

ENHANCING MATHEMATICS LITERACY IN VOCATIONAL SCHOOLS: THE KEY ROLE OF PEDAGOGICAL CONTENT KNOWLEDGE (PCK) AMONG TEACHERS

Andi Patimbangi¹⁾, Kasmah²⁾, Rahma Hidayati³⁾

^{1,2,3}Institut Agama Islam Negeri Bone

^{1,2,3}Watampone, Tanete Riattang, Bone, South Sulawesi, Indonesia

E-mail: andipatimbangi@yahoo.com¹⁾, kasmah@iain-bone.ac.id²⁾,
rahmahidayati@iain-bone.ac.id³⁾

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Abstract:

Pedagogical Content Knowledge (PCK) is an ability that is very necessary to improve students' mathematical literacy skills. For this reason, this research describes in depth the ability of Pedagogical Content Knowledge (PCK) teachers and the relationship between these abilities in building mathematical literacy. This type of research used a mixed method through data collection techniques using triangulation, namely interviews, observation, and questionnaires. The research results show that Pedagogical Content Knowledge (PCK) is still at level 1 in terms of the teaching knowledge component, student knowledge component, and content knowledge component. Besides that, the research results also found that Pedagogical Content Knowledge (PCK) teachers have a relationship with students' mathematical literacy skills. The better the ability of the Pedagogical Content Knowledge (PCK) teacher the greater the potential for students to have good mathematical literacy skills. One of the learning models needed to improve students' literacy skills is a learning model that can accommodate differences in student characteristics including differences in intelligence.

Keywords: Pedagogical Content Knowledge, Mathematical Literacy

MENINGKATKAN LITERASI MATEMATIKA DI SMK: PERAN KUNCI PENGETAHUAN KONTEN PEDAGOGIS (PCK) DI KALANGAN GURU

Abstrak:

Pedagogical Content Knowledge (PCK) merupakan kemampuan yang sangat diperlukan dalam rangka meningkatkan kemampuan literasi matematika siswa. Maka dari itu dalam penelitian ini diuraikan secara mendalam mengenai kemampuan Pedagogical Content Knowledge (PCK) guru dan keterkaitan kemampuan tersebut dalam membangun literasi matematika. Jenis penelitian yang digunakan adalah mixed method dengan teknik pengumpulan data yang menggunakan triangulasi yakni wawancara, observasi, dan pemberian angket. Hasil penelitian menunjukkan bahwa Pedagogical Content Knowledge (PCK) masih berada pada level 1 dari komponen pengetahuan mengajar, komponen pengetahuan tentang siswa, maupun komponen pengetahuan tentang konten. Selain itu juga ditemukan bahwa

Pedagogical Content Knowledge (PCK) guru memiliki keterkaitan dengan kemampuan literasi matematika peserta didik. Semakin bagus kemampuan *Pedagogical Content Knowledge* (PCK) guru maka potensi siswa untuk memiliki kemampuan literasi matematika yang baik cenderung lebih besar. Salah satu model pembelajaran yang dibutuhkan dalam meningkatkan kemampuan literasi peserta didik adalah model pembelajaran yang mampu mengakomodasi berbagai perbedaan karakteristik siswa termasuk perbedaan kecerdasan.

Keywords: Pedagogical Content Knowledge, Literasi Matematika

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INTRODUCTION

The ability of students' mathematical literacy in Indonesia from 20 years ago until now has consistently been ranked in the bottom 5 (five). The presence of mathematical literacy, which is expected to be able to change the paradigm of learning mathematics in Indonesia so that it is more meaningful is not only limited to arithmetic skills. Still, it can also be used to solve everyday problems, instead of giving rise to new scourges and students' difficulties in learning mathematics. The results of a survey conducted by the Program for International Student Assessment (PISA) for Indonesian children at PISA did not reach the highest level, namely level 6. 76% of the Indonesian students at PISA were only able to reach level 2 while students who reached the highest level 5 were only 0.3%. In 2019, among 10 countries with low literacy skills, Indonesia was included in the 72nd position out of 78 participating countries (OECD, 2019). A study shows that students in Indonesia are only able to occupy level 3 of 6 levels of mathematical literacy ability based on the PISA instrument. Similar studies have also been carried out by several researchers including Fadillah and Ni'mah (2019); Manoy and Indarasati (2017); Rafianti, Setiani, and Novaliyosi (2018); Ridzkiyah and Effendi (2019) also show that student's literacy skills are still relatively low. Janaha, Suyitnob, and Rosyida (2019) state that the importance of mathematical literacy is not in line with the achievements of Indonesian students and this is a serious problem in learning mathematics in Indonesia. It

