

# **Professional Learning Community: Experiences and Perceptions of Indonesian Mathematics Teachers**

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## **ABSTRACT**

This paper describes the experiences and perceptions of mathematics teachers in Indonesia in professional learning through community. The methodology used in this study is qualitative with phenomenography design. Data collection was carried out through electronic questionnaire and interview. Research finding shows that only 17% of teacher participants has participated in professional learning community in the past 1 year. Another research finding shows teachers' perceptions stating that the reasons for their low motivation in participating in professional learning community activities are time of the activities, quality of facilitators or resource persons, government support, and teachers' culture. Finally, participants offer strategies in implementing professional learning through community namely the integration of information and communication technology, zoning or school-based activities, government involvement, experts involvement, and research-based activities.

Keywords: Professional learning, teacher community, teacher experience, and teacher perception

## **INTRODUCTION**

Teachers play a significant role in students' learning achievement (Sanders, Wright, & Horn, 1997; Darling-Hamond, 2000; Rice, 2003; Wayne & Youngs, 2003; Harris, 2011). The role can be excellently executed if teachers acquire the ability, skill, and belief in managing teaching and learning (Ernest, 1989). Teachers' expertise and competency affect the quality of classroom learning (Jenning, Grenberg, 2009). Fact shows that education improvement in several countries are highly supported by teachers' competency both in individual or collective manner (Stoll, Bolam, McMahon, Wallace & Thomas, 2006).

In fulfilling their professional duties, teachers have to maintain their competency. Thus, professional development is a crucial requirement to guarantee that classroom learning follows and keeps up with the world development and demand. A sustained competency ensures a consistent education in reaching education goals (Lasauskien, Rauduvait, Barkauskait, 2015).

One form of teacher professional development is done collaboratively through community (Kennedy, 2005). Professional learning community presents positive impact on the development of teacher and student learning practice (Vescio, D., & dkk, 2008; Lakshamanan, et al., 2011; Brodie, 2013), and on the effort of school development (Hughes, & Kritsonis, 2006).

Practice of sustainable teacher professional development is actualized in various models. Kennedy (2005) elaborates 9 models of teachers professional development namely training, award bearing, deficit, cascade, standards based, coaching or mentoring, community of practice, action research, and transformative. One form of collaborative professional development is professional learning through community. Community practice has been long developed and become a model in teacher professional learning in various countries (Stoll, et al., 2006). Professional learning community gives a great impact at improving the quality of teachers teaching and student learning (Vescio, Ross, & Adams, 2008).

Professional learning community is a learning performed by a group of people by sharing experiences to improve learning practice in critical, reflective, sustainable, collaborative, inclusive, and learning-oriented manner (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Professional learning community is also defined as a learning process performed by a group of teachers who are committed to collaborate systematically and are involved in interactional support to improve the quality of learning (McLaughlin & Talbert, 2007; Stoll et al., 2006; Wahlstrom & Louis, 2008).

According to Garet et al. (2001) teachers who keep learning their subject will get more ease to find ways of how to teach the subject to students. Professional learning through community which focuses on the subject enables teachers to directly apply the knowledge that they get. A study by Hill and Loewenberg-Ball (2004) in California shows that subject-focused professional development is more beneficial for students. The finding of this study highlights that subject-focused professional development, like in Mathematics, displays greater benefits for both teachers and students.

Since Teachers and Lecturers Constitution was issued in 2005, Indonesian government has facilitated teacher professional development program for both pre-service and in-service teachers. Indonesian government realizes how important sustainable teachers professionalism development is. Therefore, a regulation Number 16 2009 was issued by Ministry of Administrative and Bureaucratic Reform which locates sustainable professional development (*pengembangan keprofesian berkelanjutan-PKB*) as the main component in teacher career development. Teacher PKB is teacher competency development which is implemented according to needs, in stages, and sustainably to improve their professionalism (Permenegpan RB, 2009). Within the framework of professionalism, a teacher is not only obliged to apply classroom teaching and learning but also is responsible to develop their profession sustainably.

