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## THE TEACHERS' EXPERIENCE BACKGROUND AND THEIR PROFESIONALISM

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### ABSTRACT

Based on literature review Three categories of teachers are: good, very good, and excellent which are viewed from aspects of beliefs, attitude, depth of pedagogical and didactic aspects, and teacher reflection in the learning process has been obtained in previous studies. Various external aspects are considered to affect teacher professionalism in learning about mathematical problem solving. These aspects need to be studied to maximize the teacher professionalism. This study will examine these external aspects, ranging from teaching experience, educational background, and experience in participating in training to improve teacher competencies. This type of qualitative research with survey methods was chosen as a research method. Three teachers from three junior high schools with different clusters were selected as research subjects. Each teacher is given short questions related to this. The results obtained are the experiences of the trainings that teachers follow in increasing their competence and teacher's educational background have more significant influence on teacher professionalism compared to the experience or length of teacher teaching.

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## 1. INTRODUCTION

Teacher professionalism in the process of learning mathematics can be seen from various factors. Factors influencing teacher professionalism according to Muir & Beswick (2007) are: teacher beliefs, the depth and breadth of the didactic and pedagogical aspects, and the teacher's reflection on the mathematics teaching practice in the classroom. Furthermore, according to Ernest (1989) things that affect teacher professionalism are attitudes towards mathematics and the process of learning mathematics itself.

Research on teacher professionalism in mathematics learning experiences a very exponential growth. Some studies that explore and improve teacher professionalism in mathematics learning process are researches (Beswick, 2007, 2012) this study examines teachers' beliefs about mathematics, learning, and mathematics learning and discerns how

teachers' beliefs about mathematics will affect the way teachers conduct mathematics learning process in class.

Furthermore, research conducted by Zoest, Jones, & Thornton (1994) has observed and categorized the breadth and depth of the teacher's pedagogical and didactic abilities in the learning process. These categories are named with Content Performance, Understanding Content, and Learner Interaction. In Content Performance, the teacher only focuses on the achievement of the material in learning mathematics without regard to students' understanding and student interaction with other students. Content Understanding and Learner Interaction focus on how students understand and construct learning material.

In addition to the belief factor and the depth and breadth of didactic and pedagogical aspects, teacher reflection in the learning process is also an important aspect of teacher professionalism. Reflection factor is how the teacher's reflection in the learning process also greatly influences how a professional teacher can evaluate and improve the learning process that has been done. According to Beswick (2007) there are three categories of teacher types in reflecting the mathematics learning process, namely technical reflection, deliberate reflection, and critical reflection. In technical reflection, the teacher is at the stage of being only able to describe the general sequence of classroom teaching practices, often only focusing on technical aspects, without considering any experience or behaviour values. The deliberate reflections are where the teacher has been able to identify reflection more critically with the rationale or explanation for action or behaviour which is not only based on teaching facts. The critical reflections are where the teachers who have conducted reflections are able to identify, criticize, and provide explanations by including perspectives on considering others and offering alternatives for settlement. Furthermore, it is expanded by research Muir & Beswick (2007) which discusses how teachers reflect themselves, the learning, and students in mathematics teaching and learning process.

Teacher's attitude in the learning process has also been studied in research Ernest (1989) which has categorized the teacher's attitude towards mathematics learning. In research Ernest the teacher's attitude towards mathematics and the learning process are categorized into three categories: teachers who do not like mathematics, teachers who are in the middle of whether liking and disliking mathematics and teachers who like mathematics. Ulug, Ozden, & Eryilmaz (2011) conducted a study of 353 students at Istanbul University. This study looks at the relationship between teacher attitudes and student attitudes. The findings of the Ulug et al. (2011) are that the teacher's positive attitude influences students' attitudes.

The above studies only focus on the professionalism of teachers in general mathematics learning. If viewed from the learning process of problem solving, teacher professionalism in problem solving and the learning process has not been explored and studied by educational researchers. Researches on this subject can be seen from several studies, namely research Harisman, Kusumah, & Kusnandi (2018, 2019a). Research Harisman et al. (2019a) studied categories of teachers' beliefs in the learning process of mathematical problem solving which can be seen in [Table 1](#).

