BUKTI KORESPONDENSI

ARTIKEL JURNAL NASIONAL TERAKREDITASI

Judul Artikel : Describing prospective teachers' promote action in online mathematics learning

Jurnal : Journal of Research and Advances in Mathematics Education (JRAMathEdu)

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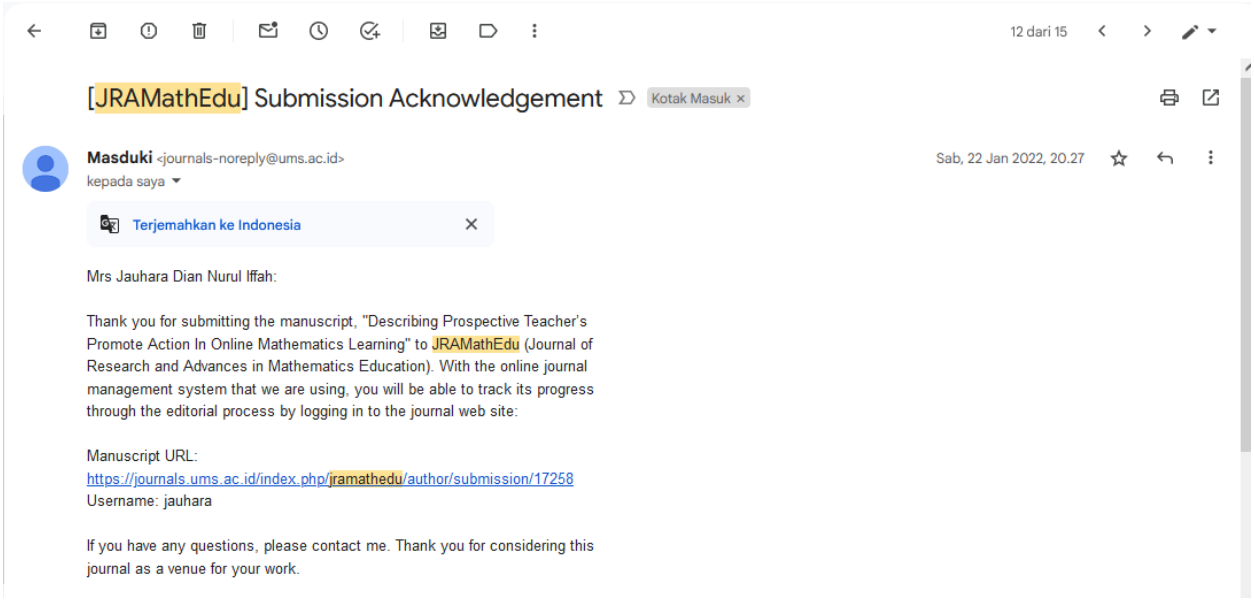
No	Perihal	Tanggal
1	Bukti konfirmasi submit artikel dan artikel yang disbumit	22 Januari 2022
2	Bukti permintaan revisi 1	16 April 2022
3	Bukti pengiriman hasil revisi 1, Artikel hasil revisi	23 April 2022
4	Bukti permintaan revisi 2, Reviewer's Comment to Author	21 Juni 2022
5	Bukti pengiriman hasil revisi 2, respon kepada reviewer, dan artikel yang diresubmit	1 Juli 2022
6	Bukti permintaan untuk mengirim *response to review form* berikut penjelasan	8 Juli 2022
7	Bukti balasan untuk penjelasan *response to review form*	9 Juli 2022
8	Bukti permintaan untuk mengirim *response to review form*	19 Juli 2022
9	Bukti balasan konfirmasi untuk penjelasan *response to review form*	21 Juli 2022
10	Bukti permintaan *proofread*, hasil *proofread*, revisi akhir gambar	21 Juli 2022
11	Bukti Artikel Accepted	23 Juli 2022
12	Bukti permintaan pembayaran dan konfirmasi revisi akhir artikel	2 Agustus 2022
13	Bukti artikel terbit online berikut artikel yang terbit	Volume 7 Issue 3

1. Bukti Konfirmasi Submit Artikel dan Artikel yang disubmit (22 Januari 2022)

Screenshoot Email



12 dari 15

[JRAMathEdu] Submission Acknowledgement Kotak Masuk ×

Masduki <journals-noreply@ums.ac.id> Sab, 22 Jan 2022, 20.27
kepada saya

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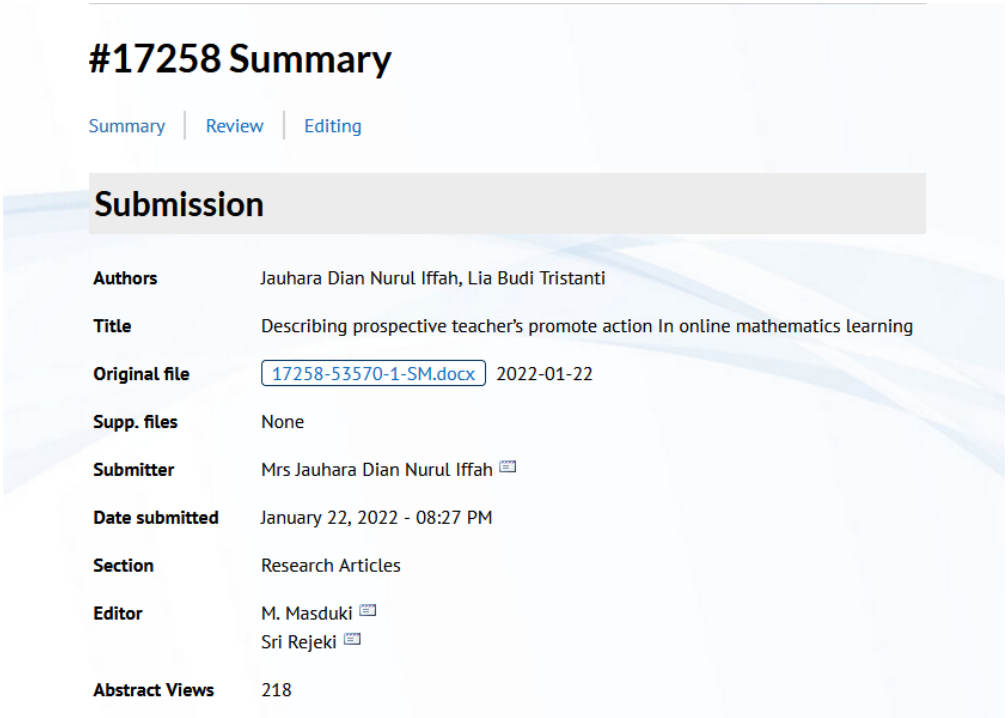

#17258 Summary

Summary | Review | Editing

Submission

Authors	Jauhara Dian Nurul Iffah, Lia Budi Tristanti
Title	Describing prospective teacher's promote action In online mathematics learning
Original file	17258-53570-1-SM.docx 2022-01-22
Supp. files	None
Submitter	Mrs Jauhara Dian Nurul Iffah
Date submitted	January 22, 2022 - 08:27 PM
Section	Research Articles
Editor	M. Masduki Sri Rejeki
Abstract Views	218

Journal of Research and Advances in Mathematics Education

Volume x, Issue x, xxxxx 2021, pp. xx – xx
DOI:
p-ISSN: 2503-3697, e-ISSN: 2541-2590

Describing Prospective Teacher's Promote Action In Online Mathematics Learning

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ARTICLE INFO

Article history:
Received:
Revised:
Accepted:
Published online:
Published regularly:

Keywords:
Prospective Teacher, Promote Action, Online Learning

ABSTRACT

Online teaching brought its own challenge to every teacher. The procedures of teaching should be carefully selected in order to attain the expected teaching goals. It was a must for prospective teacher to prepare themselves as well as possible to become a professional teacher since they decided to take their educational major. Hence, this study aimed to describe the promote action of prospective teachers in mathematics teaching. It was a descriptive-qualitative research that took four students who were in peer-teaching program as the subject. They were selected based on the criteria of subject's PCK (Pedagogical Content Knowledge) which categories involved 0-0, 0-1, 1-0,1-1 on content-knowledge-pedagogical knowledge. It used *vignette yang*, which was a sheet that identified prospective teachers' Pedagogical Content Knowledge, in addition to observation sheet of teaching. The author gave the *vignette* to subject candidates and then classified them based on their responses to *vignette*. The author finally selected four subjects and observed their mathematics online teaching. The result found that every subject showed their promote action in every single phase of students' learning. However, those with highest pedagogical knowledge had more various promote actions rather than those with highest content knowledge who were good at delivering materials but less in having interaction with students.

Introduction

The development of teaching method from conventional to more creative and innovative ones had been implemented in some schools. Thus, teachers should have good competence in teaching to reach good learning outputs for students. They might apply various teaching models to deliver their course. Of course, it should be carefully considered for the sake of any expected goals. Some factors to be considered involved the attainment of learning outputs, learning environment, and operational cost (Anggrawan, 2019). Good teaching models generated good learning outputs, as well as conducive learning environment, and affordable operational cost. This current pandemic era of covid-19 made teaching activities shift from offline to online. A previous study suggested that students who were good in offline learning should get their teeth in online learning. One thing that would never be substituted from offline learning was meaningful interaction between teacher and students (Tang et al., 2013). No interaction brought less learning experiences among

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students, and thus they would feel difficult to understand the course (Mairing, Sidabutar, Lada, & Aritonang, 2021). Online learning tended to give more tasks to students and less explanation by teachers. A lot of tasks and limited explanations made online learning seem to be less effective for students (Giatman, Siswati, Basri, & Article, 2020; Suryaman et al., 2020).

Some other factors of considering teaching models and the attainment of optimal learning outputs were conducive environment and affordable cost and facility. Towards online learning, students needed to have stable internet connections, capability to operate technology, and supporting devices. Particularly to students in villages, they had serious problem on internet connection (Mulyanti, Purnama, & Pawinanto, 2020; Putra, Witri, & Sari, 2020). This problem, however, could be addressed by students' autonomous learning along with their confidence in problem solving (Mairing et al., 2021).

Teachers' capability to do a good teaching while adapting with online technology was necessary. Therefore, they should have four kinds of competences including: pedagogy, personality, social, and professional (Kemdikbud, 2005). Among those competences by the Ministry of Education and Culture, it mentions *Pedagogical Content Knowledge* (PCK) that combined *pedagogical knowledge* with *content knowledge*. *Pedagogical knowledge* related to class management, tasks, students, and class teaching (Shulman, 1986). It was in line with teachers' pedagogical competence by Act No. 74/2008, that teachers' pedagogical competence referred to the competence of students teaching management that at least included the comprehension of education base or insights, the comprehension of students, curriculum/syllabus development, teaching design, educated and dialogic implementation of teaching, technology utilization, evaluation on learning result, and student development to actualize their various potencies.

Towards *content knowledge*, it referred to one's knowledge about a concept, theory, the framework of thought, and argumentation (Shulman, 1986). Similarly, teacher professional competence based on Act No. 74/2008 mentioned that professional competence is teachers' capability to master the knowledge of science, technology, art, and culture they are teaching to, at least, including the mastery of the course materials in thorough way according to the content standard of education program, a subject matter, and group of subjects to be taught, the relevant concept and method of art, technology, scientific disciplines which was conceptually coherent to an education program, subject matter, and group of subjects to be taught.

Krauss *et.al*. identified three dimensions of PCK which were important for teaching mathematics. Those three dimensions were teachers' knowledge about math tasks, students' initial knowledge (i.e., any difficulty and misconception) and representation, analogy, illustration or models of math content that would be useful to be taught (Krauss et al., 2008). Teachers' PCK might determine the process of teaching and finally affect students' learning outputs (Olfos, Goldrire, & Estrella, 2014). Developing and selecting tasks, representing and explaining, facilitating a productive discussion, interpreting students' responses, emphasizing students' understanding as well as analyzing their misconception and difficulty appropriately are the elements that underlie PCK (Ball, Lubienski, & Mewborn, 2001). Another argument claimed that among content, curriculum, and teaching, "the knowledge of teaching" was the basic component of pedagogical content knowledge (An, Kulm, & Wu, 2004). Some researchers argued that to be a successful math teacher, it needed a strong foundation on pedagogical content knowledge, referring to a kind of professional knowledge for teaching specific branch of knowledge (S M Wilson, Shulman, & Richert, 1987; Suzanne M. Wilson, Floden, & Ferrini-Mundy, 2016). Overall, those all descriptions show that PCK is important for teacher.

Furthermore, some studies showed that the comprehension of teaching mathematics to reach a qualified education is a specific professional knowledge that could be obtained through trainings in university and be developed through reflection on teaching practices (Fennema & Romberg, 1999; Grossman, 2008; Morris, Hiebert, & Spitzer, 2009). Therefore, prospective teachers got materials about theories of teaching and learning in order to give them knowledge about teaching. More specifically, prospective math teachers also had chances to do teaching practices to implement any theories they had learned before. The importance of having teaching practices was to make them familiar with the real teaching circumstance. Hence, they should prepare themselves since they were in college. To teach mathematics, it did not only need good knowledge about mathematics contents, but also pedagogical knowledge (Turnuklu & Yesildere, 2007). Therefore, since in college, prospective teachers should learn about any competences of being a good teacher both theoretically and practically in order to be a good professional teacher. This indicated the importance of identifying prospective teachers' PCK to prepare them to be a professional teacher.

Teachers might apply various models and methods of teaching during the process of their teaching. They took their decision by previously considering some matters such as the difficulty of materials to be taught, students' characteristics, and adequate facility (Lui, 2012). Students' different characteristics and competences was the main concern for teachers. Every student had their own learning style and speed which may become a challenge for teachers to give an appropriate teaching that covers all those diversity. Once teachers ignored students' diversity, their teaching would be less effective.

The standard of professionalism as mathematics teachers was by shifting their teaching method from teacher-centered to student-centered.

> "Five fundamental shifts in teaching mathematics to develop students' mathematical competence were: 1) changing the circumstance of class from merely a group of students to mathematics community; 2) taking mathematical arguments and logics as a justification tool and avoid teacher authority to define a truth; 3) emphasizing understanding rather than solely memorizing the procedures; 4) considering to making hypotheses, finding, and problem-solving as well as avoiding any pressures on finding mechanical answers; 5) relating mathematics with ideas and its applications, and not treating mathematics as a set of isolated concepts and procedures" (NCTM, 2000)

Apparently, the second and the fifth shifts showed that teachers should involve students in teaching process, and the involvement is related to connecting mathematics ideas. The procedure of teaching that might encourage students to be active was by promoting students to do an activity. This kind of activity was called teacher's *promote action.*

Promote action referred to any activities that mature individual promoted to children to do in particular way (Valsiner, 1983). What was promoted might vary. It could be in the form of things or activities that finally made the children do particular action. *Promote action* might also refer to activities that teachers promoted to their students for the sake of attaining new insights (Goos, 2005, 2012). A set of promote actions by a teacher to students in particular area was called *zone of promoted action* (ZPA). The process of teaching by a teacher had some procedures. However, not all of them were implemented, including ZPA. The procedures of teaching that dealt with ZPA referred to any activities which made student do or behave in order to attain new skills. In this case, the author limited the new skills on new competence, skill, comprehension, and development that student attained, given that mathematics at school was about developments since elementary grade.

Valsiner found that the main characteristic of ZPA was its non-binding nature. However, once ZPA had set but the children did not follow the promoted direction, but otherwise, they took another object with another way, it indicated that the children refused the ZPA, or they were out of the expected ZPA. This could be fixed by defining new ZPA. Given that teacher's ZPA was not binding, students' responses may either accept (i.e., *accepted promote action/ A-PA*) refuse (i.e., *rejected promote action/R-PA*) or respond in pseudo way (i.e., *pseudo promote action/P-PA*).

Accepted promote action (A-PA) was seen once the students followed the teacher's instruction, had active participation, and gave their focus on what they were learning. Rejected promote action (R-PA) was seen from students' negative responses such as ignoring their teacher's instruction and having another activities out of what they were learning. Pseudo promote action was seen from students' behavior as if they accepted their teacher's promote action, but in fact they rejected them all, as well as the vice versa (Iffah, Sutawidjaja, & Sa'dijah, 2017). Some previous studies had discussed about *zone of promoted action* (ZPA) in both medical and school areas (Bennison & Goos, 2013; Galligan, 2008; Goos & Bennison, 2008; Iffah, Sutawidjaja, Sa'dijah, & Subanji, 2016; Iffah, Sutawidjaja, Sadijah, & Subanji, 2016). Another study conducted on mathematics students found that lecturing by implementing Valsiner's theory might convince them on probability course (Tirto, Herman, & Turmudi, 2019). Furthermore, studies about prospective teachers' PCK had been done before although they solely described on how the PCK was, not yet leading to how the prospective teachers learn to teach (Ayuningtyas & Apriandi, 2019; Gultom & Mampouw, 2019; Irfan, Tuti Marjan Fuadi, Blang Bintang Lama Km, Keudee, & Besar, 2018; Makaraka, Ilyas, & Cokroaminoto Palopo, 2021). The novelty of this current study was the author detected and described *promote action* by prospective teachers when they hade teaching practice in secondary school. Furthermore, the author also considered prospective teachers' PCK as the criteria for subject selection. The author would make some categories of PCK and describe the promote action in a teaching process based on the PCK criteria.

Considering the issue described, the problem of this study was the presence of promote action (PA) by prospective teachers when they had teaching practices in secondary school. The teaching process was online via zoom meeting. The author identified the promote action of prospective math teachers whether it corresponded to the phases of teaching. The subjects of this study were selected by considering the students' PCK criteria. The result of this study could be useful to develop prospective teachers' competences and skills of teaching. In addition, lecturers might identify their students' PCK earlier in order to improve their students' PCK through lecturing in case that they had students with low skills.

Research Method

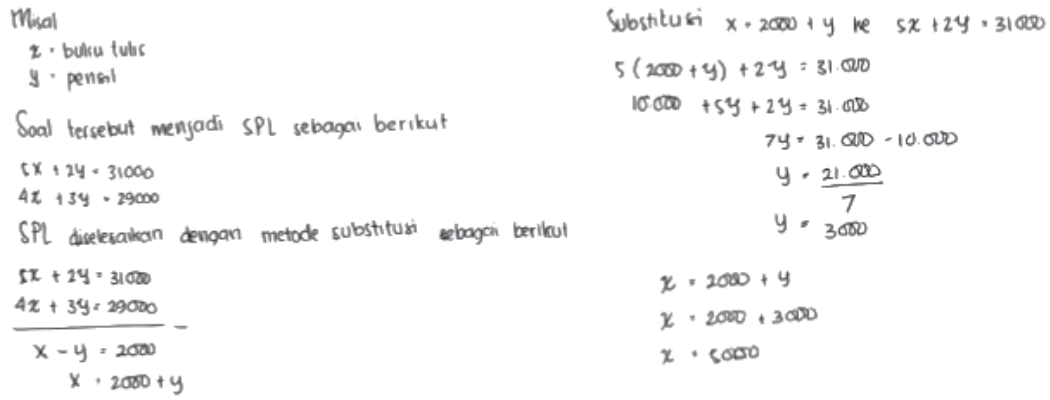
The author applied descriptive-qualitative research to describe the promote action of prospective math teachers in their teaching practice. The subject of this study was four students of SKIP PGRI Jombang who were in peer teaching program. For subject selection, the author gave them an initial test called *vignette*. It was a scenario/illustration that contained students' solutions, questions, arguments, confusion, misconception, or comments that teachers should responded (Ebert, 1993). With vignette test, the prospective teachers were asked to give their comments/responses on what students had written. Figure 1 showed the vignette test distributed to the subject candidates in order to identify their PCK.

Kasus 1

Dalam suatu pembelajaran seorang guru memberikan contoh soal cerita tentang SPLDV sebagai berikut:

Firza membeli 5 buku tulis dan 2 pensil di sebuah toko, ternyata dia harus membayar Rp. 31.000,-. Keesokan harinya Nisa membeli 4 buku tulis dan 3 pensil di toko yang sama, ternyata total harganya Rp. 29.000,-. Berapakah harga sebuah buku tulis dan sebuah pensil di toko tersebut?

Selanjutnya guru meminta kepada siswa untuk menyelesaikan soal tersebut dengan terlebih dahulu membuat model matematika. Berikut adalah jawaban salah satu siswa bernama Ghildan:



a. Tuliskan komentar saudara terhadap jawaban Ghildan tersebut!
b. Adakah jawaban yang salah atau kurang? Mohon berikan tanda.
c. Jika jawaban tersebut terdapat kesalahan atau kekurangan, bagaimana jawaban yang sebenarnya?
d. Bagaimana cara saudara memberikanpenjelasan kepada siswa tentang jawaban yang tepat dari soal tersebut?

Figure 1. Vignette

The author asked the subject candidates to write down their responses for point a-d on the vignette sheet. According to their responses, the author defined some criteria of PCK that the subject candidates had. The author used comments (Karahasan, 2010) to analyze the PCK of prospective teachers in this study. It was based on that this framework was the completion and combination of another framework. In this framework, there were 2 components of PCK. Those were pedagogical knowledge and content knowledge. Each of the components was classified into 3 categories, including: *less* (level 0), *moderate* (level 1), and *good* (level 2). Table 1 showed the characteristics of PCK that the author used for analyzing the prospective teachers' PCK, in addition to subject selection.

Table 1
Criteria of PCK

Components of PCK	**Level 0 (*Less*)**	**Level 1 (*Moderate*)**	**Level 2 (*Good*)**
Content knowledge	Unable to express a definition correctly. Unable to use appropriate notation.	Able to express a definition correctly. Able to use notation appropriately.	Able to express a definition correctly. Able to use notation appropriately.

	Only use either declarative or procedural questions.	Still use either declarative or procedural questions.	Use any types of questions (including declarative, procedural, and conditional) appropriately.
	Unable to interpret and use representation.	Able to interpret and use both graphic and non-graphic representation.	Able to interpret and use both graphic and non-graphic representation.
	Unable to see the connection among different topics/sub-units.	Able to see the connection among different topics/sub-units.	Able to see the connection among different topics/sub-units, as well as taking a step between the connections carefully.
	Providing and demonstrating knowledge for students.	Not only providing any instructions or adequate procedures, but also assisting students to construct meanings and understanding.	Facilitating and assisting students, rather than providing answers along with its explanations.
	Introducing the procedures after the concept.	Seeing their roles as mentor, evaluator, and reminder.	Evaluating the students' understanding as well as enhancing their comprehension through questions that deal with further mathematical knowledge.
Pedagogical knowledge	Dominating any information.	Still dominating any information.	Appreciating and encouraging students to construct their mathematical knowledge through mathematical inquiry.
	Having problems in both topic and question orders during either the teaching process or teaching designing.	Only having problems on question order during either teaching process of reaching designing.	Ordering the topic material and questions/task appropriately.
	Feeling difficult to control and create a class with democratic vibe/circumstance.	Sometimes capable to control and create a class with democratic circumstance.	Controlling and creating a class with democratic circumstance.

Furthermore, the author determined the subject of this study. They were prospective teachers who were in peer teaching program. The subjects consisted of four prospective teachers with the following criteria:

Subject 1: pedagogical knowledge – content knowledge: level 0 – 0
Subject 2: pedagogical knowledge – content knowledge: level 0 – 1
Subject 3: pedagogical knowledge – content knowledge: level 1 – 0
Subject 4: pedagogical knowledge – content knowledge: level 1 – 1

This study used *vignette* sheet that aimed to identify the prospective teachers' PCK. This vignette was adopted from a previous study, and the author only took some parts that dealt with content knowledge and pedagogical knowledge. It corresponded to the subject candidates who just got this knowledge theoretically. For data collection that dealt with the subjects' *promote actions*, the author used an observation sheet which aimed to identify the subjects' promote action during their teaching practice. This observation sheet was the development result of the author's dissertation. It contained teaching procedures that corresponded to students' learning phases following (Winkel, 2007) and a set of promote

actions that might appear in each procedures of their teaching practice (Iffah, Sutawidjaja, Sa'dijah, et al., 2016).

Result And Discussion

Promote action by Subject 1

Subject 1 implemented her teaching practice with her classmates playing a role as students. The author recorded the process of teaching and then analyzed the result. At ***motivation phase***, the promote action that should appear was *asking students to correlate a given example to the material to discussed*. However, it seemed that Subject 1 delivered the teaching objectives and asked the students about the previous material for their initial activity. She displayed her teaching objectives on the slides of power point. She conveyed that the current teaching objective was matrix operation. She directly conveyed the objective without asking the students to correlate the example with the material to be discussed. Next, the subject *asked the student to explore their knowledge through some questions related to the previous material.* She then asked them some questions that dealt with the definition of matrix and the types of matrix. These questions were for all students in class. She asked these questions to identify whether the students had already understood the previous material. Nevertheless, none of the students responded her question. They claimed that they forgot, did not understand yet, and even some of them decided to no give any response.

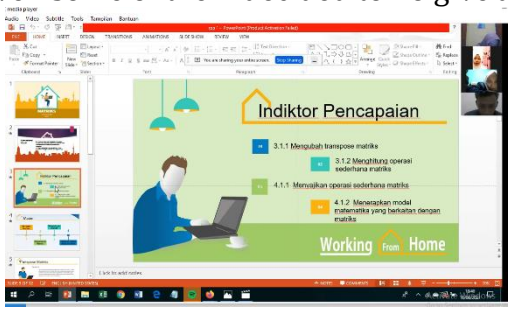


Figure 2. Subject 1 expressed the teaching objectives and proposed some questions

Since the students could not address her questions, she briefly re-explained the answers of the questions. In this case, she did not assist them to get the answer but directly re-explaining them. It seemed that Subject 1 was less in exploring the students' competence. In fact, this point is vital to detect students' initial competence, whether or not they were ready to get further material. However, the subject had gone through the initial phase of her teaching, which was apperception (in accordance to the teaching plan she had designed) although it was less optimal.

The next phase of teaching activity was about delivering material. It was **concentration phase**. The subject applied zoom meeting and an application of matrix operation. This application had already been installed by students from Google Play Store via their own smartphone. The *promote action* that appeared was *asking students to prepare the learning instrument.* The subject asked them to install the application a day before having the zoom meeting. *She identified the scope of material* by making a voice recording that explained the material. When it came to explaining the material, hence, she played the recording during zoom meeting. It was not only explaining the material being discussed, but also about how to operate the application. She solely utilized the application to explain the material without having any other procedural explanation. The students only focused on the explanation and the application. With this activity, the subject successfully delivered the material. However, it was considered incomplete, as she did not give any procedural explanation. This made students difficult to thoroughly understand the explanation of matrix

operation. The application might display the answer along with the method. But, the teaching process seemed less meaningful when the students had no idea about the roots of the solution displayed. The procedural process of attaining the solution remained necessary for students, given that they would not always be allowed to use the application for problem solving.

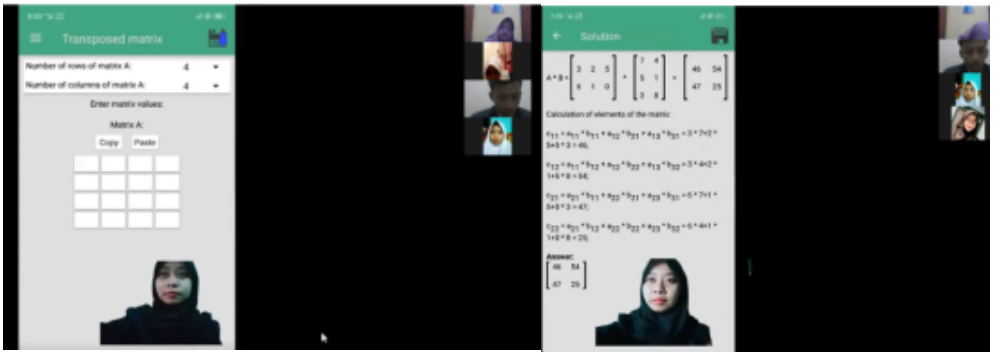


Figure 3. Subject 1 explained about the material being discussed via an application.

She explained the material via by using the application, and the students needed to input the numbers of matrix and the result would be displayed in just one click. Unfortunately, they might not understand the procedural counting method of the matrix operation. Besides, they would less understand the elements of matrix, especially those that were useful for counting matrix. The subject neither asked them to identify the material nor constructed the concept. Otherwise, she directly explained it using the application. In this case, the students were her classmates who had already understood the procedural steps of how to solve matrix problems. In fact, when it came to high school graders, they might not understand the material well. In **processing phase**, the subject did not fully assist the students to thoroughly understand the material. She should have asked the students to *construct the concept according to her instruction*, but it was not apparent since the application automatically displayed the final answer. They just needed to read the answer without needing to construct the concept.