Community-based teacher professional development has been carried out by Indonesian government. Teacher professional development through teachers team work (*Kelompok Kerja Guru-KKG*) and subject teacher working group (*Musyawarah Guru Mata Pelajaran-MGMP*) will save budget and is considered to be more effective. Teachers do not need to leave schools, therefore students, to join the training. Teacher professional development through KKG and MGMP is expected to be able to reach all teachers which is previously hard to actualize by the government along this time. In the program of professional development through community, it is enough for the government to only facilitate competency development for the core teachers. Those core teachers are the ones who will become the facilitators in KKG and MGMP programs.

Although collaborative-based professional learning has been a model of teacher professional development in a number of countries, it only started to develop in Indonesia in 2005 through lesson study program (Iskandar, Suratno, 2010; Saito, et al., 2006). Teacher professional learning practice through KKG and MGMP community is a model which is facilitated and funded

by the government (Tanang & Abu, 2014). Indonesian government through the Ministry of Education has created a teacher professional learning program through community (Yanuarti & Treagust, 2016). In this program, the government grants direct funding to KKG and MGMP community to implement classroom action research-based reflective practice.

Professional learning community of mathematics teachers in Indonesia undergoes several problematic issues. A research conducted by Widodo and Riandi (2013) shows that professional learning through community in Indonesia is not sustainable in which teachers also spot difficulties in its practice at school. In another research by Saito et al. (2006), a fact is found out stating that observation in professional learning has not yet focused on student learning process, mistake, and misunderstanding. These problems signify that the implementation of professional learning for mathematics teachers in Indonesia is not yet effective.

Some factors contribute to the effectiveness of teacher professional learning. Program of teacher professional learning development is not successful as it does not consider teachers' background, experience, knowledge, belief, and needs (Loucks-Horsley, et al., 2003). This idea is supported by a research by Chval, et al. (2008) which mentions that one of factors causing ineffective teacher professional development program in America is discrepancy between teachers' needs, perceptions, and experiences with the government program. Therefore, it is necessary to precedingly collect information on teachers' needs, experiences, and perceptions before planning mathematics teacher professional learning program.

Grounding on the above elaboration, this article attempts to elaborate mathematics teachers' experiences and perceptions in Indonesia towards professional learning community. The research question which serves as the foundation in describing this article is "how are Indonesian mathematics teachers' experiences and perceptions on activities of teacher professional learning community?". This article is expected to serve as a reference and consideration in designing model of mathematics teacher professional through community which is effective and goes along with Indonesian context and culture.

## **METHODOLOGY**

This research applies qualitative research design with phenomenography approach. Phenomenography is a research approach aiming at describing, analyzing, and understanding an experience (Marton, 1981). This approach highlights the use of an individual's or group's subjective knowledge to reveal meaning and reality of a phenomenon (Barnard, et al., 1999). Within this article, professional learning community is investigated based on Indonesian mathematics teachers' point of view.

### **Data Collection Technique**

Data were collected using mixed method from electronic questionnaire and restricted interview via handphone or whatsapp (Whitehead, Groothuis & Blomquist, 1993). Instrument applied on the questionnaire is used to answer two groups of questions covering mathematics teachers' experiences on professional learning community and mathematics teachers' perceptions on professional learning community. Questions consist of closed and open questions. Besides, data were also collected through restricted interview method. Interview data were gathered to support participants' answers on the questionnaire.

Questionnaire was distributed through electronic link. Questionnaire link distribution was carried out by the person in charge in the province. The questionnaire was then distributed to mathematics teachers through social media of Whatsapp and Facebook. The person in charge in province level was ensured to distribute the link to mathematics teachers that she or he knew. This idea was suggested to anticipate if there would be feedback or response from the participants related to the questionnaire, the distributor was able to directly give clarification and explanation.

## Research Participant

Research participants involve mathematics teachers from nine provinces in Indonesia. Participants were selected purposively by considering the geographical distribution of their school sites. There were 145 participants. Those participants were mathematics teachers from junior and senior high school level and they were from private and public schools.