**Table 1.** Category of Teachers Beliefs on Learning Process on Mathematical Problem Solving

Aspect	Category		
	<i>Good</i>	<i>Very Good</i>	<i>Excellent</i>
teacher's beliefs about problem solving learning	The teacher considers that learning about mathematical problem solving is emphasized on <i>performance</i> (emphasizing to know rules and procedures without understanding) of the mathematical problem-solving process	The teacher considers that learning about mathematical problem solving is emphasized in understanding the process of solving mathematical problems	The teacher considers that learning about mathematical problem solving is emphasized on how students construct a mathematical problem-solving process.
teacher's beliefs about problem solving teaching	The teacher considers that if given a mathematical problem then the student completes by receiving knowledge from the teacher	The teacher sees that if given a mathematical problem then the student finishes by constructing his knowledge with the teacher's direction	The teacher considers that if given a mathematical problem the student completes by exploring the problem-solving strategy based on their own interests
teacher's beliefs about what is the positions of mathematical knowledge to learning about mathematical problem solving	Teacher considers that in the process of mathematical problems, solving we must remember the definitions/rules needed to solve the problem	Teacher considers that in the process of solving mathematical problems, we must understand the definitions/rules needed to solve the problem	Teacher considers that in the process of solving mathematical problems, we must be able to adjust and differentiate the definitions used to solve the problem

The categories of teacher beliefs in the learning process of solving problems are graded from good to excellent, along with categories of how teachers reflect the learning process they do in problem solving which can be seen in [Table 2](#). The results of teacher reflection categories are contained in research Harisman et al. (2018).

**Table 2.** Categories of Teacher Reflection on the Learning Process of Problem Solving

Aspect	Aspect Description	Categories		
		<i>Good</i>	<i>Very Good</i>	<i>Excellent</i>
Teacher's reflection on the learning process of mathematical problem solving	Teacher reflection on how to provide understanding to understand problems in the learning process of mathematical problem solving	Reflecting on the process of how to provide understanding to understand the problem in the learning process of solving the problem is limited to revealing the facts that occurred in class	Able to reflect on the process of how to provide understanding to understand problems in the learning process of problem-solving, but cannot provide an alternative how to overcome them	Able to reflect on the process of how to provide understanding to understand problems in the learning process of problem-solving, and provide an alternative how to overcome them
	Teacher's reflection on the selection of strategies in the learning process on mathematical problem solving	Reflecting the process of selecting strategies in learning about mathematical problem solving is limited to revealing the facts that occur in the classroom	Able to reflect on the strategy selection process in learning about mathematical problem solving, but cannot give an alternative how to overcome it	Able to reflect on the strategy selection process in learning about mathematical problem solving, and provide an alternative how to overcome it

Aspect	Aspect Description	Categories		
		<i>Good</i>	<i>Very Good</i>	<i>Excellent</i>
	Teacher's reflection on the use of strategies in the learning process on mathematical problem solving	Reflecting on the use of strategies in learning about mathematical problem solving is limited to revealing the facts that occur in the classroom	Able to reflect the process of using strategies in learning about mathematical problem solving, but cannot provide an alternative how to overcome them	Able to reflect on the use of strategies in learning about mathematical problem solving, and provide an alternative how to overcome them
	Teacher's reflection on the verification of solutions in the learning process on mathematical problem solving	Reflecting the process of verifying solutions in learning about mathematical problem solving is limited to revealing facts that occurred in the classroom	Able to reflect the process of verifying solutions in learning about mathematical problem solving, but cannot provide an alternative how to overcome them	Able to reflect the process of verifying solutions in learning about mathematical problem solving, and providing an alternative how to overcome them
	Reflection of teachers on students in the learning process on mathematical problem solving	Reflecting student behavior during the learning process on mathematical problem solving is limited to revealing the facts that occur in the classroom	Able to reflect student behavior during the learning process on mathematical problem solving, but cannot provide an alternative how to overcome it	Able to reflect on student behavior during the learning process on mathematical problem solving, and provide an alternative how to overcome it

Furthermore, research Harisman et al. (2018) has also categorized teacher's attitude towards mathematical problem solving and the learning process on mathematical problem solving that can be seen in Table 3.

**Table 3.** Three categories of attitudes teachers toward mathematical problem solving and its learning process

Aspect	Category		
	<i>Good</i>	<i>Very Good</i>	<i>Excellent</i>
Teachers Attitude on mathematical problem solving	Teacher is phobia (fear) when faced with mathematical problem solving content	Teachers have a little phobia (fear) when faced with problem-solving content matematis	Teachers like, enjoy, and are interested, when faced with solving content
Attitude of teachers to learning about mathematical problem solving	Teachers look nervous in the learning process of mathematical problem solving	Teachers do not seem nervous in the learning process of mathematical problem solving, but they do not like totally, enjoy, or excited	Teacher looks to like, enjoy, and passionate in the learning process of mathematical problem solving

Research Harisman et al. (2019b) has also categorized the extension of teacher's didactic and pedagogic in the learning process of problem solving, categorized in *good*, *very good*, and *excellent* which can be seen in Table 4.

