Didaktika: Jurnal Kependidikan Vol. 14 No. 4 Nopember 2025

Pedagogical Content Knowledge: Validation of Basic Teaching Ability for Mathematics Education Preservice Teacher

Lailin Hijriani[1], Zulkaidah Nur Ahzan[2], Meiva Marthaulina Lestari Siahaan[3]
[1,2,3]Universitas Timor Kefamenanu, Indonesia

[1]elinhijriani@unimor.ac.id

Abstract

Research on Pedagogical Content Knowledge (PCK) of prospective Mathematics Education teachers as an answer to the problems being faced is expected to be one of the evaluation tools for the lecture process in order to improve the quality of graduates and by realizing the importance of good PKP skills, a communicative learning atmosphere will be created and create multi-directional interactions between students and lecturers. The subjects in this study consisted of three prospective teacher students who had participated in Field Experience Practice (PPL) activities. The findings of this qualitative study used a triangulation design based on purposive sampling using several instruments including test questions, interview guidelines, and documents. The results of the study indicate that the Pedagogical Content Knowledge of prospective Mathematics Education teachers is in the insufficient category. If this is allowed to continue, it will impact the mathematics education graduates quality.
Keywords: Pedagogical Knowledge, Content Knowledge, Pedagogical Content Knowledge

Introduction

Educational quality is influenced by qualified teachers. In other words, only professional teachers can improve the quality of education. For institutions that educate preservice teachers to think about this, so that teachers are not only good at solving mathematical problems but also good at making problems with various situations or levels according to what their students need (Afriansyah, 2018). Being a professional teacher should make students as learning partners because the hope is to become a moral, creative, and innovative person to achieve their goals (Hamid, 2017). To achieve learning objectives, teachers are required to have good abilities in teaching, have a good understanding of a child's concept, have a good understanding of the a Field Experience Practice icable curriculum and various other tasks that cannot be ignored including educating, fostering, guiding and shaping the personality of students to prepare and develop the resources of each student. Talking about teacher professionalism, it becomes a necessity and a professional commitment that must be fulfilled by a preservice teacher if one day he chooses to become a teacher as a profession. Professional commitment is the most effective predictor of teacher retention in the teaching profession, which is the most pressing issue in many countries (Wang et al, 2021). So if teacher professionalism becomes a commitment and a necessity then, there is no reason not to become a professional teacher.

Pedagogical content knowledge is very important to be owned by a teacher to create meaningful learning for students. PCK is an issue as well as a new idea to maximize the learning process and results, especially in mathematics learning. Facts show that mathematics teachers in general can be categorized into 4 groups, namely: (1) teachers with good content knowledge and pedagogical knowledge, (2) teachers with good content knowledge but poor pedagogical knowledge, (3) teachers with poor content knowledge but good pedagogical knowledge, and (4) teachers with poor content knowledge and pedagogical knowledge. Ideally a teacher should fall

into group (1), but in reality many cannot be categorized into that group. By analyzing a teacher's PCK, it is hoped that information can be obtained for consideration by education policy makers in designing teacher in-servicetraining and pre-service training for preservice teachers (Maryono, 2016).

Studies show that preservice teachers are often severely lacking in conceptual understanding of the content they will teach. Preservice teachers often understand subject matter knowledge (SMK) in a fragmentary and disorganized manner, making it difficult to access this knowledge when they have to teach it (Gess et al, 2011). Another problem they face is their lack of ability to create lesson plans which results in difficulties in classroom teaching practice (Käpylä et al, 2009). Other research shows that the PCK of prospective teacher students is relatively low (Sutamrin et al, 2022). Another fact shows that many of Unimor's mathematics education preservice teachers are not ready to carry out Field Experience Practice this is based on observations and discussions with host teacher when mathematics education preservice teacher carry out Field Experience Practice activities in schools. Their unpreparedness can be seen from the inability of students to manage the class and the preparation of learning tools that are still not optimal. It is feared that the inability of students when participating in Field Experience Practice activities is considered the cause of low student learning outcomes. Although before students are involved in Field Experience Practice activities they must fulfill several prerequisite courses, one of which is micro teaching. But in fact, during micro teaching, Unimor mathematics education preservice teacher students were not ready for the skills that a teacher must have, starting from the preparation of material and how to deliver the material they poured in the practice of making lesson plans. This fact is based on direct observation of Unimor mathematics education preservice teacher students who program micro teaching courses.