## Data Analysis

The questionnaire consists of two types of questions namely open and closed questions. Participants' answers to closed questions were analyzed quantitatively. The result is displayed in graphic of frequency.

Answers to open questions were analyzed using qualitative data analysis. The techniques applied were data collection, data reduction, data presentation, and data conclusion (Miles Huberman, 1994).

Data analysis process was started by reading participants' answers on open questions in the form of electronic survey which dealt with mathematics teachers' perceptions on professional learning through community. Data coded into several theme categorisations was the next phase. Restricted interview was conducted to several participants as representatives of each theme category. Description on research finding is the result of synthesis between quantitativ and qualitative data.

## FINDINGS AND DISCUSSION

This article elaborates research findings into two components namely mathematics teachers' experiences and perceptions in professional learning community.

### Mathematics Teachers' Experiences in Professional learning community

Description on teachers' experiences on professional learning through community is obtained from participants' answers to seven questions on the questionnaire.

**Table 1**  
Types of Activities on Teacher Professional Development (Subject-Based) Followed by Participants in the Last One Year

NO	Types of Activities on Teacher Professional Development (Subject-Based) Followed by Participants in the Last One Year	Percentage (%)
1	Workshop/Technical Guidance/Training	74
2	Reflective Practice/Lesson Study/Peer Observation	17
3	Lecture/Formal Education	8

<b>4</b>	Learning Supervision	56
<b>5</b>	Distant Professional Development via Telecommunication Tools	11
<b>6</b>	Scientific Publication	12
<b>7</b>	Others	7
<b>8</b>	Never	1

Referring to Table 1, it is concluded that the percentage of participants who has ever involved in teacher professional development in the form of workshop/technical guidance/training is 74 %. Workshop/technical guidance/training is a form of mathematics teacher professional development most followed by the participants in the last one year.

Table 1 also displays that there is only 17 % of participants who has ever participated in professional development program in the form of professional learning (in the last one year). Meanwhile, the number of participants who has ever published scientific work for as much as 12 % denotes the form of teacher professional development which is the least followed by mathematics teachers in the previous one year.

This fact reveals that although professional learning community has been developed and implemented in Indonesia in the form of lesson study since 2005, research finding shows a fact that there is only 17 % of mathematics teachers who has the experience of joining professional development through community as a form of professional learning. This notion is supported by the fact that the total learning hours of professional learning community in which teachers participate is still less than 60 learning hours in a year. In fact, ideally, a teacher needs more than 60 learning hours of professional development each year.

**Table 2**

Types of Activities on Teacher Professional Development (Subject-Based) through Teachers Community in the Last 1 Year

<b>NO</b>	<b>Types of Activities on Teacher Professional Development (Subject-Based) through Teachers Community in the Last 1 Year</b>	<b>Percentage (%)</b>
<b>1</b>	Workshop/Technical Guidance/Training	69
<b>2</b>	Reflective Practice/Lesson Study/Peer Observation	17
<b>3</b>	Lecture/Formal Education	31
<b>4</b>	Learning Supervision	11
<b>5</b>	Distant Professional Development using Communication and Information Technology	8
<b>6</b>	Scientific Publication	8
<b>7</b>	Others	1

Table 2 shows that workshop/technical guidance/training is a form of teacher professional development which is most frequently followed; it is for as much as 69 %. Meanwhile, professional learning is only followed by 17 % of participants. Scientific publication becomes the least frequently followed which derives only as much as 8 %.

Table 1 and 2 generate the same finding mentioning that workshop/technical guidance/training is a type of teacher professional development which is the most followed by participants and scientific publication becomes the least followed one.

**Table 3**  
Topics in Teacher Professional Development Activities (Subject-Based) through Teachers Community which Participants Have Attended in the Last 1 Year

NO	Topics in Teacher Professional Development Activities (Subject-Based) through Teachers Community which Participants Have Attended in the Last 1 Year	Percentage (%)
1	Learning Plan/Design	74
2	Learning Strategy/Model/Method	74
3	Learning Assessment	66
4	Additional Course on Subject Matter	46
5	Scientific Writing	21
6	Information and Communication Technology in Learning	38
7	Others	3

Table 3 shows information that materials or topics on learning planning/design and learning strategy/model/method are the topics in teachers community professional development activities through which is the most frequently joined by participants. Fo as much as 74 % of participants has participated in the professional development program through community within materials/topics of learning planning/design and learning strategy/model/method. Table 3 also displays that only 21% of participants has taken a part in teacher professional development within the topic of scientific publication.