is also necessary to underline that real situations based on experience do not exclude mathematical problems that continue to develop (Widjaja, 2013).

Previous researchers have widely studied the study of mathematical literacy skills by conducting various analyses to describe the causes of low mathematical literacy. As stated by Ulger, Bozkurt, and Altun (2020), in general, low literacy skills are caused by students not being able to model a problem mathematically, reasoning skills, not being able to understand a problem, interpret data, design solutions, and evaluate the suitability of results, as well as difficulties in interpreting the results of the work. Hayati and Kamid (2019) argue that there are still many schools that do not have contextual skills that are in line with the low literacy abilities of students in Indonesia. Meanwhile, in his findings, Ekmekci (2015) showed that in addition to the problems mentioned above, there was also an inconsistency between school mathematics material and the abilities students need in mathematical literacy. Previously conducted studies generally tended to focus on personal factors, in this case, the conditions of the students and the content (material) factors taught by the teacher, even though other factors also greatly contributed to mathematical literacy skills, including instructional factors and environmental factors. Meanwhile, several researchers such as Edo, Putri, and Hartono (2013) have studied the issues surrounding PISA. Furthermore, research conducted by Funny (2014); Julie, Suwarsono, and Juniati (2014); and Widjaja (2013) examines topics around contextual and mathematical problems realistic.

Mathematical literacy is an individual's capacity to formulate, use, and interpret mathematics in various contexts, including mathematical reasoning and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena (Ekawati, Susanti, and Chen, 2020). According to Hayat (2010), mathematical literacy plays an important role in solving PISA problems. Mathematical literacy skills will help students solve problems around them with mathematics (Kurniawati & Mahmudi, 2019). In addition, someone who is literate in mathematics can estimate, interpret data, solve everyday problems in various situations, and communicate them (Ojose, 2011). Mathematical literacy problems can be more easily solved if students can determine the appropriate procedure (Kyttala & Bjorn, 2014).

This paper aims to complement these deficiencies, from previous studies that have not focused on in-depth studies of instructional factors. This instructional factor is related to the teacher's skills in transferring knowledge

usually called pedagogic ability. In line with that, in addition to mapping the manifestations of various problems students experience in improving mathematical literacy skills, this paper also analyzes instructional factors related to teacher pedagogic abilities and mastery of the material.

According to Neumann, Kind, and Harms (2019), Pedagogical Content Knowledge (PCK) includes knowledge about misunderstandings and strategies for overcoming them. Meanwhile, Berry, Depaepe, and Driel (2016) stated that the idea of PCK as the main supporter of teacher professional knowledge has experienced an increase. Anwar (2014) added that a teacher with a high PCK level can relate the importance of concepts to students' daily lives. With the teacher's ability, it is hoped that students can also use the concepts taught by the teacher in everyday life.

This paper is based on an argument that the low ability of mathematical literacy is because many teachers still do not have adequate pedagogical skills. In the learning process, teachers tend not to pay attention to differences in student characteristics so the use of models, approaches, or learning methods becomes monotonous. The teacher does not try to make innovations in concocting learning so that it can be more engaging, accommodate different student characteristics, and also make it easier for students to understand the material. For this reason, according to the researcher's opinion, one of the solutions that can be taken to accommodate the problems found in mathematical literacy is that encouragement needed to strengthen reasoning so that students' abilities in higher-order thinking can flourish and can form more productive, creative, innovative human beings, and this will have implications for the abilities needed in mathematical literacy. Strengthening reasoning is closely related to pedagogical content knowledge (PCK). Therefore it is necessary to disclose in-depth and carefully regarding Teacher's Pedagogical Content Knowledge (PCK) and students' mathematical literacy.

