Constraints and Strategy of Mathematics Teachers in The Implementation of Continuing Professional Development (CPD) in Disadvantaged Areas

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Abstract. This study describes the constrains and strategies of math teachers in implementing CPD in disadvantaged areas, especially in Poso Central Sulawesi Indonesia. The method used in this research is mix-method by using questionnaire and interview. The respondents involved amounted to 31 junior high mathematics teachers in Poso district. The data obtained were analyzed using quantitative descriptive data analysis technique. The results showed that the constrains are: a) lack of knowledge of teachers related to the making of writing; b) lack of information and containers to carry out scientific publications; c) lack of teacher skills in optimizing technology; d) no internet network to access information that supports learning; e) lack of funds; f) time constraints, as well as; g) lack of teacher motivation to develop. The strategies used by some teachers to overcome them are: a) increase knowledge by reading some literature; b) ask teachers' colleagues about the difficulties experienced; c) the schools bring in professionals to help train teachers' skills in optimizing technology; d) to exclude certification and salary funds for the benefit of personal development; e) actively participate in math teacher forum; f) completing all tasks at school, so when at home teachers can create scientific papers.

1. Preliminary

In the world of education, there are many factors that influence the success of students in learning one of which is the teacher. Teacher involvement in the learning process is not only in the process of teaching or transferring knowledge but only in the mentoring process. This is in line with the opinion of [1], which says that education is an important part of society and the most important thing in the education system is the role of a teacher. Then proceed with an explanation related to the role of the teacher in the community, which is related to the responsibility of a teacher in educating individuals so that this has an impact on the development of a quality society. This indicates that education requires professional teachers to be able to produce a quality society.

Based on the need for professional teachers, in mid 1970 Richard Gardner introduced a term that focuses on teacher professional development, namely CPD (Continuing Professional Development). In addition to these definitions, CPD is also defined by Kelctermans as a learning process carried out by professionals to improve performance and change the perspective of being better [2]. From this definition it is not excessive if we say that CPD or known as CPD (Sustainable Professional Development) is an important thing in teacher professional development. This opinion is in line with
Luke and [3] who say that CPD is a basic element that influences the professionalism of a teacher. The benefits of CPD for teachers is to increase the confidence of teachers by improving the cognitive abilities of teachers to be able to keep abreast of the times and sensitive to educational issues [4]. In the field of education, in addition to the teacher's performance the focus of CPD is students [5]. Therefore, teachers are expected to be able to participate in CPD activities in order to improve their performance so that it can impact on the improvement of the quality of students. In line with [5] that teacher participation in CPD activities not only encourages teacher activity but also encourages student activity.

Seeing the importance of CPD for teacher professional development, in 2009 Indonesia began to focus on increasing the professionalism of its teachers. As stated in the Regulation of the Minister of State for the Empowerment of State Apparatus Number 16 article 1 point 5, it is explained that in order to improve teacher professionalism, the development of teacher competencies is adjusted to the needs of teachers and carried out gradually and continuously. So, based on this description, it can be concluded that the purpose of the CPD itself is so that teachers are facilitated in order to achieve the established professional competency standards and the teacher can continue to actualize their abilities or competencies in accordance with the demands of the profession. This also applies to math teachers.

Mathematics teachers are expected to have a level of creativity and have good competence to be able to deliver the material well, so that students can understand what is taught well too. As we know, mathematics is one of the subjects in schools that requires teachers to be more creative in teaching material. This is because, the problems presented in mathematics learning need to be presented in such a way so that students can understand, analyze, and get answers to problems correctly. This is because mathematics is not just a problem solving which is the main focus, but high-level applications and skills are also the main focus [6]. Therefore, following the CPD is expected to have a positive impact on the development of abilities and improvement of mathematics teacher competence. The CPD components that are the focus of activities in Indonesia are self-development, scientific publications, and innovative works. The three components, if the implementation is maximal, will have an impact on improving teacher competence. Improving teacher competencies will have an impact on improving student knowledge and nationally will have an impact on improving the quality of national education. However, this achievement will occur if the teacher applies CPD activities regularly. This is in line with the opinion expressed by [7] that CPD can be beneficial for students if teachers who teach can understand their knowledge correctly and continuously improve their pedagogical abilities and adjust to the existing curriculum. In relation to the curriculum, in Indonesia the teachers still have problems in implementing the 2013 curriculum in the process of learning mathematics in the CPD classroom, one of the obstacles is that teachers still have difficulty in determining applications that can describe students' abilities [8]. This indicates that teacher skills and knowledge related to the use of applications in mathematics learning are still low.

The focus of mathematics learning in the CPDssroom one of which is to improve students' thinking skills or Higher Order Thingking Skills (HOTS). Based on the results of the study, the fundamental difficulties experienced by students are that students find it difficult to perform count operations and algebraic manipulation [9]. Therefore, it is hoped that the teacher can design learning better to be able to improve the ability of HOTS students. As stated by [10] the teacher's ability to design effective learning can encourage more creative students and students are able to build knowledge and develop it. Thus, learning mathematics in class will be more meaningful.

In connection with efforts to achieve the goals of the CPD and meet the needs of professional teachers, CPD is described in several forms of activities. Globally, CPD activities include three components, namely self-development, scientific publications and innovative works, where these three components have several activities in it, such as workshops, conferences, co-guidance, mentoring, action research, visits to other schools, and partnerships between schools and universities [11]. [12] also describe CPD activities into several types, namely, a) workshops; b) Certified course; c) Courses at universities; d) Conferences or seminars; e) Conduct lesson study; f) Building a learning community.
with fellow teachers; g) Independent learning. The implementation of CPD in Indonesia also includes the three components above. The hope is that with all these activities the goals of CPD can be fulfilled.