**Table 4**  
Total Duration (in Hour) of Teacher Professional Development (Subject-Based) through Teachers Community Attended in the Last 1 Year

NO	Total Duration (in Hour) of Teacher Professional Development (Subject-Based) through Teachers Community Attended in the Last 1 Year	Percentage (%)
1	0-30 Learning Hours	51
2	30 – 80 Learning Hours	36
3	81 – 180 Learning Hours	10
4	181 – 480 Learning Hours	2
5	481 – 640 Learning Hours	0
6	641 – 960 Learning Hours	0
7	More than 960 Learning Hours	1

Table 4 mentions that 51 % of participants has attended professional development program through community for the last 1 year with a total of 0-30 learning hours and 36 % of participants has the total of 30-80 learning hours. It can be concluded from the data that most of participants, for as much as 87%, attends community professional development program for less than 80 learning hours in the last 1 year.

**Table 5**  
Types of Teachers Community Attended in the Last 1 Year

NO	Types of Teachers Community Attended in the Last 1 Year	Percentage (%)
1	Subject Teacher Working Group ( <i>Musyawah Guru Mata Pelajaran</i> -MGMP)	95
2	Organisation of Profession (PGRI, IGI, and the alike)	38
3	School Community	34
4	Teachers Learning Community	17
5	Others	3

Table 5 displays that the majority of participants, for as much as 95%, participates in MGMP community. The data also show that there is MGMP in each participant's region as a community of teacher professional development.

#### Teachers' Perception on Teacher Professional Learning through Community

Data collection technique to get a description on teachers' perception on teacher professional learning through community is in the form of open and closed question. Closed questions are applied to obtain information on materials or topics that the teachers need, ideal total meeting, ideal total learning hours, and ideal total teachers involved in professional learning community program.

Open questions are utilized to gain description on teachers' perceptions on professional learning community, aspects which affect teachers' motivation, and strategy/type/model of ideal activities which enable effective professional learning.

**Table 6**  
Topics on Teacher Professional Development Needed the Most by Teachers

NO	Topics on Teacher Professional Development Needed the Most by Teachers	Percentage (%)
1	Learning Planning/Design	52
2	Learning Strategy/Model/Method	60
3	Learning Assessment	48
4	Additional Course on Subject Matter	47
5	Scientific Writing	45
6	Information and Communication Technology in Learning	61
7	Others, 21 <sup>st</sup> Century Learning Educational Psychology Lesson Study	2

Table 6 mentions that as much as 61% of participants thinks that topic on information and communication technology in learning is the most needed topic for teachers. Meanwhile, as much as 60% of participants chooses topic of learning strategy/model/method. The two topics or materials are the most selected ones by participants as the most needed topics.

**Table 7**

Total Ideal Routine Meetings of Professional Learning Program (Reflective Practice/Lesson Study/Peer Learning Observation) Completed through Teachers Community

NO	Total Ideal Routine Meetings of Professional Learning Program (Reflective Practice/Lesson Study/Peer Learning Observation) Completed through Teachers Community	Percentage (%)
1	Once a week	16
2	Once in two weeks	17
3	Once a month	46
4	Once in two months	3
5	Once in three months	14
6	Once in a semester	3
7	Three times in a month	1
8	Incidentally	1
9	Each discussion per KD (basic competency)/KI (core competency)	1

Table 7 shows that 46 % of participants desires professional learning program to be conducted once in a month, 17 % of participants chooses once in 2 weeks, and 16 % of participants thinks that ideal routine meeting for professional learning community should be carried out at least once in a month.