METODE

The approach used in this study is a mixed method approach or an approach that combines qualitative and quantitative research approaches. The design of this research approach is based on assumptions like the inquiry method. This method assumes that in showing direction or giving instructions on how to collect and analyze data and a combination of quantitative and qualitative approaches through several phases of the research process. Mixed methods research focuses on data collection and analysis and combines

quantitative and qualitative data, both in single studies (single research) and series studies (serial research). Sukmadinata (2009) argues that quantitative analysis uses formal, standard, and measuring instruments. While qualitative research uses researchers as instruments. In this study, the formal instruments were questionnaires to measure teachers' pedagogical abilities and test questions to measure students' literacy abilities, while qualitative data were obtained through interviews and observation.

The central premise that forms the basis of mixed methods research is using a combination of quantitative and qualitative approaches to find better research results than just one approach. In the research conducted, the phenomena that were explored in depth were the Pedagogical Content Knowledge (PCK) of teachers at the Vocational School of Accounting and financial institutions in Bone Regency, and also revealed the learning process, and students' literacy abilities.

This study was designed by analyzing the Pedagogical Content Knowledge (PCK) of mathematics teachers and students' mathematical literacy at SMK majoring in Accounting and financial institutions in Bone Regency. Informants will be selected through a purposive sampling technique or through several considerations to ensure that the selected informants are indeed representative. Researchers chose SMK majoring in Accounting and financial institutions in Bone Regency to be research subjects. Next, the researcher collected data about the class taught by the teacher. After the class to be studied is selected, the researcher will collect initial data about students' math scores and interviews with the teacher concerned to divide students into three groups, namely: upper group, middle group, and lower group which students will select from each group. This research began by administering Content Knowledge pedagogical questionnaires to teachers. Furthermore, an initial interview was conducted with the mathematics teacher regarding the lesson plans carried out. After conducting the interviews, the next step is to document the ongoing mathematics learning to determine pedagogical abilities and mastery of content related to mathematical literacy. To know more about students' mathematical literacy, a mathematical literacy test was carried out on each student, and interviews with selected students were chosen based on initial data and discussions with the teacher concerned.

The focus of this research is as follows: Content Knowledge pedagogical abilities of math teachers at SMK majoring in Accounting and institutional finance which are conducted at schools located in Bone Regency with the

consideration that schools that will later become research subjects are schools that have superior accreditation and their math teachers have tenure of at least -at least 10 years. Mathematical literacy of students at SMK majoring in accounting and financial institutions. The data in the research conducted included mathematics teachers' Pedagogical Content Knowledge (PCK), implementation of PCK in learning, and students' mathematical literacy skills in learning mathematics. Data sources in the research included mathematics teachers, students taught by these teachers, and the ongoing process of learning mathematics. The data to be obtained is qualitative data, a description, and an in-depth analysis of the subjects studied.

Data collection in this study was carried out using various data collection techniques. Each data collection instrument on teacher PCK was prepared based on aspects of the CoRe that try to describe a holistic overview of PCK expert teachers related to teaching a particular topic, data on students' mathematical literacy based on indicators of mathematical literacy in the PISA study. The indicators of mathematical literacy skills studied were: 1) Communication; 2) Mathematization; 3) Strategies in problem-solving; 4) Use of language and symbolic operations; formal and technical; 5) Reasoning and argumentation skills. The data collection techniques used in this research were literature study, questionnaires, and observation. The data analysis stage is an inseparable part of the other stages. Data analysis in qualitative research was carried out when data collection took place and was carried out intensively after completion in the field. In the research that will be carried out, data analysis is carried out by organizing and systematically compiling the data obtained from the results of questionnaires, interviews, observations, documentation, and tests into units and patterns so that it can be sorted out which are important and which will be studied.