This fact contradicts the purpose of the Field Experience Practice program, which is expected to be an experience for preservice teachers in practicing all the theories and knowledge they have gained in lectures. In addition, Field Experience Practice teachers are also expected to be able to transmit new teaching strategies and the right things in designing and preparing lesson plans to teachers. If the above situation continues and does not receive serious attention from all parties, it will become a new phenomenon which will then have an impact on the quality of education. This is because preservice teachers who are the next generation of teachers will be further away from the expected quality. If preservice teachers are not equipped with good teaching skills and material mastery, it is certain that the hope of getting quality teachers is only a "dream". So that this reality becomes a joint evaluation to pay more attention to the skills that preservice teachers must master when programming Micro Teaching courses. It is hoped that in the future, when preservice teacher students are involved in Field Experience Practice activities, they will be better prepared and capable both in terms of pedagogical content and content knowledge.

Referring to the results of the 2023 In-Service Teacher Professional Education Student Competency Test (UKMPPG), as many as 2,864 did not pass with a percentage of 16% (Kemdikbud, 2023). Based on the above facts, it is necessary to understand again how to become a professional teacher in which teaching abilities and skills need to be improved. In the view of constructivism, teaching is not just a transfer of knowledge, but an activity that allows students to build their own knowledge. The ability of students to build their own knowledge cannot be separated from the abilities of teachers, one of which must be considered by teachers, namely their pedagogical abilities. High and stable teacher PCK has an impact on the way teachers present integrated teaching which will have a good impact on student abilities. Among the impacts that can be felt are related to the selection of learning content. Because the selection of content becomes an important part that is then conveyed to students both from the depth of

content, the reasons for choosing teaching procedures and several other things. So in order for teachers to integrate teaching, they must have good and balanced PCK (Putra et al, 2017; Shing et al, 2018). On this basis, a teacher must have knowledge of effective, appropriate and appropriate materials and pedagogy to teach students easily, in other words, teachers must have good abilities and skills related to pedagogical content knowledge. The PCK referred to in this study is related to the content knowledge and pedagogical content of prospective Mathematics education teachers, namely how the skills of prospective mathematics education teachers include the understanding of preservice teachers of the Unimor mathematics education study program in selecting and implementing appropriate and effective learning strategies that are appropriate and make the material taught easily understood by students.

With the hope this research will have an impact on the readiness of the Study Program to prepare carefully for preservice teacher students before participating in Field Experience Practice activity. In addition, by knowing the pedagogical content knowledge (PCK) of preservice teacher, it will create quality graduates of the Unimor Mathematics Education Study Program in order to improve the quality of national education.

Method

This study employed a qualitative approach with a triangulation design based on purposive sampling. Data were collected from several different sources and methods. The research instruments consist of test questions, interview guidelines and documents. The subjects were three students from the Mathematics Education Study Program at the University of Timor who had participated in the Field Experience Practice. Data analysis was based on the principles of Miles and Huberman, including data reduction, data presentation, and data conclusion drawing. Data on Pedagogical Content Knowledge are presented as is to illustrate the basic teaching skills of student teacher candidates.

This study aims to describe Pedagogical Content Knowledge as a description of the basic teaching skills of student teacher candidates. This research is important because, in addition to obtaining an overview of the basic teaching skills of student teacher candidates, it can also serve as an evaluation tool after completing teaching practice activities in schools. This can be a valid assessment that can be used by mathematics education study programs to develop the skills of prospective teachers before they begin teaching practice. This research is based on the results of student learning practices that have been validated using several instruments, including test questions, interview guidelines, and documents, followed by an assessment of student abilities during the learning process and knowledge manifested in understanding and solving mathematics problems before being taught to students in schools. This aims to ensure the achievement of learning objectives in accordance with the expected outcomes, with the hope that this will be followed by adequate skills from prospective teachers.

Results

Furthermore, related to Pedagogical Content Knowledge (PCK) of prospective teacher students will be studied based on predetermined indicators. The Pedagogical Content Knowledge (PCK) is studied in two parts, namely in the real of Pedagogical Knowledge and Content Knowledge. In order, it will be discussed first in the real of Pedagogical Knowledge and Content Knowledge for each subject based on the results of research instruments.