In **exploration phase**, the subject showed her promote action by *asking the students to apply the concept of solving all the given problems under her assistance*. *The students could also use the application to solve the given problems.* The task should be completed in group. She divided them into two groups, and gave them a group task. They were divided randomly. Given that it was an online teaching, the subject observed the group work via group chat. She made a WhatsApp group chat which members consisted of the students and the subject. The task was displayed in the form of power point via zoom meeting and the subject began to observe the process of discussion through group chat.

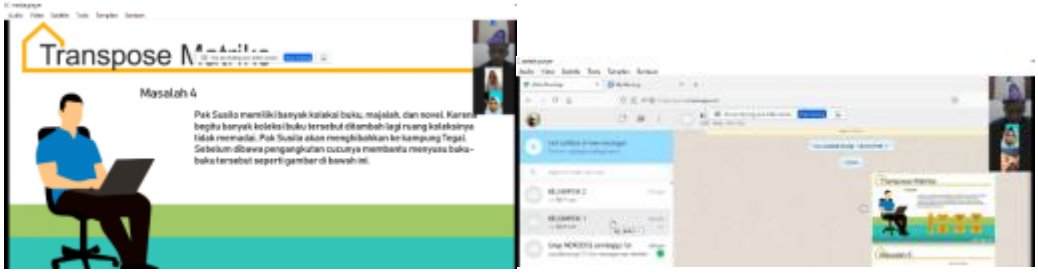


Figure 4. Students were asked to complete a group task.

The discussion was held very well. It was found from the students' active participation in each group chat. Some students asked some questions to their group mates

and the subject. The other group mates responded their questions. As students had already been familiar with WhatsApp, they had no problem of using the application. In this phase, the students were able to follow the subject's instruction well.

After they held the group activity, the subject gave them another task as their next activity. She aimed to identify the students' understanding by asking them to complete the task individually. The task was displayed in the form of PPT via zoom meeting. She asked them to complete the task through application. She gave them some minutes to complete the task individually. The task was given one by one. She then asked them to present their work. They could choose the method, either manual or using application, to complete the task. However, if they decided to use the application, they could not be able to explain in detail the process of solving the problem since the application automatically displayed the final result. In this case, Subject 1 did not show any promote action in motivation phase. She immediately closed her teaching when all the tasks had been complete and discussed together.

Figure 5. Subject 1 asked the students to complete the given task individually

Promote Action by Subject 2

Subject 2 chose *relations and function* as the material of her teaching. Her *PCK* level was 0-1. She began her teaching activity with **motivation phase** by conveying the teaching objectives and the importance of learning this material. The promote action she showed here was *giving questions to explore and correlate with the previous material.*

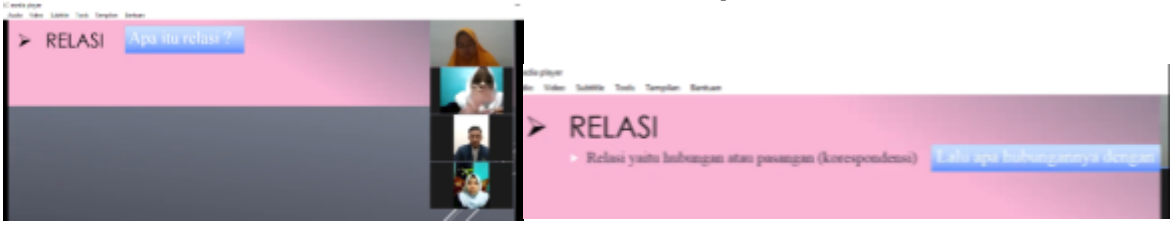


Figure 6. Subject 2 correlated with the previous material.

Relations and function was not new for students. Therefore, when Subject 2 proposed a question "what it relations? ", many students could answer the question. Some of them could answer correctly, however, some other were wrong. Towards the students' wrong answers, Subject 2 immediately corrected their answers without giving the questions away to the other students, hoping that they would give a correct answer. Towards the students' correct answer, the subject gave reinforcement and compliment to them.

After responding the students' answers, Subject 2 then explained the answer of the question theoretically. During the explanation, what made it interesting was in **concentration phase**. In this phase, the teacher directed the students' attention and focus on the main substance of material being discussed. The *promote action* she proposed here was *emphasizing by underlining the main substance of material being discussed including each nature of relations.* She marked the important parts of what she wrote. She also underlined some headlines. Since she gave a lot of description on the slides of PPT, she needed to mark and underlie the important concepts of them.

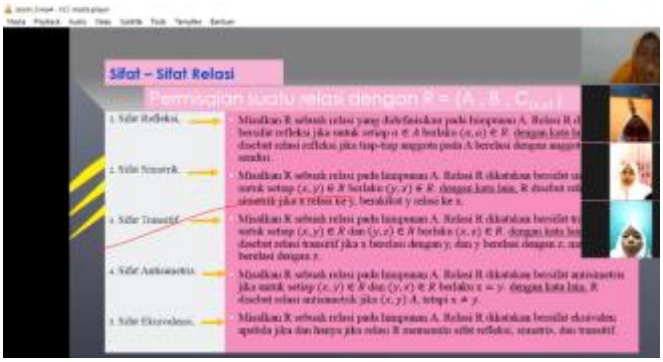


Figure 7. Subject 2 underlined the important parts

Subject 2 went on to **exploration phase** that aimed to encourage students to attain their expected learning output. The *promote action* she showed was *asking them to use the concept of relations to solve the problem.* The students should complete the task individually. In addition, Subject 2 only gave two tasks displayed via zoom meeting.

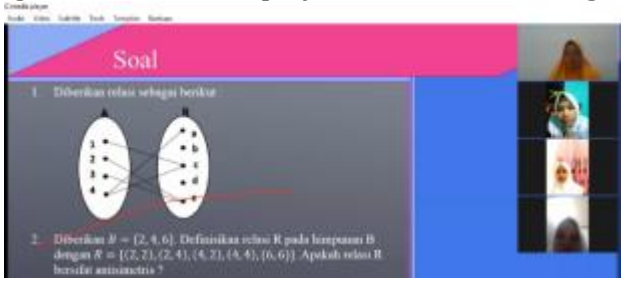


Figure 8. Subject 2 asked the students to solve the given problems

After asking the students to complete the given tasks, Subject 2 checked their works through students' work presentation. Every student completed the given tasks. However, they needed more time to complete the tasks. It was seen from how many times the subject asked them whether or not they completed their tasks, and they said '*not yet*'. This longer time that students needed to complete the tasks indicated that they actually found difficulty but not conveyed in class. The subject then went on to *function*.

Figure 9. Subject 2 went on to *function*

Subject 2 displayed the material in complete, neat and systematic way using PPT. However, she only read them without giving any explanation at all. Although she could actually ask the students to construct a concept about function, she ended up with solely asking them to listen to what she read. In **concentration phase**, she could give some emphasis by underlining the important parts although she only read the material which was in the form of an example task about algebraic function. This emphasis was aimed to make the students focus on what she read. Indeed, what she did here was interesting. Subject 2 then went on to **exploration phase** by *asking the students to use application to draw a graphic of simple algebraic function.* The application she used was *Geogebra*.

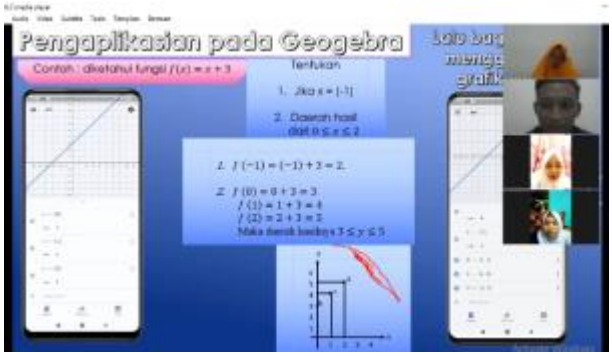


Figure 10. Subject 2 used Geogebra to draw the graphic of algebraic function

Subject 2 explained how to draw a graphic using Geogebra. In **exploration phase**, *the students used media or mathematics instrument.* The media she used was actually interesting as it could create a graphic which process often brought difficulty to students. However, she was less interactive in delivering the instruction of operating Geogebra. Since the students only listened to what teacher read, not all of them understood on how to use Geogebra to draw a graphic of algebraic function. Geogebra was actually interesting to apply. Nevertheless, the students were not asked to demonstrate the application to draw a graphic since it was still the teacher-centered explanation. Hence, the subject could not measure whether or not the students understood on how to use the application.

Subject 2 asked the students to correct the graphic resulted from Geogebra. Unfortunately, they could not respond what she asked for optimally since they had not tried the application yet. Hence, only few of them gave responses. In this case, the subject still had to actively assist the students. She did not implement a **feedback phase** in her teaching process as she did not ask the students to conclude the material they discussed in that meeting.

Promote Action by Subject 3

Subject 3 was classified into level 1 for her pedagogical knowledge and level 0 for her content knowledge. The author recorded her teaching activity and made an analysis on it. Towards her teaching activity, Subject 3 began with giving a question about the previous material.

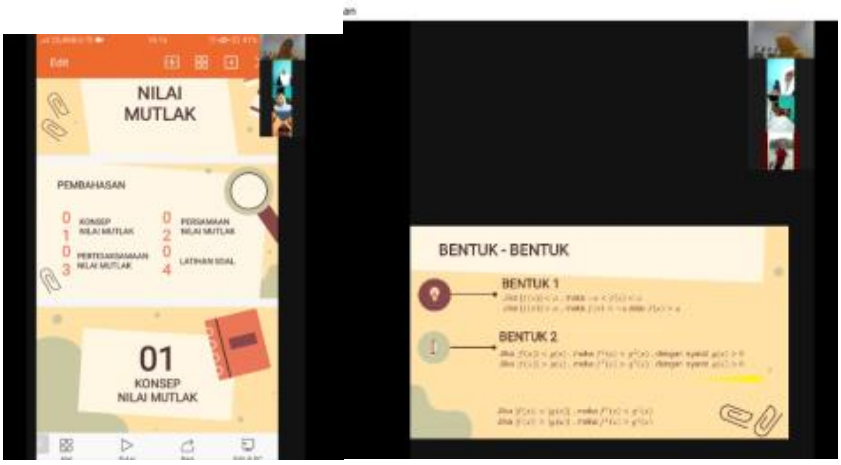


Figure 11. Subject 3 gave a question about the previous material

The material was about absolute value. Subject 3 asked the students about the previous material which was about the concept of absolute value. In **motivation phase**, she showed her promote action by *asking the students to correlate a given example with the material to*

be discussed. Along with an example of a kid having a scout practice by moving back and forth, Subject 3 gave a question "what is the concept of absolute value according to the example?". She gave some illustration to remind them. in **concentration phase**, she showed a promote action by *asking the students to identify the scope of the material as the initial description.* After they got their memory about the concept of absolute value, the subject went on by asking them to identify the types of absolute value. She gave some types and asked them to identify the features and the types of the absolute value. During the process of teaching, the subject always gave as much as chances for the students to ask questions. When none of them asked any question, she sometimes gave a question while choosing one of them to answer the question. It was aimed to direct their attention to the material being discussed. If their answer was correct, she would give reinforcement and compliment. Otherwise, if their answer was wrong, the subject would assist them to find the correct answer.

Subject 3 implemented **exploration phase** in her teaching process in order to make students reach the expected output. She showed a promote action by *asking the students to utilize a learning media such as worksheet, learning instrument, and other mathematic media.* This phase was held by means of learning media. The subject showed that the application she used was *cymath*.

Figure 12. Cymath, the application that students had downloaded

The subject waited and made sure that every student had installed the application, *cymath*. Afterward, she made a simulation of how to use the application by inputting the type of absolute value to be completed. The final answer along with the detail explanation would automatically appear in just one click. Furthermore, *the subject also assisted the students to solve the given problem.* She had good interaction with them. In addition, she ensured that the students could totally operate the application. Next, the subject asked the students to solve the given problem in order to see how far they had understood the material.

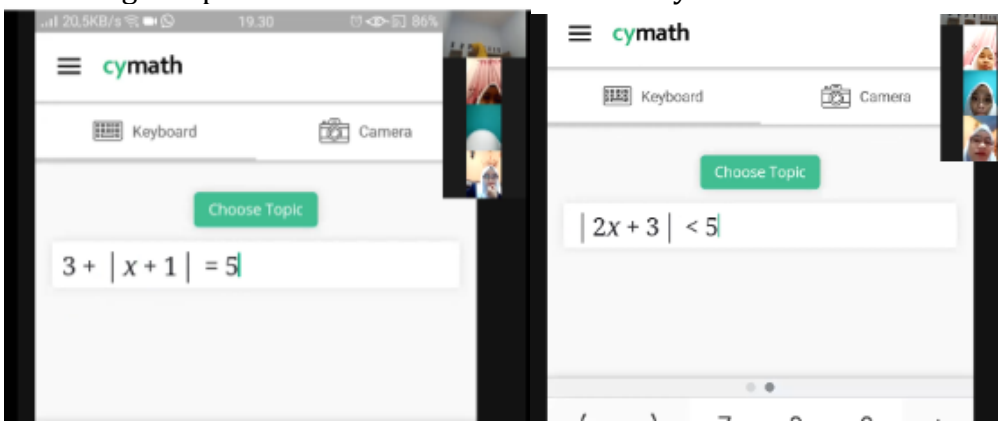


Figure 13. Subject 3 asked the students to solve the given problem

Subject 3 asked the students to use the application and the concept of absolute value in order to solve the given problem. It was classified into **exploration phase**, in which *the students applied the given concept to solve problem.* Every student was then able to solve problems and showed the correct answers. It also indicated that the teacher could deliver the material well, and thus the students could totally understand it. She did not show any feedback phase. It seemed from how the students had no instruction to conclude the material being discussed.

Promote Action by Subject 4

Subject 4 was in level 1-1 for pedagogical knowledge and content knowledge. She began her teaching activity with **motivation phase** by *exploring the students' knowledge through some questions.* The material to be discussed was logarithm. She began the phase by asking a question "what is logarithm?".

Figure 14. Subject's question to the students in the initial process of teaching

The subject chose some students to answer the question. She aimed to see their initial insight. The responses were vary. Some of them kept silent, some gave wrong answer, and some other gave answer that was close with the correct one although using their own words. After each student gave their answer, the subject explained about what logarithm was while giving reinforcement to their responses. Afterward, she went on to the features of logarithm.

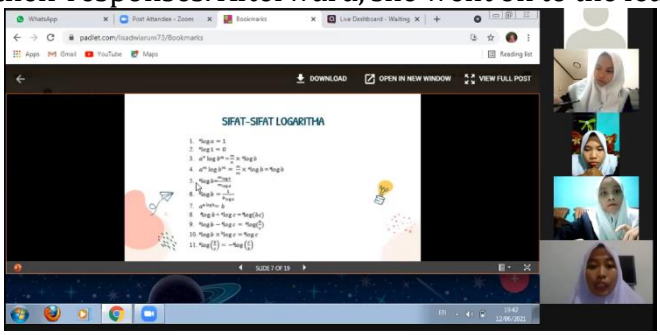


Figure 15. Subject 4 asked the students to identify the features of logarithm

In **concentration phase,** the subject showed her promote-action by *asking the students to identify the features of logarithm displayed.* They were asked to see and show the differences among each feature. At first, the students worked together to identify the features until the subject gave questions to each of them individually. Luckily, they could identify the features under her instruction. Eventually, the students could successfully understand the features of logarithm. Then, Subject 4 went on to the next phase by giving them problems with logarithm features.

Figure 16. Subject 4 gave a task about logarithm feature

In **processing phase,** Subject 4 showed her promote action by *asking the students to construct the concept of material being learned.* The students constructed the concept of logarithm based on powers of numbers. They constructed the concept by addressing the subject's questions. In storing phase, furthermore, Subject 4 conveyed that what they were learning should always be well memorized. In **exploration phase**, she asked the students to apply the concept they constructed to solve the given problems. She gave them six problems to be solved and immediately discussed. Those problems were all related to the features of logarithm. In the process of addressing the problems, she called the students one by one to immediately solve the problem and mention which feature they used. However, she would assist the student who felt difficult to find the correct answer. As those problems were immediately discussed, the students could also immediately see whether their work was correct or wrong. The subject asked them to correct their work once they found that their work was wrong. Subject 4 identified the students' performance and assisted those who found difficulties in understanding the material.

In **exploration phase**, the subject assisted the students to reach their expected performance/output through learning media. She made an interesting media in order to encourage students' motivation to learn mathematics. Besides, she also facilitated them to discuss the given problems and corrected their answers together.

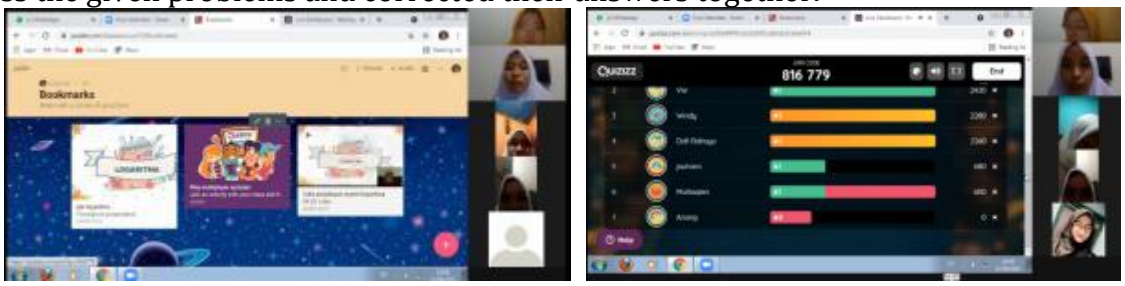


Figure 17. Subject 4 utilized media as means of teaching

Subject 4 used *padlet* as means to explain logarithm. It contained material to be discussed in the form of PPT along with some problems displayed as quiz. The students were interested in that media, and thus, motivated to study as the physical appearance of the media was interesting, in addition to the complete content within. At the end of teaching, the subject directly ended the class meeting without asking the students to conclude the material being discussed.

Discussion

This study aimed to see any promote actions that prospective teachers might show during their mathematics teaching practices. The research selected the subject based on the level of their PCK. The result found that those four subjects with different level of PCK had different teaching output as well. In general, subjects with lower pedagogical and content knowledge taught using a simple method and applied the procedures of teaching. The higher

the PCK, the method of teaching became simpler and to-the-point. In addition they would take more effort in exploring media.

Those four subjects showed promote actions in their motivation phase of teaching process by conveying their teaching objectives. Furthermore, they also gave questions related to the particular materials in order to explore their students' initial knowledge. This was important as they should consider their students' learning experience (Goos & Bennison, 2008). Students' initial insight and learning experience might help the students to construct new insights. It was consistent to constructivist perspective that teachers should give chances to students to construct their own knowledge actively by considering their initial insights (Sa'dijah, 2001). Next, the subjects delivered their teaching material by means of media, which was inseparable from online teaching and learning process. It was consistent to further study that media could facilitate students to get concepts and experience by their own or through experiments. The four subjects also gave a lot of tasks to complete, either in group or individual. It aimed to drill students with exercises in order to make them totally understand the given material, in addition to having problem-solving. Teaching mathematics was indeed familiar with lots of task (Goos, 2012). Therefore, the subjects let the students to complete the tasks using various ways. However, the subjects would immediately assist their students once they got lost or stuck. It was consistent to a study that it would bring positive vibes if teachers let their students free with their own thinking (Hussain, Monaghan, & Threlfall, 2011).

Various promote actions and a variety of teaching depended on the prospective teachers' competence and creativity reflected on their PCK, which also depended on their academic competence (Aminah & Wahyuni, 2018; Gilang, Santosa, Kusumaningsih, & Endahwuri, 2019; Maryono, 2016). Subjects or prospective teachers with PCK level at 0 could still develop their competence by either developing materials or extending the frequency of teaching practice in order to gain more experience and improve their PCK level (Aminah & Wahyuni, 2018; Jatisunda & Kania, 2020).

Conclusion

The result of this current study found that those four prospective teachers with different PCK level had different competence as well in generating their promote actions. Each of those subjects had implemented the phases of teaching process. However, they had different way in delivering materials. Prospective teachers with higher content knowledge could present the material completely and systematically. They could also generate more promote actions related to the materials. Unfortunately, they were less interactive with students. They tended to focus on exploring rather than teaching. It was totally different from prospective teachers with higher pedagogical knowledge who tended to present the material in simple way. Although they only gave brief explanation, they actively generated more promote actions, either through media or directly interacting with students. Finally, further researches could describe prospective teachers' promote actions during the teaching practice at schools, in addition to any improvement of teaching for prospective teachers with lower PCK. Besides, further researches could also consider blended learning which might evoke different promote actions by prospective teachers

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2. Bukti Permintaan Revisi 1
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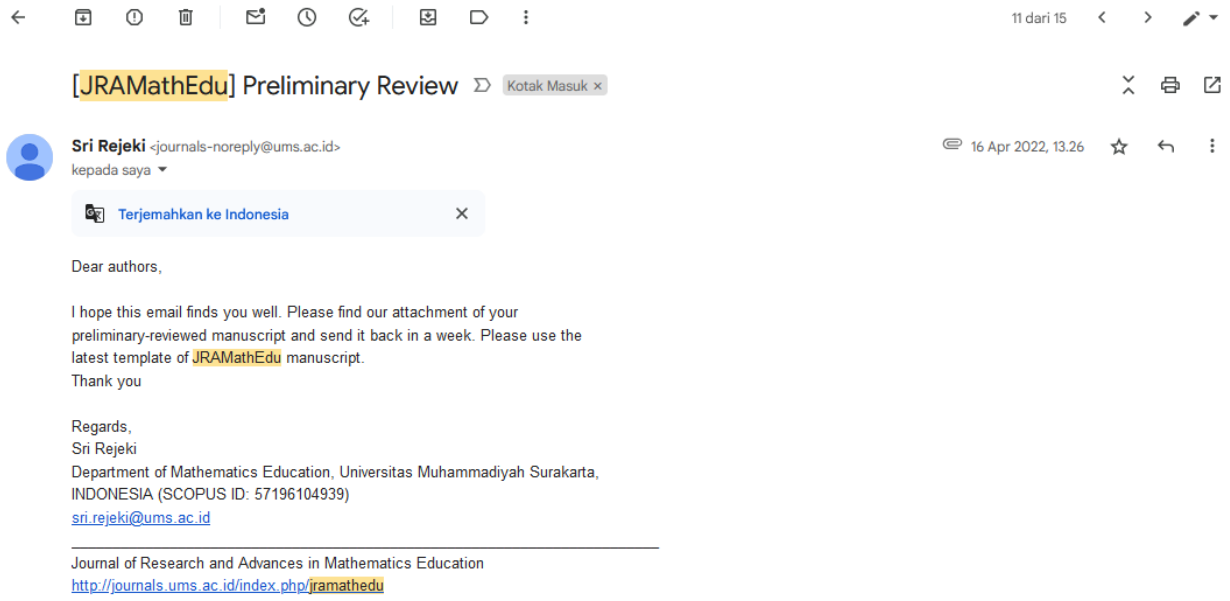

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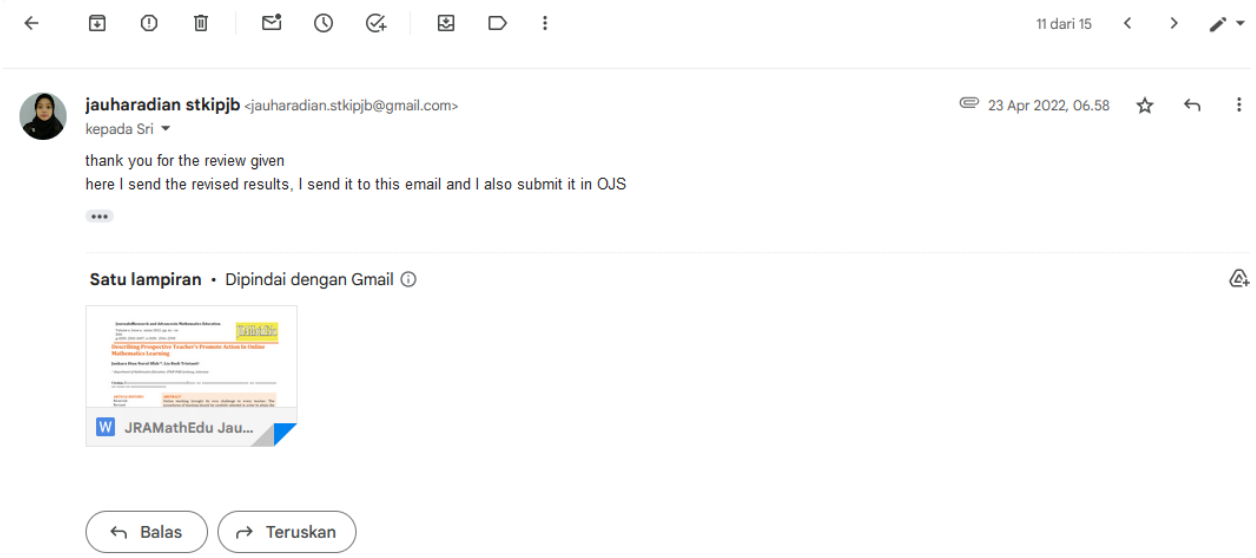

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JournalofResearch and Advancesin Mathematics Education

Volume x, Issue x, xxxxx 2022, pp. xx – xx
DOI:
p-ISSN: 2503-3697, e-ISSN: 2541-2590

Describing Prospective Teacher's Promote Action In Online Mathematics Learning

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Citation:*XxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxXxxxxx xxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxx xxxxxxxxxxxxxxx xxx xxxxxx xxx xxxxxxxxxxxxxxxxxxxxxxxx*

ARTICLE HISTORY:
Received
Revised
Accepted
Published

KEYWORDS:
Prospective Teacher
Promote Action
Online Learning

ABSTRACT
Online teaching brought its own challenge to every teacher. The procedures of teaching should be carefully selected in order to attain the expected teaching goals. It was a must for prospective teacher to prepare themselves as well as possible to become a professional teacher since they decided to take their educational major. Hence, this study aimed to describe the promote action of prospective teachers in mathematics teaching. It was a descriptive-qualitative research that took four students who were in peer-teaching program as the subject. They were selected based on the criteria of subject's PCK (Pedagogical Content Knowledge) which categories involved 0-0, 0-1, 1-0,1-1 on content-knowledge-pedagogical knowledge. It used *vignette yang*, which was a sheet that identified prospective teachers' Pedagogical Content Knowledge, in addition to observation sheet of teaching. The author gave the *vignette* to subject candidates and then classified them based on their responses to *vignette*. The author finally selected four subjects and observed their mathematics online teaching. The result found that every subject showed their promote action in every single phase of students' learning. However, those with highest pedagogical knowledge had more various promote actions rather than those with highest content knowledge who were good at delivering materials but less in having interaction with students.

INTRODUCTION

The development of teaching method from conventional to more creative and innovative ones had been implemented in some schools. Thus, teachers should have good competence in teaching to reach good learning outputs for students. They might apply various teaching models to deliver their course. Of course, it should be carefully considered for the sake of any expected goals. Some factors to be considered involved the attainment of learning outputs, learning environment, and operational cost (Anggrawan, 2019). Good teaching models generated good learning outputs, as well as conducive learning environment, and affordable operational cost. This current pandemic era of covid-19 made teaching activities shift from offline to online. A previous study suggested that students who were good in offline learning should get their teeth in online learning. One thing that would never be substituted from offline learning was meaningful interaction between teacher and students (Tang et al., 2013). No interaction brought less learning experiences among students, and thus they would feel difficult to understand the course(Mairing et al., 2021). Online learning tended to give more tasks to students and less explanation by

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teachers. A lot of tasks and limited explanations made online learning seem to be less effective for students(Giatman et al., 2020; Suryaman et al., 2020).

Some other factors of considering teaching models and the attainment of optimal learning outputs were conducive environment and affordable cost and facility. Towards online learning, students needed to have stable internet connections, capability to operate technology, and supporting devices. Particularly to students in villages, they had serious problem on internet connection (Mulyanti et al., 2020; Putra et al., 2020). This problem, however, could be addressed by students' autonomous learning along with their confidence in problem solving(Mairing et al., 2021).