**Table 8**

Total Ideal Learning Hours in Each Professional Learning Activity (Reflective Practice/Lesson Study/Peer Learning Observation) Completed through Teachers Community

NO	Total Ideal Learning Hours in Each Professional Learning Activity (Reflective Practice/Lesson Study/Peer Learning Observation) Completed through Teachers Community	Percentage (%)
1	Less than 2 learning hours	11
2	2 – 4 learning hours	64
3	4 – 8 learning hours	20
4	More than 8 learning hours	5

Table 8 shows that as much as 64 % of participants perceives that the ideal total hours for each meeting in professional learning program through community is 2 up to 4 learning hours. Meanwhile, the number of participants who think that the ideal total hours for each meeting for less than 2 learning hours is as much as 11 %. Therefore, there is 75 % of participants having the perception that ideal total hours for each meeting should not exceed 4 learning hours.

**Table 9**

Ideal Total Number of Teachers Involved in Routine Meeting of Professional Learning (Reflective Practice/Lesson Study/Peer Learning Observation) through Teachers Community to Reach Effective Implementation



NO	Ideal Total Number of Teachers Involved in Routine Meeting of Professional Learning (Reflective Practice/Lesson StudyPeer Learning Observation) through Teachers Community to Reach Effective Implementation	Percentage (%)
1	Less than 10 teachers	39
2	10 – 20 teachers	37
3	20 – 40 teachers	16
4	40 – 50 teachers	2
5	More than 50 teachers	6

Table 9 shows that as much as 37 % of participants perceives that the ideal total number of teachers involved in each meeting of professional learning program through community is 10-20 teachers. Meanwhile, ideal total number of teachers of 10 is generated by 39% of participants. Therefore, there is 76% of participants who thinks that maximum total teachers involved in professional learning program through community to reach effectiveness is 20 teachers.

Another finding in this research is that 95% of mathematics teachers takes a part in professional development practice through MGMP community. Based on MGMP guidance issued by the Ministry of Education and Culture of Republic of Indonesia, MGMP usually gathers subject teachers in junior, senior, and vocational high school level in one regency or municipality. There are usually more than 20 teachers in an MGMP so that when there is an MGMP-based program, the participant number can reach more than 20. This finding is against teachers' perception related to the ideal number of teachers to participate in professional development program through community. As much as 76 % of participants perceives maximum of 20 teachers to be involved. This fact signifies that professional learning model through MGMP which has been implemented so far needs to be renewed especially when it comes to the total number of teachers participated in the program.

### Mathematics Teachers' Perception on Professional learning community

Based on analysis result on participants' answers towards the question "how is your perception towards professional learning community?", six answers were gathered. Teacher participants view professional learning as a from of learning evaluation, a decent learning practice, sharing values and motivation, learning quality improvement, learning problem solution, and teacher professionalism improvement.

This finding is supported by the interview result to participants which depicts professional learning community. The following are some of the relevant interview parts:

It is an activity to improve planning, teaching strategy, and learning implementation (Participant EHD, 55 years old)

It is a type of activity to develop teachers' professionalism. Teachers who attend professional learning in routine manner will develop their knowledge and skills (Participant TB, 44 years old).

It is one of ways to figure out a teacher's weaknesses and strengths in learning. Each teacher gives constructive input for the sake of the success of learning itself. (Participant NP, 35 years old).

It is a medium in which teachers can share knowledge and experiences in solving learning problems (Participant NC, 30 years old).

It is a medium for teachers to exchange thoughts, have discussion, perform self-evaluation, and motivate each other. (Participant AI, 23 years old).

### **Mathematics Teachers' Perception on Motivation to Attend Professional learning community**

Based on analysis result on participants' answers to the question "what motivates teachers to attend professional learning program completed through community?", six answer groups were generated. Those six elements are time, strategy, support from the government or school principal, teachers' awareness, distance, and cultural aspect.