**Table 4.** Categories of depth and breadth of pedagogy and didactic aspects of the teacher in the learning process of mathematical problem solving

Aspect	Description of Aspect	Categories		
		<i>Good</i>	<i>Very Good</i>	<i>Excellent</i>
Depth and Extent Aspect of Didactic and Pedagogic in learning about mathematical problem solving	Using various problem solving strategies	Directing students to problem solving process with strategy that has been set	Directing students to the problem-solving process with a variety of strategies	Teachers ask the students to display their own troubleshooting process by providing only help needed instructions
	Heuristic mathematical problem solving learning	Students with teachers try to understand the process of solving mathematical problems in accordance with predetermined strategy	Students with teachers try to understand the problem-solving process toward pre-defined strategy choices	Students recognize the process of understanding the mathematical problem solving of the stratum Self-constructed strategy
	Creating interactions among students, teaching materials, and teachers in the learning process on mathematical problem solving	One-way interaction from teachers to students in mathematical problem-solving process	Two-way interaction but not involving other students in mathematical problem-solving process	Two-way interaction by involving other students collaboratively in the process of solving mathematical problems

These teacher categories influence how students behave in problem solving. Research Harisman et al. (2019b) examines the influence of teacher professionalism in the learning process on students' problem solving behaviour. The results of this study conclude that teacher professionalism is one of the external factors that influence student behaviour in solving problems. Different teachers in the excellent category tend to generate students who behave sophisticatedly in mathematical problem solving and vice versa.

The problem is what external aspects cause the teacher to be in an adequate category in solving mathematical problems. There are no studies trying to conduct a depth study to seek what aspects greatly affect the teacher category (level) in learning about mathematical problem solving. This study attempts to reveal external factors that influence teacher professionalism in the learning process of mathematical problem solving. For that reason, this research proposes research questions, namely: what external factors influence the category of teachers in mathematical and learning problem solving in terms of beliefs, attitude, depth and breadth of pedagogy and didactic behaviour, and also teacher's reflection on the process of learning mathematical problem solving.

## 2. METHOD

### 2.1. Study Description

Three junior high school teachers were categorized using the aspects proposed by study Harisman et al. (2018, 2019a, 2019b). Teachers are selected from three schools that have different clusters, namely: high, medium, and low clusters. The aspects seen were the same aspects as the research, namely: teacher beliefs, teacher attitude, depth of didactic and pedagogical aspects, and teacher's reflection, which were all measured and reviewed

on the learning process of mathematical problem solving. After obtaining the teacher categories in each aspect, the same way as the one done by research, the study began by documenting the teacher's learning process of problem solving, giving questionnaires, and interviewing each teacher, as well as watching videos and giving some questions related to the learning process that had been done.

After the teacher category in every aspect of professionalism was obtained, the teachers were interviewed in depth about educational background, attended training, and teaching periods. This is considered as an external factor that will affect the professionalism of each teacher towards mathematical problem solving and the learning process. This aspect was chosen based on recommendations from the Muir, Beswick, & Williamson (2008) study. Things that will become the focus of this research are what factors greatly influence the professionalism of teachers in mathematical problem solving and the learning process of mathematical problem solving. The process of categorizing teachers will not be discussed in detail, but the final category of the teacher will be displayed inasmuch as the focus of the research is the external aspect that affects the category while the categorization process only performs the imitation of the process and the instruments carried out in the research.

## **2.2. Research Subjects**

Three volunteer teachers were selected from three junior high schools. The three teachers were given open questions related to teaching experience, educational background and attended trainings. Beforehand, the three teachers were categorized according to beliefs, attitude, depth of pedagogical and didactic aspects and teacher's reflection on mathematical problem solving and learning processes on mathematical problem solving. Teachers were selected from three schools with different clusters. The purpose of selecting schools with varying levels is to avoid the problem of reliability and validity that might happen in small sample sizes (Patton, 1990).