Teachers' capability to do a good teaching while adapting with online technology was necessary. Therefore, they should have four kinds of competences including: pedagogy, personality, social, and professional (Kemdikbud, 2005). Among those competences by the Ministry of Education and Culture, it mentions *Pedagogical Content Knowledge* (PCK) that combined *pedagogical knowledge* with *content knowledge*. *Pedagogical knowledge* related to class management, tasks, students, and class teaching(Shulman, 1986). It was in line with teachers' pedagogical competence by Act No. 74/2008, that teachers' pedagogical competence referred to the competence of students teaching management that at least included the comprehension of education base or insights, the comprehension of students, curriculum/syllabus development, teaching design, educated and dialogic implementation of teaching, technology utilization, evaluation on learning result, and student development to actualize their various potencies.

Towards *content knowledge*, it referred to one's knowledge about a concept, theory, the framework of thought, and argumentation (Shulman, 1986). Similarly, teacher professional competence based on Act No. 74/2008 mentioned that professional competence is teachers' capability to master the knowledge of science, technology, art, and culture they are teaching to, at least, including the mastery of the course materials in thorough way according to the content standard of education program, a subject matter, and group of subjects to be taught, the relevant concept and method of art, technology, scientific disciplines which was conceptually coherent to an education program, subject matter, and group of subjects to be taught.

Krauss *et.al*. identified three dimensions of PCK which were important for teaching mathematics. Those three dimensions were teachers' knowledge about math tasks, students' initial knowledge (i.e., any difficulty and misconception) and representation, analogy, illustration or models of math content that would be useful to be taught(Krauss et al., 2008). Teachers' PCK might determine the process of teaching and finally affect students' learning outputs(Olfos et al., 2014). Developing and selecting tasks, representing and explaining, facilitating a productive discussion, interpreting students' responses, emphasizing students' understanding as well as analyzing their misconception and difficulty appropriately are the elements that underlie PCK (Ball et al., 2001). Another argument claimed that among content, curriculum, and teaching, "the knowledge of teaching" was the basic component of pedagogical content knowledge(An et al., 2004). Some researchers argued that to be a successful math teacher, it needed a strong foundation on pedagogical content knowledge, referring to a kind of professional knowledge for teaching specific branch of knowledge(Wilson et al., 1987, 2016). Overall, those all descriptions show that PCK is important for teacher.

Furthermore, some studies showed that the comprehension of teaching mathematics to reach a qualified education is a specific professional knowledge that could be obtained through trainings in university and be developed through reflection on teaching practices(Fennema & Romberg, 1999; Grossman, 2008; Morris et al., 2009). Therefore, prospective teachers got materials about theories of teaching and learning in order to give

them knowledge about teaching. More specifically, prospective math teachers also had chances to do teaching practices to implement any theories they had learned before. The importance of having teaching practices was to make them familiar with the real teaching circumstance. Hence, they should prepare themselves since they were in college. To teach mathematics, it did not only need good knowledge about mathematics contents, but also pedagogical knowledge(Turnuklu & Yesildere, 2007). Therefore, since in college, prospective teachers should learn about any competences of being a good teacher both theoretically and practically in order to be a good professional teacher. This indicated the importance of identifying prospective teachers' PCKto prepare them to be a professional teacher.

Teachers might apply various models and methods of teaching during the process of their teaching. They took their decision by previously considering some matters such as the difficulty of materials to be taught, students' characteristics, and adequate facility(Lui, 2012). Students' different characteristics and competences was the main concern for teachers. Every student had their own learning style and speed which may become a challenge for teachers to give an appropriate teaching that covers all those diversity. Once teachers ignored students' diversity, their teaching would be less effective.

The standard of professionalism as mathematics teachers was by shifting their teaching method from teacher-centered to student-centered.

> "Five fundamental shifts in teaching mathematics to develop students' mathematical competence were: 1) changing the circumstance of class from merely a group of students to mathematics community; 2) taking mathematical arguments and logics as a justification tool and avoid teacher authority to define a truth; 3) emphasizing understanding rather than solely memorizing the procedures; 4) considering to making hypotheses, finding, and problem-solving as well as avoiding any pressures on finding mechanical answers; 5) relating mathematics with ideas and its applications, and not treating mathematics as a set of isolated concepts and procedures" (NCTM, 2000).

Apparently, the second and the fifth shifts showed that teachers should involve students in teaching process, and the involvement is related to connecting mathematics ideas. The procedure of teaching that might encourage students to be active was by promoting students to do an activity. This kind of activity was called teacher's promote action.

Promote action referred to any activities that mature individual promoted to children to do in particular way (Valsiner, 1983). What was promoted might vary. It could be in the form of things or activities that finally made the children do particular action. Promote action might also refer to activities that teachers promoted to their students for the sake of attaining new insights (Goos, 2005, 2012). A set of promote actions by a teacher to students in particular area was called zone of promoted action (ZPA). The process of teaching by a teacher had some procedures. However, not all of them were implemented, including ZPA. The procedures of teaching that dealt with ZPA referred to any activities which made student do or behave in order to attain new skills. In this case, the author limited the new skills on new competence, skill, comprehension, and development that student attained, given that mathematics at school was about developments since elementary grade.

Valsiner found that the main characteristic of ZPA was its non-binding nature. However, once ZPA had set but the children did not follow the promoted direction, but otherwise, they took another object with another way, it indicated that the children refused the ZPA, or they were out of the expected ZPA. This could be fixed by defining new ZPA. Given that teacher's ZPA was not binding, students' responses may either accept (i.e., *accepted promote action/ A-PA*) refuse (i.e., *rejected promote action/R-PA*) or respond in pseudo way (i.e., *pseudo promote action/P-PA*).

Accepted promote action (A-PA) was seen once the students followed the teacher's instruction, had active participation, and gave their focus on what they were learning. Rejected promote action (R-PA) was seen from students' negative responses such as ignoring their teacher's instruction and having another activities out of what they were learning. Pseudo promote action was seen from students' behavior as if they accepted their teacher's promote action, but in fact they rejected them all, as well as the vice versa(Iffah et al., 2017). Some previous studies had discussed about *zone of promoted action* (ZPA) in both medical and school areas (Bennison & Goos, 2013; Galligan, 2008; Goos & Bennison, 2008; Iffah, Sutawidjaja, Sa'dijah, et al., 2016; Iffah, Sutawidjaja, Sadijah, et al., 2016). Another study conducted on mathematics students found that lecturing by implementing Valsiner's theory might convince them on probability course(Tirto et al., 2019). Furthermore, studies about prospective teachers' PCK had been done before although they solely described on how the PCK was, not yet leading to how the prospective teachers learn to teach(Ayuningtyas & Apriandi, 2019; Gultom & Mampouw, 2019; Irfan et al., 2018; Makaraka et al., 2021). The novelty of this current study was the author detected and described *promote action* by prospective teachers when they hade teaching practice in secondary school. Furthermore, the author also considered prospective teachers' PCK as the criteria for subject selection. The author would make some categories of PCK and describe the promote action in a teaching process based on the PCK criteria.

Considering the issue described, the problem of this study was the presence of promote action (PA) by prospective teachers when they had teaching practices in secondary school. The teaching process was online via zoom meeting. The author identified the promote action of prospective math teachers whether it corresponded to the phases of teaching. The subjects of this study were selected by considering the students' PCK criteria. The result of this study could be useful to develop prospective teachers' competences and skills of teaching. In addition, lecturers might identify their students' PCK earlier in order to improve their students' PCK through lecturing in case that they had students with low skills.

METHODS

The author applied descriptive-qualitative research to describe the promote action of prospective math teachers in their teaching practice. The subject of this study was four students of SKIP PGRI Jombang who were in peer teaching program. For subject selection, the author gave them an initial test called *vignette*. It was a scenario/illustration that contained students' solutions, questions, arguments, confusion, misconception, or comments that teachers should responded(Ebert, 1993). With vignette test, the prospective teachers were asked to give their comments/responses on what students had written. Figure 1 showed the vignette test distributed to the subject candidates in order to identify their PCK.

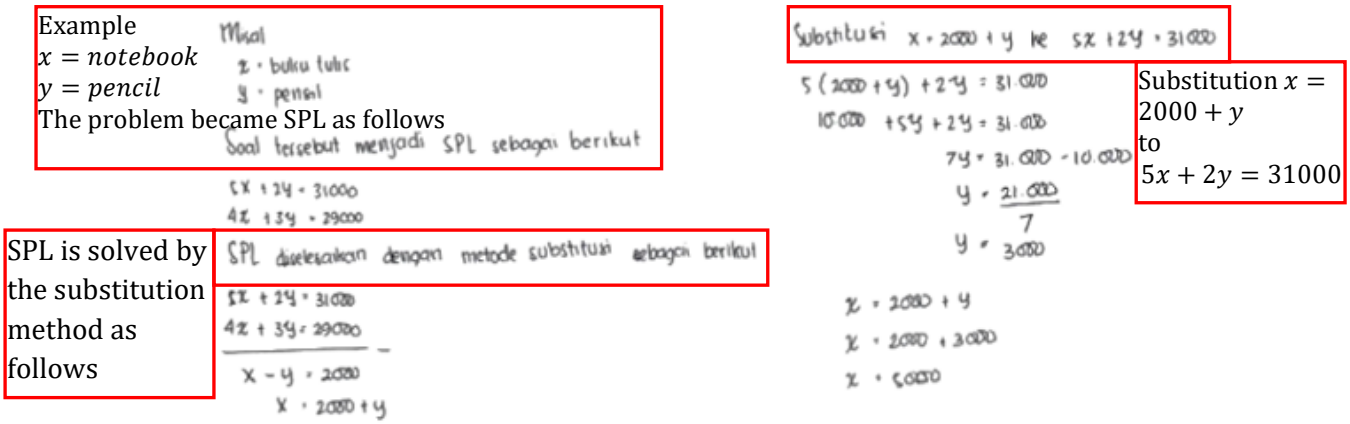
The author asked the subject candidates to write down their responses for point a-d on the vignette sheet. According to their responses, the author defined some criteria of PCK that the subject candidates had. The author used comments (Karahasan, 2010) to analyze the PCK of prospective teachers in this study. It was based on that this framework was the completion and combination of another framework. In this framework, there were 2 components of PCK. Those were pedagogical knowledge and content knowledge. Each of the components was classified into 3 categories, including: *less* (level 0), *moderate* (level 1), and *good* (level 2). Table 1 showed the characteristics of PCK that the author used for analyzing the prospective teachers' PCK, in addition to subject selection

Case 1

In a teacher's learning gives an example of a story about SPLDV as follows:

Firza bought 5 notebooks and 2 pencils in a shop, it turned out he had to pay Rp. 31,000. The next day Nisa bought 4 notebooks and 3 pencils in the same store, it turned out that the total price was Rp. 29,000. Any price of a notebook and a pencil in the store?

Furthermore, the teacher asks students to resolve the matter by first making the mathematics model. Here's the answer to one of the students named Ghildan:



After observing the case, answer the question below:

a. Write your comments on Ghildan's answer
b. Is there something wrong or less? Please provide a sign
c. If the answer has an error or lack, what is the actual answer?
d. How do you give an explanation to students about the right answer from the matter?

Figure 1. Vignette

Table 1
Criteria of PCK

Components of PCK	**Level 0 (*Less*)**	**Level 1 (*Moderate*)**	**Level 2 (*Good*)**
Content knowledge	Unable to express a definition correctly. Unable to use appropriate notation. Only use either declarative or procedural questions. Unable to interpret and use representation. Unable to see the connection among different topics/sub-units.	Able to express a definition correctly. Able to use notation appropriately. Still use either declarative or procedural questions. Able to interpret and use both graphic and non-graphic representation. Able to see the connection among different topics/sub-units.	Able to express a definition correctly. Able to use notation appropriately. Use any types of questions (including declarative, procedural, and conditional) appropriately. Able to interpret and use both graphic and non-graphic representation. Able to see the connection among different topics/sub-units, as well as taking a step between the connections carefully.
Pedagogical knowledge	Providing and demonstrating knowledge for students.	Not only providing any instructions or adequate procedures, but also assisting students to construct meanings and understanding.	Facilitating and assisting students, rather than providing answers along with its explanations.

	Introducing the procedures after the concept.	Seeing their roles as mentor, evaluator, and reminder.	Evaluating the students' understanding as well as enhancing their comprehension through questions that deal with further mathematical knowledge.
	Dominating any information.	Still dominating any information.	Appreciating and encouraging students to construct their mathematical knowledge through mathematical inquiry.
	Having problems in both topic and question orders during either the teaching process or teaching designing.	Only having problems on question order during either teaching process of reaching designing.	Ordering the topic material and questions/task appropriately.
	Feeling difficult to control and create a class with democratic vibe/circumstance.	Sometimes capable to control and create a class with democratic circumstance.	Controlling and creating a class with democratic circumstance.

Furthermore, the author determined the subject of this study. They were prospective teachers who were in peer teaching program. The subjects consisted of four prospective teachers with the following criteria:

Subject 1: pedagogical knowledge – content knowledge: level 0 – 0

Subject 2: pedagogical knowledge – content knowledge: level 0 – 1

Subject 3: pedagogical knowledge – content knowledge: level 1 – 0

Subject 4: pedagogical knowledge – content knowledge: level 1 – 1

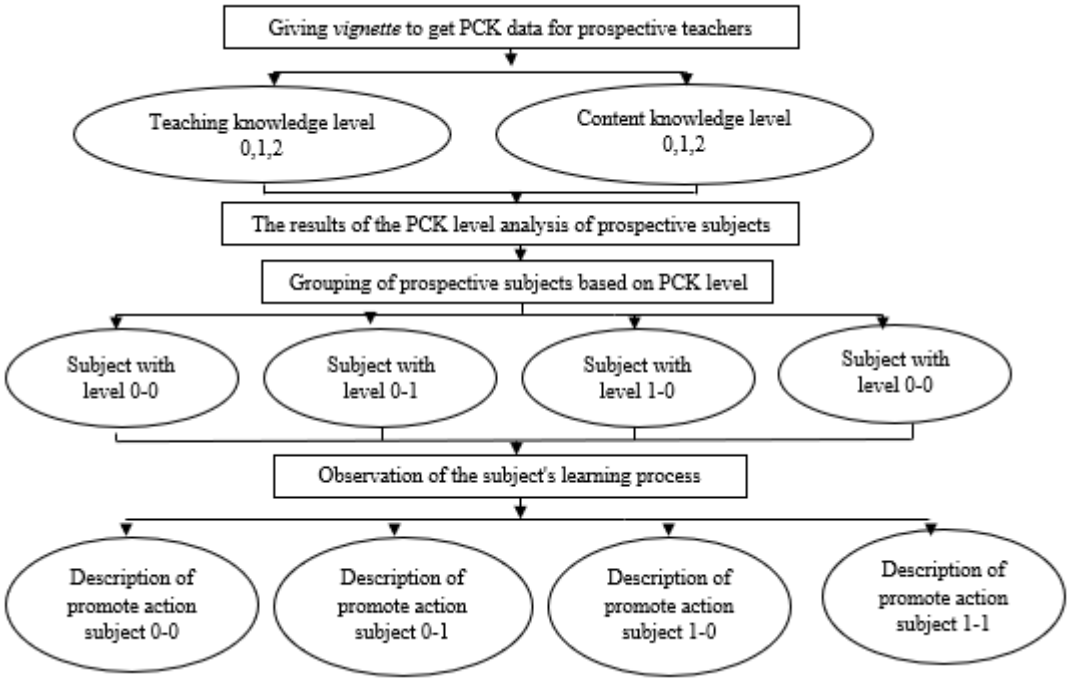


Figure 2. Research Procedure

This study used *vignette* sheet that aimed to identify the prospective teachers' PCK. This vignette was adopted from a previous study, and the author only took some parts that dealt with content knowledge and pedagogical knowledge. It corresponded to the subject candidates who just got this knowledge theoretically. For data collection that dealt with the subjects'*promote actions*, the author used an observation sheet which aimed to identify the subjects' promote action during their teaching practice. This observation sheet was the development result of the author's dissertation. It contained teaching procedures that corresponded to students' learning phases following (Winkel, 2007)and a set of promote actions that might appear in each procedures of their teaching practice(Iffah, Sutawidjaja, Sa'dijah, et al., 2016). Research procedures are presented in the following chart

FINDINGS

Promote action by Subject 1

Subject 1 implemented her teaching practice with her classmates playing a role as students. The author recorded the process of teaching and then analyzed the result. At ***motivation phase***, the promote action that should appear was *asking students to correlate a given example to the material to discussed*.However, it seemed that Subject 1 delivered the teaching objectives and asked the students about the previous material for their initial activity. She displayed her teaching objectives on the slides of power point. She conveyed that the current teaching objective was matrix operation. She directly conveyed the objective without asking the students to correlate the example with the material to be discussed. Next, the subject *asked the student to explore their knowledge through some questions related to the previous material.* She then asked them some questions that dealt with the definition of matrix and the types of matrix. These questions were for all students in class. She asked these questions to identify whether the students had already understood the previous material. Nevertheless, none of the students responded her question. They claimed that they forgot, did not understand yet, and even some of them decided to no give any response.

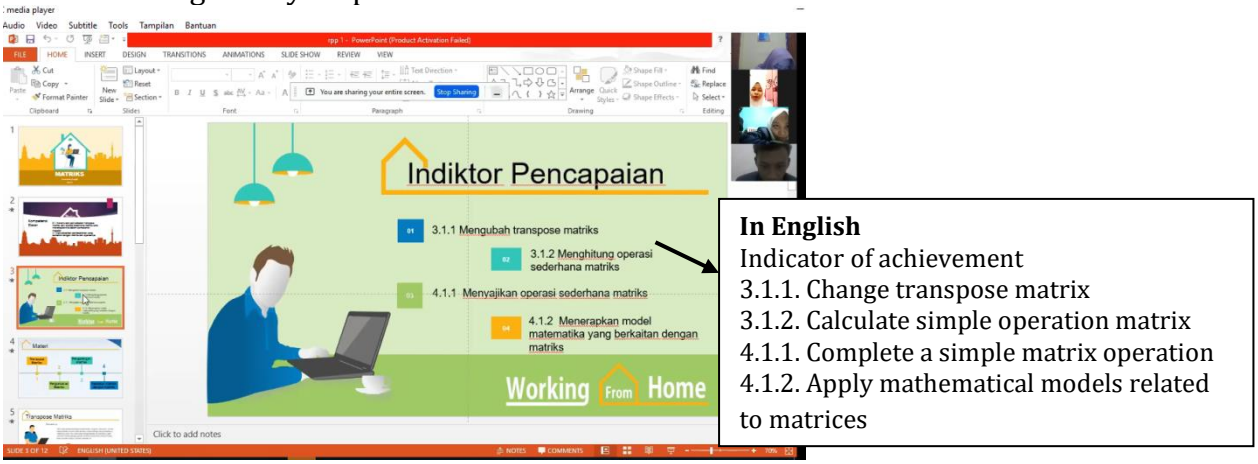


Figure3. Subject 1 expressed the teaching objectives and proposed some questions

Since the students could not address her questions, she briefly re-explained the answers of the questions. In this case, she did not assist them to get the answer but directly re-explaining them. It seemed that Subject 1 was less in exploring the students' competence. In fact, this point is vital to detect students' initial competence, whether or not they were ready to get further material. However, the subject had gone through the initial phase of her teaching, which was apperception (in accordance to the teaching plan she had designed) although it was less optimal.

The next phase of teaching activity was about delivering material. It was **concentration phase**. The subject applied zoom meeting and an application of matrix operation. This application had already been installed by students from Google Play Store via their own smartphone. The *promote action* that appeared was *asking students to prepare the learning instrument.* The subject asked them to install the application a day before having the zoom meeting. *She identified the scope of material* by making a voice recording that explained the material. When it came to explaining the material, hence, she played the recording during zoom meeting. It was not only explaining the material being discussed, but also about how to operate the application. She solely utilized the application to explain the material without having any other procedural explanation. The students only focused on the explanation and the application. With this activity, the subject successfully delivered the material. However, it was considered incomplete, as she did not give any procedural explanation. This made students difficult to thoroughly understand the explanation of matrix operation. The application might display the answer along with the method. But, the teaching process seemed less meaningful when the students had no idea about the roots of the solution displayed. The procedural process of attaining the solution remained necessary for students, given that they would not always be allowed to use the application for problem solving.

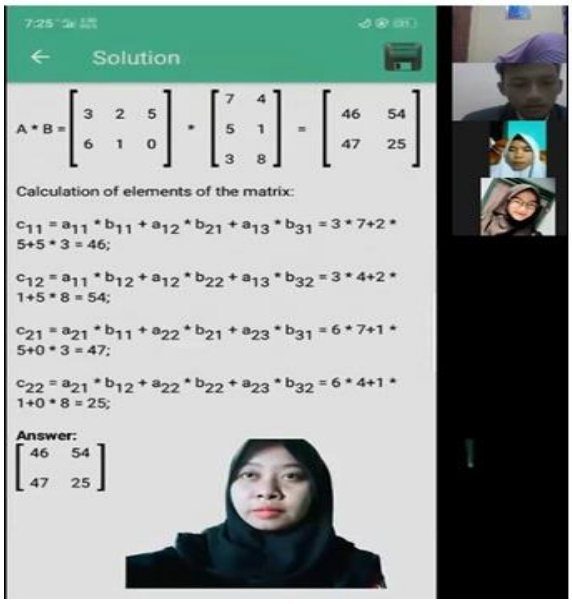
Display the subject in zoom meeting	Her explanation
	The subject reads the numbers entered in the application and the end result out of the application

Figure 4. Subject 1 explained about the material being discussed via an application

She explained the material via by using the application, and the students needed to input the numbers of matrix and the result would be displayed in just one click. Unfortunately, they might not understand the procedural counting method of the matrix operation. Besides, they would less understand the elements of matrix, especially those that were useful for counting matrix. The subject neither asked them to identify the material nor constructed the concept. Otherwise, she directly explained it using the application. In this case, the students were her classmates who had already understood the procedural steps of how to solve matrix problems. In fact, when it came to high school graders, they might not understand the material well. In **processing phase**, the subject did not fully assist the students to thoroughly understand the material. She should have asked the students to *construct the concept according to her instruction*, but it was not apparent since the application automatically displayed the final answer. They just needed to read the answer without needing to construct the concept.

In **exploration phase**, the subject showed her promote action by *asking the students to apply the concept of solving all the given problems under her assistance*. *The students could also use the application to solve the given problems.* The task should be completed in group. She divided them into two groups, and gave them a group task. They were divided randomly. Given that it was an online teaching, the subject observed the group work via group chat. She made a WhatsApp group chat which members consisted of the students and the subject. The task was displayed in the form of power point via zoom meeting and the subject began to observe the process of discussion through group chat.

The discussion was held very well. It was found from the students' active participation in each group chat. Some students asked some questions to their group mates and the subject. The other group mates responded their questions. As students had already been familiar with WhatsApp, they had no problem of using the application. In this phase, the students were able to follow the subject's instruction well.

After they held the group activity, the subject gave them another task as their next activity. She aimed to identify the students' understanding by asking them to complete the task individually. The task was displayed in the form of PPT via zoom meeting. She asked them to complete the task through application. She gave them some minutes to complete the task individually. The task was given one by one. She then asked them to present their work. They could choose the method, either manual or using application, to complete the task. However, if they decided to use the application, they could not be able to explain in detail the process of solving the problem since the application automatically displayed the final result. In this case, Subject 1 did not show any promote action in motivation phase. She immediately closed her teaching when all the tasks had been complete and discussed together

Promote Action by Subject 2

Subject 2 chose *relations and function* as the material of her teaching. Her *PCK* level was 0-1. She began her teaching activity with **motivation phase** by conveying the teaching objectives and the importance of learning this material. The promote action she showed here was *giving questions to explore and correlate with the previous material*

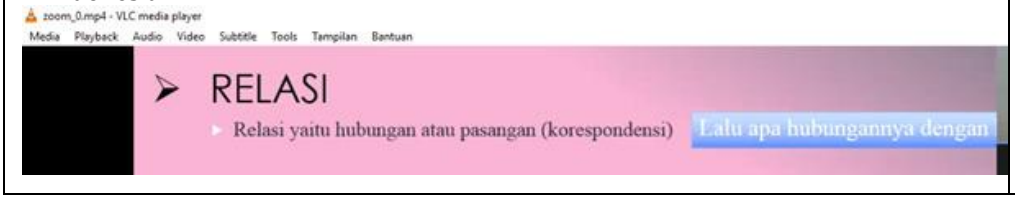
In Indonesia	In English
	Relation relationship i.e. relationship or partner (correspondence)

Figure5. Subject 2 correlated with the previous material

Relations and function was not new for students. Therefore, when Subject 2 proposed a question "what it relations? ", many students could answer the question. Some of them could answer correctly, however, some other were wrong. Towards the students' wrong answers, Subject 2 immediately corrected their answers without giving the questions away to the other students, hoping that they would give a correct answer. Towards the students' correct answer, the subject gave reinforcement and compliment to them.

After responding the students' answers, Subject 2 then explained the answer of the question theoretically. During the explanation, what made it interesting was in **concentration phase**. In this phase, the teacher directed the students' attention and focus on the main substance of material being discussed. The *promote action* she proposed here was *emphasizing by underlining the main substance of material being discussed including each nature of relations.* She marked the important parts of what she wrote. She also underlined some headlines. Since she gave a lot of description on the slides of PPT, she needed to mark and underlie the important concepts of them.

Subject 2 went on to **exploration phase** that aimed to encourage students to attain their expected learning output. The *promote action* she showed was *asking them to use the concept of relations to solve the problem.* The students should complete the task individually. In addition, Subject 2 only gave two tasks displayed via zoom meeting.

After asking the students to complete the given tasks, Subject 2 checked their works through students' work presentation. Every student completed the given tasks. However, they needed more time to complete the tasks. It was seen from how many times the subject asked them whether or not they completed their tasks, and they said '*not yet*'. This longer time that students needed to complete the tasks indicated that they actually found difficulty but not conveyed in class. The subject then went on to *function.*

Subject 2 displayed the material in complete, neat and systematic way using PPT. However, she only read them without giving any explanation at all. Although she could actually ask the students to construct a concept about function, she ended up with solely asking them to listen to what she read. In **concentration phase**, she could give some emphasis by underlining the important parts although she only read the material which was in the form of an example task about algebraic function. This emphasis was aimed to make the students focus on what she read. Indeed, what she did here was interesting. Subject 2 then went on to **exploration phase** by *asking the students to use application to draw a graphic of simple algebraic function.* The application she used was *Geogebra.*

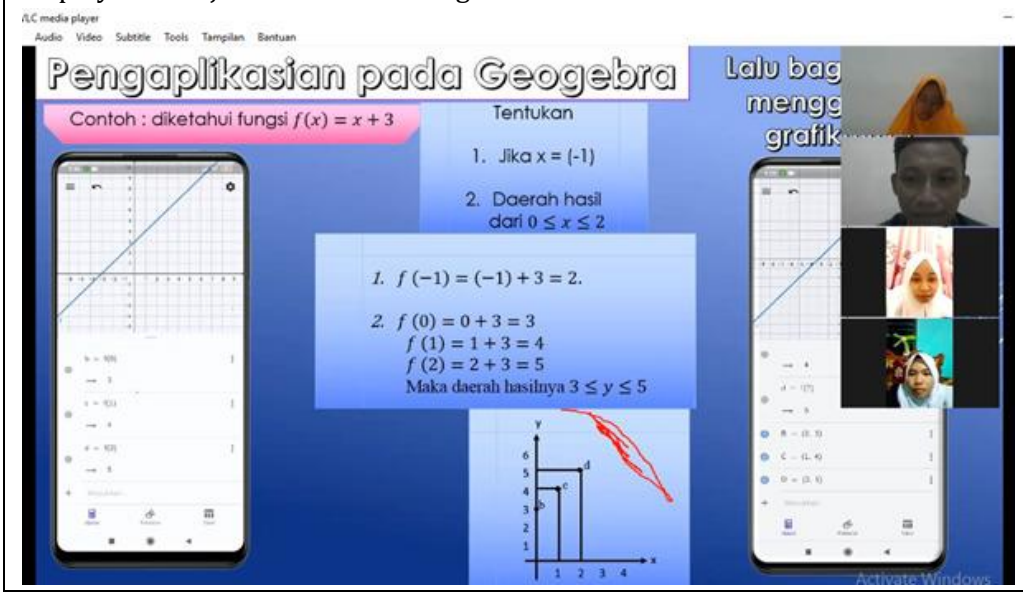
Display the subject in zoom meeting 	His explanation operation on geogebra subject simulates how to draw a graph using the geogebra app

Figure6. Subject 2 used Geogebra to draw the graphic of algebraic function

Subject 2 explained how to draw a graphic using Geogebra. In **exploration phase**, *the students used media or mathematics instrument.* The media she used was actually interesting as it could create a graphic which process often brought difficulty to students. However, she was less interactive in delivering the instruction of operating Geogebra. Since the students only listened to what teacher read, not all of them understood on how to use Geogebra to draw a graphic of algebraic function. Geogebra was actually interesting to apply. Nevertheless, the students were not asked to demonstrate the application to draw a graphic since it was still the teacher-centered explanation. Hence, the subject could not measure whether or not the students understood on how to use the application.