Pedagogical Knowledge

One of the instruments used to see the subject's ability in terms of Pedagogical Knowledge is that the subject is given an independent task to make lesson plans. The lesson plans made

are based on their experience when participating in field experience practice. Furthermore, using the lesson plan, the researcher clarified to the subject how the learning process was carried out in the classroom so that Pedagogical Knowledge could be described in detail for each research subject. To see the pedagogical knowledge ability of prospective teacher students, researchers looked at the suitability between the lesson plans made and the teaching ability of prospective teacher students during teaching practice. The following will present the pedagogical knowledge ability of the research subjects in sequence.

a. Subject IMN

Based on the research results, subject IMN is quite capable of making lesson plans in accordance with the curriculum used by the school where subject IMN is located, namely the 2013 curriculum. The IMN subject's lesson plan includes the identity of the lesson plan, namely the unit of education, the subject being taught, teaching in what class, complete with semester, school year and time allocation. Furthermore, the IMN subject lesson plan is also equipped with core competencies, basic competencies and indicators of competency achievement, learning objectives, learning materials, methods, models and learning approaches, learning media, and learning resources. However, the learning steps, teaching materials and assessments are not included in the lesson plan. Furthermore, to see the extent of the ability of IMN subjects in the learning process both in terms of professionalism in teaching, IMN subjects are quite professional because IMN subjects consistently only teach mathematics subjects during field experience practice . The ability to understand students is quite good, this can be seen from how IMN subjects can find out the extent of students' understanding of the material being taught. Regarding the curriculum used when teaching, based on the results of the interview, IMN subjects have a good understanding of the curriculum used in the school where IMN subjects field experience practice. However, this is inversely proportional to the ability of IMN subjects in preparing lesson plans which are still not in accordance with the curriculum used, namely the 2013 curriculum (K13), then IMN siblings make plans in learning in accordance with the lesson plans that have been made, this is based on the ability to determine learning models and strategies. The implementation of learning carried out during the learning process is said to be educational and dialogical. The clarification regarding the learning process in class is contained in the following interview excerpt.

> *Researcher: How is the learning process in class? Are there sessions for students to discuss?*
> *Subject IMN: created in groups, then the results of the discussion are presented by group representatives*
> *Researcher: Does the learning process use technology?*
> *Subject IMN: Using ppt as a learning medium and advising students to use technology in learning*
> *Researcher: What is the teacher's role in group discussions?*
> *Subject IMN: Helps if students ask questions during the discussion process*

The learning process is carried out in groups, in the group a discussion atmosphere is created, then shortly before the discussion ends, the IMN subject asks representatives of each group to present the results of the discussion. Then the results of the group presentation are assessed based on the assessment rubric that has been created. The utilization of technological media is very necessary in learning, considering that we are currently in a digital age. So that the introduction and use of digital devices has a good impact if used positively. In this case, the utilization of technology used is power point learning media in the learning process. And the last indicator that becomes the benchmark for part of the IMN subject's pedagogical knowledge ability is how the subject evaluates learning outcomes. The learning evaluation carried out is

assessing the Student Worksheet based on the assessment rubric that has been made. Where information on the assessment of the LKS is obtained from the results of the interview, this assessment is not obtained in the lesson plan made by the IMN subject. So that if it is based on the achievement of the Pedagogical Knowledge indicator, it can be said that the IMN subject has not been able to make a complete lesson plan.