## **2.3. Instruments and Data Analysis Technique**

The instruments used to categorize teachers for beliefs, attitude, and depth of pedagogical aspects were the same as the instruments used in research. After the teacher category was obtained, the main instrument in this study was to provide open questions related to teacher teaching experience, personal development training experience, and the level of education held by the teacher. Questions could be improvised by researchers in accordance with research needs; this is due to the role of researchers as the main instrument in qualitative research. Data were analysed by giving codes to teacher's answers.

# **3. RESULTS AND DISCUSSION**

## **3.1. Results**

Teachers from each school are grouped according to the rubric stated in study. Each teacher was given a code that is: teachers who came from school one (T-1), teachers from school two were coded with (T-2), and teachers coming from school three were coded with (T-3). In the early stages the teacher was classified and the results were obtained as shown in [Table 5](#).

**Table 5.** The Category of Teacher Professionalism in Learning about Problem Solving

Aspects		Things shown by teachers		
		First school's teacher (T-1)	Second school's teacher (T-2)	Third school's teacher (T-3)
<b>Teacher's belief</b>	Teacher's belief in the nature of mathematics	The teacher views mathematics as a creative science that is useful in everyday life ( <i>Problem-solving</i> ) ( <i>excellent</i> ).	The teacher considers mathematics as a collection of facts, rules and skills that are interrelated with one another ( <i>very good</i> ).	The teacher considers mathematics as a collection of facts, rules and skills that stand alone ( <i>good</i> )
	Teacher's belief in learning about mathematical problem solving	The teacher views the learning of mathematical problem solving as it is emphasized on how students construct mathematical problem solving processes ( <i>excellent</i> ).	The teacher considers learning mathematical problem solving emphasizing in understanding the mathematical problem solving process ( <i>very good</i> ).	The teacher views that learning about mathematical problem solving is emphasized on performance (knowing rules and procedures without understanding) on the mathematical problem solving process ( <i>good</i> )
	Teacher's beliefs in students in learning mathematical problem solving	The teacher views that if given a mathematical problem, students solve by exploring problem solving strategies based on their own interests ( <i>excellent</i> ).	The teacher considers that if given a mathematical problem, students solve it by constructing their knowledge with the teacher's direction ( <i>very good</i> ).	The teacher considers students to receive knowledge from the teacher when solving mathematical problems ( <i>good</i> )
	Teacher's beliefs on mathematical knowledge for learning about mathematical problem solving	The teacher considers that in carrying out mathematical problem solving processes, we must be able to adjust and distinguish the definitions used to solve problems ( <i>excellent</i> ).	The teacher considers that in carrying out mathematical problem solving processes, we must be able to adjust and distinguish the definitions used to solve problems ( <i>excellent</i> )	The teacher believes that we must understand the definitions/rules needed to solve problems ( <i>very good</i> )
<b>Teacher's response is very good positively or negatively towards certain ideas, objects, people, or situations (attitude)</b>	Teacher's attitudes to mathematical problem solving	The teacher likes, enjoys, and is interested, when faced with mathematical problem solving content ( <i>excellent</i> )	The teacher has little phobia (fear) when faced with mathematical problem solving content ( <i>very good</i> )	The teacher has little phobia (fear) when faced with mathematical problem solving content ( <i>good</i> )
	Teacher's attitude towards learning mathematical problem solving	The teacher looks like, enjoys, and eager in the learning process about mathematical problem solving ( <i>excellent</i> )	The teacher looks like, enjoys, and eager in the learning process about mathematical problem solving ( <i>excellent</i> )	The teacher is afraid when faced with solving content. The teacher does not seem nervous in the learning process about mathematical problem solving, but is not so fond of, enjoying, or excited ( <i>very good</i> )
<b>Depth and Extent of Didactic and Pedagogical</b>	Use of various problem solving strategies	The teacher asks students to display their own problem solving process by only providing help	Directing students to the problem solving process with a predetermined strategy ( <i>good</i> )	Directing students to the problem solving process with a predetermined strategy ( <i>good</i> )