Subject 2 asked the students to correct the graphic resulted from Geogebra. Unfortunately, they could not respond what she asked for optimally since they had not tried the application yet. Hence, only few of them gave responses. In this case, the subject still had to actively assist the students. She did not implement a **feedback phase** in her teaching process as she did not ask the students to conclude the material they discussed in that meeting.

Promote Action by Subject 3

Subject 3 was classified into level 1 for her pedagogical knowledge and level 0 for her content knowledge. The author recorded her teaching activity and made an analysis on it. Towards her teaching activity, Subject 3 began with giving a question about the previous material.

In Indonesia	In English
	absolute value discussion 01 absolute value concept 02 absolute value equation 03 absolute value inequality 04 practice questions

Figure 7. Subject 3 gave a question about the previous material

The material was about absolute value. Subject 3 asked the students about the previous material which was about the concept of absolute value. In **motivation phase**, she showed her promote action by *asking the students to correlate a given example with the material to be discussed.* Along with an example of a kid having a scout practice by moving back and forth, Subject 3 gave a question "what is the concept of absolute value according to the example?". She gave some illustration to remind them. in **concentration phase**, she showed a promote action by *asking the students to identify the scope of the material as the initial description.* After they got their memory about the concept of absolute value, the subject went on by asking them to identify the types of absolute value. She gave some types and asked them to identify the features and the types of the absolute value. During the process of teaching, the subject always gave as much as chances for the students to ask questions. When none of them asked any question, she sometimes gave a question while choosing one of them to answer the question. It was aimed to direct their attention to the material being discussed. If their answer was correct, she would give reinforcement and compliment. Otherwise, if their answer was wrong, the subject would assist them to find the correct answer.

Subject 3 implemented **exploration phase**in her teaching process in order to make students reach the expected output. She showed a promote action by *asking the students to utilize a learning media such as worksheet, learning instrument, and other mathematic media.* This phase was held by means of learning media. The subject showed that the application she used was *cymath*

Figure8. Cymath, the application that students had downloaded

The subject waited and made sure that every student had installed the application, *cymath*. Afterward, she made a simulation of how to use the application by inputting the type of absolute value to be completed. The final answer along with the detail explanation would automatically appear in just one click. Furthermore, *the subject also assisted the students to solve the given problem.* She had good interaction with them. In addition, she ensured that the students could totally operate the application. Next, the subject asked the students to solve the given problem in order to see how far they had understood the material.

Subject 3 asked the students to use the application and the concept of absolute value in order to solve the given problem. It was classified into **exploration phase**, in which *the students applied the given concept to solve problem.* Every student was then able to solve problems and showed the correct answers. It also indicated that the teacher could deliver the material well, and thus the students could totally understand it. She did not show any feedback phase. It seemed from how the students had no instruction to conclude the material being discussed.

Promote Action by Subject 4

Subject 4 was in level 1-1 for pedagogical knowledge and content knowledge. She began her teaching activity with **motivation phase** by *exploring the students' knowledge through some questions.* The material to be discussed was logarithm. She began the phase by asking a question "what is logarithm?".

The subject chose some students to answer the question. She aimed to see their initial insight. The responses were vary. Some of them kept silent, some gave wrong answer, and some other gave answer that was close with the correct one although using their own words. After each student gave their answer, the subject explained about what logarithm was while giving reinforcement to their responses. Afterward, she went on to the features of logarithm.

In **concentration phase,** the subject showed her promote-action by *asking the students to identify the features of logarithm displayed.* They were asked to see and show the differences among each feature. At first, the students worked together to identify the features until the subject gave questions to each of them individually. Luckily, they could identify the features under her instruction. Eventually, the students could successfully understand the features of logarithm. Then, Subject 4 went on to the next phase by giving them problems with logarithm features.

In **processing phase,** Subject 4 showed her promote action by *asking the students to construct the concept of material being learned.* The students constructed the concept of logarithm based on powers of numbers. They constructed the concept by addressing the subject's questions. In storing phase, furthermore, Subject 4 conveyed that what they were learning should always be well memorized. In **exploration phase**, she asked the students to apply the concept they constructed to solve the given problems. She gave them six problems to be solved and immediately discussed. Those problems were all related to the features of logarithm. In the process of addressing the problems, she called the students one by one to immediately solve the problem and mention which feature they used. However, she would assist the student who felt difficult to find the correct answer. As those problems were immediately discussed, the students could also immediately see whether their work was correct or wrong. The subject asked them to correct their work once they found that their work was wrong. Subject 4 identified the students' performance and assisted those who found difficulties in understanding the material.

In **exploration phase**, the subject assisted the students to reach their expected performance/output through learning media. She made an interesting media in order to

encourage students' motivation to learn mathematics. Besides, she also facilitated them to discuss the given problems and corrected their answers together

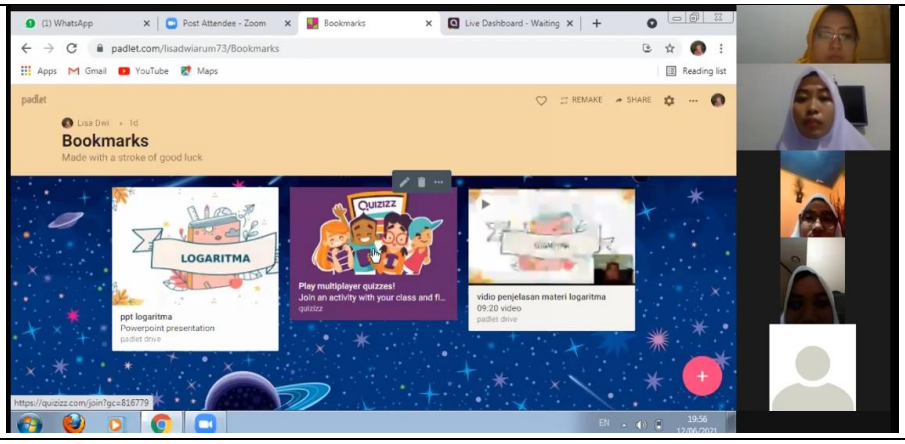
Display the subject in zoom meeting	Her explanation
	the subject provides an explanation of the features that exist in the padlet application. students can access the material and conduct competitions to solve the problems on this padlet

Figure9. Subject 4 utilized media as means of teaching

Subject 4 used *padlet* as means to explain logarithm. It contained material to be discussed in the form of PPT along with some problems displayed as quiz. The students were interested in that media, and thus, motivated to study as the physical appearance of the media was interesting, in addition to the complete content within. At the end of teaching, the subject directly ended the class meeting without asking the students to conclude the material being discussed.

DISCUSSION

This study aimed to see any promote actions that prospective teachers might show during their mathematics teaching practices. The research selected the subject based on the level of their PCK. The result found that those four subjects with different level of PCK had different teaching output as well. In general, subjects with lower pedagogical and content knowledge taught using a simple method and applied the procedures of teaching. The higher the PCK, the method of teaching became simpler and to-the-point. In addition they would take more effort in exploring media.The results of this study are in accordance with other studies which state that there are differences in the way of learning that is influenced by the teacher's PCK(Bowie et al., 2019; Capraro et al., 2005; Livy et al., 2019)

Those four subjects showed promote actions in their motivation phase of teaching process by conveying their teaching objectives. Furthermore, they also gave questions related to the particular materials in order to explore their students' initial knowledge. This was important as they should consider their students' learning experience(Goos & Bennison, 2008). Students' initial insight and learning experience might help the students to construct new insights. It was consistent to constructivist perspective that teachers should give chances to students to construct their own knowledge actively by considering their initial insights(Sa'dijah, 2001). Next, the subjects delivered their teaching material by means of media, which was inseparable from online teaching and learning process. It was consistent to further study that media could facilitate students to get concepts and experience by their own or through experiments. The four subjects also gave a lot of tasks to complete, either in group or individual. It aimed to drill students with exercises in order to make them totally understand the given material, in addition to having problem-solving. Teaching mathematics was indeed familiar with lots of task(Goos, 2012). Therefore, the subjects let the students to complete the tasks using various ways. However, the subjects would immediately assist their students once they got lost or stuck. It was consistent to a study that it would bring positive vibes if teachers let their students free with their own thinking (Hussain et al., 2011).

Various promote actions and a variety of teaching depended on the prospective teachers' competence and creativity reflected on their PCK, which also depended on their academic competence(Aminah & Wahyuni, 2018; Gilang et al., 2019; Maryono, 2016). Subjects or prospective

teachers with PCK level at 0 could still develop their competence by either developing materials or extending the frequency of teaching practice in order to gain more experience and improve their PCK level (Aminah & Wahyuni, 2018; Jatisunda & Kania, 2020). Through this study, it was found that the differences in PCK possessed by prospective mathematics teachers can create diversity in the practice of teaching mathematics. For prospective teachers who have PCK in the low category, it is hoped that they can improve their abilities through frequent practice and practice in more depth about mathematical content and pedagogical knowledge so that when these prospective teachers actually teach in class, they can actually become professional teachers(Bowie et al., 2019). This is in accordance with the results of research by Kahan (2003) which states that the ability of mathematical content contributes to the implementation of learning (Kahan et al., 2003).

CONCLUSIONS

The result of this current study found that those four prospective teachers with different PCK level had different competence as well in generating their promote actions. Each of those subjects had implemented the phases of teaching process. However, they had different way in delivering materials. Prospective teachers with higher content knowledge could present the material completely and systematically. They could also generate more promote actions related to the materials. Unfortunately, they were less interactive with students. They tended to focus on exploring rather than teaching. It was totally different from prospective teachers with higher pedagogical knowledge who tended to present the material in simple way. Although they only gave brief explanation, they actively generated more promote actions, either through media or directly interacting with students. Finally, further researches could describe prospective teachers' promote actions during the teaching practice at schools with various materials, in addition to any improvement of teaching for prospective teachers with lower PCK. Besides, further researches could also consider blended learning which might evoke different promote actions by prospective teachers

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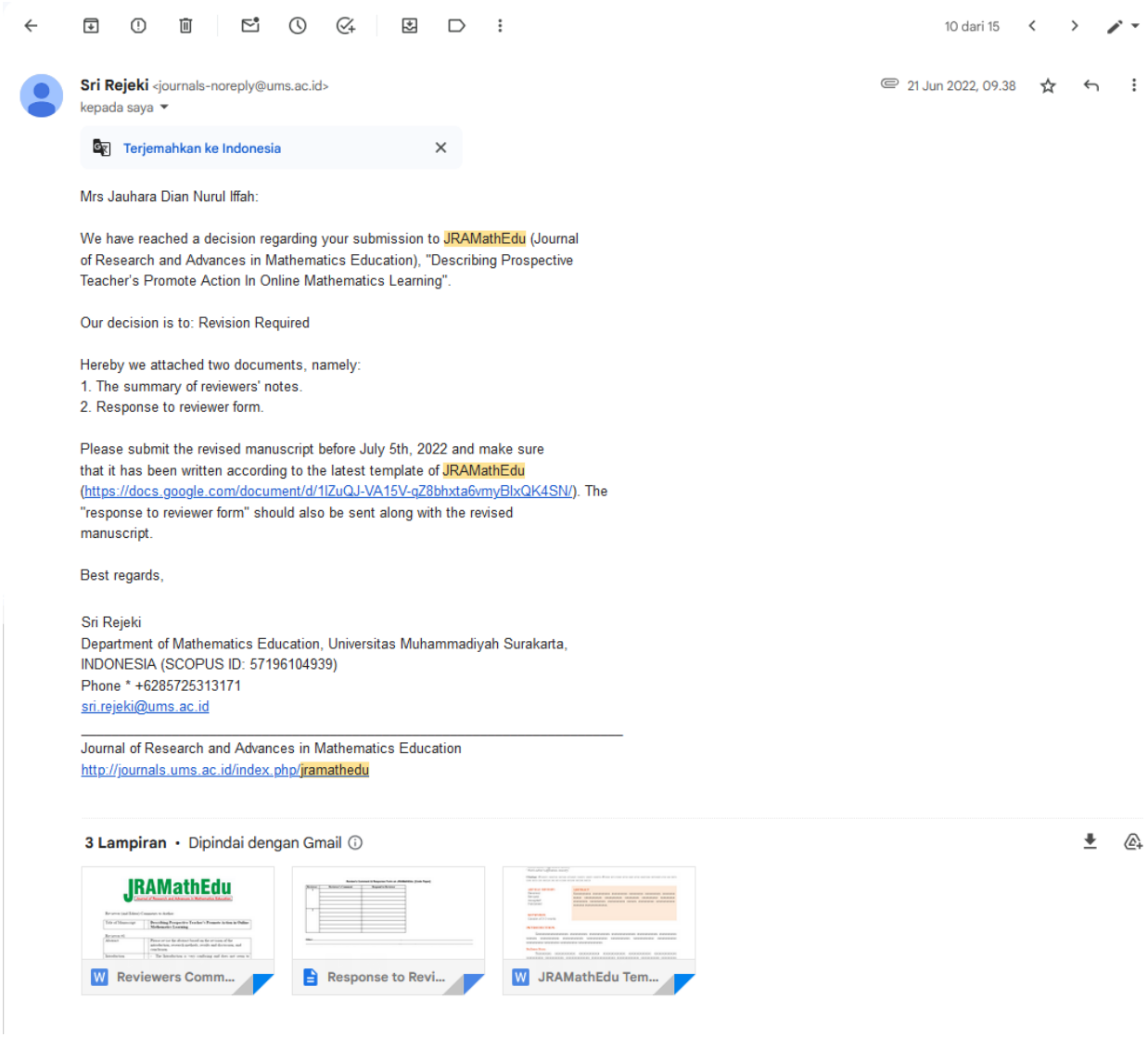
4. Bukti Permintaan Revisi 2, Reviewer's Comment to Author

(21 Juni 2022)

Screenshoot Email



10 dari 15

Sri Rejeki <journals-noreply@ums.ac.id>
kepada saya

21 Jun 2022, 09.38

Terjemahkan ke Indonesia

Mrs Jauhara Dian Nurul Iffah:

We have reached a decision regarding your submission to JRAMathEdu (Journal of Research and Advances in Mathematics Education), "Describing Prospective Teacher's Promote Action In Online Mathematics Learning".

Our decision is to: Revision Required

Hereby we attached two documents, namely:
1. The summary of reviewers' notes.
2. Response to reviewer form.

Please submit the revised manuscript before July 5th, 2022 and make sure that it has been written according to the latest template of JRAMathEdu (https://docs.google.com/document/d/1IZuQJ-VA15V-qZ8bhxta6vmyBlxQK4SN/). The "response to reviewer form" should also be sent along with the revised manuscript.

Best regards,

Sri Rejeki
Department of Mathematics Education, Universitas Muhammadiyah Surakarta,
INDONESIA (SCOPUS ID: 57196104939)
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3 Lampiran • Dipindai dengan Gmail

Reviewers Comm...

Response to Revi...

JRAMathEdu Tem...

JRAMathEdu
Journal of Research and Advances in Mathematics Education

Reviewer (and Editor) Comments to Author:

Title of Manuscript	:	**Describing Prospective Teacher's Promote Action in Online Mathematics Learning**

Reviewer #1

Abstract	:	Please revise the abstract based on the revision of the introduction, research methods, results and discussion, and conclusion.
Introduction	:	- The Introduction is very confusing and does not seem to follow a clear thread of argument, making it difficult to find the point at which the problem under study is motivated, delimited and stated. - There is also confusion in relation to the context in which the research is framed, as on the one hand it seems to be described by the boundary conditions of online teaching, but on the other hand, most of the background information does not refer to this context and the research itself does not seem to be contextualised in it either. - The background does not follow a clear storyline either and seems to be a juxtaposition of articles that relate to teacher education in general, but without clearly serving as background to the research being presented, i.e. without helping to define what is known and what questions remain open that the research helps to resolve. - There is also a lack of relevant references in relation to the specialised knowledge of mathematics teachers, to online teaching and to technological-pedagogical knowledge. - The definition and treatment of pedagogical content knowledge, based on Shulman's seminal work, is not correct. It is not a "direct sum" or mere combination of content knowledge and pedagogical knowledge, but has an entity in itself as a domain of intersection of the two. In this sense, Shulman's work is subsequently developed in the field of mathematics by other researchers who do seek to characterise and operationalise this domain, with the proposal of the MTK model by Ball and collaborators being particularly relevant, a model that would have been much more relevant, in my opinion, as part of the theoretical framework than the one that is finally chosen. - At the same time, taking into account that the study problem is to be approached in a context of online or, at least, technology-supported teaching, some references to the

		TPACK model might be included.
Research Methods	:	- It is not only the approach (qualitative) and purpose (descriptive) should be defined, but also the design, which is not clear whether it was finally approached in a case study format (instrumental) or rather a content analysis approach. - It is also not clear why the selected vignette is considered particularly significant for the selection of participants, as it seems more reasonable to have used a broader test composed of several vignettes. - No coding manual for the responses is provided, nor is there any reference to the criteria for quality and rigour of such research (e.g. those proposed by authors such as Guba), which also helps to identify limitations in the research. - The so-called "phases" that are part of the analysis of results should be described beforehand and not as the results are shown. This helps the reader to follow the process and to have a global overview from the beginning.
Results and Discussion	:	- The discussion and conclusions should not be limited to a summary of results, but should follow a deductive pattern that allows going beyond mere description, including implications for Mathematics Education, limitations of the research and even future lines of work. - On the other hand, the contrasts with previous results refer to articles that are more than a decade old, and it would be advisable to include more current references, especially when talking about online teaching.
Conclusion	:	Please see the notes on “Results and Discussion” section.
Others	:	- The writing needs to be carefully revised and significantly improved, as it presents serious deficiencies in some sections that make it difficult to read. - In any case, being an interesting approach and having data that I also consider can be analysed to provide interesting ideas and conclusions, I think it is worth reorganising and improving the article.

Reviewer #2

Abstract	:	Please revise the abstract based on the revision of the introduction, research methods, results and discussion, and conclusion.
Introduction	:	-
Research Methods	:	The subjects should involve students with levels: 2-0, 2-1, 2-2, 1-2, and 0-2, unless the authors provide strong arguments for

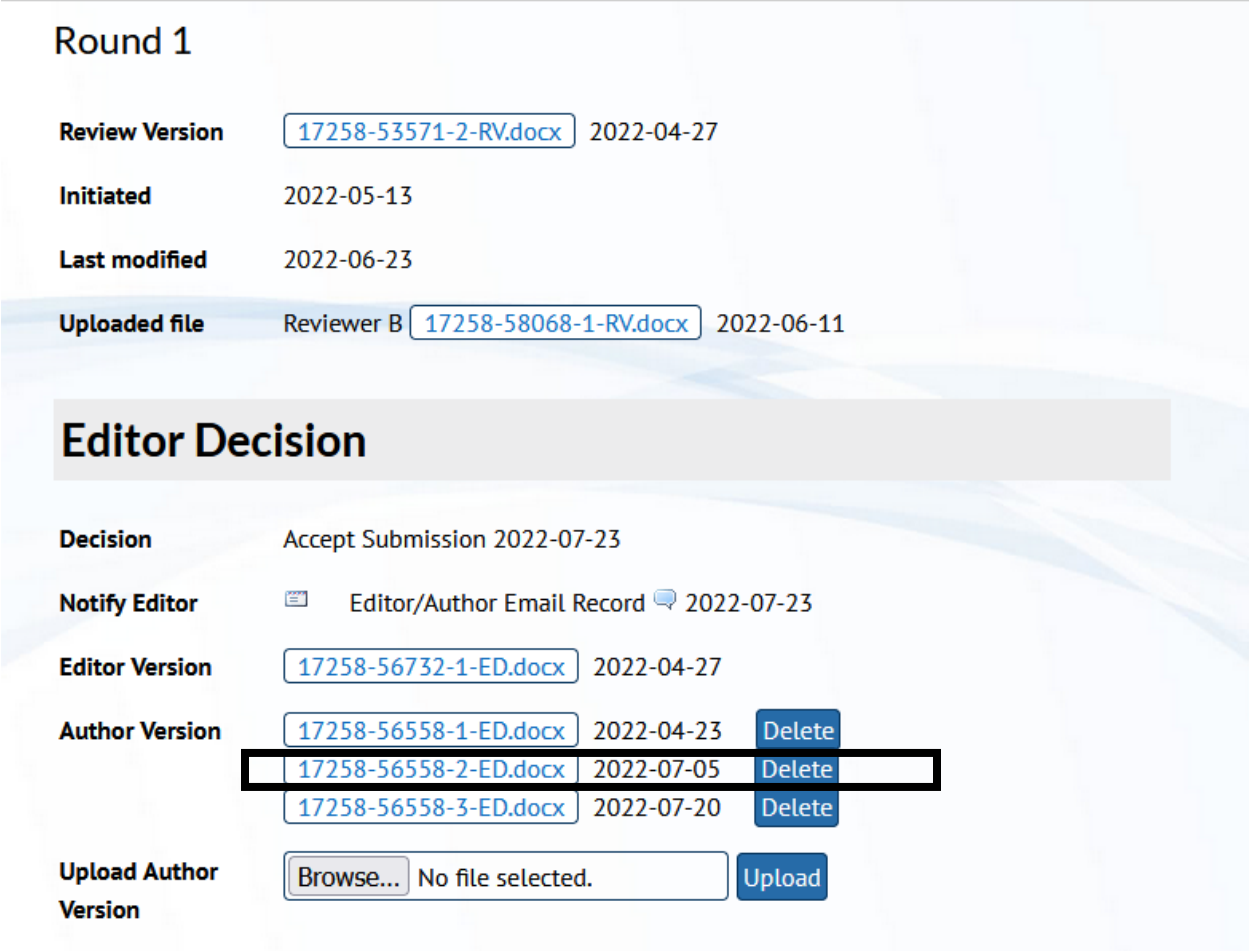
		only analyzing those four subjects mentioned in the manuscript.
Findings	:	The findings are mainly describing the observation results. Please describe the application of triangulation technique which describing and comparing the data from observation, interview, and teachers' self-reflection.
Discussion		-
Conclusion	:	-
Others	:	Please do English proofreading in order to avoid confusion.

5. Bukti Pengiriman Hasil Revisi 2, Respon Kepada Reviewer, dan Artikel yang Diresubmit

(1 Juli 2022)

Screenshoot Email

Screenshoot OJS



JournalofResearch and Advancesin Mathematics Education

Volume x, Issue x, xxxxx 2022, pp. xx – xx
DOI:
p-ISSN: 2503-3697, e-ISSN: 2541-2590

Describing Prospective Teacher's Promote Action In Online Mathematics Learning

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Citation:*XxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxXxxxxx xxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxx xxxxxxxxxxxxxxx xxx xxxxxx xxx xxxxxxxxxxxxxxxxxxxxxxxxx*

ARTICLE HISTORY:
Received
Revised
Accepted
Published

KEYWORDS:
Prospective Teacher
Promote Action
Online Learning

ABSTRACT

Promote action is an action or activity offered by the teacher to students so that students gain new knowledge or experience. The promote action chosen by the teacher will depend on the knowledge possessed by the teacher, this is commonly referred to as pedagogical content knowledge (PCK). In addition, to become a professional teacher who has a well-measured PCK, he has been trained since he was a student. Therefore, this study aims to describe promoting the actions of prospective teacher students in learning mathematics online. This type of research is descriptive qualitative with the subject of four students who take the peer teaching program. Subject selection was based on the PCK criteria of subjects with categories 0-0, 0-1, 1-0, 1-1 which indicated the order of levels of pedagogical knowledge- content knowledge. Data collection methods are tests to determine the PCK of prospective subjects, observation of the learning process, documentation of learning records. The triangulation used to see the credibility of the data is time triangulation. The results showed that all subjects elicited promote action in the phases of motivation, concentration, processing, exploration. The four students have different ways of bringing up promote action based on their ability criteria.

INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual strength, self-control, intelligence, noble character, and skills needed by themselves, society, nation and state (Undang-Undang, 2003). Education is held by empowering all components of society through participation in the implementation and control of the quality of education services. The implementation of education cannot be carried out by only individuals, but there is a national education system that is applied. The national education system is all components of education that are interrelated in an integrated manner to achieve national education goals. This component consists of (1) educational objectives; (2) educators; (3) students; (4) curriculum; (5) facilities and infrastructure; (6) learning media; (7) learning resources; (8) education management; (9) educational evaluation; (10) educational supervision; (11) research in education; (12) dedication in education. This study will not discuss all components of education, but will only discuss educators and learning media.

Educators are educational staff who are qualified as teachers, lecturers, counselors, tutors, widyaiswara, tutors, instructors, facilitators, and other designations according to their specificity, and participate in providing education (Undang-Undang, 2003). Educators as one component of the National Education System play an important role in learning activities. Learning is a process of

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interaction between students and educators and learning resources in a learning environment. Educators at the school level are hereinafter referred to as teachers. Teachers should have four kinds of competences including: pedagogy, personality, social, and professional (Undang-Undang, 2005). Teachers' pedagogical competence referred to the competence of students teaching management that at least included the comprehension of education base or insights, the comprehension of students, curriculum/syllabus development, teaching design, educated and dialogic implementation of teaching, technology utilization, evaluation on learning result, and student development to actualize their various potencies. Toward professional competence is teachers' capability to master the knowledge of science, technology, art, and culture they are teaching to, at least, including the mastery of the course materials in thorough way according to the content standard of education program, a subject matter, and group of subjects to be taught, the relevant concept and method of art, technology, scientific disciplines which was conceptually coherent to an education program, subject matter, and group of subjects to be taught (Undang-Undang, 2008).

The competencies that must be owned by teachers as formulated in the Constitution are in line with the opinion of Shulman (1986) which reveals about Pedagogical Content Knowledge (PCK). Shulman (1986) was the first to use the term Pedagogical Content Knowledge (PCK) when trying to help professionalize the work of teachers. PCK is described as the result of a combination of understanding teaching material (content knowledge) and understanding how to educate (pedagogical knowledge) which blend into one thing that a teacher needs to have. Shulman (1986) formulated that PCK is an understanding of effective learning methods to explain certain materials, as well as an understanding of what makes certain materials easy or difficult to learn (Shulman, 1986). Two major parts that make up PCK are content knowledge and pedagogical knowledge. Shulman also stated that pedagogical knowledge is related to teaching methods and processes which include knowledge of class management, assignments, lesson planning and student learning. content knowledge includes knowledge of concepts, theories, ideas, frameworks of thought, methods of proof and evidence (Shulman, 1986). PCK is defined broadly so that the PCK idea can be applied to every teacher at every grade level, but it is also explained that each teacher has or needs a different PCK

Krauss *et.al*. identified three dimensions of PCK which were important for teaching mathematics. Those three dimensions were teachers' knowledge about math tasks, students' initial knowledge (i.e., any difficulty and misconception) and representation, analogy, illustration or models of math content that would be useful to be taught(Krauss et al., 2008). Teachers' PCK might determine the process of teaching and finally affect students' learning outputs(Olfos et al., 2014). Developing and selecting tasks, representing and explaining, facilitating a productive discussion, interpreting students' responses, emphasizing students' understanding as well as analyzing their misconception and difficulty appropriately are the elements that underlie PCK (Ball et al., 2001). Another argument claimed that among content, curriculum, and teaching, "the knowledge of teaching" was the basic component of pedagogical content knowledge(An et al., 2004). Some researchers argued that to be a successful math teacher, it needed a strong foundation on pedagogical content knowledge, referring to a kind of professional knowledge for teaching specific branch of knowledge(Wilson et al., 1987, 2016).