Data analysis in this study will use the Miles and Huberman model. Miles and Huberman's data analysis in qualitative research through three processes, namely: condensation, data display (data presentation), and verification (concluding) (Sugiyono, 2014).

RESULTS AND DISCUSSION

This research has the main objective of knowing comprehensively Pedagogical Content Knowledge (PCK) teachers and students' literacy skills in learning mathematics; knowing in depth the relationship between Pedagogical Content Knowledge (PCK) teachers in building mathematical literacy. This

study uses the theory of Karahasan (2010) to analyze the characteristics of teacher PCK. This theory combines and refines previous theories, namely Thompson's theory and Lindgren's theory. In his explanation, Karahasan (2010) suggests that there are 3 (three) components at each level of teacher PCK ability: the teaching knowledge component, the student knowledge component, and the content knowledge component.

The three components mentioned above have their own characteristics, namely for the teaching knowledge component, has characteristics: (1) Level 0: as a provider and demonstrator of knowledge for students, introduces procedures after concepts, dominates information, has problems ordering topics and questions during learning or in designing learning, it is difficult to control the class so as to create a democratic learning environment; (2) Level 1: not only providing sufficient rules and procedures, but also helping students build meaning and understanding, viewing their role as mentors, assessors and reminders, still dominating information, only having problems with the order of questions during learning or in designing learning, occasionally controlling the class so as to create a democratic learning environment; (3) Level 2: facilitating and guiding students rather than providing answers and explanations, assessing student understanding expanding this understanding with questions of mathematical knowledge furthermore, assessing student-student interaction, appreciating and encouraging students to construct mathematical knowledge through mathematical inquiry, sequencing topics and questions in an appropriate way, controlling the class so as to create a democratic learning environment.

As for the knowledge component about students, its characteristics can be described as follows: (1) Level 0: has difficulty diagnosing student errors, views responding to student misconceptions as an opportunity to tell students the actual rules or procedures, has difficulty realizing students' needs in understanding; (2) Level 1: diagnosing some of the student's mistakes even if they point out the error they focus on surface errors only, solving similar numerical examples, practical problems, and appreciating the importance of discussion, from time to time realizing students' needs in understanding; (3) Level 2: easily diagnose student errors and pinpoint student difficulties, guide and facilitate students rather than provide answers and explanations, be aware of students' needs in understanding. Hence, it becomes easy to create a good learning environment. Whereas in the content knowledge component, the characteristics are: (1) Level 0: unable to state definitions correctly, unable to

use notation correctly, only uses declarative or procedural questions, unable to interpret and use different representations easily, difficulty when seeing connections between different topics/sub-units; (2) Level 1: state definitions correctly, use notations correctly, still use declarative or procedural questions, interpret and use graphic representations and besides graphics, see connections between different topics/sub-units; (3) Level 2: states definitions correctly, uses notations correctly, uses all types of questions (declarative, procedural, and conditional) in the correct position, interprets and uses graphical and non-graphical representations, sees connections between topics/subunits and tread between those connections carefully.

1. Teacher's Pedagogical Content Knowledge (PCK)

Based on excerpts from interviews and observations, it can be seen that most of the subjects have demonstrated the appropriate use of declarative, procedural, and conditional question types and can also represent concepts in the form of graphs, tables, etc. So it can be concluded that the subject's knowledge of the content for the questions relating to mathematical literacy is at level 2. As for teaching knowledge, most of the teachers who are the subject of the study are still at level 1, although some teachers are already at level 2. Teaching knowledge can be seen in the vignette analysis. The characteristics of teaching knowledge at level 1 are facilitating not only providing sufficient rules and procedures, but also helping students build meaning and understanding, viewing their role as guides, assessors, and reminders, but in conveying information the teacher still tends to dominate information, only has problems with the order questions during learning or in designing learning, as well as during observations in the learning process carried out by research subjects, it appears that only occasionally do class control to create a democratic learning environment.

