but sometimes there are still students who cannot complete assignments well.
 9. The Indonesian language teacher at MAN 1 Banda Aceh can be categorized as very good at mastering learning material and presenting it very well in digital form according to learning objectives. Teachers at MAN 3 Banda Aceh are also good at presenting teaching material in accordance with learning objectives, while teachers at MAN 2 Banda Aceh can also be categorized as good, but still often present it through normal learning.
 10. Teachers can access the internet well. The results of the research show that this aspect is categorized as "very good" for the three Indonesian language teachers at the Madrasah Aliyah who were the objects of the research. Through interviews, it was discovered that the three teachers could access the internet for learning purposes, such as searching e-book and learning videos. This is supported by excellent internet facilities in the three madrasas. If they experience problems related to learning, administration, or inadequate teaching materials, teachers will look for them on the internet. Currently, online learning requires teachers to be technologically literate, otherwise they will be left behind by students.
 11. Teachers involve students in using technology-based learning media This aspect applies to all students in the three madrasas. Each student has their own laptop. The three madrasas have implemented digital-based learning, by providing internet facilities, implementing e-learning, providing digital classes, and providing focus media in each learning room. This aspect is

- categorized as "very good" for MAN 1 Banda Aceh students, where they are required to use technological media such as cellphones, tablets or laptops to adapt to e-learning. During observation, students seemed proficient in using technological media for learning. MAN 2 and MAN 3 Banda Aceh students are also very good at using technology-based learning media, even though they do not study in special classes like MAN 1 Banda Aceh.
12. Teachers demonstrate skills in the use of diverse and technology-based learning media. This aspect is categorized as "very good" for Indonesian language teachers at MAN 1 Banda Aceh. The teacher looks very skilled and familiar with various technology-based learning media. MAN 2 and MAN 3 Banda Aceh teachers are also good at using learning media, although they are not as skilled as MAN 1 Banda Aceh teachers, and are only able to use some of the media that have been prepared in the madrasah
 13. Teachers carry out evaluation activities both in groups and individuals using various technology-based assessment techniques. This aspect is categorized as "very good" for all teachers. Evaluation of student learning is all done on a computer or laptop, starting from the evaluation process with applications Google form, Quizz, or Kahoot, to storing values in the assessment table which are calculated for report cards. According to all teachers, they have provided assessment tables for all students, including cognitive, affective and psychomotor assessments.

14. Teachers use technology-based assessment rubrics. All Indonesian language teachers in the three madrasas (MAN 1, MAN 2, and MAN 3 Banda Aceh) have used technology-based assessment rubrics to assess students' learning abilities. They have an assessment rubric file for each module/teaching material. This rubric makes it easier for teachers to group questions according to the material and determine assessment scores.
15. Teachers carry out reflection with students by utilizing technology. Teachers at MAN 1 Banda Aceh can be categorized as very good at carrying out reflection after learning. They designed reflective questions for teachers and students, which were displayed through infocus media. Meanwhile, Indonesian language teachers at MAN 2 and MAN 3 Banda Aceh only asked reflective questions without displaying them through the media. In MAN 3, reflective questions are only occasionally asked if there is material that is considered difficult.

c. Evaluation TPACK based learning

The third stage in observing the implementation of TPACK at MAN Banda Aceh is the evaluation stage. Evaluation is a measurement of the achievement of learning objectives. Teacher competence in mastering technology greatly influences the process of evaluating student learning outcomes based on TPACK. The following are several aspects observed related to teachers' digital competence and capacity to support the implementation of TPACK at MAN Banda Aceh.

Table 3: Evaluation Instrument for Implementation of TPACK-Based Learning

No	Aspek TPACK	MAN 1 Model	MAN 2	MAN 3
1	Teachers carry out assessments using technology-based media	SB	SB	SB
2	The teacher asked several questions regarding the topic of learning with technology media	B	B	B
3	Teachers are able to process student learning outcomes using technological media	SB	SB	SB
4	The teacher documents the assessment results	SB	SB	SB
5	Teachers are able to use technology to assess learning outcomes such as questionnaires, image recordings and sound recordings	SB	B	B
6	Teachers use applications such as Kahoot and Quiz in carrying out evaluations	SB	B	B
7	Teachers carry out measurements in evaluations and are digital-based	SB	B	B
8	Teachers carry out trials and analyze questions/evaluation using technology	B	B	B
9	Teachers carry out diagnostic tests using technology	SB	B	B
10	Teachers fill out digital-based report cards	SB	SB	SB
11	Teachers demonstrate activities of evaluating and reflecting on learning practices by implementing TPACK	SB	B	B
12	Teachers carry out follow-up plans using technology	SB	B	B