In this study, it is focused on researching student teacher candidates, because to become a professional teacher, you must start being trained since becoming a student. Furthermore, some studies showed that the comprehension of teaching mathematics to reach a qualified education is a specific professional knowledge that could be obtained through trainings in university and be developed through reflection on teaching practices(Fennema & Romberg, 1999; Grossman, 2008; Morris et al., 2009). Therefore, prospective teachers got materials about theories of teaching and learning in order to give them knowledge about teaching. More specifically, prospective math teachers also had chances to do teaching practices to implement any theories they had learned before. The importance of having teaching practices was to make them familiar with the real teaching circumstance. Hence, they should prepare themselves since they were in college. To teach mathematics, it did not only need good knowledge about mathematics contents, but also pedagogical knowledge(Turnuklu & Yesildere, 2007). Therefore, since in college, prospective teachers should learn about any competences of being a good teacher both theoretically and practically in order to be a good professional teacher. This indicated the importance of identifying prospective teachers' PCKto

prepare them to be a professional teacher. This identification will be the basis for selecting students as research subjects and will describe the learning process they are doing.

Teachers might apply various models and methods of teaching during the process of their teaching. They took their decision by previously considering some matters such as the difficulty of materials to be taught, students' characteristics, and adequate facility(Lui, 2012). Students' different characteristics and competences was the main concern for teachers. The main changes in the teaching of mathematics that are needed so that students can develop mathematical abilities include: making mathematical logic and proof as a means of justification and depriving the teacher of authority to decide a truth; relate mathematics, its ideas and applications, and not treat mathematics as an isolated collection of concepts and procedures (NCTM, 2000). This shows that teachers must involve students in the learning process and that involvement is related to linking mathematical ideas. Learning steps that can lead to active students are steps that are giving students an offer to carry out an activity. This kind of activity is called teacher's *promote action.*

Promote action is an activity offered by an older person to a child so that the child acts in a certain way (Valsiner, 1983). What was promoted might vary. It could be in the form of things or activities that finally made the children do particular action. Promote action can also be interpreted as activities offered by teachers to students that lead to new knowledge (Goos, 2005, 2012). A set of promote actions by a teacher to students in particular area was called zone of promoted action (ZPA). The process of teaching by a teacher had some procedures. However, not all of them were implemented, including ZPA. The procedures of teaching that dealt with ZPA referred to any activities which made student do or behave in order to attain new skills. In this case, the author limited the new skills on new competence, skill, comprehension, and development that student attained, given that mathematics at school was about developments since elementary grade. In this study, researchers will describe various promote actions that are raised by prospective teacher students when teaching practice.

Some factors to be considered involved the attainment of learning outputs, learning environment, and operational cost (Anggrawan, 2019). Good teaching models generated good learning outputs, as well as conducive learning environment, and affordable operational cost. This current pandemic era of covid-19 made teaching activities shift from offline to online. The results of previous studies indicate that students who previously studied face-to-face with good results, must be able to adapt to online learning. In face-to-face learning activities, what cannot be replaced is direct meaningful interaction between teachers and students (Tang et al., 2013). No interaction brought less learning experiences among students, and thus they would feel difficult to understand the course (Mairing et al., 2021). Online learning tended to give more tasks to students and less explanation by teachers. A lot of tasks and limited explanations made online learning seem to be less effective for students (Giatman et al., 2020; Suryaman et al., 2020). Towards online learning, students needed to have stable internet connections, capability to operate technology, and supporting devices. Particularly to students in villages, they had serious problem on internet connection (Mulyanti et al., 2020; Putra et al., 2020). This problem, however, could be addressed by students' autonomous learning along with their confidence in problem solving (Mairing et al., 2021). In this study, it will focus on learning practices carried out by students online. Associated with online learning, later student teacher candidates will use technology to teach. So that in the future the development of skills will increase and is referred to as Technological pedagogical and content knowledge (TPACK). TPACK itself presents a dynamic framework to describe teacher knowledge needed to design, implement, and evaluate curriculum and teaching with technology (Niess, 2011). However, in this study the skills related to TPACK have not been measured, researchers still focus on the PCK of prospective teacher students because students do not have experience in teaching in the field so that students' PCK can still be assessed based on the teaching theory gained during lectures.

Some previous studies had discussed about *zone of promoted action* (ZPA) in both medical and school areas (Bennison & Goos, 2013; Galligan, 2008; Goos & Bennison, 2008; Iffah, Sutawidjaja, Sa'dijah, et al., 2016; Iffah, Sutawidjaja, Sadijah, et al., 2016). Another study conducted on mathematics students found that lecturing by implementing Valsiner's theory might convince them on probability course(Tirto et al., 2019). In addition, the research on prospective teacher PCK that

has been carried out previously is still limited to describing how the PCK of prospective teachers has not led to the learning of prospective teachers when teaching practice(Ayuningtyas & Apriandi, 2019; Gultom & Mampouw, 2019; Irfan et al., 2018; Makaraka et al., 2021). The novelty of this current study was the author detected and described *promote action* by prospective teachers when they hade teaching practice in secondary school. Furthermore, the author also considered prospective teachers' PCK as the criteria for subject selection. The author would make some categories of PCK and describe the *promote action* in a teaching process based on the PCK criteria.

Considering the issue described, the problem of this study was the presence of promote action (PA) by prospective teachers when they had teaching practices in secondary school. The teaching process was online via zoom meeting. The author identified the promote action of prospective math teachers whether it corresponded to the phases of teaching. The subjects of this study were selected by considering the students' PCK criteria. The result of this study could be useful to develop prospective teachers' competences and skills of teaching. In addition, lecturers might identify their students' PCK earlier in order to improve their students' PCK through lecturing in case that they had students with low skills.

METHODS

Research design

The Researchers applied descriptive-qualitative research to describe the promote action of prospective math teachers in their teaching practice. Data was collected through a skill test called a vignette to get the subject, observation, and documentation. The vignette test is used as a tool to identify content knowledge and teaching knowledge of prospective teacher students who will later be selected as research subjects. Observation is used as a tool to describe the subject's promote action during teaching practice. The researcher observed during the subject's teaching practice and recorded the subject's learning steps which were included in the category of promoting action. The researcher uses the observation sheet guidelines and lesson plans that have been made by students as research subjects to identify and classify student activities that are included in promoting action. Researchers only focus on observing student activities as teachers when teaching because it will describe promoting actions that appear in teaching practice. Researchers do documentation by recording all learning activities. Learning activities in this study were carried out online with zoom media. The data collected was analyzed in stages according to Miles and Huberman, namely reduction, presentation, and drawing conclusions (Moleong, 2011a; Sugiyono, 2015).

Participant

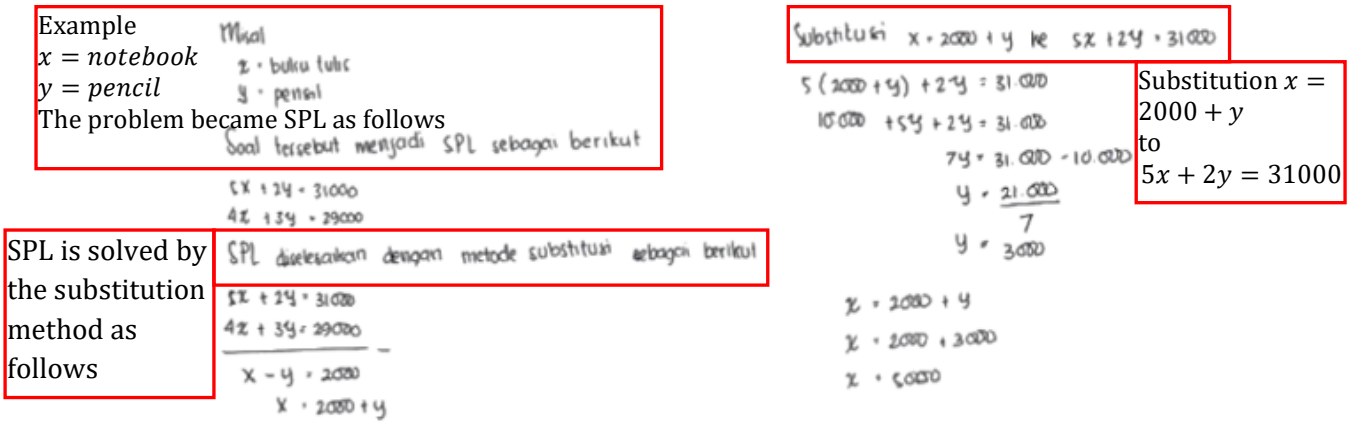
The participants in this study were the mathematics education student study program STKIP PGRI Jombang who were currently taking a peer teaching program. Selection of students who are taking peer teaching programs because students have graduated and passed courses on education and are ready to practice teaching. For subject selection, the researcher gave them an initial test called vignette. It was a scenario/illustration that contained students' solutions, questions, arguments, confusion, misconception, or comments that teachers should responded (Ebert, 1993). With vignette test, the prospective teachers were asked to give their comments/responses on what students had written. **Figure 1** showed the vignette test distributed to the subject candidates in order to identify their PCK.

Case 1

In a teacher's learning gives an example of a story about SPLDV as follows:

Firza bought 5 notebooks and 2 pencils in a shop, it turned out he had to pay Rp. 31,000. The next day Nisa bought 4 notebooks and 3 pencils in the same store, it turned out that the total price was Rp. 29,000. Any price of a notebook and a pencil in the store?

Furthermore, the teacher asks students to resolve the matter by first making the mathematics model. Here's the answer to one of the students named Ghildan:



After observing the case, answer the question below:

a. Write your comments on Ghildan's answer
b. Is there something wrong or less? Please provide a sign
c. If the answer has an error or lack, what is the actual answer?
d. How do you give an explanation to students about the right answer from the matter?

Figure 1. Vignette

The researcher asked the subject candidates to write down their responses for point a-d on the vignette sheet. According to their responses, the researcher defined some criteria of PCK that the subject candidates had. The author used comments (Karahasan, 2010) to analyze the PCK of prospective teachers in this study. It was based on that this framework was the completion and combination of another framework. In this framework, there were 2 components of PCK. Those were pedagogical knowledge and content knowledge. Each of the components was classified into 3 categories, including: less (level 0), moderate (level 1), and good (level 2). Table 1 showed the characteristics of PCK that the researcher used for analyzing the prospective teachers' PCK, in addition to subject selection

Table 1
Criteria of PCK

Components of PCK	**Level 0 (*Less*)**	**Level 1 (*Moderate*)**	**Level 2 (*Good*)**
Content knowledge	Unable to express a definition correctly. Unable to use appropriate notation. Only use either declarative or procedural questions. Unable to interpret and use representation.	Able to express a definition correctly. Able to use notation appropriately. Still use either declarative or procedural questions. Able to interpret and use both graphic and non-graphic representation.	Able to express a definition correctly. Able to use notation appropriately. Use any types of questions (including declarative, procedural, and conditional) appropriately. Able to interpret and use both graphic and non-graphic representation.

	Unable to see the connection among different topics/sub-units.	Able to see the connection among different topics/sub-units.	Able to see the connection among different topics/sub-units, as well as taking a step between the connections carefully.
	Providing and demonstrating knowledge for students.	Not only providing any instructions or adequate procedures, but also assisting students to construct meanings and understanding.	Facilitating and assisting students, rather than providing answers along with its explanations.
	Introducing the procedures after the concept.	Seeing their roles as mentor, evaluator, and reminder.	Evaluating the students' understanding as well as enhancing their comprehension through questions that deal with further mathematical knowledge.
Pedagogical knowledge	Dominating any information.	Still dominating any information.	Appreciating and encouraging students to construct their mathematical knowledge through mathematical inquiry.
	Having problems in both topic and question orders during either the teaching process or teaching designing.	Only having problems on question order during either teaching process of reaching designing.	Ordering the topic material and questions/task appropriately.
	Feeling difficult to control and create a class with democratic vibe/circumstance.	Sometimes capable to control and create a class with democratic circumstance.	Controlling and creating a class with democratic circumstance.

Furthermore, the author determined the subject of this study. They were prospective teachers who were in peer teaching program. The subjects consisted of four prospective teachers with the following criteria:

Subject 1: pedagogical knowledge – content knowledge: level 0 – 0

Subject 2: pedagogical knowledge – content knowledge: level 0 – 1

Subject 3: pedagogical knowledge – content knowledge: level 1 – 0

Subject 4: pedagogical knowledge – content knowledge: level 1 – 1

Instruments and Procedures

This study used vignette sheet that aimed to identify the prospective teachers' PCK. This vignette was adopted from a previous study, and the author only took some parts that dealt with content knowledge and pedagogical knowledge. It corresponded to the subject candidates who just got this knowledge theoretically. The test results through the student vignette were grouped according to the PCK level and the researcher took one from each level for further observation. The researcher chose one student who had good communication from each of the criteria based on the researcher's experience when teaching the student during lectures before the peer teaching program took place. Taking one student from each level is also based on the student being in the researcher's peer teaching guidance group so that the teaching practice activities of the research subject become natural to do.

Furthermore, researchers to obtain data about activities or the subject's promote action in learning, researchers use learning observation sheets. This observation sheet is the result of the development of the researcher's dissertation. The observation sheet instrument contains learning steps according to the student's learning phase according to Winkel, namely (1) the motivation phase, (2) the concentration phase, (3) the processing phase, (4) the storing phase, (5) the

exploration phase, (6) the feedback phase. (Winkel, 2007) as well as a series of promote actions that are possible to appear at each learning step in the learning phase (Iffah, Sutawidjaja, Sa'dijah, et al., 2016). the research procedure is presented in figure 2 below

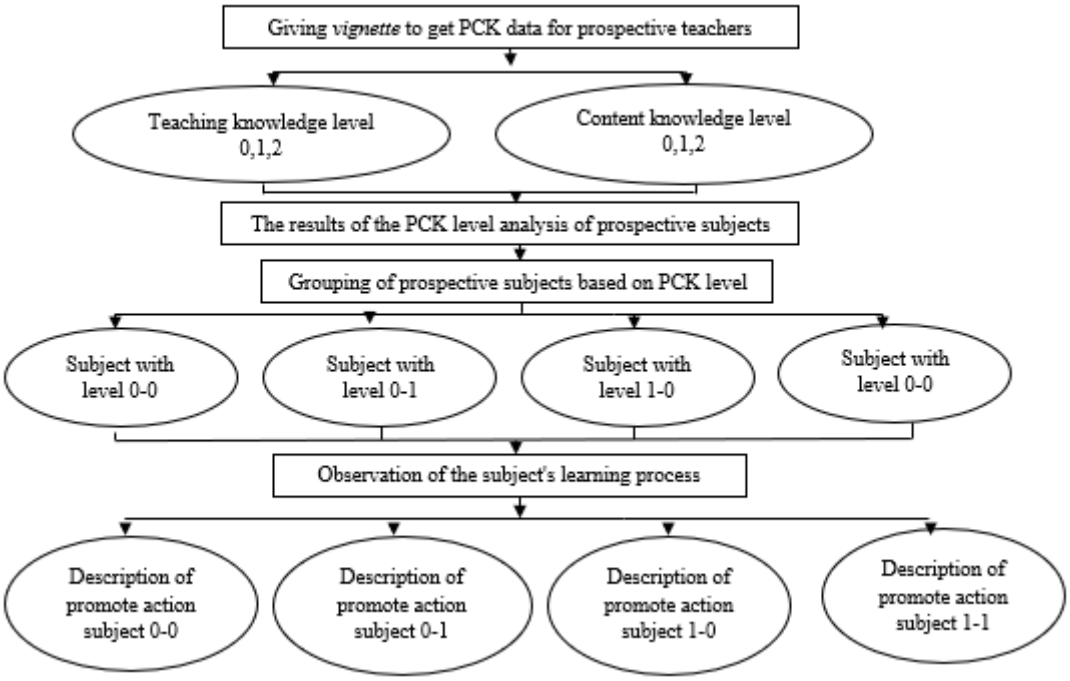


Figure 2. Research Procedure

Data analysis

Data analysis in qualitative descriptive research is data reduction, data presentation and making conclusion. Data reduction is done by removing data that is not in accordance with the research objectives. In this study, the reduction was carried out by removing data about the activities of research subjects that were not included in the promote action category. The presentation of the data is done by presenting the results of data reduction and grouping the data. In this study, the reduced activity data of research subjects were grouped based on the promote action and learning phase according to Winkel, namely (1) the motivation phase, (2) the concentration phase, (3) the processing phase, (4) the storing phase, (5) the exploration phase, (6) Feedback phase. In grouping, the researcher also played the learning recording to confirm the results of the observations and added if any data was missed when making observations. The results of the grouping are presented in a narrative manner. Based on the results of the presentation, the researchers drew conclusions in the form of promoting the action of prospective teacher students in learning mathematics which was carried out online.

Triangulation is a technique of checking the validity of data that utilizes something else (Creswell, 2012; Moleong, 2011b; Sugiyono, 2017). In this study using time triangulation to test the accuracy of the data. Researchers compared the results of the first and second observations and documentation taken at different times. The first and second data retrieval has the same characteristics so that it meets the valid criteria

FINDINGS

Promote action by Subject 1

Subject 1 implemented her teaching practice with her classmates playing a role as students. The author recorded the process of teaching and then analyzed the result. At ***motivation phase***, the promote action that should appear was *asking students to correlate a given example to the material to discussed*.However, it seemed that Subject 1 delivered the teaching objectives and asked the

students about the previous material for their initial activity. She displayed her teaching objectives on the slides of power point. She conveyed that the current teaching objective was matrix operation. She directly conveyed the objective without asking the students to correlate the example with the material to be discussed. Next, the subject *asked the student to explore their knowledge through some questions related to the previous material.* She then asked them some questions that dealt with the definition of matrix and the types of matrix. These questions were for all students in class. She asked these questions to identify whether the students had already understood the previous material. Nevertheless, none of the students responded her question. They claimed that they forgot, did not understand yet, and even some of them decided to no give any response.

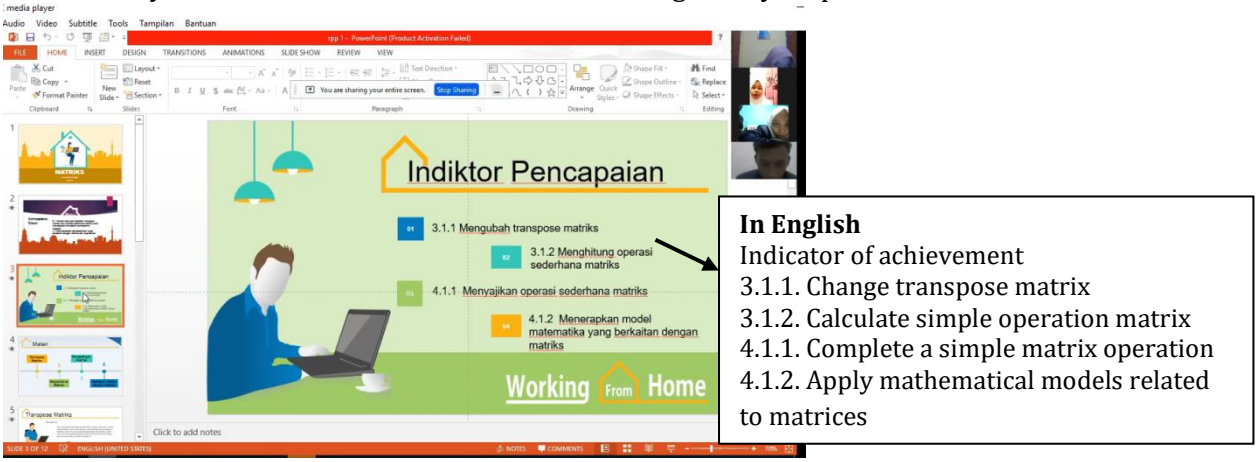


Figure3. Subject 1 expressed the teaching objectives and proposed some questions

Since the students could not address her questions, she briefly re-explained the answers of the questions. In this case, she did not assist them to get the answer but directly re-explaining them. It seemed that Subject 1 was less in exploring the students' competence. In fact, this point is vital to detect students' initial competence, whether or not they were ready to get further material. However, the subject had gone through the initial phase of her teaching, which was apperception (in accordance to the teaching plan she had designed) although it was less optimal.

The next phase of teaching activity was about delivering material. It was **concentration phase**. The subject applied zoom meeting and an application of matrix operation. This application had already been installed by students from Google Play Store via their own smartphone. The *promote action* that appeared was *asking students to prepare the learning instrument.* The subject asked them to install the application a day before having the zoom meeting. *She identified the scope of material* by making a voice recording that explained the material. When it came to explaining the material, hence, she played the recording during zoom meeting. It was not only explaining the material being discussed, but also about how to operate the application. She solely utilized the application to explain the material without having any other procedural explanation. The students only focused on the explanation and the application. With this activity, the subject successfully delivered the material. However, it was considered incomplete, as she did not give any procedural explanation. This made students difficult to thoroughly understand the explanation of matrix operation. The application might display the answer along with the method. But, the teaching process seemed less meaningful when the students had no idea about the roots of the solution displayed. The procedural process of attaining the solution remained necessary for students, given that they would not always be allowed to use the application for problem solving.

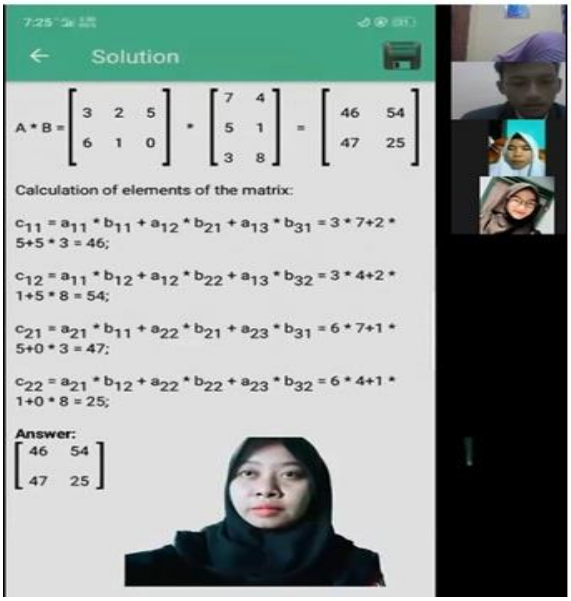
Display the subject in zoom meeting	Her explanation
	The subject reads the numbers entered in the application and the end result out of the application

Figure 4. Subject 1 explained about the material being discussed via an application

She explained the material via by using the application, and the students needed to input the numbers of matrix and the result would be displayed in just one click. Unfortunately, they might not understand the procedural counting method of the matrix operation. Besides, they would less understand the elements of matrix, especially those that were useful for counting matrix. The subject neither asked them to identify the material nor constructed the concept. Otherwise, she directly explained it using the application. In this case, the students were her classmates who had already understood the procedural steps of how to solve matrix problems. In fact, when it came to high school graders, they might not understand the material well. In **processing phase**, the subject did not fully assist the students to thoroughly understand the material. She should have asked the students to *construct the concept according to her instruction*, but it was not apparent since the application automatically displayed the final answer. They just needed to read the answer without needing to construct the concept.

In **exploration phase**, the subject showed her promote action by *asking the students to apply the concept of solving all the given problems under her assistance*. *The students could also use the application to solve the given problems.* The task should be completed in group. She divided them into two groups, and gave them a group task. They were divided randomly. Given that it was an online teaching, the subject observed the group work via group chat. She made a WhatsApp group chat which members consisted of the students and the subject. The task was displayed in the form of power point via zoom meeting and the subject began to observe the process of discussion through group chat.

The discussion was held very well. It was found from the students' active participation in each group chat. Some students asked some questions to their group mates and the subject. The other group mates responded their questions. As students had already been familiar with WhatsApp, they had no problem of using the application. In this phase, the students were able to follow the subject's instruction well.

After they held the group activity, the subject gave them another task as their next activity. She aimed to identify the students' understanding by asking them to complete the task individually. The task was displayed in the form of PPT via zoom meeting. She asked them to complete the task through application. She gave them some minutes to complete the task individually. The task was given one by one. She then asked them to present their work. They could choose the method, either manual or using application, to complete the task. However, if they decided to use the application, they could not be able to explain in detail the process of solving the problem since the application automatically displayed the final result. In this case, Subject 1 did not show any promote action in feed back phase. She immediately closed her teaching when all the tasks had been complete and discussed together

Promote Action by Subject 2

Subject 2 chose *relations and function* as the material of her teaching. Her *PCK* level was 0-1. She began her teaching activity with **motivation phase** by conveying the teaching objectives and the importance of learning this material. The promote action she showed here was *giving questions to explore and correlate with the previous material*

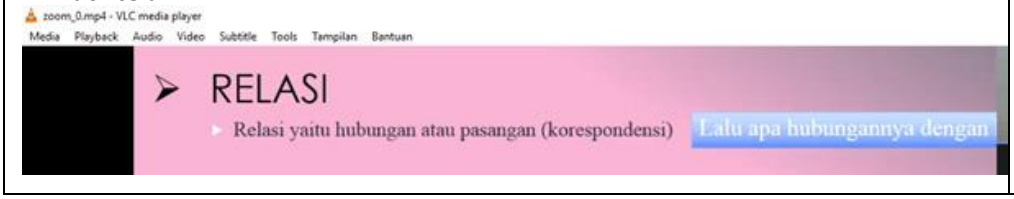
In Indonesia	In English
	Relation relationship i.e. relationship or partner (correspondence)

Figure5. Subject 2 correlated with the previous material

Relations and function was not new for students. Therefore, when Subject 2 proposed a question "what it relations? ", many students could answer the question. Some of them could answer correctly, however, some other were wrong. Towards the students' wrong answers, Subject 2 immediately corrected their answers without giving the questions away to the other students, hoping that they would give a correct answer. Towards the students' correct answer, the subject gave reinforcement and compliment to them.

After responding the students' answers, Subject 2 then explained the answer of the question theoretically. During the explanation, what made it interesting was in **concentration phase**. In this phase, the teacher directed the students' attention and focus on the main substance of material being discussed. The *promote action* she proposed here was *emphasizing by underlining the main substance of material being discussed including each nature of relations.* She marked the important parts of what she wrote. She also underlined some headlines. Since she gave a lot of description on the slides of PPT, she needed to mark and underlie the important concepts of them.

Subject 2 went on to **exploration phase** that aimed to encourage students to attain their expected learning output. The *promote action* she showed was *asking them to use the concept of relations to solve the problem.* The students should complete the task individually. In addition, Subject 2 only gave two tasks displayed via zoom meeting.After asking the students to complete the given tasks, Subject 2 checked their works through students' work presentation. Every student completed the given tasks. However, they needed more time to complete the tasks. It was seen from how many times the subject asked them whether or not they completed their tasks, and they said '*not yet*'. This longer time that students needed to complete the tasks indicated that they actually found difficulty but not conveyed in class. The subject then went on to *function.*

Subject 2 displayed the material in complete, neat and systematic way using PPT. However, she only read them without giving any explanation at all. Although she could actually ask the students to construct a concept about function, she ended up with solely asking them to listen to what she read. In **concentration phase**, she could give some emphasis by underlining the important parts although she only read the material which was in the form of an example task about algebraic function. This emphasis was aimed to make the students focus on what she read. Indeed, what she did here was interesting. Subject 2 then went on to **exploration phase** by *asking the students to use application to draw a graphic of simple algebraic function.* The application she used was *Geogebra.*

Subject 2 explained how to draw a graphic using Geogebra. In **exploration phase**, *the students used media or mathematics instrument.* The media she used was actually interesting as it could create a graphic which process often brought difficulty to students. However, she was less interactive in delivering the instruction of operating Geogebra. Since the students only listened to what teacher read, not all of them understood on how to use Geogebra to draw a graphic of algebraic function. Geogebra was actually interesting to apply. Nevertheless, the students were not asked to demonstrate the application to draw a graphic since it was still the teacher-centered explanation. Hence, the subject could not measure whether or not the students understood on how to use the application

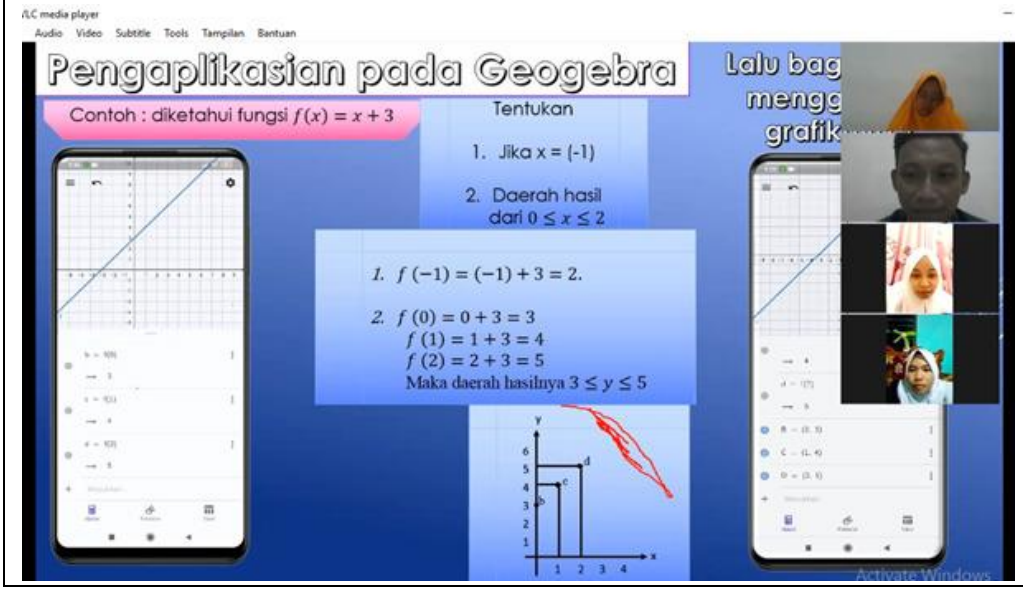
Display the subject in zoom meeting	His explanation
	operation on geogebra subject simulates how to draw a graph using the geogebra app

Figure6. Subject 2 used Geogebra to draw the graphic of algebraic function

Subject 2 asked the students to correct the graphic resulted from Geogebra. Unfortunately, they could not respond what she asked for optimally since they had not tried the application yet. Hence, only few of them gave responses. In this case, the subject still had to actively assist the students. She did not implement a **feedback phase** in her teaching process as she did not ask the students to conclude the material they discussed in that meeting.

