

**MATHEMATICAL COMMUNICATION PROFILE
OF FEMALE STUDENT WHO IS MATHEMATICS TEACHER CANDIDATE
IN IMPLEMENTING TEACHING PRACTICE PROGRAM**

**PROFIL KOMUNIKASI MATEMATIS MAHASISWA PEREMPUAN CALON GURU
MATEMATIKA DALAM IMPLEMENTASI PROGRAM PRAKTIK MENGAJAR**

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Abstract: Students who are mathematics teacher candidates have different mathematical communication skills. They carry out mathematics learning when doing teaching practice. Their mathematical communication skills greatly influence the communication that is implemented into mathematics learning in the classroom. This study aims to describe the mathematical communication profile of female students who are mathematics teacher candidates. The participant of this study was a female teacher candidate who was carrying out teaching practice (PPL) at the training school. Data collection was done by recording the implementation of learning, which was presented through learning video transcripts and analyzed by data reduction, data displaying, and interpretation-verification. The results of this study are prospective female teachers always ask students to repeat their answers, to ensure the answers mentioned. This has resulted in the fact that female mathematics teacher candidates are not strict in making decisions, seem rambling in making decisions. The nonverbal communication of female teacher candidates is a clear voice heard throughout the class; ways/gestures, movements of appearance and facial expressions show calmness and smile to students, so learning flows smoothly.

Keywords: mathematical communication, female student who is mathematics teacher candidate, Field Experience Program, gender, implementation of learning

Abstrak: Mahasiswa calon guru matematika memiliki keterampilan komunikasi matematis yang berbeda-beda. Mereka melaksanakan pembelajaran matematika sebagai tugas dalam praktik keguruan. Keterampilan komunikasi matematis yang mereka miliki sangat mempengaruhi komunikasi mereka dalam pelaksanaan pembelajaran matematika di kelas. Penelitian ini bertujuan untuk mendeskripsikan profil komunikasi matematis mahasiswa perempuan calon guru matematika. Partisipan penelitian adalah seorang mahasiswa perempuan calon guru matematika yang sedang melakukan praktik mengajar di sekolah. Pengumpulan data dilakukan dengan merekam implementasi pembelajaran, yang disajikan berupa transkrip video pembelajaran dan dianalisis dengan tahapan reduksi data, penyajian data, dan interpretasi-verifikasi. Hasil penelitian menunjukkan bahwa mahasiswa perempuan calon guru selalu meminta siswa untuk mengulangi jawaban mereka untuk memastikan jawaban yang disebutkan. Ini berarti bahwa mahasiswa perempuan calon guru matematika tidak tegas dalam membuat keputusan, tampak bertele-tele dalam membuat keputusan. Komunikasi nonverbal mahasiswa perempuan calon guru terdengar jelas di seluruh kelas; gaya/gestur, perubahan ekspresi tubuh dan wajah menunjukkan ketenangan dan senyum kepada siswa, sehingga pembelajaran mengalir dengan lancar.

Kata kunci: komunikasi matematis, mahasiswa perempuan calon guru matematika, Program Pengalaman Lapangan, gender, implementasi pembelajaran

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One's thought or idea can be presented by communication, that thought or idea needs to be considered in mathematics. That thought or idea can be known through communication made by that person because through communication we can know someone's idea or thought about the mathematical concepts that has been delivered. A teacher (teacher candidate) needs to communicate mathematical ideas/thoughts to students because if the communication of the teacher and the students is hampered or less smooth then the students will be less sympathetic or be disappointed to the teacher. Therefore, the mathematical communication of the teacher and the students, also each student needs to be considered. Mathematical communication is one component that determines the students' mathematical ability, according to the groupings delivered by Sumarmo and Hendriana, mathematical ability can be grouped into the following abilities: mathematical understanding, problem solving, mathematical communication, and mathematical understanding (Sumarmo & Hendriana, 2014)

The thinking ability of high level mathematics includes understanding ability, problem solving and mathematical communication. Good mathematical communication will make easier to understand and solve the problems. There are two reasons why mathematics learning focuses on communication according to Baroody. First, mathematics is essentially a Language (second language). Second, mathematical communication in mathematics learning is a social activity (Baroody, 1993). Basically, the mathematics language and natural language is different, according to Yacobs mathematics is a universal language (Baroody, 1993). Learning mathematics is a joint activity. In the classroom, language and social activities will be seen in mathematics learning.