b. Subject LEKR

Based on the results of the research, LEKR subject has not been able to make lesson plans in accordance with the curriculum used by the school where LEKR subject is located, namely the 2013 curriculum. The lesson plan of subject LEKR included the identity of the lesson plan, namely the unit of education, teaching in what grade, complete with semester, theme and material, meeting and time allocation. Furthermore, the lesson plan of subject LEKR is equipped with learning objectives, learning activities (learning steps), and assessment. However, there were no core competencies, basic competencies and indicators of competency achievement, learning materials, methods, learning models and approaches, learning media, and learning resources. Furthermore, to see the extent of LEKR subject's ability in the learning process both in terms of professionalism in teaching, LEKR subject has not been professional because LEKR subject taught other than mathematics subject during field experience practice. The ability to understand students is quite good, this can be seen from how LEKR subject can immediately overcome students who are not focused during the learning process which is feared will have an impact on students' lack of understanding in understanding the subject matter. Regarding the curriculum used when teaching, based on the results of the interview, LEKR subject has a poor understanding of the curriculum used in the school where LEKR subject field experience practice. This is directly proportional to the ability of the LEKR subject in preparing lesson plans which are still not in accordance with the curriculum used, namely the 2013 curriculum (K13), then the LEKR subject makes planning in learning not in accordance with the K13 lesson plan in this case based on the LEKR subject not being able to determine learning models and strategies. The implementation of learning carried out during the learning process is said to be educational and dialogical. The clarification regarding the learning process in class is contained in the following interview excerpt.

> *Researcher: What learning model is used during the learning process?*
> *Subject LEKR: Discussion. By forming groups based on heterogeneous student abilities*
> *Researcher: How do you manage your class during the learning process?*
> *Subject LEKR: Explaining and asking to pay attention, then intensely during group discussions, namely explaining again if the group does not understand the material being taught. Give students opportunities for discussion. At the end of the discussion there is time to ask questions and the teacher answers directly.*
> *Researcher: Is there any use of technology during the learning process?*
> *Subject LEKR: Yes. By watching learning videos online. However, this is not often done because the signal does not support accessing learning videos online.*

Based on the interview excerpt above, the learning process is carried out in groups, but this statement is in contrast to the LEKR subject RPP which does not explain exactly the existence of a discussion process in the learning steps section. However, in the RPP the LEKR subject asks representatives of each group to present answers to the tasks given even though it is not explained whether there was a previous discussion process taking place. The utilization of technological media is very necessary in learning, considering that we are currently in a digital age. So the introduction and use of digital devices has a good impact if used positively. In this case, the utilization of technology used is in the form of online learning videos. The utilization of online learning videos is not effective enough to be used, considering that based on the results

of interviews with LEKR subjects, the school where field experience practice is placed is constrained by the internet network. And the last indicator that becomes the benchmark for part of the pedagogical knowledge ability of the LEKR subject is how the subject evaluates learning outcomes. The learning evaluation carried out is asking students to solve the assigned problems. However, the LEKR subject did not mention the form of the task assessment rubric. So, based on the achievement of the Pedagogical Knowledge indicator, it can be said that the LEKR subject has not been able to make a complete lesson plan.

c. Subject MFHK

Based on the results of the research, subject MFHK was able to make lesson plans in accordance with the curriculum used by the school where subject LEKR is located, namely the 2013 curriculum. The MFHK subject's lesson plan includes the identity of the lesson plan, namely the unit of education, teaching in what grade, complete with semester, theme and material, meeting and time allocation. Furthermore, the lesson plan of MFHK subject is equipped with basic competencies, indicators, learning objectives, teaching materials, learning activities (learning steps), and assessment. However, there is nothing in the MFHK subject's lesson plan regarding core competencies, methods, learning models and approaches, learning media, and learning resources. Furthermore, to see the extent of MFHK subject's ability in the learning process both in terms of professionalism in teaching, MFHK subject is professional because he consistently teaches math lessons during field experience practice. The ability to understand students is quite good, this can be seen from how MFHK subjects can immediately overcome students who are not focused during the learning process which is feared to have an impact on students' lack of understanding in understanding the subject matter. Regarding the curriculum used when teaching, based on the results of the interview, subject MFHK has a fairly good understanding of the curriculum used in the school where subject MFHK field experience practice. However, the understanding possessed regarding K13 has not been able to make MFHK subject have a good ability in making lesson plans. Furthermore, the MFHK subject in making lesson plans is not in accordance with the K13 lesson plan, this is based on the MFHK subject not explicitly determining the learning models and strategies used. Meanwhile, the implementation of learning carried out during the learning process is said to be educational and dialogical. The clarification regarding the learning process in class is contained in the following interview excerpt.