Promote Action by Subject 3

Subject 3 was classified into level 1 for her pedagogical knowledge and level 0 for her content knowledge. The author recorded her teaching activity and made an analysis on it. Towards her teaching activity, Subject 3 began with giving a question about the previous material.

In Indonesia	In English
	absolute value discussion 01 absolute value concept 02 absolute value equation 03 absolute value inequality 04 practice questions

Figure 7. Subject 3 gave a question about the previous material

The material was about absolute value. Subject 3 asked the students about the previous material which was about the concept of absolute value. In **motivation phase**, she showed her promote action by *asking the students to correlate a given example with the material to be discussed.* Along with an example of a kid having a scout practice by moving back and forth, Subject 3 gave a question "what is the concept of absolute value according to the example?". She gave some illustration to remind them. in **concentration phase**, she showed a promote action by *asking the students to identify the scope of the material as the initial description.* After they got their memory about the concept of absolute value, the subject went on by asking them to identify the types of absolute value. She gave some types and asked them to identify the features and the types of the absolute value. During the process of teaching, the subject always gave as much as chances for the

students to ask questions. When none of them asked any question, she sometimes gave a question while choosing one of them to answer the question. It was aimed to direct their attention to the material being discussed. If their answer was correct, she would give reinforcement and compliment. Otherwise, if their answer was wrong, the subject would assist them to find the correct answer.

Subject 3 implemented **exploration phase**in her teaching process in order to make students reach the expected output. She showed a promote action by *asking the students to utilize a learning media such as worksheet, learning instrument, and other mathematic media.* This phase was held by means of learning media. The subject showed that the application she used was *cymath*

Figure8. Cymath, the application that students had downloaded

The subject waited and made sure that every student had installed the application, *cymath*. Afterward, she made a simulation of how to use the application by inputting the type of absolute value to be completed. The final answer along with the detail explanation would automatically appear in just one click. Furthermore, *the subject also assisted the students to solve the given problem.* She had good interaction with them. In addition, she ensured that the students could totally operate the application. Next, the subject asked the students to solve the given problem in order to see how far they had understood the material.

Subject 3 asked the students to use the application and the concept of absolute value in order to solve the given problem. It was classified into **exploration phase**, in which *the students applied the given concept to solve problem.* Every student was then able to solve problems and showed the correct answers. It also indicated that the teacher could deliver the material well, and thus the students could totally understand it. She did not show any feedback phase. It seemed from how the students had no instruction to conclude the material being discussed.

Promote Action by Subject 4

Subject 4 was in level 1-1 for pedagogical knowledge and content knowledge. She began her teaching activity with **motivation phase** by *exploring the students' knowledge through some questions.* The material to be discussed was logarithm. She began the phase by asking a question "what is logarithm?".

The subject chose some students to answer the question. She aimed to see their initial insight. The responses were vary. Some of them kept silent, some gave wrong answer, and some other gave answer that was close with the correct one although using their own words. After each student gave their answer, the subject explained about what logarithm was while giving reinforcement to their responses. Afterward, she went on to the features of logarithm.

In **concentration phase,** the subject showed her promote-action by *asking the students to identify the features of logarithm displayed.* They were asked to see and show the differences among each feature. At first, the students worked together to identify the features until the subject gave questions to each of them individually. Luckily, they could identify the features under her instruction. Eventually, the students could successfully understand the features of logarithm. Then, Subject 4 went on to the next phase by giving them problems with logarithm features.

In **processing phase,** Subject 4 showed her promote action by *asking the students to construct the concept of material being learned.* The students constructed the concept of logarithm based on powers of numbers. They constructed the concept by addressing the subject's questions. In storing

phase, furthermore, Subject 4 conveyed that what they were learning should always be well memorized. In **exploration phase**, she asked the students to apply the concept they constructed to solve the given problems. She gave them six problems to be solved and immediately discussed. Those problems were all related to the features of logarithm. In the process of addressing the problems, she called the students one by one to immediately solve the problem and mention which feature they used. However, she would assist the student who felt difficult to find the correct answer. As those problems were immediately discussed, the students could also immediately see whether their work was correct or wrong. The subject asked them to correct their work once they found that their work was wrong. Subject 4 identified the students' performance and assisted those who found difficulties in understanding the material.

In **exploration phase**, the subject assisted the students to reach their expected performance/output through learning media. She made an interesting media in order to encourage students' motivation to learn mathematics. Besides, she also facilitated them to discuss the given problems and corrected their answers together

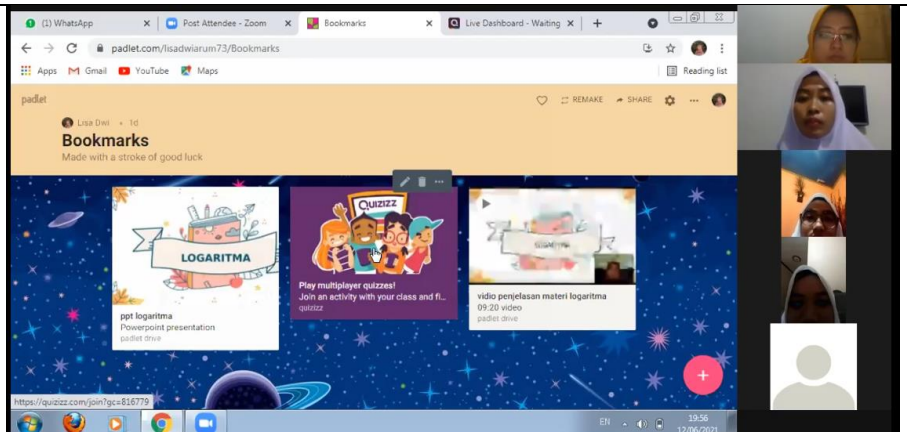
Display the subject in zoom meeting	Her explanation
	the subject provides an explanation of the features that exist in the padlet application. students can access the material and conduct competitions to solve the problems on this padlet

Figure9. Subject 4 utilized media as means of teaching

Subject 4 used *padlet* as means to explain logarithm. It contained material to be discussed in the form of PPT along with some problems displayed as quiz. The students were interested in that media, and thus, motivated to study as the physical appearance of the media was interesting, in addition to the complete content within. At the end of teaching, the subject directly ended the class meeting without asking the students to conclude the material being discussed.

DISCUSSION

This study aimed to see any promote actions that prospective teachers might show during their mathematics teaching practices. The research selected the subject based on the level of their PCK. The result found that those four subjects with different level of PCK had different teaching output as well. In general, subjects with lower pedagogical and content knowledge taught using a simple method and applied the procedures of teaching. The higher the PCK, the method of teaching became simpler and to-the-point. In addition they would take more effort in exploring media.The results of this study are in accordance with other studies which state that there are differences in the way of learning that is influenced by the teacher's PCK(Bowie et al., 2019; Capraro et al., 2005; Livy et al., 2019)

Those four subjects showed promote actions in their motivation phase of teaching process by conveying their teaching objectives. Furthermore, they also gave questions related to the particular materials in order to explore their students' initial knowledge. This was important as they should consider their students' learning experience(Goos & Bennison, 2008). Students' initial insight and learning experience might help the students to construct new insights. It was consistent to constructivist perspective that teachers should give chances to students to construct their own knowledge actively by considering their initial insights(Sa'dijah, 2001). Next, the subjects delivered their teaching material by means of media, which was inseparable from online teaching and learning

process. It was consistent to further study that media could facilitate students to get concepts and experience by their own or through experiments. The four subjects also gave a lot of tasks to complete, either in group or individual. It aimed to drill students with exercises in order to make them totally understand the given material, in addition to having problem-solving. Teaching mathematics was indeed familiar with lots of task(Goos, 2012). Therefore, the subjects let the students to complete the tasks using various ways. However, the subjects would immediately assist their students once they got lost or stuck. It was consistent to a study that it would bring positive vibes if teachers let their students free with their own thinking (Hussain et al., 2011).

Various promote actions and a variety of teaching depended on the prospective teachers' competence and creativity reflected on their PCK, which also depended on their academic competence(Aminah & Wahyuni, 2018; Gilang et al., 2019; Maryono, 2016). Subjects or prospective teachers with PCK level at 0 could still develop their competence by either developing materials or extending the frequency of teaching practice in order to gain more experience and improve their PCK level (Aminah & Wahyuni, 2018; Jatisunda & Kania, 2020). Through this study, it was found that the differences in PCK possessed by prospective mathematics teachers can create diversity in the practice of teaching mathematics. For prospective teachers who have PCK in the low category, it is hoped that they can improve their abilities through frequent practice and practice in more depth about mathematical content and pedagogical knowledge so that when these prospective teachers actually teach in class, they can actually become professional teachers(Bowie et al., 2019). This is in accordance with the results of research by Kahan (2003) which states that the ability of mathematical content contributes to the implementation of learning (Kahan et al., 2003).

The learning process carried out during the research process was online learning due to the Covid-19 pandemic using the Zoom application. This online learning provides new things for prospective teacher students. Because previously students only experienced direct learning. So students must consider ways to package the material so that it can be conveyed properly. Learning activities carried out online make prospective teacher students more relaxed in preparing materials and teaching because students do it only from home but it is also more flexible in time, this is one of the advantages of online learning (Firman & Rahayu, 2020; Handayani, 2020). Constraints experienced by prospective teacher students include the same, namely sometimes the unstable network that makes the material not smooth to be delivered. One of the online learning activities carried out by using the Zoom application, although it has obstacles, it still gives an interesting impression because it has features that can be utilized, besides that online learning will accelerate the digital transformation process in Indonesia (Nurmala et al., 2021; Suni Astini, 2020).

Therefore, it can be said that although it has limitations in online learning, online learning can still be done because it still gives an attractive impression to students. How a teacher can package learning so that it is conveyed properly, what activities the teacher makes to make students active, promote what actions the teacher takes so that it can be accepted by students and what media are suitable for use in online learning are a series of important things that must be considered. prepared by the teacher. For this reason, it is necessary to do further research to identify promote teacher action on various materials, as well as what media are suitable to be developed for online learning.

CONCLUSIONS

The results showed that the four prospective teacher who have PCK with different levels have different skills in bringing up promote action. The four prospective teacher both carry out learning according to the phases in the learning process, but there are different ways of delivering the material. prospective teacher with the criteria of pedagogical knowledge (0)-content knowledge (0) carry out learning according to all phases of learning, but prospective teacher only promote action in the phases of motivation, concentration, processing, exploration. prospective teacher with these criteria present material briefly and lack interaction with students so that the class situation is still classified as passive. prospective teacher with the criteria of pedagogical knowledge (0) - content knowledge (1) carry out learning according to all phases of learning, but prospective teacher only promote action in the phases of motivation, concentration, exploration and feedback. There is a difference in the appearance of promote action in the learning phase when compared to the first prospective teacher. prospective teacher present material in a more structured and clear way, but

prospective teacher are less able to bring out student activity. The third prospective teacher with the criteria of pedagogical knowledge (1) - content knowledge (0) raises promote action in the phases of motivation, concentration, and exploration. Prospective teacher on this criterion present the material in a simple and easy way for students to accept. The explanation given is also concise, as well as the variety of questions given which are also easy to do. The fourth prospective teacher with the criteria of pedagogical knowledge (1) - content knowledge (1) raises promote action during learning in the phases of motivation, concentration, processing and exploring. The fourth criterion of prospective teacher students presents material in a more complete and structured manner, can explore the material, can make students more active and make good use of the media. Student teacher candidates are also more communicative with students. Based on the conclusions from the research results, it can be said that it is necessary to have a balance between pedagogical knowledge and content knowledge in order to bring up promote action and carry out learning well and achieve learning objectives. For prospective teacher who still have low PCK criteria, they can continue to practice and make improvements in teaching methods. prospective teacher need to practice by teaching a variety of materials to better prepare students to become real teachers. Regarding online learning, blended learning can also be considered for further research because it is possible that there will be different promotion actions from prospective teacher.

So it can be concluded that the four prospective teachers both carry out learning according to the phases in the learning process, but there are differences in the way they deliver the material. Prospective teacher who have a higher level of content knowledge can make the presentation of the material more complete and structured, bringing up promote actions related to more material but less interactive delivery. Prospective teacher explore the material more than how to teach. This is different from students who have a higher level of teaching knowledge, students present the material simply. Only a few materials were presented, but prospective teacher were creative in bringing up promote action to students. Both through the media and through the way prospective teacher speak.

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Review's Comment & Response Form on JRAMathEdu: [17258]

Reviewer	Reviewer's Comment	Respond to Reviewer
1	Please revise the abstract based on the revision of the introduction, research methods, results and discussion, and conclusion	I have revised the abstract according to the research results
	The Introduction is very confusing and does not seem to follow a clear thread of argument, making it difficult to find the point at which the problem under study is motivated, delimited and stated	I've changed the flow in the introduction to make it easier to understand
	There is also confusion in relation to the context in which the research is framed, as on the one hand it seems to be described by the boundary conditions of online teaching, but on the other hand, most of the background information does not refer to this context and the research itself does not seem to be contextualised in it either	learning is done online, I have added some literature on online learning
	There is also a lack of relevant references in relation to the specialised knowledge of mathematics teachers, to online teaching and to technological-pedagogical knowledge	I have added some literature on teacher knowledge, online learning
	The definition and treatment of pedagogical content knowledge, based on Shulman's seminal work, is not correct. It is not a "direct sum" or mere combination of content knowledge and pedagogical	I have added several studies from Ball's research results, so that they can add references and understanding

	knowledge, but has an entity in itself as a domain of intersection of the two. In this sense, Shulman's work is subsequently developed in the field of mathematics by other researchers who do seek to characterise and operationalise this domain, with the proposal of the MTK model by Ball and collaborators being particularly relevant, a model that would have been much more relevant, in my opinion, as part of the theoretical framework than the one that is finally chosen	
	It is not only the approach (qualitative) and purpose (descriptive) should be defined, but also the design, which is not clear whether it was finally approached in a case study format (instrumental) or rather a content analysis approach	I have created a separate sub-chapter to discuss research design, participant, research instruments
	No coding manual for the responses is provided, nor is there any reference to the criteria for quality and rigour of such research (e.g. those proposed by authors such as Guba), which also helps to identify limitations in the research	I have added data credibility criteria
	The so-called "phases" that are part of the analysis of results should be described beforehand and not as the results are shown. This helps the reader to follow the process and to	I've added an explanation about the phase in the results of data analysis is a phase in learning

	have a global overview from the beginning	
	The discussion and conclusions should not be limited to a summary of results, but should follow a deductive pattern that allows going beyond mere description, including implications for Mathematics Education, limitations of the research and even future lines of work	I have added some references and explanations that support the discussion
	In any case, being an interesting approach and having data that I also consider can be analysed to provide interesting ideas and conclusions, I think it is worth reorganising and improving the article	I have tried to improve the related structure and content of the article. I thank you very much for being given the opportunity to improve this article
2	Please revise the abstract based on the revision of the introduction, research methods, results and discussion, and conclusion	I have revised the abstract according to the research results
	The subjects should involve students with levels: 2-0, 2-1, 2-2, 1-2, and 0-2, unless the authors provide strong arguments for only analyzing those four subjects mentioned in the manuscript	I have added an explanation about the focus of observation in this study is on the teacher
	The findings are mainly describing the observation results. Please describe the application of triangulation technique which describing and comparing the data from observation, interview, and teachers' self-reflection	I have added an explanation of the triangulation used in the research method

Other:……..

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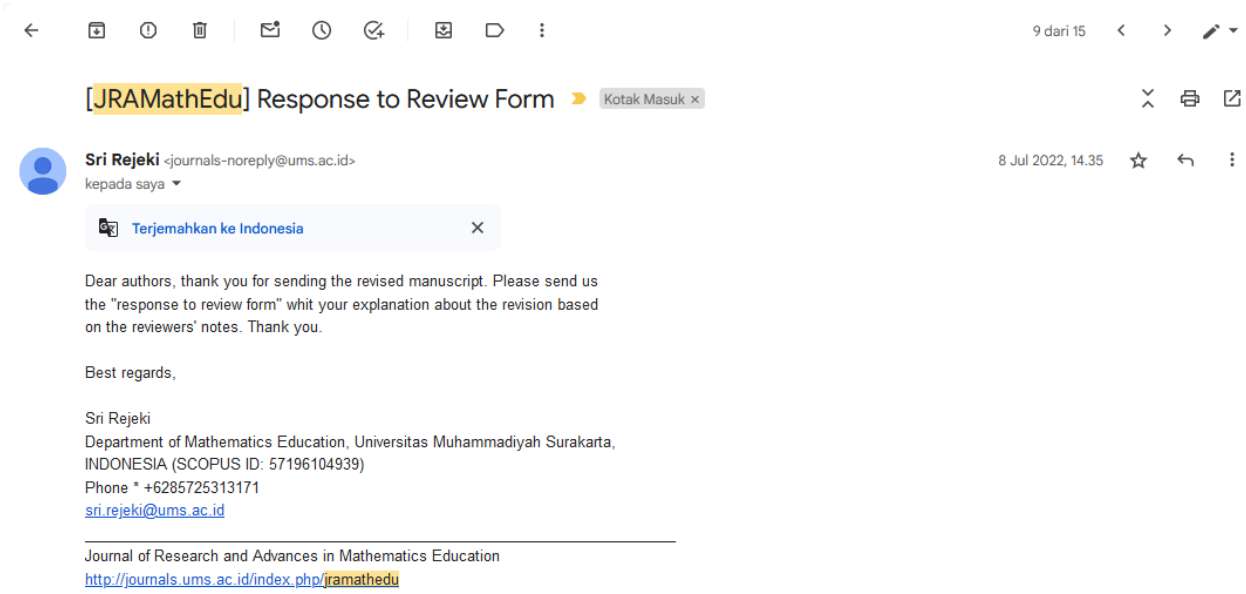
6. Bukti permintaan untuk mengirim *response to review form* berikut penjelasan (8 Juli 2022)

Screenshoot Email



9 dari 15

[JRAMathEdu] Response to Review Form Kotak Masuk ×

Sri Rejeki <journals-noreply@ums.ac.id> 8 Jul 2022, 14.35
kepada saya

Terjemahkan ke Indonesia

Dear authors, thank you for sending the revised manuscript. Please send us the "response to review form" whit your explanation about the revision based on the reviewers' notes. Thank you.

Best regards,

Sri Rejeki
Department of Mathematics Education, Universitas Muhammadiyah Surakarta,
INDONESIA (SCOPUS ID: 57196104939)
Phone * +6285725313171
sri.rejeki@ums.ac.id

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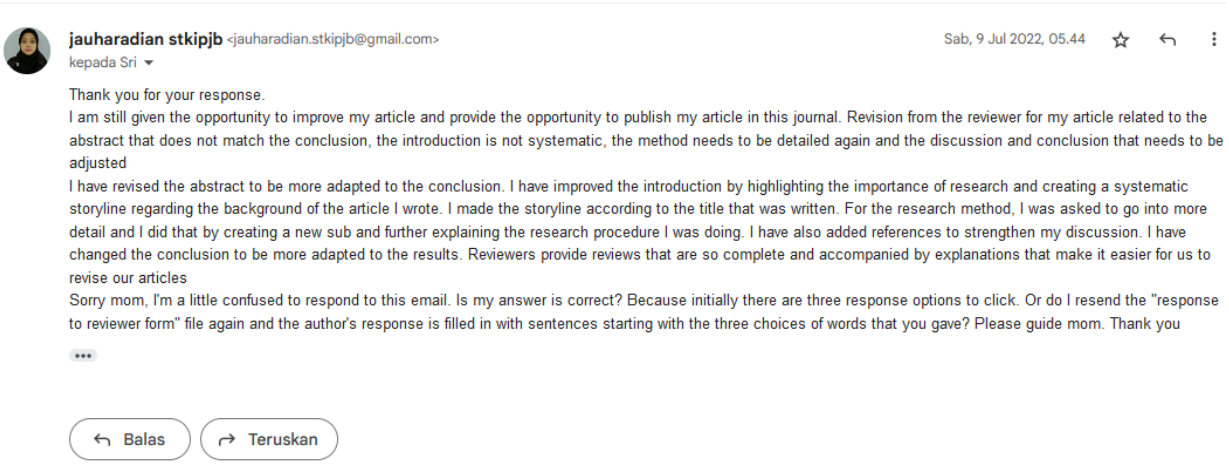
7. Bukti balasan untuk penjelasan *response to review form*

(9 Juli 2022)

Screenshoot Email



jauharadian stkipjb <jauharadian.stkipjb@gmail.com> Sab, 9 Jul 2022, 05.44

kepada Sri

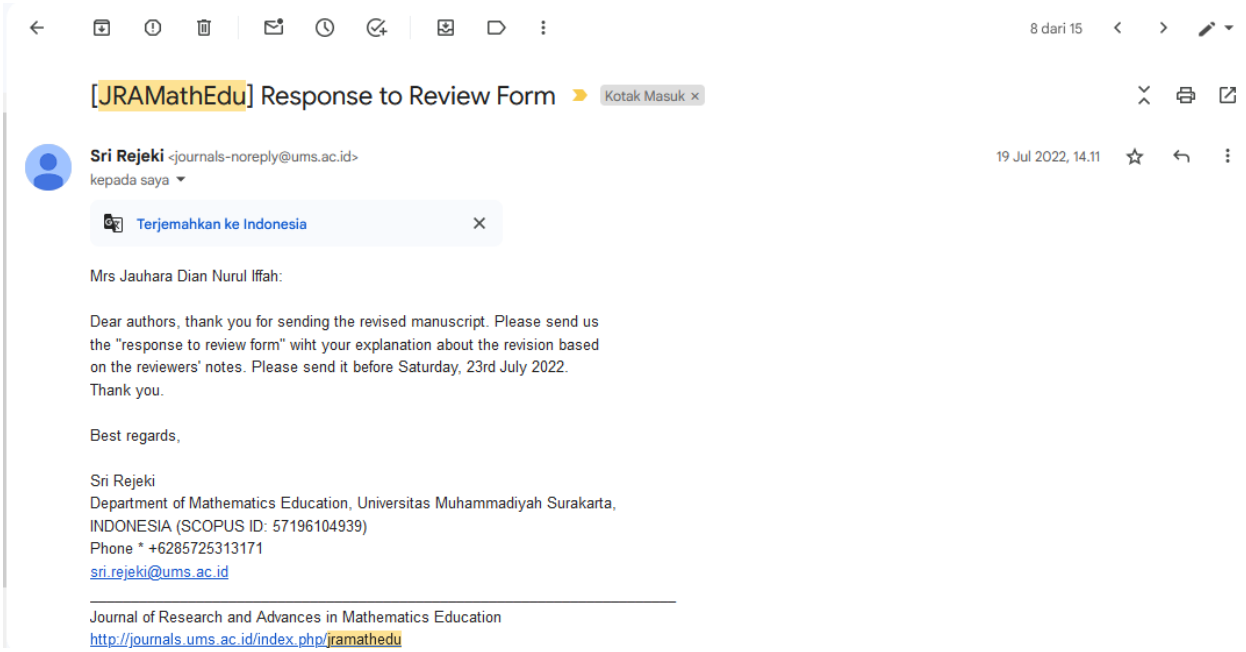
Thank you for your response.
I am still given the opportunity to improve my article and provide the opportunity to publish my article in this journal. Revision from the reviewer for my article related to the abstract that does not match the conclusion, the introduction is not systematic, the method needs to be detailed again and the discussion and conclusion that needs to be adjusted
I have revised the abstract to be more adapted to the conclusion. I have improved the introduction by highlighting the importance of research and creating a systematic storyline regarding the background of the article I wrote. I made the storyline according to the title that was written. For the research method, I was asked to go into more detail and I did that by creating a new sub and further explaining the research procedure I was doing. I have also added references to strengthen my discussion. I have changed the conclusion to be more adapted to the results. Reviewers provide reviews that are so complete and accompanied by explanations that make it easier for us to revise our articles
Sorry mom, I'm a little confused to respond to this email. Is my answer is correct? Because initially there are three response options to click. Or do I resend the "response to reviewer form" file again and the author's response is filled in with sentences starting with the three choices of words that you gave? Please guide mom. Thank you

Balas Teruskan

8. Bukti permintaan untuk mengirim *response to review form*

(19 Juli 2022)

Screenshoot Email



8 dari 15

[JRAMathEdu] Response to Review Form Kotak Masuk ×

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kepada saya

Terjemahkan ke Indonesia

Mrs Jauhara Dian Nurul Iffah:

Dear authors, thank you for sending the revised manuscript. Please send us the "response to review form" wiht your explanation about the revision based on the reviewers' notes. Please send it before Saturday, 23rd July 2022.
Thank you.

