



## Readiness of Pre-Service Mathematics' Teachers

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### Article Info

Article History:

Received: February 27, 2020

Revised: March 13, 2020

Published: April 14, 2020

e-ISSN: 2623-2324

p-ISSN: 2654-2528

DOI: 10.5281/zenodo.3750965

### Abstract:

This research aims to describe students' ability to study program of mathematics to be ready to become professional teacher. This research is a qualitative descriptive study in which the research subject is a student of odd microteaching semester 2019/2020 academic year which consisted 8 pre-service teachers selected with purposive sampling technique. Data collection instruments i.e., professional knowledge sheet, practice assessment sheet and interview. Based on the results of data analysis can be described that most students of pre-service mathematics teachers already have readiness to become a professional mathematics teachers seen from two readiness indicators namely, professional knowledge and professional practice.

**Keywords:** Pre-service Mathematics Teachers, Mathematics' Education, Readiness

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## INTRODUCTION

Readiness of pre-service mathematics teachers is an illustration to prepare professional teachers in the future. Professional teachers who will contribute to the advancement of a nation's education system. Wermke (2011) stated that, "*Teachers are agents of change. They build relationship to other actors in their school system and they decide which models and ideas will sustainably be implemented in schools.*" Professional teachers are teachers who are good at facilitating the best learning. The teacher is said to be professional with professional teacher competency indicators.

According to Yash Pal Singh (2014), four indicators affect the readiness of professional teachers namely, 1) knowledge related to the subjects being taught; 2) knowledge related to subject matter; 3) pedagogic knowledge; 4) awareness related to learning (intentions towards teaching). The Australian Institute for Teaching and School Leadership (AITSL, 2013: 5) divides three domains of professional teacher competency standards including: (1) *professional knowledge*, including teacher understanding of how to teach students and how students learn

and how material learning that must be the teacher's power and how to learn in class; (2) *professional practice*, including the ability of teachers to plan and implement effective learning, create and manage a safe and enjoyable learning environment, and evaluation capabilities which consist of providing feedback and reports on student learning outcomes; (3) *professional engagement*, including involvement in professional learning and involvement with stakeholders who support learning including other teacher colleagues, parents, and the teacher professional learning community.

Meanwhile, NCTM (2019) sets out six standards for professional mathematics teacher candidates, including:

*Standard 1: Knowing and Understanding the meaningful Mathematics*

Pre-service mathematics teachers should have the ability to relate understanding and good procedural in mathematical subjects including number; algebra and functions; statistics and probability; geometry, trigonometry, and measurement; calculus and discrete mathematics;

*Standard 2: Knowing and Using Mathematical Processes*

Pre-service mathematics teachers must have the ability to demonstrate 1) the problem-solving process, ready to provide learning related to the problem of non-routine mathematics whether contextual or non-contextual; 2) reasoning and explaining, Pre-service teachers are able to provide learning by improving the student mathematics and communication of both verbal and non-oral students; 3) modelling and using tools, pre-service teachers are able to provide learning to represent, analyze either conventionally or with the use of technology; seeing structure and generalizing across mathematical domains.

*Standard 3: Knowing students and Planning for Mathematical Learning.* Pre-service have readiness with students and mathematics materials to plan effective and optimal learning for learners

*Standard 4: Teaching Meaningful Mathematics*

Pre-service mathematic teachers implement effective and equitable teaching practices using knowledge of mathematics content, mathematical learning progressions, mathematical processes, and students.

*Standard 5: Assessing Impact on Student Learning*

Pre-service mathematic teachers can assess and use evidence of students' progress towards rigorous mathematics learning goals.

*Standard 6: Social and Professional Context of Mathematics Teaching and Learning*

Pre-service mathematic teachers are reflective reflective mathematics educators who collaborate with colleagues and other stakeholders to grow professionally, to support student learning, and to create more equitable mathematics learning environments.

Furthermore, Abdullah (2015) revealed three domains of the readiness of pre-service mathematics teachers candidates, namely (1) professional knowledge is professional knowledge consisting of knowledge about mathematics material / content, learning theory (approaches / models / methods / learning strategies), curriculum, and assessment. Others, professional knowledge includes professional competence and pedagogical competence; (2) professional practice is a professional practice consisting of the ability to prepare learning as set out in the learning implementation plan and teaching performance (microteaching / PPL); (3) professional attitude is a professional attitude consisting of students' beliefs to become professional mathematics teachers and students' perceptions about themselves, students, colleagues, and professions as mathematics teachers.

Based on the Law of Teachers and Lecturers of Republic of Indonesia Number 14 of 2005 and Republic of Indonesia Government Regulation Number 19 of 2005 stated that teacher competencies include four professional competencies (Republic of Indonesia, 2005: 6; National Education Minister, 2005: 12) namely, 1) pedagogic competencies; 2) personality competence; 3) social competence and 4) professional competence. Pre-service mathematics teachers must have mathematical content and pedagogical knowledge (Hine & Thai, 2018; Kennedy, Tipps & Johnson, 2006; Merliza & Retnawati, 2018).

In this study, researchers wanted to see the readiness of pre-service mathematics teachers viewed from two indicators namely, professional knowledge and professional practice. Professional knowledge is seen from the readiness of pre-service teachers in understanding models / strategies in mathematics classrooms, while professional practice is related to the ability to prepare lesson plans along with a number of tools, as well as their practice in microteaching classes.

## **RESEARCH METHODOLOGY**

The type of research used is descriptive qualitative research, with 8 students as pre-service teachers in the mathematics study program in the microteaching subject in the odd semester of the academic year 2019/2020 selected by the purposive sampling technique based on lecturer selection, and the proportion of men and women.