Mathematical communication in the classroom needs to focus on the concepts that will be delivered and prepared for learning. All levels or stages of school also need an attention of mathematical communication. Mathemati-

cal communication skill is a part of mathematical abilities.

Mathematical communication is an important part of the mathematics class. Mathematical communication is a central part of mathematics learning. Students can use verbal language to communicate their thoughts, broaden their thinking, and understand mathematical concepts, ideas/thoughts. They can also use written language to explain reason and process of their thoughts in conveying mathematical ideas. Mathematical ideas can be facilitated, built and internalized through discourse (Cheah, 2008). Teacher is the one who can facilitate mathematical communication in the classroom because the teacher has a very important role. In accordance with Gucler's opinion that teachers have a very important role in making abstract mathematical ideas visible for the students to improve mathematical communication (Gucler, 2017). Communication from its form can be seen as four constructs, which are uni-directional communication, contributive communication, reflective communication, and instructive communication (Frykholm, 2000). Contributive communication can be developed during implementation by dividing tasks to issue opinions.

The candidate teacher is a person who is studying or taking a bachelor's degree (S-1) in a university that is specialized in the teacher and education study field, according to online KBBI (official dictionary of Bahasa Indonesia) teacher is a person who teaches (profession). (Ministry of Education and Culture, 2016)

Gender is one of the focuses in this mathematical research, there are studies that showed there is no difference in ability between boys and girls, and there are several mathematical education studies that showed differences between boys and girls. In addition, the teacher sees mathematics as a male domain and link the success of the boy with the ability and success of girl. They also interact with boys more often regardless of the nature of exchange. This study wanted to focus on female teacher candidate.

The ability of students to apply in an integrated manner their learning experiences on campus into field practice activities, indicates the success of students in carrying out the teaching profession and they hold the position of teacher or education staff. There are a number of specific objectives to be achieved from the implementation of PPL at the Lambung Mangkurat University FKIP as follows: "(1) Know carefully the physical, administrative, academic, and social-psychological environment of the school where the pre-service training takes place; (2) Implementing a variety of professional teacher skills as a whole and integrated in real situations; (3) Able to develop personal and social aspects in the school environment; (4) Drawing conclusions on educative values from appreciation and experience during the training through reflection, and pouring out the results of these reflections in the form of reports. (UPMPPL, 2017) "

PPL as a course is one of the curricular activities carried out by prospective teacher students in the form of teaching practice in schools, the scope of student activities at the time of implementing PPL includes teaching training, supervised and integrated teaching tasks to meet the requirements for teacher formation.

This study will answer the question: How is the mathematical communication profile of female student who is mathematics teacher candidate in implementing learning on the teaching practice.

Research Methods

This research is an explorative qualitative research type. The subjects of this study were students in the FKIP ULM of Mathematics Education study program that was chosen based on criteria applied. In this study, one of the subjects was selected, which was female mathematics education student, with criteria that she had followed the teaching practice course (PPL). The data collection of

this study was carried out by recording implementation of teaching and learning process using video and then making the recording into written transcripts in order to obtain valid and credible data, also triangulation was done, with the type of time triangulation.

Research data processing was carried out by qualitative data analysis method of Miles and Huberman model through stages, 1) data reduction, 2) data display, and 3) conclusion drawing. Furthermore, a comprehensive analysis of valid and credible data was carried out to answer all research questions.

Results and Discussion

The presentation and validation of mathematical communication data of female teacher candidate student in the implementation of teaching practice here was only presented in the form of presentation footage of credible/valid data about communication for female teacher candidate.