Based on the results of interviews conducted, it is known that Indonesian language teachers at MAN Banda Aceh have very good abilities in Evaluation TPACK Based Learning:

1. Teachers carry out assessments using technology-based media. Digital media provides enormous benefits in the student assessment process. Apart from making the process easier, technological media is also useful for making administration more orderly and neater. Indonesian language teachers at the three madrasah aliyah are very good at carrying out technology-based assessments. All forms of assessment are made using technological devices. According to them, the student evaluation process, from daily grades to final exam scores and even to completion, is all processed using digital media. According to the MAN 3 Banda Aceh

teacher, they carried out the assessment process using technology-based media with knowledge exploration applications.

2. The teacher asked several questions regarding the topic of learning with technology media. This aspect is included in learning apperception. The teacher carries out apperception by asking questions about the teaching material that will be presented to students. This aspect can be categorized as 'Good' for all Indonesian language teachers at the three madrasah aliyah. From the results of observations, the teacher carried out an apperception before showing the video/image in focus. After greeting and greeting the students, the teacher connects the infocus to his laptop media. Before the video/image is shown, the teacher asks questions and answers with the students about the topic or material

- that will be presented. At MAN 2 Banda Aceh, the teacher asked several questions regarding learning topics using the technology media of the knowledge exploration application, which students then answered these questions directly in the knowledge exploration application.
3. Teachers are able to process student learning outcomes using technological media. This aspect is categorized as very good for the three Indonesian language teachers. According to the three, they process student learning outcomes using tables Microsoft Excel. This table can be automatic, because it has been set beforehand. The teacher only fills in the student's grades and they will accumulate themselves in the table. Usually a table like this is used to process final exam results. However, if necessary, teachers can also create their own assessment tables according to assessment requirements.
 4. The teacher documents the assessment results. This aspect can be categorized as very good for the three Madrasah Aliyah Indonesian language teachers who were the research objects. According to them, they will document whatever students' grades are in the assessment file and will print it if necessary. From daily assignment scores to final semester exam scores, attitude scores and skill scores, they document everything. The Indonesian language teacher at MAN 3 Banda Aceh said that the teacher documented the results of students' assessments in the knowledge exploration application, then the scores could be seen in the form of a report in the application connected to the parent's account, apart from that the teacher also copied them into the teacher's activity book which was distributed by the party. madrasa curriculum.
 5. Teachers are able to use technology in assessing learning outcomes such as questionnaires, image recordings and sound recordings. For this aspect, all Indonesian language teachers at Madrasah Aliyah Banda Aceh can be categorized as very good. Indonesian language teachers at MAN 3 Banda Aceh, the three teachers use technology in assessing learning outcomes such as image recording and sound recording via cell phone. MAN 1 Banda Aceh teachers also use technology in assessing learning outcomes, for example video observations made by students and voice recordings of reading poetry. MAN 3 Banda Aceh teachers also do the same thing. In assessing certain materials, they use image recordings, sound recordings and also questionnaires.
 6. Teachers use applications such as Kahoot and Quiz in carrying out evaluations. The MAN 1 Banda Aceh Indonesian language teacher is categorized as very good in this aspect. All of these applications have been used in carrying out evaluations. Application display Quiz which is full of color and equipped with animated emojis, making the assessment process more fun (data attached). Especially when applying quiz If it is broadcast on Infocus, the evaluation process will definitely be more exciting. MAN 2 and MAN 3 Banda Aceh teachers said they also used the application Quiz in carrying out evaluations. Benefits of evaluation learning Quiz that is fun and effective. However, this application cannot revise if an answer is incorrect, but students can repeat the question using a code Quiz the new one.
 7. Teachers carry out measurements in evaluations and are digital-based. In this aspect, all Indonesian language teachers who are the object of research are able to carry out measurements in evaluating digital-based students. Measurement is usually used by using assessments in formative form (to measure understanding, for example by using Google form), summative assessment and project assessment. According to his explanation, these measurements are used according to the language stages/aspects, namely listening, reading, speaking/presenting and writing. However, the Indonesian language teacher at MAN 1 Banda Aceh is very good at using digital-based evaluation, as previously stated, the Indonesian language teacher at MAN 2 Banda Aceh uses the application Quiz, Kahoot or Google form in evaluating student learning outcomes.
 8. Teachers carry out question analysis and evaluation using technology. This aspect is categorized as good for all Indonesian language teachers in the research object. According to them, analyzing questions is rarely done for class X, but for class XII. The questions you want to analyze are created in the application Google form sso that it can be easily accessed by students via laptop, tablet or cellphone.
 9. Teachers carry out diagnostic tests using technology. Indonesian language teachers at three madrasah aliyah in Banda Aceh, namely MAN 1, MAN 3, and MAN 2, have carried out diagnostic tests to determine students' strengths and weaknesses. The results of this test are used as a basis for teachers to determine follow-up learning. In MAN 1, tests are carried out for 1-2 materials at once and are used as a guide for the teacher to continue or not to the next material. This test succeeded in increasing students' enthusiasm for learning. In MAN 3 and MAN 2, the decision to continue the material is based on the student's final score on each learning material, without special diagnostic tests.
 10. Teachers fill out digital-based report cards. Digital-based learning at three aliyah madrasahs in Banda Aceh is also supported by digital madrasah report cards (RDM) which makes it easier for parents to monitor the development of their children's grades. This digital assessment system means that students have to study seriously, because their test scores can be directly accessed by parents through their respective accounts. Based on an interview with one of the students, not only the Indonesian language teacher, but all the teachers at the madrasa have used digital-based learning and assessment, so that parents can monitor their children's learning results every day.
 11. Teachers demonstrate activities of evaluating and reflecting on learning practices by implementing TPACK. For this aspect, the Indonesian language teachers at MAN 2 and MAN 3 Banda Aceh show good activity. From the results of interviews with MAN 3 Banda Aceh teachers, they said that their reflection activities were only written in the teacher's notebook. Likewise, according to the MAN 2 Banda Aceh teacher, reflection activities were carried out by writing in notebooks or on the back of certain teaching module