Data collection instruments used professional knowledge sheet, practice assessment sheet and interview. The *professional knowledge* sheet consists of a learning device assessment is used for knowing knowledge of pre-service mathematics teachers related to lesson plan and devices usage. Meanwhile, the practice assessment sheet was used for observing practice knowledge of them. The data that has been obtained was then analyzed using an interactive model, Miles, Huberman & Saldana (2014: 12-13) with the stages of data analysis consisting of the process of data reduction, data presentation, and conclusion and verification.

## **RESULT AND DISCUSSION**

Based on the results of data collection obtained data from 8 pre-service mathematics teachers on microteaching course, this course is a prerequisite course before the student of mathematics teacher candidates perform internship/practice teaching directly at the school in the next semester.

Innitially, starting the implementation of microteaching, there was an exception to remember the mathematical learning strategy, the evaluation of mathematical learning, and the planning of mathematical learning. Furthermore, teacher candidates choose junior or high school (JHS and SHS) teaching material to be equipped with learning devices that must be prepared in microteaching class. The data obtained during the meeting of microteaching course in the duration of 15-20 minutes, in each of the microteaching meetings conducted 2-3 participants. To obtain the readiness data for pre-service mathematics teachers used two indicators, namely, professional and practice knowledge.

The data of professional knowledge using learning devices checklist. It consists of syllabus check, lesson study sheet that are compliant with Lesson Plan standards consisting of competency standards, basic competencies, learning indicators, teaching materials, models/strategies/methods/approaches selected in the lesson plan (Number Head Together, Think Talk Write, Team Games Tournament, Mathematics Realistic, Think Pair Share, etc).

While the observation sheet of learning practice is the conformity process between lesson plan and the practice in the microteaching class. The learning which consist of skills, namely 1) opening and closing learning, 2) explaining and facilitating (conducting variation in the class), 3) giving reinforcement, 4) giving question, 5) dividing and guiding in small groups or individuals

### 1. Opening and Closing Learning Skill

Most of the practice has been able to open and close learning, some practice of opening learning with the submission of realistic contextual-based goals related to the material, but it is still found an introduction that does the opening by simply giving icebreacking without linking the relation of material to the daily life of the student.

In closing the learning, it is practicable to invite students to draw conclusions from the materials learned and can invite students to mention the learning points. But most of the introduction has not been able to provide feedback reflection of learning outcomes, others still found to be a less practical time management, so close the learning by assigning the evaluation in a hurry.

### 2. Explaining and Facilitating Learning Skill

In the process of explaining most of the practice can well explain the concept of prerequisite material up to facilitate through the introduction of the problem, but still found an introduction explaining in detail the concept of material without inviting students to find the concept of material. In the process of facilitating already found an introduction that provides learning media that supports the learning model used, e.g. introductory material learning in a flat with mind mapping strategy, practice creating a simple mind mapping that appeals to students.

### 3. Reinforcement Skill

In the process of strengthening the learning, the practice has done well, either verbally or gesture. The form of verbal reinforcement that is shown is a sincere smile, a sense of kindness, and a warm-up of positive words (praise and appreciation).

There is also an introduction that gives words of affirmation to conditioned the class to be more conducive and optimal. Be sure to provide a simple gift, such as an introduction that uses the NHT model, at the end of the class giving prizes and inviting other groups to give awards in the form of congratulation, success or good job.

### 4. Giving Question Skill

In the process of giving questions, found that since the introduction has already given questions related to the teaching material, giving questions that can stimulate students' critical thinking skills, the questions asked are problem solving. But still found an introduction that still difficult to ask questions, so should read lesson plan before giving questions to students.

### 5. Dividing and Guiding Into Small Group Discussions Skill

In dividing and guiding small group discussions, in the process of Division the Group of Practice is already aware of the importance of member heterogeneity in the group so as to divide them appropriately. Practice also explains the purpose of group formation, group tasks and the system must be done in groups. Related to the guidance in the group, most of the active teaching is to provide assistance when the group is given a task.

## **DISCUSSION**

Based on a professional knowledge sheet is known that 80% of participants can compile the lesson plan and its completeness very well, they have the ability to achieve good learning tailored to the mathematical learning approach. This is in line with the research results of Hidayah (2018). For example, to know the ability of mathematical communication, students prepare Thin Talk Write learning models along with contextual questions accordingly. Nevertheless it still found an introduction that has not detailed the assessment section of the essay clearly, so that the feared will be obtained an evaluation value that is not objective.

While based on the learning practice sheet, students already have the ability to open and divide students in small groups, but still difficulty in managing time in the group discussion process, pre-service teachers can take the role to conditioned the class, some participants who become students are also less able to position themselves as students so as to make the pre-service teachers who practice to become nervous. Some math teachers who are less courageous do the reflection of learning because they feel bad in the learning process. Also found pre-service math teachers give icebreacking for too long so time-consuming learning. Another condition is found where pre-service mathematics teachers are still not comprehensive in mastering the RPP that is implemented in the class, especially with regard to the syntax of the learning model applied. This is in line with the interview results where most of the teachers have understood the theory related to the model/method/strategy/technique but still confused in its application in the learning process resulting in an unoptimal time management.

## CONCLUSION

Based on the results of the research known that the readiness of mathematics teachers related to professional knowledge is good, but the practice knowledge is still to be improved, this is possible because pre-service mathematics teacher are not yet accustomed in Implementation time management of constructivism-based learning. Other findings in this study related to the belief of teacher candidates mathematics towards their readiness to become professional teachers, it requires further research.

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