Other subjects also tend to show similarities with subjects previously studied regarding their teaching knowledge. From the results of in-depth interviews which were reinforced by observation during the learning process, it was illustrated that the subject had guided students in providing answers and explanations, assessed student understanding, broadened this understanding with questions of further mathematical knowledge, assessed student interaction with students, but had not been optimal in encouraging students to construct mathematical knowledge through guided discovery. The

subject has also sorted the topics and questions in the right way but lacks classroom control to create a democratic learning environment.

Knowledge of content and teaching/ Knowledge Content Teaching (KCT) is the fourth domain of mathematical knowledge for teaching. This domain combines knowledge of teaching and mathematics. Ball, Thames, and Phelps (2008) further explained that the order in which content is taught and deciding whether content representations are useful are all parts of this domain. As for knowledge about students, it turns out that most of the subjects are still at level 1. That is, many cases where the subject is required to correct students' misconceptions have not been responded to optimally, however, the subject has tried with the experience and knowledge that has been obtained. The characteristics of the knowledge about students obtained from the results of the study were that the subject only made a diagnosis of several student errors and after these errors were found the teacher only focused on the surface of the errors and did not carry out an in-depth analysis of the roots of the problems experienced by students, as well as in giving examples. the sample subject only assigns students to complete numerical examples similar to what has been described but does not try to make examples that can stimulate students' creative thoughts and that value the discussion's importance.

When the subject was shown the problem of mathematical literacy, in this case, the form of the instrument used was problems that were included in the HOTS category, they were able to understand quite well, but some math problems that required high-level thinking made the subject confused and took a relatively long time to solve. understand the problem. As for subjects with good academic abilities, most were at level 1. The difficulties that subjects sometimes experienced in understanding mathematical literacy content (HOTS questions) were problems that required high reasoning abilities. From the interview excerpts it can be seen that at first, the subject was still confused about some of the problems or HOTS material content, even the subject was still wrong in modeling the problem in a mathematical form. However, after careful attention, assisted by several questions, the subject finally realized his mistakes in modeling the problem. From this description, it can be concluded that subject content knowledge in mathematical literacy problems is at level 1. This confirms that academic ability is not the main thing in the development of content knowledge, but there are other factors such as experience and training. Martin (2008) opinion that a degree in the subject area helps prospective

teachers in the classroom. This study shows that content knowledge from one's major is not the only thing needed to teach students. As for the knowledge of teaching in the subject group that has academic achievement mostly at level 2.

Experience is another way to accumulate pedagogical knowledge. A qualitative study conducted by Gatbonton (2008) provides a comparison of the pedagogical knowledge of novice teachers (teachers with less than two years of experience) and experienced teachers of pedagogical knowledge. Gatbonton (2008) found that the pedagogical knowledge of novice and experienced teachers was similar, but the experienced group of teachers appeared to have more detailed pedagogical knowledge, especially in recognizing student attitudes and behavior. This study shows that college programs are very helpful in developing pedagogical knowledge, but the teacher's prior experience will help build knowledge to be more specific and useful (Gatbonton, 2008).

The results of this study were also strengthened through the distribution of questionnaires regarding the pedagogical abilities of SMK teachers in Bone Regency and it was found that from several respondents on the teacher pedagogical competence variable who were given questionnaires, the teacher pedagogical competence was in the less category of 91%, sufficient 9%, good 0%, and very well 0%. In addition, if you look at the score obtained by all respondents, it was 1787 (attachment), and the maximum total score of 206 respondents with 17 statement items was 3502, so when included in the score, the mastery level was obtained 51%. It can be concluded that the pedagogical competence of SMK teachers in Bone Regency based on the respondent's score is in the less category. Furthermore, it was also found that teacher pedagogical competence which was formed from existing attributes, teacher pedagogical competence was classified as a wrong answer by 49.0 %. This is due to the 13 attributes forming the variable teacher pedagogical competence which are classified as less than 17 attributes, the thirteen attributes include teacher pedagogical competence in the form of knowledge of the science that studies student characteristics by 49.5%, understanding of student characteristics by 30.6%, identifying student difficulties in learning by 46.1%, knowledge about identifying student difficulties by 60.7%, knowledge about lesson plans, syllabus, KKM, SKL respectively by 83.0% and 49.0%, knowledge in implementation of learning discussions by 78.6%, use of learning media respectively by 44.7% and 59.2%, development of learning

instruments by 82.0%, implementation of assessment of learning outcomes by 54.9%, and developing students' abilities respectively by 71.8%, and 44.7%.