The following are several interview excerpts from interview to participants in responding to the question which investigates teachers' low motivation in participating in professional learning community:

Based on my experience so far, sometimes teachers are reluctant to take a part in professional learning community as the program is conducted at the same time as the active learning hours. Teachers have a tight schedule, have classes every day which makes it difficult for them to participate in routine MGMP agenda. In addition, if the venue is far from school, we have to leave school the whole day. Further impact is that we have to replace the learning hours that we previously leave to attend MGMP agenda, which is hard as there is not enough time (Participant PTR, 30 years old).

I have the experience of participating in a lesson study program, but it does not run effectively. Teachers are sometimes reluctant to join lesson study activity as they are afraid of becoming a model teacher. Sometimes, peer observers give hard critics while, on the other hand, model teachers are still learning. Even sometimes the feeling of disappointment is brought out of the class. Model teachers become sensitive. My colleagues are also sometimes shy and are not ready to be observed. This fact causes teachers to be reluctant to be model teachers. With this condition, observers are sometimes not objective in giving inputs. The reason is that the observers are afraid to make the model teachers offended if they give many critics. (Participant WD, 45 years old).

At times, teachers are reluctant to participate in MGMP agenda as the facilitators are their own colleagues. The activities are boring, cause sleepiness, and there are no solutions for the existing problems. Rather than leaving students and only getting sleepy at the program venue, it is better to just be absent. Therefore, expert facilitators need to be presented; those who can provide solutions if problems take place. Besides, the letter of assignment has to be issued by the education authorities at municipality or regency level so that teachers become more encouraged. It can also be used as a requirement to get a promotion (Participant JSM, 50 years old).

Existing problematic issues regarding teacher professionalism in Indonesia have been revealed in a number of previous research. Widodo and Rianadi (2013) state that time is one of Indonesian teachers' challenges in participating in professional development program through community. Patahuddin (2018) views that teachers' limited access to experts in their field is another problem in teacher development in Indonesia. Sunarto (2012), on the other hand, mentions that the main issue of Indonesian mathematics teachers in professional learning community especially in lesson study is teachers' culture.

The analysis towards participants' answers to the question of "what is the ideal strategy to ensure a more effective professional learning community?" generates six groups of answers namely the use of IT (Information Technology), the use of group discussion strategy, motivating strategy, school-based activities, collective-designed activities, contextual experience-based

activities, impact of the activities, arrangement on the venue of the activities, observers with separated classroom, research-based activities, and involvement of government, supervisor, and school principal.

The following are several excerpts of interview transcripts to participants regarding teachers' perception on ideal strategy which is necessary to be applied to ensure a more effective professional learning community program:

To ensure its effectiveness, professional learning community needs to consider the use of information and communication technology. It is intended to enable teachers to have the knowledge and skills related to information and communication technology which is not only used as communication media but also as learning media. It is necessary for professional learning community to consider social media as a facility to communicate and interact with other community members. Besides, there are actually many teachers who are competent in using ICT but find it hard when they have to integrate it into the subject matter. Therefore, the learning program needs to facilitate teachers on how to use ICT-based media in mathematics learning process (Participant PTR, 30 years old).

One of teachers' problems so far regarding professional learning community is their limited time. It is because teachers have other responsibilities at school beside teaching. If the venue of the agenda is distant from school, sometimes they need to leave the school for the whole day. The students will be displaced if they are left. Thus, during the implementation of professional learning community, it is better if the venue is at school or at least close to the school. The MGMP community will facilitate each community in each zone to share their experiences in one special forum (Participant STW, 44 years old).

My experience in professional learning community is usually initiated by MGMP community. I hope the activities in MGMP are initiated by Educational Authorities of regency or municipality. Other than that, the activities need to involve experts such as lecturers or civil servants who are appointed as functional officials (*widyaiswara*). Sometimes teachers are reluctant to come as the facilitators are their own colleagues (Participant WA, 54 years old).

One of requirements for getting a promotion is scientific publication. This far, a lot of teachers find it difficult to publish scientific work. Therefore, it will be better if the professional learning agenda is completed through research-based community. By doing so, teachers can develop themselves and produce one research report such as classroom action research after the program (Participant YBW, 48 years old).