Best regards,

Sri Rejeki
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9. Bukti balasan konfirmasi untuk penjelasan *response to review form*

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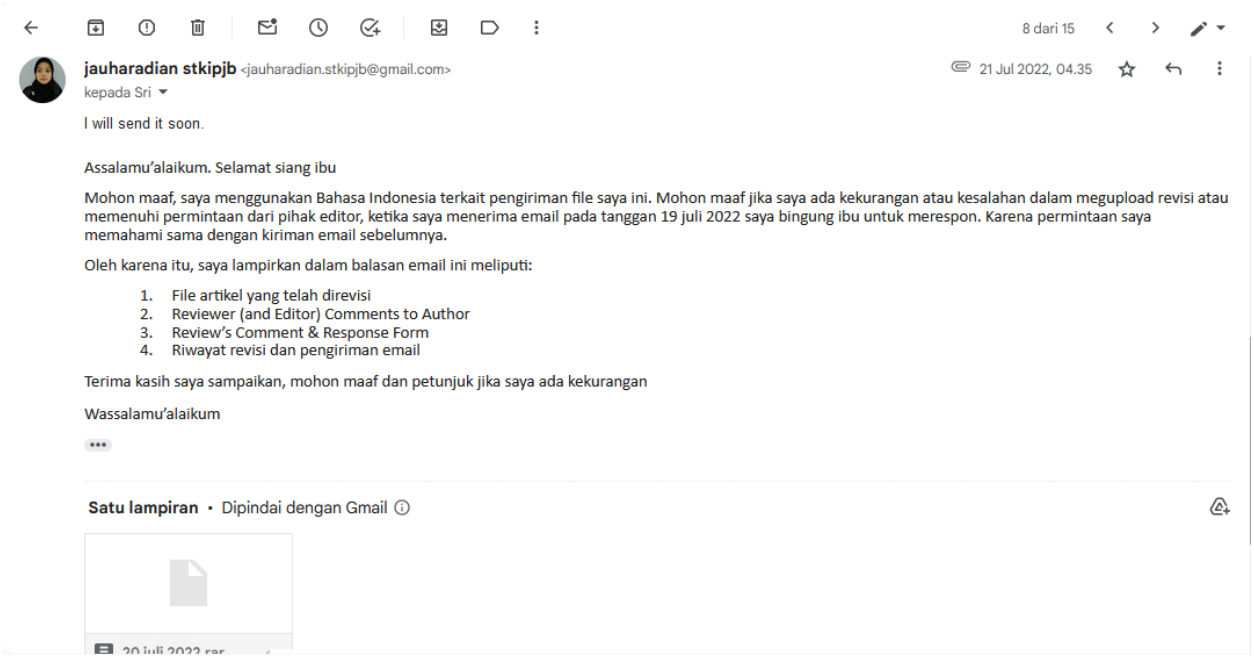

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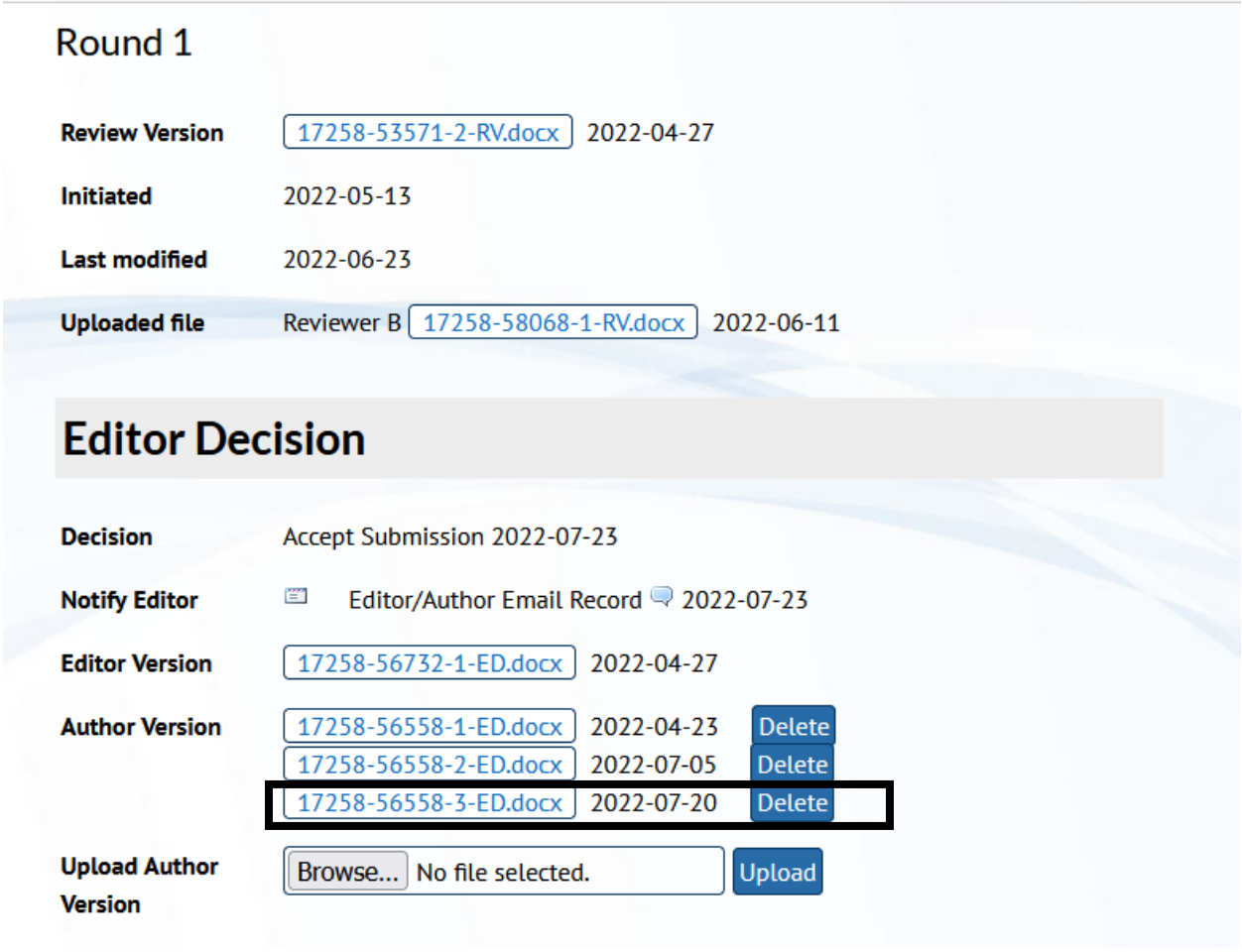

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Manuscript Title

Describing Prospective Teacher's Promote Action In Online Mathematics Learning

Authors

Jauhara Dian Nurul Iffah & Lia Budi Tristanti

Date Issued,
July, 25 2022

Lailatus Saadah, M.Pd.
Head of Language Center

11. Bukti Artikel Accepted
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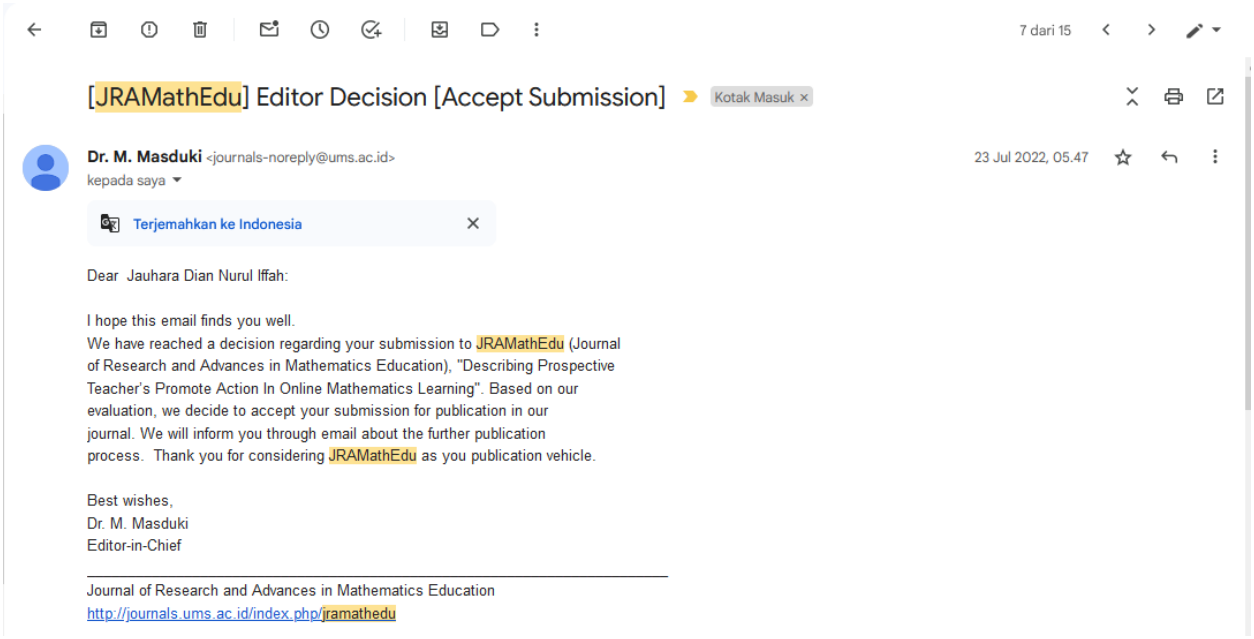

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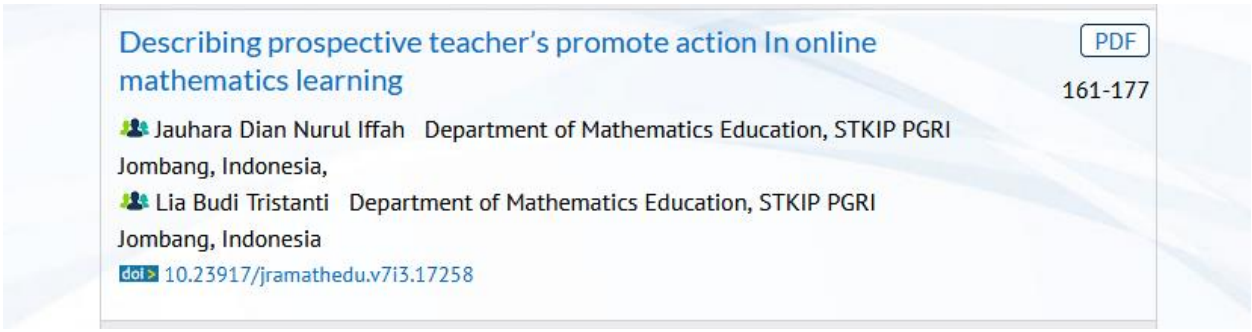

Journal of Research and Advances in Mathematics Education

Volume 7, Issue 3, July 2022, pp. 161-177
DOI: 10.23917/jramathedu.v7i3.17258
p-ISSN: 2503-3697, e-ISSN: 2541-2590

Describing prospective teachers' promote action in online mathematics learning

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Citation: Iffah, J. D. N, & Tristanti, L B. (2022). Describing prospective teacher's promote action In online mathematics learning. *JRAMathEdu (Journal of Research and Advances in Mathematics Education), 7*(3). 161-177 https://doi.org/10.23917/jramathedu.v7i3.17258

ARTICLE HISTORY:
Received 22 January 2022
Revised 20 July 2022
Accepted 23 July 2022
Published 31 July 2022

KEYWORDS:
Prospective Teacher
Promote Action
Online Learning

ABSTRACT

Promoted action is an activity offered by the teacher to students so that they can develop new knowledge or experience. The promoted action chosen by the teacher will depend on the knowledge possessed by the teacher. It is commonly referred to as pedagogical content knowledge (PCK). In addition, to become a professional teacher with a well-measured PCK, the prospective teacher has been trained since the lecturing process. This study aims to describe promoting the actions of prospective teacher students in learning mathematics online. It is descriptive qualitative research on the subject of four students who take the peer teaching program. Subject selection was based on the PCK criteria of subjects with categories 0-0, 0-1, 1-0, and 1-1, which indicated the order of levels of pedagogical knowledge- content knowledge. Data collection methods are tests to determine the PCK of prospective subjects, observation of the learning process, and documentation of learning records. The triangulation used to see the credibility of the data is time triangulation. The results showed that all subjects elicited promoted actions in motivation, concentration, processing, and exploration phases. The four students have different ways of bringing up encouraging action based on their ability criteria.

INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual strength, self-control, intelligence, noble character, and skills needed by themselves, society, nation, and state (The Law of Educational System in Indonesia, 2003). Education is held by empowering all components of society to participate in the implementation and control of the quality of education services. The implementation of education cannot be carried out by only individuals, but there is a national education system applied. The national education system is all components of education that are interrelated in an integrated manner to achieve national education goals. This component consists of (1) educational objectives; (2) educators; (3) students; (4) curriculum; (5) facilities and infrastructure; (6) learning media; (7) learning resources; (8) education management; (9) educational evaluation; (10) educational supervision; (11) research in education; (12) dedication in education. This study will not only discuss all education components, but it will also discuss educators and learning media.

Educators are educational staff who are qualified as teachers, lecturers, counselors, tutors, widyaiswara (civil servant of education), instructors, facilitators, and other designations according to their specificity and participation in providing education (The Law of Educational System in Indonesia, 2003). Educators, as one component of the National Education System, play an essential

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role in learning activities. Learning is an interactive process between students and educators and learning resources in a learning environment. From now on, educators at the school level are referred to as teachers. Teachers should have four competencies: pedagogy, personality, social, and professional (The Law of Educational System in Indonesia, 2005). Teachers' pedagogical competence refers to the competencies of students teaching management that at least included some points. Those are the comprehensions of education base or insights, students, curriculum/syllabus development, teaching design, educated and dialogic implementation of teaching, technology use, evaluation on learning result, and student development to actualize their various potencies. Teachers should master science, technology, art, and cultural knowledge toward professional competence. They are teaching the course materials based on the content standard of the education program, subject matter, and group of subjects. The materials cover the relevant concept and methods of art, technology, and scientific disciplines which were conceptually coherent to an education program, subject matter, and group of subjects to be taught (The Law of Educational System in Indonesia, 2008).

The competencies that teachers must possess as formulated in the Constitution are in line with Shulman (1986) about Pedagogical Content Knowledge (PCK). Shulman (1986) was the first to use the term Pedagogical Content Knowledge (PCK) when trying to help professional teachers. PCK is described as the result of understanding teaching material (content knowledge) and how to educate (pedagogical knowledge), which blend into teacher needs. Shulman (1986) formulated that PCK is an understanding of effective learning methods to explain certain materials and what makes certain materials easy or difficult to learn (Shulman, 1986). Two major parts of PCK are content knowledge and pedagogical knowledge. Shulman also stated that pedagogical knowledge is related to teaching methods and processes, including class management, assignments, lesson planning, and student learning. Content knowledge includes knowledge of concepts, theories, ideas, frameworks of thought, methods of proof, and evidence (Shulman, 1986). PCK is defined broadly so that the PCK idea not only can be applied to every teacher at every grade level but it is also explained that each teacher has or needs a different PCK.

Krauss *et al*. identified three dimensions of PCK, which were important for teaching mathematics. Those three dimensions were teachers' knowledge about math tasks, students' initial knowledge (i.e., any difficulty and misconception), and representation, analogy, illustration, or models of the math content that would be useful to be taught (Krauss et al., 2008). Teachers' PCK might determine the teaching process and affect students' learning outputs (Olfos et al., 2014). Developing and selecting tasks, representing and explaining, facilitating a productive discussion, interpreting students' responses, emphasizing students' understanding, and analyzing their misconceptions and difficulty appropriately are the elements of PCK (Ball et al., 2001). Another argument claimed that among content, curriculum, and teaching, "the knowledge of teaching" was the basic component of pedagogical content knowledge (An et al., 2004). Some researchers argued that a successful math teacher needed a strong foundation in pedagogical content knowledge, referring to professional knowledge for teaching specific branches of knowledge (Wilson et al., 1987, 2016).

This study focuses on researching student teacher candidates because to become a professional teacher, someone must start being trained after becoming a student. Furthermore, some studies showed that the comprehension of teaching mathematics to reach a qualified education is a specific professional knowledge that could be obtained through training in university and developed through reflection on teaching practices (Fennema & Romberg, 1999; Grossman, 2008; Morris et al., 2009). Therefore, prospective teachers got materials about teaching and learning theories to give them knowledge about teaching. More specifically, prospective math teachers also had chances to do teaching practices to implement any theories they had learned before. The importance of teaching practices was to familiarise them with the real teaching circumstance. Hence, they should prepare themselves since they are in college. Teaching mathematics needs a good knowledge of mathematics contents and pedagogical knowledge (Turnuklu & Yesildere, 2007). Therefore, in college, prospective teachers should learn about any competencies of being a good teacher theoretically and practically to be an excellent professional teacher. This indicated the importance of identifying prospective

teachers' PCKto prepare them to be professional teachers. This identification will be the basis for selecting students as research subjects and will describe the learning process they are doing.

Teachers might apply various models and teaching methods during their teaching process. They took their decision by considering some matters such as the difficulty of teaching materials, students' characteristics, and adequate facility (Lui, 2012). Students' different characteristics and competencies were the main concern for teachers. The main challenges in the teaching of mathematics include making mathematical logic and proof as a means of justification and depriving the teacher of authority to decide a truth, relating mathematics, its ideas, and applications, but not treating mathematics as an isolated collection of concepts and procedures (NCTM, 2000). This shows that teachers must involve students in the learning process and that involvement is related to linking mathematical ideas. Learning steps that can lead to active students are giving students an offer to carry out an activity. It is called teacher's *promote action.*

Promote action is an activity offered by an older person to a child so that the child acts in a certain way (Valsiner, 1983). What was promoted might vary. It could be in the form of things and activities that finally made the children do a particular action. It can also be interpreted as activities offered by teachers to students that lead to new knowledge (Goos, 2005, 2012). A set of promoted actions by a teacher to students in a particular area was called the zone of promoted action (ZPA). The process of teaching by a teacher has some procedures. However, not all of them were implemented, including ZPA. The teaching procedures that dealt with ZPA referred to any activities which made students do or behave to attain new skills. In this case, the author limited the new skills to new competence, skill, comprehension, and development that students attained, given that mathematics at school was about developments since elementary grade. In this study, researchers will describe various promote actions prospective teacher students raise when teaching practice.

Some factors to be considered involved the attainment of learning outputs, learning environment, and operational cost (Anggrawan, 2019). Good teaching models generated good learning outputs, a conducive learning environment, and affordable operational costs. This current pandemic era of covid-19 made teaching activities shift from offline to online. The results of previous studies indicate that students who previously studied face-to-face with good results must be able to adapt to online learning. In face-to-face learning activities, what cannot be replaced is direct, meaningful interaction between teachers and students (Tang et al., 2013). No interaction brought fewer learning experiences among students, and thus it would be difficult to understand the course (Mairing et al., 2021). Online learning tended to give more tasks to students and less explanation by teachers. Many tasks and limited explanations made online learning less effective for students (Giatman et al., 2020; Suryaman et al., 2020). Towards online learning, students need stable internet connections, the capability to operate technology, and supporting devices. Mainly, students in villages had serious internet connection problems (Mulyanti et al., 2020; Putra et al., 2020). However, this problem could be addressed by students' autonomous learning and their confidence in problem-solving (Mairing et al., 2021). This study will focus on learning practices carried out by students online. In the future, student teacher candidates will use technology to teach with online learning. So that in the future, the development of skills will increase and is referred to as Technological pedagogical and content knowledge (TPACK). TPACK presents a dynamic framework describing teacher knowledge needed to design, implement, and evaluate curriculum and teaching with technology (Niess, 2011). However, in this study, the skills related to TPACK have not been measured. The writers still focus on the PCK of prospective teacher students because students do not have experience in teaching in the field so students' PCK can still be assessed based on the teaching theory gained during lectures.

Some previous studies have discussed *zone of promoted action* (ZPA) in both medical and school areas (Bennison & Goos, 2013; Galligan, 2008; Goos & Bennison, 2008; Iffah, Sutawidjaja, Sa'dijah, et al., 2016; Iffah, Sutawidjaja, Sadijah, et al., 2016). Another study on mathematics students found that lecturing by implementing Valsiner's theory might convince them on probability courses (Tirto et al., 2019). In addition, the research on prospective teacher PCK that has been carried out previously is still limited to describing how the PCK of prospective teachers has not led to the learning of prospective teachers when teaching practice (Ayuningtyas & Apriandi, 2019; Gultom & Mampouw,

2019; Irfan et al., 2018; Makaraka et al., 2021). The novelty of this current study was that the author detected and described promoted action by prospective teachers when they had teaching practice in secondary school. Furthermore, the author also considered prospective teachers' PCK as the criteria for subject selection. The author would make some categories of PCK and describe the *promoted action* in a teaching process based on the PCK criteria.

Considering the issue described, this study's problem was promoting action (PA) by prospective teachers when they took teaching practices in secondary school. The teaching process was online via zoom meeting. The author identified the promoted action of prospective math teachers and whether it corresponded to the phases of teaching. The subjects of this study were selected by considering the students' PCK criteria. The result of this study could help develop prospective teachers' competencies and skills in teaching. In addition, lecturers might identify their students' PCK earlier to improve their students' PCK through lecturing in case they have students with low skills.

METHODS

Research design

The writers applied descriptive-qualitative research to describe the promoted action of prospective math teachers in their teaching practice. Data was collected through a skill test called a vignette to get the subject, observation, and documentation. The vignette test is used as a tool to identify the content knowledge and teaching knowledge of prospective teacher students who will later be selected as research subjects. Observation is used as a tool to describe the subject's promote action during teaching practice. The writers observed during the subject's teaching practice and recorded the subject's learning steps which were included in the category of promoting action. The researcher uses the observation sheet guidelines and lesson plans that have been made by students as research subjects to identify and classify students' activities that are included in promoting action. Researchers only focus on observing student activities as teachers when teaching because it will describe promoting actions that appear in teaching practice. Researchers do documentation by recording all learning activities. Learning activities in this study were carried out online with zoom media. The data collected was analyzed in stages according to Miles and Huberman, namely reduction, presentation, and concluding (Moleong, 2011; Sugiyono, 2015).

Participant

The participants in this study were the students of the Mathematics Education Department of STKIP (School of Teacher Training and Education) PGRI Jombang, East Java, Indonesia. They have currently been taking a peer teaching program. The selection of research subjects was based on students who are taking peer teaching programs because they have graduated and passed courses on education and are ready to practice teaching. For subject selection, the researcher gave them an initial test called vignette. The initial test was a scenario/illustration that contained students' solutions, questions, arguments, confusion, misconception, or comments that teachers should respond (Ebert, 1993). With the vignette test, the prospective teachers were asked to give their comments/responses on what students had written. Figure 1 showed the vignette test distributed to the subject candidates to identify their PCK.

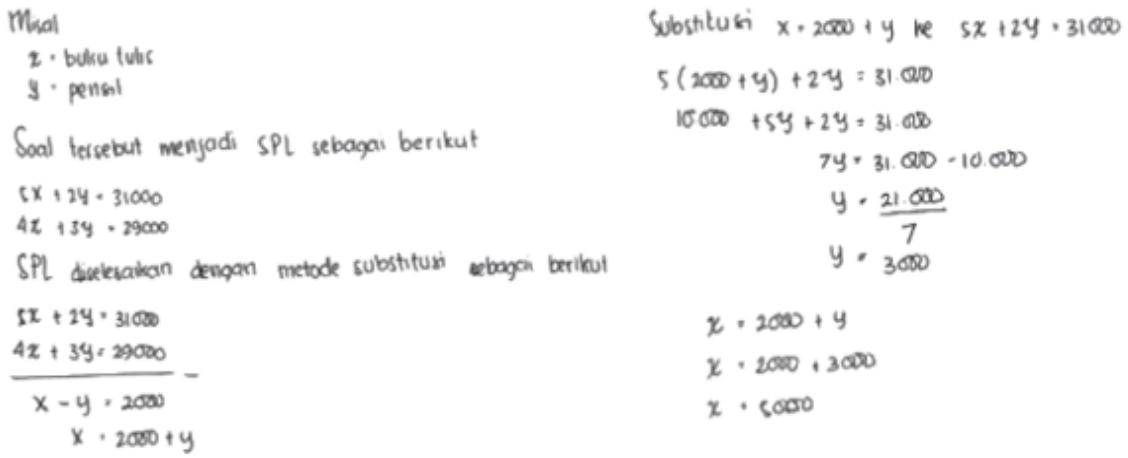
The researcher asked the subject candidates to write down their responses for points a-d on the vignette sheet. According to their responses, the researcher defined some criteria of PCK that the subject candidates had. The author used Karahasan (2010) framework to analyze the PCK of prospective teachers in this study. This framework was the completion and combination of another framework. In this framework, there were 2 components of PCK: pedagogical knowledge and content knowledge. Each of the components was classified into 3 categories: less (level 0), moderate (level 1), and good (level 2). Table 1 shows the characteristics of PCK that the researcher used for analyzing the prospective teachers' PCK, in addition to subject selection.

Case 1

In a teacher's learning gives an example of a story about SPLDV as follows:

Firza bought 5 notebooks and 2 pencils in a shop, it turned out he had to pay Rp. 31,000. The next day Nisa bought 4 notebooks and 3 pencils in the same store, it turned out that the total price was Rp. 29,000. Any price of a notebook and a pencil in the store?

Furthermore, the teacher asks students to resolve the matter by first making the mathematics model. Here's the answer to one of the students named Ghildan:



After observing the case, answer the question below:

a. Write your comments on Ghildan's answer
b. Is there something wrong or less? Please provide a sign
c. If the answer has an error or lack, what is the actual answer?
d. How do you give an explanation to students about the right answer from the matter?

Figure 1. Vignette

Furthermore, the author determined the subject of this study. They were prospective teachers who were in a peer teaching program. The subjects consisted of four prospective teachers with the following criteria:

Subject 1: pedagogical knowledge – content knowledge: level 0 – 0
Subject 2: pedagogical knowledge – content knowledge: level 0 – 1
Subject 3: pedagogical knowledge – content knowledge: level 1 – 0
Subject 4: pedagogical knowledge – content knowledge: level 1 – 1

Instruments and procedures

This study used a vignette sheet to identify the prospective teachers' PCK. This vignette was adopted from a previous study and the author only took some parts that dealt with content knowledge and pedagogical knowledge. It corresponded to the subject candidates who just got this knowledge theoretically. The test results through the student vignette were grouped according to the PCK level and the researcher took one from each level for further observation. The researcher chose one student who had good communication from each of the criteria based on the researcher's experience when teaching the student during lectures before the peer teaching program took place. Taking one student from each level is also based on the student being in the researcher's peer teaching guidance group so that the teaching practice activities of the research subject become natural to do. Table 1 shows the PCK level criteria used by researchers to take research subjects

Table 1
Criteria of PCK

Components of PCK	Level 0 (*Less*)	Level 1 (*Moderate*)	Level 2 (*Good*)
Content knowledge	Unable to express a definition correctly.	Able to express a definition correctly.	Able to express a definition correctly.
	Unable to use appropriate notation.	Able to use notation appropriately.	Able to use notation appropriately.
	Only use either declarative or procedural questions.	Still use either declarative or procedural questions.	Use any types of questions (including declarative, procedural, and conditional) appropriately.
	Unable to interpret and use representation.	Able to interpret and use both graphic and non-graphic representation.	Able to interpret and use both graphic and non-graphic representation.
	Unable to see the connection among different topics/sub-units.	Able to see the connection among different topics/sub-units.	Able to see the connection among different topics/sub-units, as well as take a step between the connections carefully.
	Providing and demonstrating knowledge for students.	Not only providing any instructions or adequate procedures but also assisting students to construct meanings and understanding.	Facilitating and assisting students, rather than providing answers along with their explanations.
	Introducing the procedures after the concept.	Seeing their roles as mentor, evaluator, and reminder.	Evaluating the students' understanding as well as enhancing their comprehension through questions that deal with further mathematical knowledge.
Pedagogical knowledge	Dominating any information.	Still dominating any information.	Appreciating and encouraging students to construct their mathematical knowledge through mathematical inquiry.
	Having problems in both topic and question orders during either the teaching process or teaching designing.	Only having problems on question order during either teaching process of reaching designing.	Ordering the topic material and questions/tasks appropriately.
	Feeling difficult to control and create a class with a democratic vibe/circumstance.	Sometimes capable to control and create a class with democratic circumstances.	Controlling and creating a class with democratic circumstances.

Data analysis

Data analysis in qualitative descriptive research is data reduction, data presentation, and concluding. Data reduction is done by removing data that is not under the research objectives. In this study, the reduction was carried out by removing data about the activities of research subjects that were not included in the promote action category. The presentation of the data is done by presenting the results of data reduction and grouping the data. In this study, the reduced activity data of research subjects were grouped based on the promoted action and learning phase In grouping, the researcher also played the learning recording to confirm the results of the observations and added if any data was missed when making observations. The results of the grouping are presented narratively. Based

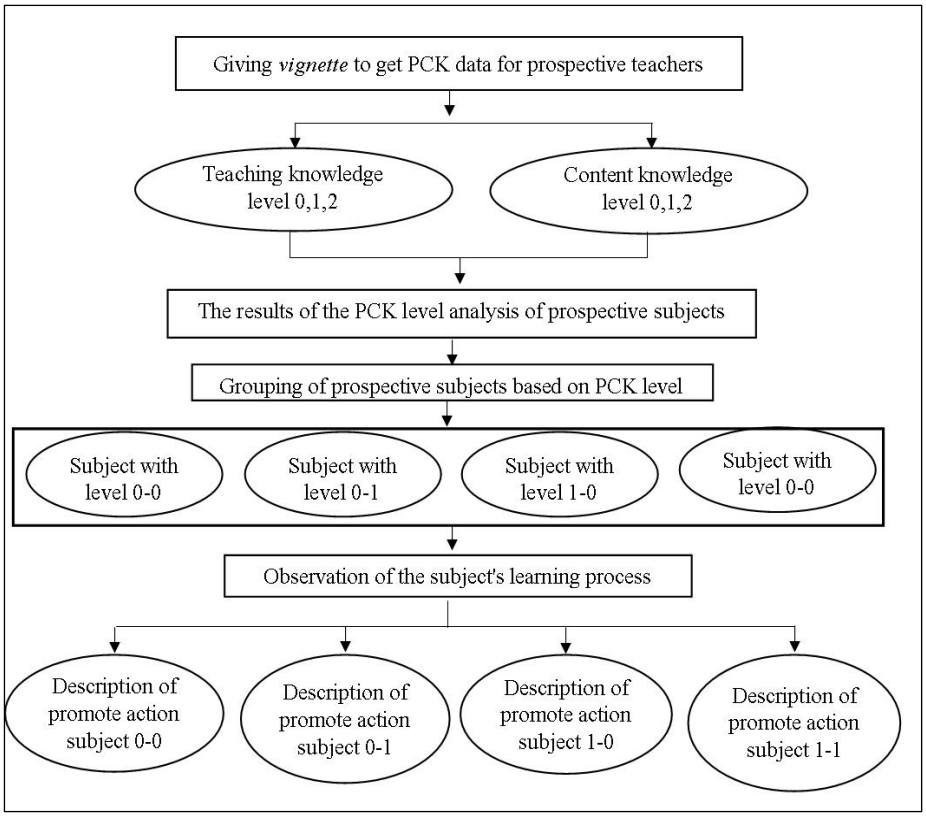


Figure 2. Research procedure

on the results of the presentation, the researchers concluded the form of promoting the action of prospective teacher students in learning mathematics which was carried out online (see Figure 2).