If viewed based on the attribute percentage score, the correct answer is 51.0 %, which is below 70%, then the teacher pedagogical competence variable formed from the existing attributes is categorized as lacking. Based on these results, it can be concluded that teacher pedagogical competence which is formed from existing attributes is categorized as lacking.

2. Students' Mathematical Literacy Ability

The description of mathematical literacy skills is grouped into 2 (two) parts, namely the mathematical literacy abilities of students who are taught by teachers who have pedagogical content knowledge (PCK) at level 2 and the mathematical literacy abilities of students who are taught by teachers who have pedagogical content knowledge (PCK) abilities. at levels 1 and 0. This aims to describe the relationship between teachers' pedagogical content knowledge (PCK) abilities and students' mathematical literacy abilities. Based on the results of data collection, it was found that students tended to be able to solve math literacy questions at levels 1 and 2 but there were still some problems experienced by students, especially at level 3 PISA questions in mathematical literacy, including students' modeling abilities which tended to be low, reasoning, less able to understand a problem, interpret data, design solutions and evaluate the appropriateness of the results.

In general, the problems found in this study related to mathematical literacy are divided into 3 (three) parts: difficulties in the process of formulating problems, difficulties in interpreting work results, and their applications such as differentiating information, which are mathematical procedures needed to find solutions. Although there are still some problems with students, classically students who are taught by teachers who have good pedagogical Content Knowledge (PCK) abilities or are at level 2 have been able to solve level 3 mathematical literacy questions (PISA questions) quite well.

Furthermore, groups of students taught by teachers who have pedagogical content knowledge skills tend to be at levels 0 and 1 showing some mistakes and difficulties in solving math literacy questions. Students' difficulties are caused by not being able to work on basic algorithms, use formulas, carry out procedures or agreements in solving problems, and not being able to conclude precisely from the results of the solution. This is

indicated by students' errors in carrying out arithmetic operations, other difficulties observed are related to understanding algebraic concepts, applying arithmetic operations in algebraic expressions, and interpreting symbols to represent something that is not yet known. In this group of students, in general, they were only able to solve mathematical literacy questions well at level 1, although some students were able to solve mathematical literacy questions well at level 2. It was also seen during data collection that many of them did not respond as expected from the cases given. This is consistent with the general characteristics of Karahasan (2010) which states that to obtain a good response from students, the teacher does not only provide sufficient rules and procedures. However, it also helps students build meaning and understanding, viewing their role as guides, assessors, and reminders so that good Pedagogical Content Knowledge (PCK) skills are needed. The teacher still dominates in conveying information, only occasionally controlling the class to create a democratic learning environment is one of the causes that can affect students' abilities.

Ball, Thames, and Phelps (2008) provide several examples to foster students' literacy skills, including motivating and providing interesting examples for students, anticipating students will think about what tasks are given and how they will handle them, and predicting what students think and what students think is confusing about a particular topic. Mathematical literacy is still a major challenge in mathematics education and a major issue and trend in mathematics education research (Murtiyasa, 2016). This is because a person must be able to prepare for his role as a subject who learns independently for the rest of his life (Trilling & Fadel, 2009), and solve real-world problems that require him to use skills and competencies acquired through experience at school and in everyday life (Rizki & Priatna, 2019).

3. The Rationality of Learning Model Development

Currently, various types of learning models have been developed which are based on certain learning theories. These models have been proven to significantly influence students' academic performance. But it cannot be denied that until now, we still find various problems in the learning process both from teachers and from students as found in this study. With these problems, various views were born from experts in the field of education which, among other things, stated that the learning process would be better when the teacher was able to design the lesson by paying attention to the

different characteristics of students, for example, learning styles or students' thinking styles. Therefore, various learning models are needed to optimize the achievement of the expected competencies. To accommodate or cover differences in student characteristics in the learning process as the expert views, the teacher must be able to design learning activities that are more varied even though the learning is classical. This study developed a learning syntax based on the theory of Howard Gardner or the theory of multiple intelligences. In theory, Howard Gardner said that the learning process would be better if the teacher was able to optimize the dominant intelligence possessed by students, because according to Gardner everyone has multiple types of intelligence, but among these various types, there is one or more intelligences that are more dominant than other intelligences.