Researcher: What learning strategy or model is used?, because it is not written in the lesson plan?
Subject MFHK: Group. Grouped based on differences in ability, provide material, explain and learning media and ask students to explain again
Researcher: What's the atmosphere like?
Subject MFHK : Students pay attention during the learning process
Researcher: How is the learning going?
Subject MFHK: by giving them questions, and if they can't, students will be given sanctions.
Researcher: Are there discussion sessions in groups of fellow students?
Subject MFHK: Yes. Namely by giving different tasks, then a discussion process in the group occurs. After discussion, representatives from each group work at the front
Researcher: What if students can't solve the questions?
Subject MFHK: The teacher directly guides the students to complete it together
Researcher: Is there any use of technology during learning?
Subject MFHK: No. Because the network is difficult

Based on the interview excerpt above, the learning process is carried out in groups, in line with the learning steps that are explicitly written in the RPP for the MFHK subject. Next, the MFHK subject asked representatives of each group to present the answers to the tasks given.

The utilization of technology in the learning process carried out by subject MFHK is not used optimally. This is supported by the statement of subject MFHK who said that the network was unstable so that the utilization of technology could not be aField Experience Practice ied properly. Furthermore, the indicator that becomes the benchmark for part of the pedagogical knowledge ability of the MFHK subject is how the subject conducts the evaluation. The learning evaluation carried out is asking students to solve the problems in the student book. However, subject MFHK does not have an assignment assessment rubric which is used as a basis for assessing student learning outcomes. So, if based on the achievement of the Pedagogical Knowledge indicator, it can be said that the MFHK subject has not been able to make a complete lesson plan.

Content Knowledge

Content Knowledge of each research subject is based on the concept map that has been made and the subject's ability to solve the given mathematical problems. Starting from mastery of material, concepts, structures and scientific thinking patterns that can support the learning process including regularity in making concepts starting from the highest level to the lowest level (basic), having the ability to relate the material taught to everyday life. Furthermore, based on core knowledge, it includes how to understand the material made in the concept map and master the material contained in the concept map and the ability to solve mathematical problems. The following will describe the ability of Content Knowledge for each research subject.

a. Subject IMN

Based on the concept map made by the subject, IMN has been able to make a concept map, but does not understand it well. This is in accordance with the results of the interview that the IMN subject does not fully understand how to pour material into a concept map. IMN subject before making a concept map did a search in cyberspace about what is meant by a concept map and how to make it. The knowledge possessed when attending lectures before the subject participated in field experience practice was not enough to be used as a provision for how to make concept maps. So that the IMN subject feels very necessary to search in cyberspace about concept maps. Regarding the sequence of IMN subjects, they have been able to create a hierarchy on the concept map by making the main material at the top to the sub-main material. As for the ability of IMN subjects in formulating examples related to the material on the concept map, it cannot be made immediately, it takes a long time to think and then give examples of problems related to the material on the concept map. To ensure that the IMN subject mastered the material on the concept map, the researcher gave one problem to solve. However, it took quite a long time to solve it even though the results obtained were correct. As contained in the following interview excerpt.

> *Researcher: Can you solve the questions according to the material for which the concept map was made? Listen to the questions carefully. Two lines that do not intersect or coincide are called what lines?*
> *Subject IMN: Parallel lines (Answer takes a while but the correct answer is parallel lines)*

b. Subject LEKR

Based on the concept map made by the subject, LEKR was able to make a concept map, but did not understand it well. This is in accordance with the results of the interview that LEKR subject did not fully understand how to put the material in the concept map. Before making the concept map, LEKR subject searched in cyberspace about what is meant by concept map and

how to make it. The knowledge possessed during the lectures before the subject joined the field experience practice was not enough to be used as a provision for how to make concept maps. Therefore, LEKR subject felt the need to search in cyberspace about concept maps. Regarding the sequence, LEKR subject was able to make a hierarchy on the concept map by making the main material at the top to the sub-main material. As for the ability of LEKR subject in formulating examples related to the material on the concept map, it can be made directly, then giving examples of problems related to the material on the concept map. To ensure that the LEKR subject mastered the material on the concept map, the researcher gave one problem to solve. However, it took quite a long time to complete it by not immediately giving the correct answer and then correcting the answer but also not giving the correct answer, namely the LEKR subject said that the formula for the perimeter of a rectangle is "two plus length" then corrected it again with the answer "two times length plus width" which, if represented in mathematical symbols respectively, is "2+p and 2xp+l". So based on the LEKR subject's answers it can be concluded that the LEKR subject has not been able to answer the questions correctly. As contained in the following interview excerpt.