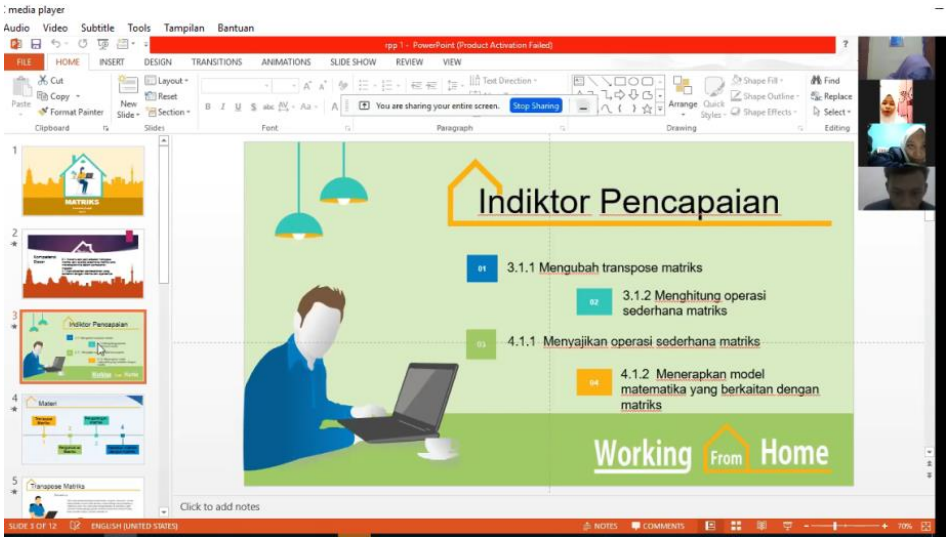
Triangulation is a technique of checking the validity of data that utilizes another thing (Creswell, 2012; Moleong, 2011; Sugiyono, 2017). The study used time triangulation to test the accuracy of the data. Researchers compared the results of the first and second observations and documentation taken at different times. The first and second data retrievals have the same characteristics so that they meet the valid criteria

FINDINGS

Promoted action by subject 1

Subject 1 implemented her teaching practice with her classmates as students. The author recorded the process of teaching and then analyzed the result. In the motivation phase, the promoted action that should appear was asking students to correlate a given example to the material to be discussed. However, it seemed that Subject 1 delivered the teaching objectives and asked the students about the previous material for their initial activity. She displayed her teaching objectives on the slides of power point. Figure 3 shows the learning objectives explained by the research subject She conveyed that the current teaching objective was matrix operation. She directly conveyed the objective without asking the students to correlate the example with the material to be discussed. Next, the subject asked the students to explore their knowledge through questions related to the previous material. Then she asked them some questions that dealt with the definition of matrix and the types of matrix. These questions were for all students in class. She asked these questions to identify whether the students had already understood the previous material. Nevertheless, none of the students responded to her question. They claimed that they had forgotten, had not understood yet, and some of them had decided not to give any response.

Since the students could not address her questions, she briefly re-explained the answers to the questions. In this case, she did not assist them in getting the answer but directly re-explaining them. It seemed that Subject 1 was lack of exploring the students' competence. This point is vital to detect



Translation:
3.1.1. Change transpose matrix
3.1.2. Calculate simple operation matrix
4.1.1. Complete a simple matrix operation
4.1.2. Apply mathematical models related to matrix

Figure 3. Subject 1 expressed the teaching objectives and proposed some questions

students' initial competence and whether or not they are ready to get additional material. However, the subject had gone through the initial phase of her teaching, called apperception (following the teaching plan she had designed), although it was less optimal.

The next phase of the teaching activity was about delivering material, called the concentration phase. The subject applied zoom meeting and an application of matrix operation. Students had already installed this application via their smartphones. The promote action that appeared was asking students to prepare the learning instrument. The subject asked them to install the application a day before having the zoom meeting. She identified the scope of the material by making a voice recording that explained the material. When it came to explaining the material, hence, she played the recording during the zoom meeting. The session was not only explaining the material being discussed but it was also explaining how to operate the application. She solely utilized the application to explain the material without having any other procedural explanation. The students only focused on the explanation and the application. With this activity, the subject successfully delivered the material. However, it was considered incomplete, as she did not give any procedural explanation. This made students difficult to understand the explanation of matrix operation thoroughly. The application might display the answer along with the method. However, the teaching process seemed less meaningful when the students had no idea about the roots of the solution displayed. The procedural process of attaining the solution remained necessary for students, given that they would not always be allowed to use the application for problem-solving.

She explained the material using the application, and the students needed to input the numbers of the matrix, and the result would be displayed in just one click (see Figure 4). Unfortunately, they might not understand the procedural counting method of the matrix operation. Besides, they would understand matrix elements, especially those useful for counting matrix. The subject neither asked them to identify the material nor constructed the concept. Otherwise, she directly explained it using the application. In this case, the students were her classmates who had already understood the procedural steps of solving matrix problems. When it comes to high school grades, they might not understand the material well. In the processing phase, the subject did not fully assist the students in understanding the material. She should have asked the students to construct the concept according

Subject 1 in the zoom meeting

The explanation by Subject 1.

The subject reads the numbers entered in the application and the end result out of the application.

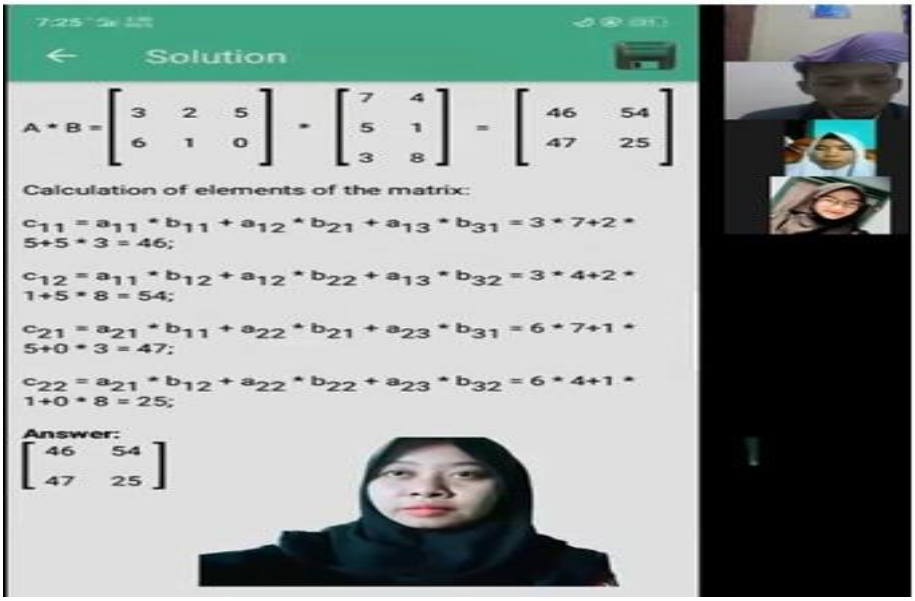


Figure 4. Subject 1 explained the material being discussed via an application

to her instruction, but it was not apparent since the application automatically displayed the final answer. They just needed to read the answer without needing to construct the concept.

In the exploration phase, the subject showed her promote action by asking the students to apply the concept of solving all the given problems under her assistance. They could also use the application to solve the given problems. The task should be completed in a group. She divided them into two groups and gave them a group task. They were divided randomly. Given that it was online teaching, the subject observed the group work via group chat. She made a WhatsApp group chat consisting of the students and the subject. The task was displayed in the form of PowerPoint via zoom meeting, and the subject began to observe the discussion process through group chat.

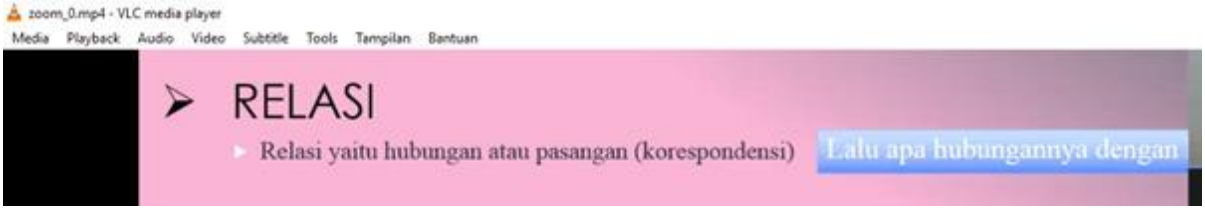
The discussion worked very well. It was found from the student's active participation in each group chat. Some students asked some questions to their group mates and the subject. The other group mates responded to their questions. As students were already familiar with WhatsApp, they had no problem using it. In this phase, they could follow the subject's instructions well.

After they held the group activity, the subject gave them another task as their next activity. She identifies the students' understanding by asking them to complete the task individually. The task was displayed in the form of PPT via zoom meeting. She asked them to complete the task through the application. She gave them some minutes to complete the task individually. The task was given one by one. She then asked them to present their work. They could choose the method, either manual or used application, to complete the task. However, if they decided to use the application, they could not explain in detail the process of solving the problem since the application automatically displayed the final result. In this case, Subject 1 did not show any promoted action in the feedback phase. She immediately closed her teaching when all the tasks had been completed and discussed together

Promoted action by subject 2

Subject 2 chose relations and function as the material of her teaching. Her PCK level was 0-1. He began his teaching activity with the motivation phase by conveying the teaching objectives and the importance of learning this material. The promote action was giving questions to explore and correlate with the previous material.

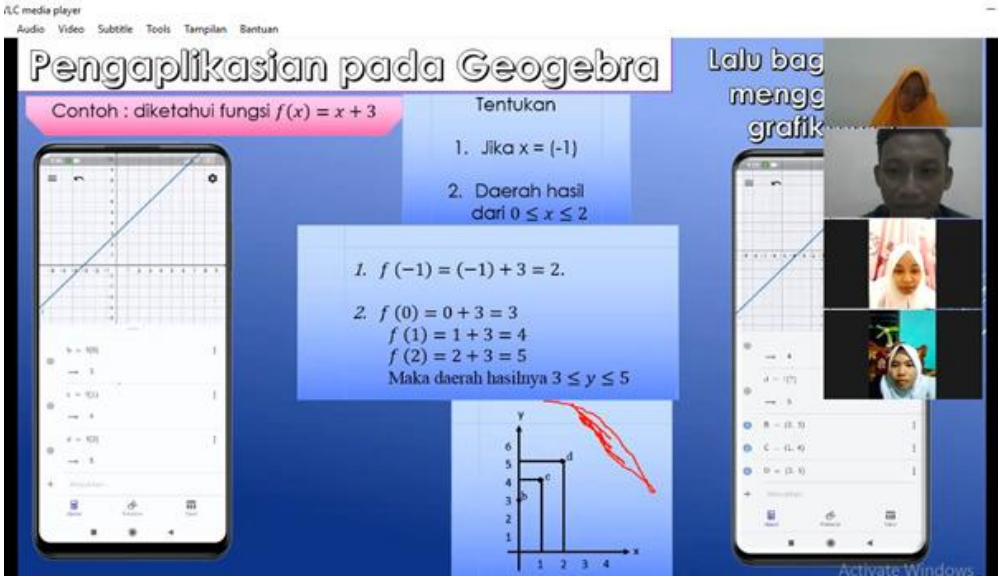
Relations and functions were not hard for students. Therefore, when Subject 2 proposed the question of its relations, many students could answer the question. Some of them could answer the question correctly, but some others were wrong. Concerning the students' wrong answers, Subject 2



Translation:
Relation
Relation is the relationship or correspondence

Figure 5. Subject 2 correlated with the previous material

Subject 2 in the zoom meeting



The explanation by Subject 2

Operation on geogebra subject simulates how to draw a graph using the geogebra app.

Figure 6. Subject 2 used Geogebra to draw the graphic of algebraic function

immediately corrected their answers without giving the questions to the other students, hoping they would give a correct answer. Based on the students' correct answers, the subject gave reinforcement and complimented them.

After responding to the student's answers, Subject 2 explained the answer to the question theoretically (see Figure 5). During the explanation, what made it enjoyable was the concentration phase. In this phase, the teacher directed the students' attention and focused on the primary substance of the material being discussed. The promote action emphasized the material's main substance, including each nature of relations. She marked the important parts of what she wrote. She also underlined some headlines. Since she gave much description on the slides of PPT, she needed to mark and underlie their important concepts.

Subject 2 went on to the exploration phase to encourage students to attain their expected learning output. The promote action was asking them to use the concept of relations to solve the problem. The students should complete the task individually. In addition, Subject 2 only gave two tasks displayed via zoom meeting. After asking the students to complete the given tasks, Subject 2 checked their works through their work presentations. Every student completed the given tasks. However, they took more time to complete the tasks. It was seen from how often the subject asked whether or not they had completed their tasks, and they said 'not yet. The longer time students spent completing the tasks indicated that they found it difficult to complete them, but they were not conveyed in class. Then, the student went on to function.

Subject 2 displayed the material in a complete, neat, and systematic way using PPT. However, he only read the PPT without giving any explanation at all. Although he could ask the students to construct a concept about function, he only asked them to listen to what he read. In the concentration phase, he could emphasize by underlining the important parts although he only read the material in the form of an example task about algebraic function. This emphasis was aimed to make the students focus on what they read. Indeed, what she did was interesting. Subject 2 then went on to the exploration phase by asking the students to use the application to draw a graphic of a simple algebraic function. The application she used was Geogebra.

Subject 2 explained how to draw a graphic using Geogebra, This can be seen in Figure 6. In the exploration phase, the students used media or mathematics instruments. The media she used was interesting as it could create a graphic which often brought difficulty to students. However, he was less interactive in delivering the instruction of operating Geogebra. Since the students only listened to what the teacher read, not all of them understood how to use Geogebra to draw a graphic of an algebraic function which was interesting to apply. Nevertheless, the students were not asked to demonstrate the application to draw a graphic since it was still teacher-centered. Hence, the subject could not measure whether or not the students understood how to use the application

Subject 2 asked the students to correct the graphic based on Geogebra. Unfortunately, they could not optimally respond to what she asked for since they had not tried the application yet. Hence, only a few of them gave responses to the use of Geogebra. In this case, the subject still had to assist the students actively. She did not implement a feedback phase in her teaching process as she did not ask the students to conclude the material they discussed in that meeting.

Promoted action by subject 3

Subject 3 was classified into level 1 for her pedagogical knowledge and level 0 for her content knowledge. The author recorded her teaching activity and analyzed it. Beginning her teaching activity, Subject 3 began with giving a question about the previous material. The material was about absolute value. Subject 3 asked the students about the previous material (absolute value), presentation slides are shown in Figure 7. In the motivation phase, she showed her promote action by asking the students to correlate a given example with the material to be discussed. Along with an example of a kid having a scout practice by moving back and forth, Subject 3 asked, “what is the concept of absolute value according to the example?” She gave some illustrations to remind them. in the concentration phase, she showed a promote action by asking the students to identify the scope of the material as the initial description. After they got their memory about the concept of absolute value, the subject went on by asking them to identify the types of absolute value. She gave some types and asked them to identify the features and the types of the absolute value. During the teaching process, the subject always gives many chances for the students to ask questions. When none of them asked any question, she sometimes gave a question while choosing one of them to answer the question. It was aimed to direct their attention to the material being discussed. If their answer was correct, she would give reinforcement and compliments. Otherwise, if their answer were wrong, the subject would assist them in finding the correct answer.

Subject 3 implemented the exploration phase in her teaching process to make students reach the expected output. She showed a promote action by asking the students to utilize learning media such as a worksheet, learning instrument, and other mathematic media. This phase was employing learning media. The subject showed that the application she used was cymath. The subject waited and ensured every student had installed the application, cymath (see Figure 8). Afterward, she simulated how to use the application by inputting the type of absolute value to be completed. The final answer and detailed explanation would automatically appear in just one click. Furthermore, the subject also assisted the students in solving the given problem. She had good interaction with them. In addition, she ensured that the students could operate the application. Next, the subject asked the students to solve the given problem to see how far they understood the material.

Subject 3 asked the students to use the application and the concept of absolute value to solve the given problem. It was classified into the exploration phase, in which the students applied the given concept to solve the problem. Every student was then able to solve problems and showed the correct answers. It also indicated that the teacher could deliver the material well, and thus the

Translation:
absolute value discussion
01 absolute value concept
02 absolute value equation
03 absolute value inequality
04 practice questions

Figure 7. Subject 3 gave a question about the previous material

Figure 8. Cymath the application that students had downloaded

students could understand it. She did not show any feedback phase. The students seemed to have no instruction to conclude the material being discussed.

Promoted action by subject 4

Subject 4 was in levels 1-1 for pedagogical and content knowledge. She began her teaching activity with the motivation phase by exploring the students' knowledge through some questions. The material to be discussed was logarithm. She began the phase by asking, "what is a logarithm?" The subject chose some students to answer the question. She aimed for seeing their initial insight. The responses varied. Some kept silent, some gave the wrong answer, and others answered almost correctly, using their own words. After each student gave their answer, the subject explained the logarithm while giving reinforcement to their responses. Afterward, she went on to the features of the logarithm.

In the concentration phase, the subject showed her promote-action by asking the students to identify the features of the logarithm displayed. They were asked to see and show the differences among each feature. At first, the students worked together to identify the features until the subject gave questions to each of them individually. Luckily, they could identify the features under her instruction. Eventually, the students could successfully understand the features of the logarithm. Then, Subject 4 went on to the next phase by giving them problems with logarithm features.

In the processing phase, Subject 4 showed her promote action by asking the students to construct the concept of the material being learned. The students constructed the concept of logarithm based on the powers of numbers by addressing the subject's questions. In the processing phase, furthermore, Subject 4 conveyed that what they were learning should always be well memorized. In the exploration phase, she asked the students to apply the concept they constructed

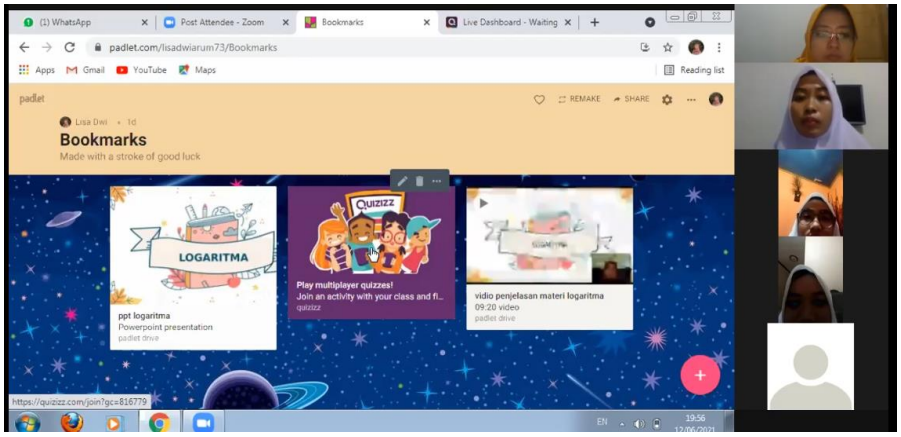
Subject 4 in the zoom meeting	The explanation by Subject 4.
	The subject explains the features that exist in the padlet application. students can access the material and conduct competitions to solve the problems on this padlet.

Figure 9. Subject 4 utilized media as means of teaching

to solve the given problems. She gave them six problems to be solved and immediately discussed. Those problems were all related to the features of the logarithm. When addressing the problems, she called the students individually to solve the problem and mentioned which feature they used immediately. However, she would assist the student who took difficulty finding the correct answer. As those problems were discussed immediately, the students could also see whether their work was correct or wrong. The subject asked them to correct their work once they found that their work was wrong. Subject 4 identified the students' performance and assisted those who were hard to understand the material.

In the exploration phase, the subject assisted the students in reaching their expected performance/output through learning media. She made an interesting media to encourage students' motivation to learn mathematics. Besides, she facilitated them to discuss the given problems and corrected their answers together

Subject 4 used a *padlet* as means to explain the logarithm. It contained material to be discussed in the form of PPT and some problems were displayed as quizzes. The students were interested in that media and thus, motivated them to study as the physical appearance of the media was interesting. At the end of the teaching, the subject directly ended the class meeting without asking the students to conclude the material being discussed (see Figure 9).

DISCUSSION

This study aimed to see any promote actions that prospective teachers might show during their mathematics teaching practices. The research selected the subject of the research based on the level of PCK. The result found that those four subjects with different levels of PCK had different teaching outputs. In general, subjects with lower pedagogical and content knowledge are taught using a simple method and applied to the procedures of teaching. The higher the PCK, the method of teaching became simpler and to-the-point. In addition, they would take more effort in exploring media. The results of this study are relevean to other studies which state that there are differences in the way of learning that is influenced by the teacher's PCK (Bowie et al., 2019; Capraro et al., 2005; Livy et al., 2019)

Those four subjects showed promote actions in their motivation phase of the teaching process by conveying their teaching objectives. Furthermore, they also gave questions related to the particular materials to explore their students' initial knowledge. This was important as they should consider their students' learning experience (Goos & Bennison, 2008). Students' initial insight and learning experience might help the students construct new insights. It was consistent with the constructivist perspective that teachers should give chances to students to construct their knowledge actively by considering their initial insights (Sa'dijah, 2001). Next, the subjects delivered their teaching material using media, which was inseparable from the online teaching and learning process.

It was consistent to further study that media could facilitate students to get concepts and experience on their own or through experiments. The four subjects also gave a lot of tasks to complete, either in groups or individually. It aimed to drill students with exercises to make them understand well the given material, besides problem-solving. Teaching mathematics was indeed familiar with lots of tasks (Goos, 2012). Therefore, the subjects let the students complete the tasks using various ways. However, the subjects would immediately assist their students once they got lost or stuck. It was consistent with a study that promoted action would bring positive vibes if teachers let their students free with their thinking (Hussain et al., 2011).

Various promoted actions and a variety of teaching depended on the prospective teachers' competence and creativity reflected on their PCK, depending on their academic competence (Aminah & Wahyuni, 2018; Gilang et al., 2019; Maryono, 2016). Subjects or prospective teachers with a PCK level of 0 could still develop their competence by either developing materials or extending the frequency of teaching practice to gain more experience and improve their PCK level (Aminah & Wahyuni, 2018; Jatisunda & Kania, 2020). This study found that the differences in PCK possessed by prospective mathematics teachers can create diversity in the practice of teaching mathematics. For prospective teachers who have PCK in the low category, it is hoped that they can improve their abilities through frequent practice and practice in more depth about mathematical content and pedagogical knowledge so that when these prospective teachers teach in class, they can become professional teachers (Bowie et al., 2019). This is relevant to the results of research by Kahan (2003) states that the ability of mathematical content contributes to the implementation of learning (Kahan et al., 2003).

The learning process carried out during the research process was done in online learning mode using zoom cloud meeting. This online learning provides new things for prospective teacher students. Because previously students only experienced direct learning, they must consider ways to package the material that can be conveyed properly. Learning activities carried out online make prospective teacher students more relaxed in preparing materials and teaching because students do it only from home, but it is also more flexible in time, and it is one of the advantages of online learning(Firman & Rahayu, 2020; Handayani, 2020). Constraints experienced by prospective teacher students include the same, namely, sometimes the unstable network that makes the material not smooth to be delivered. One of the online learning activities carried out by using the Zoom application, although it has obstacles, it still gives an interesting impression because it has features that can be utilized, besides that online learning will accelerate the digital transformation process in Indonesia (Nurmala et al., 2021; Astini, 2020).

Therefore, it can be said that although it has limitations in online learning, online learning can still be realized because it still gives an attractive impression to students. Important things must be considered and prepared by the teacher. A teacher can package learning so that it is conveyed properly, take activities to make students active, promote actions so that they can be accepted by students, and use suitable media in online learning. For this reason, it is necessary to do further research to identify promoted teacher action on various materials, as well as what media are suitable to be developed for online learning.

CONCLUSIONS

The results showed that the four prospective teachers who have PCK with different levels have different skills in bringing up promote action. The four prospective teachers carry out learning according to the phases in the learning process, but there are different ways of delivering the material. The first prospective teacher is the criteria of pedagogical knowledge (0)-content knowledge (0) only promotes action in the phases of motivation, concentration, processing, and exploration. The prospective teacher with these criteria presents material briefly and lacks interaction with students, so the class situation is still classified as passive. The second prospective teacher is a prospective teacher with the criteria of pedagogical knowledge (0) - content knowledge (1) only promotes action in the phases of motivation, concentration, exploration, and feedback. The second perspective teacher presents the material in a more structured and clear way, but prospective teachers are less able to bring out student activity. The third prospective teacher with the criteria of

pedagogical knowledge (1) - content knowledge (0) raises promoted action in the phases of motivation, concentration, and exploration. Prospective teacher with this criterion presents the material simply and easily for students to accept. The explanation is also concise and the variety of questions is easy to do. The fourth prospective teacher with the criteria of pedagogical knowledge (1) - content knowledge (1) raises promoted action during learning in the phases of motivation, concentration, processing, and exploring. The fourth criterion of prospective teachers presents the material in a more complete and structured manner, explores the material, makes students more active, and makes good use of the media. Student teacher candidates are also more communicative with students. Based on the conclusions from the research results, it can be said that it is necessary to have a balance between pedagogical knowledge and content knowledge to bring up promote action and carry out learning well and achieve learning objectives. For prospective teachers who still lack PCK criteria, they can continue to practice and make improvements in teaching methods. The prospective teacher needs to practice by teaching a variety of materials to better prepare students to become real teachers.

It can be concluded that the four prospective teachers both carry out learning according to the phases in the learning process, but there are differences in the way they deliver the material. Prospective teachers who have a higher level of content knowledge can make the presentation of the material more complete and structured, bringing up promote actions related to more material but less interactive delivery. Prospective teachers explore the material more than how to teach. This is different from Prospective teachers who have a higher level of teaching knowledge, they present the material simply. Only a few materials were presented, but students are creative in bringing up promote actions to be able to interact with students through the media and the way prospective teachers speak.

ACKNOWLEDGEMENT

We would like to thank the students of STKIP PGRI Jombang who are taking the peer teaching program who have participated in this research, especially our four research subjects

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SERTIFIKAT

Direktorat Jenderal Penguatan Riset dan Pengembangan,
Kementerian Riset, Teknologi dan Pendidikan Tinggi

RISTEKDIKTI

TERAKREDITASI

Kutipan dari Keputusan Direktur Jenderal Penguatan Riset dan Pengembangan
Kementerian Riset, Teknologi dan Pendidikan Tinggi Republik Indonesia
Nomor 36/E/KPT/2019
Peringkat Akreditasi Jurnal Ilmiah Periode VII Tahun 2019
Nama Jurnal Ilmiah

JRAMathEdu (Journal of Research and Advances in Mathematics Education)

E-ISSN: 25412590

Penerbit: Program Studi Pendidikan Matematika Universitas Muhammadiyah Surakarta

Ditetapkan Sebagai Jurnal Ilmiah

TERAKREDITASI PERINGKAT 2

Akreditasi Berlaku Selama 5 (lima) Tahun, Yaitu
Volume 4 Nomor 2 Tahun 2019 sampai Volume 9 Nomor 1 Tahun 2024

Jakarta, 13 Desember 2019
Direktur Jenderal Penguatan Riset dan Pengembangan

DIREKTORAT JENDERAL PENGUATAN RISET DAN PENGEMBANGAN
KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI

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