Data Presentation

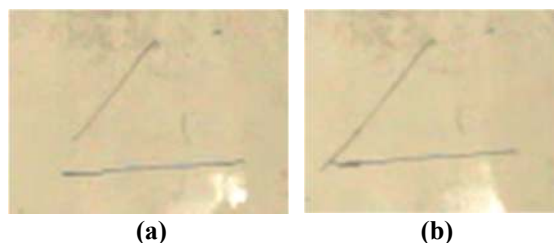
The teacher had entered the class, prepared the class and begun learning by mentioning the topic of learning.

Teacher: *today we will study interior angle and triangle exterior angle.*

The learning began by mentioning the topic of learning and continued with questions about the definition of angle with a number of similar questions. The teacher delivered questions orally while approaching the student and wanted to give the writing instrument, hoping there were students who were willing and mentioning the meaning of the angle, but none of the students who were willing to write ahead or only answer verbally about the teacher's question and the teacher quickly approached the blackboard and drew

Still facing and drawing on the board then the teacher faced the students

After saying "If I extend" at almost the same time, the teacher continued drawing from the Picture 1(a) before, so that the image became the Picture 1(b).



Picture 1

The teacher continued the learning by presenting problems on slides, the slides that are displayed were complete giving several concepts from what would be studied, namely the concept of triangles, interior angle and exterior angle, also the problems for circumference and area of triangles

Basically, the students were already familiar with the picture presented which was a house plan, and in that picture, there were many plane geometry shapes such as points, lines, triangles, and angles, also there were all types of angles represented on it. After the teacher asked to pay attention to the picture, the students were agreeing to answer the house plan. Then, the teacher continued giving a number of questions until the students find the concept of the triangle by using pictures/ images of a family room. Next, the teacher wanted to introduce the angle outside of the triangle. The teacher said "Next we come out of the living room, still in the living room but we come out. Is there any angle outside the living room?"

The teacher guided the students with questions to find the size of the exterior angle of the triangle by using the straight line property which having a 180 degree angle.

Then, the teacher introduced the exterior angle by still using the plan and the living room by saying that the *house also needs to be placed with electricity around the house. Please count in order to reach around the house (triangle) how many meters of electrical*

cable are needed? How many electricity cable is needed?

The teacher continued learning by introducing the area of the triangle, the teacher asked the students to determine the base and height of the triangle, then the student mentioned the one of the sides which was the base and the student generally mentioned another side in that triangle was the height. Because the students' answer was not appropriate, the teacher gave time to determine the area by determining the height first.

The teacher closed the lesson by saying greetings, but the teacher forgot to draw conclusions that supposed to be done with the students on the lesson that had taken place, and the teacher also did not give assignments to the subject material at the next meeting, which the students were expected to learn first.

Written Mathematical Communication

The female subject (SP) had entered the class and had prepared a presentation and also had accurately written the subject to be studied, which was the circumference of the triangle and the area of the triangle. Examples and non-examples were also accurately delivered to the students, even also given non examples, and also the examples was accurately presented by the female subject (SP) to the students. The female subject was less accurate when drawing a 90° angle (right angle) like an acute angle but corrected by the sign/symbol of " \perp ", she was accurately conveying the concept using problem of living room. The female subject was accurate in preparation, it can be seen from the problems that were arranged and processed integrated into one and could be used from the beginning to the end of the lesson and this also showed the accuracy of the learning preparation. The accuracy of the implementation of learning.

Teachers and students drew on the board by not using a ruler, even though the slide was accurate. Thus, it can be said that female subject was less accurate in writing

when drawing on the board, but the ideas and concepts were delivered accurately.

The subject carried out the learning, it can be seen her clarity in thinking because there was a process, and the process was clearly and coherently implemented.

The delivered mathematical concepts/ ideas were complete starting from recalling the definition of angle, circumference of triangle and the area of triangle, the concepts/ideas received were also complete and it was shown after the students wrote the answer that was displayed on the board, all aspects were relevant to the communication.