Referring to the interview transcripts, participants suggest 3 strategies to conduct professional learning community namely the use of ICT, zoning-based method, and activities which are initiated by Educational Authorities at regency or municipality level, involving experts, and research-based program.

Some research has elaborated a number of strategies in applying teacher professional development to make it more effective such as research conducted by Garet, et al. (2001), Whitehouse (2011), Hefnawi (2017), and Bates, et al. (2018). Meanwhile, research which specifically addresses the effectiveness of professional learning community is carried out by Bolam, et al. (2005), Timperley (2010), Watson (2014), Labone and Long (2016), and Sweet, et al. (2018).

Strategy in integrating information and communication technology in teacher professional development in Indonesia has been offered by previous investigation reports and research. Sari (2014) has examined online-based learning community, Widodo and Riandi (2015) investigates dual model, while Patahuddin and Logan (2018) inspect the use of Facebook as an information model of teacher professional development.

Result of previous studies and investigations on professional learning community shows that professional learning is focused more at school level or is department-based (Maselena et al., 2019). In general,

department is viewed as the most significant organization in high schools which regulates teachers' behavior (Visscher & Witziers, 2004) and affects their work performance, with whom they work, and how their work is appreciated by other people (Brown, Rutherford, & Boyle, 2000; Siskin, community 1997; Siskin & Little, 1995). Dunn, et al. (2018) highlight the importance of the role of school in professional learning development through education-based research.

In developing professional learning, a network for placing social, political, cultural, and educational elements into one integrated unity is necessary (Azorin, 2019). One of those can be done by involving experts in professional learning activities through community. Timperley et al. (2007) view that external experts have a crucial role to share the most recent knowledge on pedagogy and sustainable learning. Meanwhile, Suryadi, rozjanuardi, and Itoh (2010) offer models of Expert Group (EG), Interest Group (IG), and Research Mileu (RM) in developing mathematics research community at middle school level in Indonesia.

Professional learning through research-based community is not a new investigation topic. Some research has elaborated models of teacher professional development through research-based community. Holmqvist (2017) describes five models of approach in collaborative-based mathematics teachers development practice namely lesson study, educational action research, teaching research group, educational design research, and learning study. Indonesian government through the Ministry of Education and Culture has created a program of teacher professional development through community of classroom action research-based lesson study (Djajadi, & Mokhtar, 2014). Meanwhile Sari, Suryadi, and Syaodih (2018) develop a model of community-based mathematics teacher professional development using didactic design research framework.

## CONCLUSION

Workshop/technical guidance/training is a form of mathematics teacher professional development which is the most frequently attended by the participants within the last 1 year. The activities cover individual and collaborative activities completed through community. Materials or topics on learning planning/design and learning strategy/model/method are the most frequently topics attended by participants.

Majority of mathematics teachers in Indonesia only participates in community professional development for less than 30 learning hours in the last 1 year. Most of the activities show that the majority of participants for as much as 95% joins subject teacher working group (*Musyawarah Guru Mata Pelajaran-MGMP*) as the community they take a part in.

Another finding in this research is that most participants perceive that topic of information and communication technology in learning process is the most needed one by teachers. Other than that, majority of participants also thinks that it is better for professional learning community to be conducted once in a month with duration of 2 up to 4 learning hours with ideal number of participants of 10 up to 20 teachers.

Mathematics teachers in Indonesia find several problematic issues during the implementation of professional learning community program. One of those problems is their low motivation in attending professional learning community development. Based on participants' point of view, several contributing factors causing the low motivation are time, the quality of facilitator or source person, government support, and teachers' culture.

In dealing with the problems, a strategy is needed to design a more effective professional learning community program to sustain its existence. Referring to the participants' perception revealed in this research, a number of strategies which can be implemented are integration of

information and communication technology, zoning-based or school-based activities, involvement of the government, involvement of experts (lecturer or widyaiswara), and research-based activities.

Findings of this research are expected to serve as reference and basis in formulating model and design of mathematics teacher professional learning development program through community. The formulation of design and model is expected to be impactful to the effectiveness and sustainability of community teacher professional learning development.

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