Researcher: Can you solve the questions according to the material for which the concept map was made? Listen to the questions carefully. Formula for the perimeter of a rectangle?

LEKR Subject: Two plus length, e twice the length plus width (Answer a bit long but the correct answer is parallel lines)

c. Subject MFHK

Based on the concept map made by the subject, MFHK has been able to make a concept map, but does not understand it well. This is in accordance with the results of the interview that the MFHK subject did not fully understand how to pour material into a concept map. MFHK subject before making a concept map did a search in cyberspace about what is meant by a concept map and how to make it. The knowledge possessed when attending lectures before the subject participated in field experience practice was not enough to be used as a provision for how to make concept maps. So that MFHK subject feels very necessary to search in cyberspace about concept maps. Regarding the sequence, the MFHK subject has been able to create a hierarchy on the concept map by making the main material at the top to the sub-point material. As for the MFHK subject's ability to formulate examples related to the material on the concept map, it can be made immediately, then provide examples of problems related to the material on the concept map. To ensure that the MFHK subject mastered the material on the concept map, the researcher gave one problem to solve and obtained the correct answer. Even though it is not answered immediately, it takes longer to answer. As contained in the following interview excerpt.

Researcher: Can you solve the questions according to the material for which the concept map was made? Listen to the questions carefully. The formula for the volume of a block?

Subject MFHK: length times width times height (quite long duration)

Discussion

The pedagogical knowledge ability of the research subjects is based on the results of the assignments given to each research subject. In detail, it can be described regarding the pedagogical knowledge ability of the research subject, namely the IMN subject is able to make a lesson plan but it is incomplete in accordance with the components of making a lesson plan for the K13 Curriculum. Among the incomplete components in question are the absence of

learning steps and the form of assessment carried out. Based on the results of the LEKR subject's assignment, it is known that the subject is able to make a lesson plan but is incomplete in accordance with the components of making the lesson plan for Curriculum K13. Among the incomplete components in question are not in the LEKR subject's lesson plan regarding core competencies, basic competencies and indicators of competency achievement, learning materials, methods, learning models and approaches, learning media, and learning resources. Based on the results of the MFHK subject's assignment, it is known that the subject is able to make a lesson plan but it is not complete in accordance with the components of making a lesson plan for the K13 Curriculum. Among the incompleteness of the components in question is that there is nothing in the MFHK subject's lesson plan regarding core competencies, methods, learning models and approaches, learning media, and learning resources. In terms of teaching practice, prospective student teachers already have good skills, but they are not yet appropriate and complete when validated through the lesson plan that is made, which is used as a reference in teaching practice.

Based on the concept map making assignment as an instrument used and the ability to solve the given mathematical problems to see the content knowledge ability of the research subjects. The research subjects, IMN, LEKR and MFHK. It shows that all research subjects are able to make concept maps in order based on the top to the lowest hierarchy. However, it can be seen that the concept maps of the research subjects have not been able to write the right connecting words between supporting ideas that are interrelated. Meanwhile, if we look to the prospective teacher students ability to solve the given mathematics problems, it takes a long time to solve it with answers that are still not quite right.

Pedagogical Content Knowledge offers insights into knowledge, skills and abilities that are unique because they describe how what is taught is based on an understanding of teaching and learning that focuses not only on outcomes, but how the process occurs to achieve learning objectives in practice in the learning process. Pedagogical Content Knowledge offers a vision of what it means to articulate knowledge in the teaching and learning process, and how to a Field Experience Practice y that learning in practice in different ways (Loughran, 2020). PCK is seen as the transformation of content knowledge and pedagogical knowledge into different types of knowledge used to develop and implement teaching strategies. This statement is in line with the definition of PCK proposed by Wulandari & Iriani (2018) that the development of PCK can improve pedagogical competence and professional competence possessed by teachers.

The reality is that teachers' PCK still overlaps. Teachers with relatively more overlapping PCK are caused by their goals related to the subject as a whole and are less driven by understanding the concepts that teachers teach (Tuithof et al.,2023). In addition, the PCK of preservice teachers is not at a very good level, which is still at a fairly good level, this is due to the lack of skills in teaching and lack of knowledge about student abilities so that preservice teachers have difficulty identifying the source of students' concept understanding as well as being unable to find effective ways to overcome students' misconceptions (Gultom & Mampouw., 2019; Makarta & Ilyas., 2021).