The subject carried out the learning using problem in the form of a floor plan in the house and it was complete because in the plan there were illustrations of the concept of angle of triangle, triangle, exterior angles of triangle, interior angle of triangles, circumference of triangle, and area of triangle.

The smooth of communication in learning that should be considered was that the subject could solve each problem that was asked until the final purpose and according with the given time limit. Then, the subject could explain the material smoothly, and the students could show the ideas smoothly.

The subject carried out the learning using problem in the form of a floor plan in the house and it was complete because in the plan there were illustrations of the concept of angle of triangle, triangle, exterior angles of triangle, interior angle of triangles, circumference of triangle, and area of triangle. So, the research subject carried out the learning quite complete on written mathematical communication. Therefore, the subject presented and received the concept.

The subject could solve each problem by asking the students to write down the problem solving requested at the given time limit, the subject did not directly write the results of the problem but the results were written by students. The subject could explain the material smoothly using the problems. In addition, the students could also show ideas smoothly through writing down the answers on

the board or in their own book. So, the subject could solve every problem, and could explain the material smoothly, and also could give ideas smoothly.

From the analysis above, the summary is as follows:

Mathematical communication wrote that the female subject accurately wrote down the subject material, provided examples, not examples, also accurately delivered the concepts/ideas in learning, although there was a slightly miss when drawing a 90° angle (right angle) like an acute angle (GPT1038) but it was corrected by the addition of sign / symbol "┘".

The subject carried out the learning activities using problem in the form of a floor plan in the house (GPT1041) and it was complete because in the plan there were illustrations of the concept of angle of triangle, triangles, exterior angle of triangle, interior angle of triangle, circumference of triangle, and area of triangle.

The subject could explain the material smoothly using the problem. In addition, the students could also show their ideas smoothly through writing answers on the board or in their own book. So, the subject could solve every problem, could explain the material smoothly, and could give ideas smoothly.

Oral Mathematical Communication

The material delivered by the teacher to the students such as the definition of angle was correct with examples of none angle and example of angle, but the subject was less precise when mentioning the meaning of angle because the subject stated that the intersection area is called an angle, even though the definition of angle is a combination of two rays which the base point coincides. However, the circumference of the circle had been correctly explained and the concept of area had been also correctly stated. The subject was also accurate in explaining the concept of acute angle, the concept of right angle, obtuse angle, the concept of a straight-line angle of one

hundred and eighty degree, and the subject also restated the subject matter, introduced angle in triangle, exterior angle of triangle, circumference concept, and area concept.

The teacher was also accurate in giving examples such as the problem given was complete of its types of angles, angles in triangle and exterior angle, also the circumference of the triangle. The research subject also accurately discussed triangular concepts such as angle, types of angles, interior angle, exterior angle, circumference of triangle, and area of triangle verbally. So, the research subject accurately presented and received the ideas to the students, accurately and correctly delivered examples, concepts, and carried out the learning and teaching activities.

The research subject always received the opinions and ideas from the students even though that was not a solution but an alternative idea, the subject was also not rigid in discussing with the students either expressing opinions or accepting the students' opinions. The research subject carried out the learning using various methods and tools, so the learning could take place. Thus, the learning which was carried out showed flexibility in accepting opinions, not rigid, and used various methods and tools of communication, and implemented the learning using problem-based learning model orally.

The clarity of thinking of the subject research was also seen from the problem presented. The concept that became problem was discussed clearly and convinced the students as a new concept. The students' ideas and questions were always appreciated by giving responses to all that is delivered by the students, even though the responses that were presented did not solve the problem. The subject was implementing the learning through several ways such as thinking verbally, examining a concept that was presented and received by the students, and responding to the students' ideas and those looked smooth.

The research subject presented and received the concepts by conducting a joint

session with the students, all aspects relevant to communication were carried out with discussions with the students, and by exploring and conveying material relevant to the problems presented in front of the class.