sheets. Meanwhile, MAN 1 Banda Aceh teachers show self-reflection activities by making special notes on their personal laptop to find out their strengths and weaknesses in the learning practice of certain modules.

12. Teachers carry out follow-up plans using technology. The three Indonesian language teachers at three aliyah madrasahs in Banda Aceh have carried out follow-up plans well. A follow-up plan is carried out after completing one teaching module, by determining whether to continue to the next module or not, based on the completion of learning in the previous module. The teacher writes this follow-up plan in a notebook, teaching module, and sometimes also on the soft copy of the module. This follow-up plan is a form of teacher self-evaluation which is reviewed periodically to monitor quality standards in madrasahs, and is also technology-based.

Discussion

Teachers' understanding of technology, teaching materials/content, teaching methods, and being able to collaborate with technology will produce effective and enjoyable learning. In learning there are three stages that must be designed and implemented well so that the learning objectives are achieved by implementing TPACK in it. MAN 1, 2 and 3 Banda Aceh have implemented TPACK-based learning, especially in Indonesian language learning. Good planning influences good implementation and evaluation as well. At the learning planning stage, almost everything was categorized as good and very good.

In many aspects MAN 1 Banda Aceh dominates the category very well. Indonesian teachers at MAN 1 Banda Aceh have very good skills in organizing teaching modules, preparing their own materials or downloading from the internet, in addition, teachers also have expertise in planning questions in the application Google form, Kahoot, or quiz, able to create technology-based question grids, able to design learning models and flows, prepare assessment rubrics and plan technology-based media.

The very good category in many aspects proves that the Indonesian language teachers at MAN 1 Banda Aceh are very competent in the use and utilization of technology in learning. To make animated videos, MAN 1 Banda Aceh teachers are still in the good category, because they have never produced animated video works, even though they have attended training. According to his statement, it has been around 6 years of use of digital-based applications at MAN 1 Banda Aceh. The teacher added that to have skills in using digital applications and by always applying learning using various applications in every meeting and developing yourself by always practicing with something new and current.

MAN 2 Indonesian teachers are very good at several aspects of TPACK planning such as having skill compose a grid of questions using computer devices and can design learning flows by collaborating with digital-based learning techniques. In preparing learning administration, MAN 2 Banda Aceh teachers are in the good category, as well as downloading teaching materials, compiling rubrics, and compiling teaching modules, all of which still require guidance from more advanced teachers. To design applications like kahoot, quiz, and Google form You also still need direction from competent colleagues.