If teachers still experience errors in PCK, this cannot be allowed. Because the Pedagogical Content Knowledge ability of preservice teachers will indirectly have an impact on various aspects. One of them is related to teaching efficacy. Where teaching efficacy has a relationship with the knowledge, attitudes, and skills of preservice teachers when practicing effective and efficient teaching and learning activities. Teaching efficacy is closely related to the level of confidence of preservice teachers in carrying out teaching tasks, so that it contributes to student success in the learning process (Depaepe & König, 2018; Guskey, 2021; Kim & Seo, 2018). This

will be directly proportional, if the pedagogical content knowledge ability is good, the level of confidence of preservice teacher students in teaching will automatically increase.

So it is of concern that, in addition to having an impact on teaching efficacy, good Pedagogical Content Knowledge abilities will have an impact on the learning process, namely being able to create a communicative learning atmosphere and bring up multi-directional interactions between students and teachers and have the ability when faced with a concrete learning process. Because preservice teacher students have good Pedagogical Content Knowledge abilities that can be used to help students understand certain concepts or relationships, such as in understanding problems, conducting project demonstrations, the ability to investigate a problem or be involved as a facilitator when students conduct experiments in the learning process.

Empirical research shows that teacher quality is an important factor in determining the improvement of student achievement (Gerritsen et al, 2017; Mukhtar & Lukman, 2017; Yulianingsih & Sobandi, 2017). Teachers are expected to process and evaluate new knowledge relevant to the field of knowledge that is carried out professionally and regularly in order to realize the renewal of their knowledge base, realize meaningful learning and validate strategies for improving teacher skills based on teachers' professional competencies and their didactic transposition in the classroom, as an alternative to consolidating the learning process (Díaz & Poblete, 2017; Jacob et al, 2020; Littlejohn & Hood, 2017).

Conclusion

Based on the description above, it can be concluded that the research results show from the inability of the research subjects when conducting teaching practice and revalidated through the lesson plan that has been prepared during teaching practice. the inconsistency between teaching practice and the prepared lesson plans includes: the research subject does not write core competencies, basic competencies and indicators of competency achievement, does not attach learning materials, methods, models and learning approach, learning resources as well as learning and assessment steps, so that confusion arises when carrying out teaching practice due to the incompleteness of the lesson plan that was made which should be used as a reference during teaching practice. As for the content knowledge ability of the research subjects, when viewed from the concept maps made, it shows that all research subjects are able to make concept maps in order based on the top to the lowest hierarchy. However, it can be seen that the concept maps of the research subjects have not been able to write the right connecting words between supporting ideas that are interrelated, and when the subject was given routine questions to solve, the subject needed quite a long time to solve them.

So it can be concluded that the Pedagogical Content Knowledge of prospective Mathematics Education teachers at Unimor is in the lacking category. This problem cannot be ignored and considered as a passing wind, but can be used as an evaluation tool after carrying out teaching practice activity at school and can be used as a valid assessment that can be used by the Mathematics Education study program as a basis for preparing the skills of prospective teacher students before taking part in teaching practice activity.

Acknowledgment

Endless gratitude to the Institute for Research and Community Service/ LPPM Universitas Timor, Kefamenanu for giving us the opportunity to contribute to the college's three dharmas especially in the research field. Hopefully the research that we have done provide a positive impact on our beloved campus.

References

Afriansyah, E. A. (2018). Problem Posing sebagai Kemampuan Matematis. Mosharafa: Jurnal Pendidikan Matematika, 6(1), 163–180.

Depaepe, F., & König, J. (2018). General pedagogical knowledge, self-efficacy and instructional practice: Disentangling their relationship in pre-service teacher education. Teaching and Teacher Education, 69, 177–190. https://doi.org/10.1016/j.tate.2017.10.003

Díaz, V., & Poblete, Á. (2017). A model of professional competences in mathematics to update mathematical and didactic knowledge of teachers. International Journal of Mathematical Education in Science and Technology, 48(5), 702-714.