The subject carried out the learning smoothly, it can be seen from the learning based on several problems given until the end of the learning activities according to the time limit given that the subject can deliver the material smoothly by doing discussion so that the material also came from the students that developed through the class discussion. The subject really appreciated and responded to all the students' ideas smoothly without any pause. The students can also express ideas smoothly through discussions held together. Moreover, the subject can solve each problem, and the subject can also explain the material smoothly, and also the students can express their ideas smoothly. So, the subject could complete every learning problem, could explain the material smoothly, and the students could also give their ideas smoothly.

Based on the above analysis, it can be obtained a summary as follows:

The research subject accurately delivered and received the ideas to the students. The subject accurately and correctly presented questions, concepts, and carried out the learning. The learning that was carried out received opinions, was not rigid, used various methods and tools of communication, and the subject implemented the learning by using problem-based learning model verbally, and examined a concept that was presented and received by the students, and also the way the subject responded to the students' ideas looked smooth. The subject could solve every learning problem, could explain the material smoothly, and the students could also give ideas smoothly.

Written and oral mathematical communication profiles of female mathematics teacher candidate in implementing the learning on the teaching practice (PPL) was already accurate, such as drawing triangles on slide, writing topics, discussing examples and none

examples, and implementing the learning. Female mathematics teacher candidate was also accurate in presenting and receiving mathematical ideas of interior and exterior angles, circumference and area of triangle, although when drawing angle and triangle figure on the board, the subject did not use a ruler, and was still inconsistent using the terms of angle and large of angle, circumference (in the form of a curve) and the length of the circumference, as well as the area and area of a figure. Female teacher candidate could solve each problem, could explain mathematical concepts/ideas smoothly both written and verbal. Prospective female teachers always ask students to repeat their answers, to ensure the answers mentioned. This has resulted in the fact that female mathematics teacher candidates are not strict in making decisions, seem rambling in making decisions. The nonverbal communication of female teacher candidates is a clear voice heard throughout the class, ways/gestures, movements of appearance and facial expressions show calmness and smile to students, so learning flows smoothly. Opening and closing the lesson has been done calmly.. Female mathematics teacher candidate was easy to receive opinions, not rigid, use communication tools, carry out the learning using problem-based learning model, and easy to examine mathematical concepts/ideas of students and it was seen from the way of responding to the students' ideas.

Conclusions and Recommendations

Conclusions

Written and oral mathematical communication profiles of female mathematics teacher candidate in implementing the learning on the teaching practice (PPL) was already accurate, such as drawing triangles on slide, writing topics, discussing examples and none examples, and implementing the learning. Female mathematics teacher candidate was

also accurate in presenting and receiving mathematical ideas of interior and exterior angles, circumference and area of triangle, although when drawing angle and triangle figure on the board, the subject did not use a ruler, and was still inconsistent using the terms of angle and large of angle, circumference (in the form of a curve) and the length of the circumference, as well as the area and area of a figure. Female teacher candidate could solve each problem, could explain mathematical concepts/ideas smoothly both written and verbal. Prospective female teachers always ask students to repeat their answers, to ensure the answers mentioned. This has resulted in the fact that female mathematics teacher candidates are not strict in making decisions, seem rambling in making decisions. The nonverbal communication of female teacher candidates is a clear voice heard throughout the class, ways/gestures, movements of appearance and facial expressions show calmness and smile to students, so learning flows smoothly. Opening and closing the lesson has been done calmly. Female mathematics teacher candidate was easy to receive opinions, not rigid, use communication tools, carry out the learning using problem-based learning model, and easy to examine mathematical concepts/ideas of students and it was seen from the way of responding to the students' ideas.

Recommendations

Educators in general need to be aware of the importance of mathematical communication skills in mathematics learning so that mathematical materials or concepts can be embedded and trained by teachers and students.

Based on the results of this study the mathematical communication skills of the subjects are still not maximal. It is recommended that prospective mathematics teachers can learn and practice developing and enhancing mathematical communication

skills, so that when they are assigned to carry out their profession they can manage mathematics learning effectively.

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