Aspects	Things shown by teachers			
	First school's teacher (T-1)	Second school's teacher (T-2)	Third school's teacher (T-3)	
<b>Aspects in learning about mathematical problem solving</b>		with the instructions needed ( <i>excellent</i> )		
	Mathematical problem solving learning in a heuristic manner	Students understand the process of understanding mathematical problem solving from strategies that have been constructed on their own ( <i>excellent</i> )	Students and teachers understand the process of mathematical problem solving in accordance with a predetermined strategy ( <i>good</i> )	Students and teachers understand the process of mathematical problem solving in accordance with a predetermined strategy ( <i>good</i> )
	Creation of interaction between students, teaching materials, and teachers in the learning process of mathematical problem solving	Two-way interaction with collaboratively involving other students in the mathematical problem solving process ( <i>excellent</i> )	Two-way interaction but does not involve other students in the mathematical problem solving process ( <i>very good</i> )	One-way interaction from teacher to student in the mathematical problem solving process ( <i>good</i> )
<b>Teacher's reflection on the learning process of mathematical problem solving</b>	Teacher's reflection on how to provide understanding to understand problems in the process of learning mathematical problem solving	Able to reflect on the process of how to provide understanding to understand problems in the learning process about problem solving, and provide alternatives on how to overcome them ( <i>excellent</i> )	Able to reflect on the process of how to provide understanding to understand problems in the learning process about problem solving, and provide alternatives on how to overcome them ( <i>excellent</i> )	able to reflect on the process of how to provide understanding to understand problems in learning about mathematical problem solving but it is only limited to revealing the facts that occur in class. ( <i>good</i> )
	Teacher's reflection on the choice of strategies in the learning process about mathematical problem solving	Able to reflect on the process of selecting strategies in learning about mathematical problem solving, and providing alternatives on how to overcome them ( <i>excellent</i> )	Able to reflect on the process of selecting strategies in learning about mathematical problem solving, and providing alternatives on how to overcome them ( <i>excellent</i> )	Able to reflect on the process of selecting strategies in learning about mathematical problem solving but it is limited to revealing only the facts that occur in class. ( <i>good</i> )
	Teacher's reflection on the implementation of strategies in the learning process about mathematical problem solving	Able to reflect on the process of implementing strategies in learning about mathematical problem solving, and provide an alternative how to overcome them ( <i>excellent</i> )	Able to reflect on the process of implementing strategies in learning about mathematical problem solving, and provide an alternative how to overcome them ( <i>excellent</i> )	Able to reflect on the process of selecting strategies in learning about mathematical problem solving but it is limited to revealing only the facts that occur in class ( <i>good</i> )

Aspects	Things shown by teachers		
	First school's teacher (T-1)	Second school's teacher (T-2)	Third school's teacher (T-3)
Teacher's reflection on verification of solutions in the learning process of mathematical problem solving	Able to reflect on the verification process of solutions in learning mathematical problem solving, and provide an alternative how to overcome them ( <i>excellent</i> )	Able to reflect on the verification process of solutions in learning mathematical problem solving, and provide an alternative how to overcome them ( <i>excellent</i> )	Able to reflect on the process of selecting strategies in learning about mathematical problem solving but it is limited to revealing only the facts that occur in class ( <i>good</i> )
Reflection on students in the learning process of mathematical problem solving	Able to reflect on students' behavior during the learning process of mathematical problem solving, and provide alternatives on how to overcome them ( <i>excellent</i> )	Able to reflect on students' behavior during the learning process of mathematical problem solving, and provide alternatives on how to overcome them ( <i>excellent</i> )	able to reflect on the process of selecting strategies in learning about mathematical problem solving but it is limited to revealing only the facts that occur in class ( <i>good</i> )

Based on the criteria in [Table 5](#), it can be concluded that the first school's teacher (T-1) tends to be in the excellent category, the second school teacher (T-2) is in the very good category, and the third school's teacher (T-3) is in good category. Furthermore, external aspects that affect the categories of the three teachers will be displayed. These aspects are reviewed from the length of teaching, training experience, as well as teacher education background. The following are the results of interviews for the three teachers.

*Interview footage of the first school teacher (T-1)*

Below is the footage of interview with the first school teacher (T-1)

- Researcher : How long have you been teaching?*  
*T-1 Teacher : 20 years*
- Researcher : What was your last education?*  
*T-1 Teacher : The last is a master's degree in education at a leading public university in the city of Bandung*
- Researcher : Did you pay the institution individually?*  
*T-1 Teacher : I was granted by the government*
- Researcher : How about trainings?*  
*T-1 Teacher : There were many. School level training, teacher competence training. There was teacher competence training on certain subject recently.*
- Researcher : Was it obligatory?*  
*T-1 Teacher : Yes it was, especially when the one who conducted it was the education authorities*

Based on the interview, T-1 teacher has 20 years of teaching experience and has a master education background and often attends professional training. Hereafter, the interview results of T-2 teacher is presented as follows:

*Interview footage of the second school teacher (T-2)*

Below is the footage of interview with the second school teacher (T-2)

- Researcher : How long have you been teaching?*
- T-2 Teacher : 15 years since 2003*
- Researcher : Is there any intention to continue your education to a higher degree?*
- T-2 Teacher : There was. However, there was an accident where my house was burnt down by a fire, so I dropped it.*
- Researcher : So you used to study in a higher degree?*
- T-2 Teacher : I had already studied for one semester, but due to the accident, I quitted.*
- Researcher : Where did you study?*
- T-2 Teacher : I had my bachelor's degree at one of the private universities in Bandung on 2007.*
- Researcher : How about now?*
- T-2 Teacher : I need to take care of my children first.*
- Researcher : Does school offer you a help?*
- T-2 Teacher : No, I used my own wallet. There is, if we submit a request to the official, but it was a complicated process.*
- Researcher : Do you attend trainings conducted by school?*
- T-2 Teacher : Rarely, but I usually attend competence exam. It was Jogja which conducted it recently. I was challenged to do better*
- Researcher : Thank you.*

Based on the interview, T-2 teacher has 15 years of teaching experience, an undergraduate education background, and a desire to continue the master degree. She rarely attends professional training. Hereafter, the interview results of T-3 teacher is presented as follows

*Interview footage of the third school teacher (T-3)*

Below is the footage of interview with the third school teacher (T-3)

- Researcher : How long have you been teaching?*
- T-3 Teacher : I have been teaching here for 24 years. I have actually taught for 30 years but 24 years were spent in this school.*
- Researcher : You seem to be very experienced. Does it mean that you have attended lots of Olympiads and trainings?*
- T-3 Teacher : Olympiad training was once attended in 2007, but I have never*

*attended the improvement training*

*Researcher* : Why?

*T-3 Teacher* : *There used to be seniority level, I used to go to the Makkah also. There were some obstacles. I used to be a trainer for an Olympiad, but it might be due to luck.*

*Researcher* : *Is there any intention to continue your education to a higher degree?*

*T-3 Teacher* : *No, I will be retiring soon.*

*Researcher* : *Why don't you try to continue?*

*T-3 Teacher* : *It's even difficult for me to make paper. I intend to attend a two-year education at one of the public universities in Bandung. I have never taken a placement test and I was given a scholarship by the government. After that, I continued my studies at the undergraduate level. Everything is free.*

Based on the interview footage, T-3 teacher has 30 years of teaching experience, an undergraduate education background, and no desire to continue the master's degree. She rarely attends professional training.

### 3.2. Discussion

The discussion is stated in [Table 6](#).

**Table 6. Classification of Each Teacher**

No	Teacher's origin	Teacher's category on Mathematical Problem Solving and Mathematical Problem Solving Learning	Teaching experience	Level of Education	Training experience
1	First School Teacher (T-1)	Excellent	20 years	Master Degree	Often
2	Second School Teacher (T-2)	Very Good	15 years	Bachelor Degree (have a strong intention to continue)	Rare
3	Third School Teacher (T-3)	Good	30 years	Bachelor Degree (doesn't have a strong intention to continue)	Almost never

These results are in accordance with expert opinion, that is Muir et al. (2008) external factors that influence student behaviour are teacher professionalism in the process of learning mathematical problem solving. Furthermore, research Zsoldos-Marchis (2015) conducted research in elementary schools that the attitude of an elementary school teacher towards mathematics influences the attitudes of their students. Research Beswick (2012) also saw the relationship between beliefs possessed by teachers towards students whom they teach. In research, there is a consistency between the practice of learning and students' perceptions of the beliefs held by the teacher, although not always, it is always consistent.

Furthermore, research Opolot (2014) also stated based on the results of his research that the professional factors of teachers greatly influenced students' achievement in science and mathematics classes in Uganda. The implication of these researches is that teacher should be given the widest opportunity to continue education and trainings that support their professionalism at the school and education level. This is very related to the student achievement in mathematical problem solving.

#### 4. CONCLUSION

The findings of this study are external factors such as the level of education and experience in participating in training are determinants in the professionalism of teachers in the learning process about mathematical problem solving. The duration of teaching is not a professional determinant of a teacher in the learning process of solving mathematical problems. The above is important to know by decision makers because teachers who are professional in problem solving and problem solving learning are closely related to students' mathematical problem solving behavior (Harisman et al., 2019b).

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