Gerritsen, S., Plug, E., & Webbink, D. (2017). Teacher quality and student achievement: Evidence from a sample of Dutch twins. Journal of a field Experience Practice ied econometrics, 32(3), 643-660.

Gess, N, et al. (2011). A PCK Rubric to sMeasure Teachers Knowledge of Inquiry Based Instruction Using Three Data Sources.

Gultom, C. I., & Mampouw, H. L. (2019). Analisis Pedagogical Content Knowledge Guru dan Calon Guru pada Pembelajaran Matematika. Jurnal Cendekia: Jurnal Pendidikan Matematika, 3(1), 149-163.

Guskey, T. R. (2021). The past and future of teacher efficacy. Educational Leadership, 79(3), 20-25.

Hamid, A. (2017). Guru profesional. Al-Falah: Jurnal Ilmiah Keislaman dan Kemasyarakatan, 17(2), 274-285.

Https://ppg.kemdikbud.go.id/news/hasil-uji-kompetensi-mahasiswa-pendidikan-profesi-guru-ukmppg-dalam-jabatan-periode-4-tahun-2023

Jacob, F. I. L. G. O. N. A., John, S. A. K. I. Y. O., & Gwany, D. M. (2020). Teachers' pedagogical content knowledge and students' academic achievement: A theoretical overview. Journal of Global Research in Education and Social Science, 14(2), 14-44.

Kim, K. R., & Seo, E. H. (2018). The relationship between teacher efficacy and students' academic achievement: A meta-analysis. Social Behavior and Personality: an international journal, 46(4), 529-540.

Kapyla, M Et al. (2009). Influence of content knowledge on pedagogical content knowledge: the case of teaching photosynthesis and plant growth. International Journal of Science Education.

Makaraka, A., & Ilyas, M. (2021). Analisis Pedagogical Content Knowledge (PCK) Mahasiswa Perempuan Calon Guru dalam Pembelajaran Matematika Ditinjau Dari Perbedaan Prestasi Akademik. Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika, 4(2), 56-63.

Maryono, M. (2016). Profil Pedagogical Content Knowledge (PCK) mahasiswa calon guru matematika ditinjau dari kemampuan akademiknya. JRPM (Jurnal Review Pembelajaran Matematika), 1(1), 1-16.

Putra, M. A., Widodo, A., & Sopandi, D. W. (2017). Science teachers' pedagogical content knowledge and integrated approach. In Journal of Physics: Conference Series (Vol. 895, No. 1, p. 012144). IOP Publishing.

Littlejohn, A., & Hood, N. (2017). How educators build knowledge and expand their practice: The case of open education resources. British Journal of Educational Technology, 48(2), 499-510.

Mukhtar, A., & Luqman, M. D. (2020). Pengaruh kompetensi guru terhadap kinerja guru dan prestasi belajar siswa di kota makassar. Idaarah, 4(1), 1-15.

Shing, C. L., Saat, R. M., & Loke, S. H. (2018). The Knowledge of Teaching â€“Pedagogical Content wledge (PCK). MOJES: Malaysian Online Journal of Educational Sciences, 3(3), 40-55.

Sutamrin, S., Rosidah, R., & Zaki, A. (2022). The pedagogical content knowledge (PCK) of prospective teachers. *EduLine: Journal of Education and Learning Innovation*, *2*(4), 399-405.

Tuithof, H., Van Drie, J., Bronkhorst, L., Dorsman, L., & Van Tartwijk, J. (2023). Teachers' pedagogical content knowledge of two specific historical contexts captured and compared. Educational Studies, 49(4), 686-711.

Wulandari, M. R., & Iriani, A. (2018). Pengembangan Modul Pelatihan Pedagogical Content Knowledge (PCK) Dalam Meningkatkan Kompetensi Profesional dan Kompetensi Pedagogik Guru Matematika SMP. Kelola: Jurnal Manajemen Pendidikan, 5(2), 177-189.

Wang, G., Strong, M., Zhang, S., & Liu, K. (2021). Preservice teacher professional commitment: A conceptual model and literature review. Teaching and Teacher Education, 104, 103373.

Yulianingsih, L. T., & Sobandi, A. (2017). Kinerja mengajar guru sebagai faktor determinan prestasi belajar siswa. Jurnal Pendidikan Manajemen Perkantoran, 2(2), 49.