MAN 3 Banda Aceh teachers have very good digital competence in several aspects, such as preparing materials and other technology-based teaching resources that will be implemented during learning, having expertise in using computer technology tools in compiling all learning administration and having skills in compiling grids. questions using computer equipment.

The Indonesian language teacher at MAN 3 Banda Aceh is still in the good category, such as compiling technology-based teaching modules, the teacher still needs guidance from friends who are more competent in terms of technical preparation. However, in terms of usage skills, the Indonesian language teacher at MAN 3 Banda Aceh is quite good. In the aspect of compiling and downloading teaching materials, both self-made and downloaded via the internet, the MAN 3 Banda Aceh Indonesian language teacher is still in the good category because for the time being he is still at the stage of being able to download materials, but not yet able to make good teaching materials himself.

Aspects of implementing TPACK at the implementation stage in several aspects are categorized as very good for all teachers. The aspect of "conveying learning objectives and activity plans both individually, in group work, and making observations displayed through infocus" is categorized as very good for all teachers. The teacher displays the learning objectives on Infocus media as well as the activity plan, whether it will be done individually or with group work. Everything was done very well.

Another aspect that is categorized as very good is exploring students' knowledge through trigger questions. The three teachers broadcast the trigger questions very well on Infocus media, according to the videos/images that will be presented. In the aspect of being able to access the internet, teachers can also do very well, such as looking for teaching materials, looking for short videos for ice breaking, search for pictures or animated videos and so on.

In terms of involving students in utilizing learning media, teachers can also carry it out very well. Tasks carried out either individually or in groups are presented through the media infocus, or sometimes sent via groups WhatsApp or email the teacher. In carrying out evaluation activities, all teachers use technological media to input grades, process grades and determine students' final grades.

Several other aspects of implementing TPACK, MAN 2 and MAN 3 Banda Aceh teachers did well, such as being able to present videos/images in accordance with the teaching material, implementing technology-based teaching strategies, implementing HOTS learning and 21st century (4C) skills, being able to present material teach very well, use teaching media, and reflect with students. At the implementation stage, the implementation of TPACK in the classroom was more clearly visible and it was carried out very well. However, the implementation of TPACK at MAN 1 Banda Aceh is superior when compared to the others. This is supported by the role and enthusiasm of students who are specially prepared as subject Olympiad participants.

The implementation of TPACK at the evaluation stage was carried out well by Indonesian language teachers at the three madrasahs. Digital-based learning with E-learning requires them to carry out student evaluations well. The grades given can be accessed directly by parents via their account. Thus, teachers are required to implement TPACK aspects well in the assessment process. The digital-based aspects of the

assessment process apply very well to all teachers. Likewise, with processing learning results, documenting learning results, filling out report cards, all on a digital basis. Reflection can be done well after completing one or two learning modules.

This research is in line with the findings of previous research conducted by Amrullah (2021), the results show that the teacher's TPACK competency is in the very good category. Research conducted by Wardani *et al.* ^[11] (2022) results show that the implementation of TPACK in the RPP at SDN 01 Ngadilangkung is included in the good criteria. Meanwhile, research conducted by Ulfa (2023) ^[10] is development research that focuses on developing Lampung script learning materials based on 2D animation media by implementing TPACK, and was carried out in three MIN schools in Bandar Lampung. In general, relevant previous research shows that implementing TPACK in learning can improve competency and quality of learning, both in planning, implementing and developing learning materials.

Conclusion

Based on the research results, it can be concluded that the implementation of TPACK (Technological Pedagogical Content Knowledge) in Indonesian language learning at MAN 1, 2, and 3 Banda Aceh has gone well, although there are several differences. At MAN 1 Banda Aceh, the implementation of TPACK was considered very good. The Indonesian language teachers there demonstrate proficiency in mastering technology, as well as good abilities in pedagogy and understanding teaching materials. Schools also support the implementation of TPACK by providing facilities such as internet, digital learning media, e-learning, and digital report cards. At MAN 2 Banda Aceh, the implementation of TPACK can be categorized as good and smooth. Schools also provide supporting facilities, such as internet, e-learning and digital classes. However, teachers' ability to use digital technology is limited, especially in terms of creating their own digital content. Meanwhile, the implementation of TPACK at MAN 3 Banda Aceh is going well. Schools provide supporting facilities, such as internet, digital classes, e-learning, and digital report cards. Indonesian language teachers also have adequate capacity in using technology, although the intensity of their use still needs to be increased.

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