The theory of multiple intelligences is not a new thing in learning practice, learning models such as cooperative models, problem-based learning models, direct learning models, etc., actually involve one or more multiple intelligences and in fact, have a positive effect on students' academic performance. Thus when teachers can involve various types of multiple intelligences in the learning process, students' academic performance is believed to be better. The peculiarity of this model is that the stimulation of intelligence in the learning process is not just one or two intelligences but various types of multiple intelligences so that it can cover various types of learning styles and thinking styles of students. Furthermore, the advantage is that by involving various types of intelligence in the learning process, students' learning process will be more meaningful. This is in line with the principle of meaningfulness as the words of the Prophet SAW as follows: "Speak to people according to the level of their intellectual ability" (al-Hadith).

In addition, this learning model also provides opportunities for students to communicate more openly. The principle of open communication in the Qur'an is evidenced by the many verses that encourage people to open their hearts and minds, including: "And verily, We have made for (the contents of Hell) most of the jinn and humans, they have hearts, but they do not use them to understand (the verses of Allah) and they have eyes (but) they do not use them to see (signs of Allah's power), and they have hearts, but they do not use them to understand (the verses of Allah) and they have eyes (but) they do not use them to see (signs of Allah's power), and they have ears (but) they do not use them to hear (the verses of Allah). They are livestock, and they are even more astray. They are the heedless ones" (QS. Al-

A'raf 7: 179). Meaning: "And do not follow what you do not know of. Truly hearing, sight and heart, all of that will be held accountable". (QS. Al-Isra '17: 36).

Another advantage of using this learning model is liking the subject matter. The principle of providing an atmosphere of joy so that students feel happy learning can be referred to in the verses of the Koran and Hadith, including: "Allah wants convenience for you, and does not want difficulties for you" (QS. Al-Baqarah 2: 185). There is also a hadith of the Prophet which means "Make it easy for them and don't make things difficult, make them happy and don't do anything that causes them to stay away from you (Al-Hadith). The implications of a fun learning process can also be seen from an increase in one's memory abilities, as in cognitive psychology theory, if a fun event occurs, the adrenal medulla increases adrenaline secretion into the blood thereby increasing memory consolidation (increasing memory about the material being studied) and will also be a nutritional supplement for the brain. Besides that, stimulating multiple intelligences in the learning process will make it easier for students to understand the material, and reduce negative behavior significantly in class because learning activities are by the dominant intelligence.

CONCLUSION

Based on the results and discussion of the research, it can be concluded in this study as follows: (1) In general, the *pedagogical content knowledge abilities* of teachers are still dominated by teacher-centered activities, namely teachers facilitating and providing adequate rules and procedures, besides that helping students build meaning and understanding, viewing their role as mentors, assessors, and reminders, but in conveying information the teacher still tends to dominate the information and only performs occasional classroom controls to create a democratic learning environment. As for knowledge about students, the subject only diagnoses some student errors and after these errors are found the teacher only focuses on surface errors, does not carry out an in-depth analysis of the roots of the problems experienced by students, as well as in providing examples of subjects only assigning students to complete numerical examples similar to what has been explained but not trying to make examples that can stimulate students' creative thoughts and examples that value the importance of discussion. (2) Pedagogical Content Knowledge (PCK) teachers have a relationship with students' mathematical literacy abilities. The

better the ability of the Pedagogical Content Knowledge (PCK) teacher, the potential for students to have good mathematical literacy skills tends to be greater.

The learning model needed in improving students' literacy skills is a learning model that can accommodate differences in student characteristics including differences in intelligence possessed by students.

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