One of the things that can be used as a benchmark for the successful implementation of CPD is the result of the Teacher Competency Test (UKG). In 2015, Indonesia implemented UKG. The 2015 UKG results show that the average UKG score of teachers throughout Indonesia is 53.05. This low average indicates that there are several obstacles in implementing CPD in Indonesia. As for one district in Indonesia, the average UKG yield is almost the same as the national average, Poso Regency, which is an average of 54.2. The UKG value obtained by Poso district indeed exceeds the national average, but this not too far difference indicates that teachers in Poso district also experience obstacles in implementing CPD. Thus, with the disclosure of obstacles experienced by mathematics teachers in Poso district related to CPD, it is expected to provide an overview of the constraints experienced by mathematics teachers nationally. In addition to obtaining UKG scores that tend to be low, the results of the National Mathematics Examination also show more or less the same results as the UKG results. The average math score in Poso district is 50.43 for the 2015/2016 academic year and 43.03 for the 2016/2017 school year. The UN scores obtained have a tendency to decline from year to year. There are a number of points which are the reason for the low UN student scores, one of which is the low understanding of concepts [13]. This acquisition indirectly indicates that the teacher's competence in teaching mathematics is still low. Based on the UKG results that are still low and the mathematics UN scores are also still likely to be low, it can be said that the implementation of CPD which should be able to improve teacher competency is still not implemented well or in other words there are obstacles in implementation.

In connection with teacher constraints in CPD, in 2012, [14] revealed four teacher constraints in CPD, namely: a) many teacher teaching hours, so that teachers did not have time for CPD; b) the teacher is not used to doing research; c) there is no transparency of the teacher's work assessment which results in the teacher being unmotivated; d) the existence of political elements that affect teacher performance. In addition to the four constraints above, [15] also suggested constraints that resulted in low teacher participation in CPD, namely: a) teachers thought CPD was not effective in meeting their needs; b) organizations lack support; c) inadequate communication media; d) lack of control over teacher CPD activities. Therefore, this study wanted to see what obstacles were experienced by junior high school teachers in Poso district, Central Sulawesi and what strategies were taken to overcome these obstacles. The results obtained from this study can be useful in improving the competence of mathematics teachers in Poso district even nationally.

2. Method
The method used in this study is the mixed method (qualitative and quantitative methods), where the data obtained is analyzed and the results of the analysis are described according to the available data. The data used can be in the form of quantitative data which is then studied in depth using qualitative research techniques. Therefore, this research is more directed to mixed research with the Sequential Explanatory combination method. The population of this study were all junior high school mathematics teachers in Poso District, Central Sulawesi, totaling 96 people consisting of 58 civil servants and 38 non civil servants, and the sample used was 31 teachers. Regarding the determination of the research sample, the sampling technique used in this study was a stratified random sampling technique in which the CPD assessment was based on the acquisition of the teacher's UKG score which was also compared to the national examination of mathematics lessons in the last two years according to the school where the teacher taught. The data collection techniques used in this study are questionnaire techniques and interviews.

Based on the research technique used, the instrument of this research is questionnaire and interview guidelines.

3. Results and Discussion
Based on the research that has been done, the following results are obtained:
3.1. Constraints of Junior High School Mathematics Teachers in Poso District in the Implementation of CPD.

There are several obstacles experienced by junior high school mathematics teachers in implementing CPD as follows:

| Constraints             | Number of Teachers |
|-------------------------|--------------------|
| Knowledge               | 29                 |
| Motivation              | 29                 |
| Time                    | 28                 |
| Skill                   | 26                 |
| Fund                    | 25                 |
| Information             | 10                 |
| Internet Network        | 8                  |

Based on the table above it can be concluded that teacher knowledge related to CPD is still a major obstacle. The following is a description of each obstacle experienced by junior high school mathematics teachers in Poso District, Central Sulawesi.

a. Knowledge

Knowledge possessed by junior high school mathematics teachers in Poso district about activities in CPD is still less likely, especially in self-development. Teachers still have difficulties in making a scientific paper. This is because the teacher still has not mastered the techniques and procedures for making the writing framework until it becomes a paper, there are even some teachers who say they often have difficulty finding ideas or topics of writing. The effort in learning how to make a paper has been done by reading several papers that have been published, but without assistance from experts the teachers are still experiencing difficulties. In addition, a limited source of literature references is also the reason for teachers' difficulty in writing papers. The lack of teacher's knowledge in making this paper resulted in a lack of teacher participation in scientific publication activities. This is in line with what was said by [14] that one of the obstacles experienced by teachers was related to low teacher knowledge related to scientific writing caused by lack of teacher experience.

b. Motivation

Some of the constraints mentioned above are basically very dependent on the motivation of each teacher. Therefore, based on the results of the study, the main obstacles experienced by teachers related to the implementation of CPD are self-motivation. Teachers are still not motivated in participating in several CPD activities. the causes of low self-motivation include, among others, senior teachers feel that their abilities and experience are enough to be used for teaching, besides that the teachers who are already maximal feel that they no longer have the benefit of implementing CPD activities because they no longer need credit points for promotion, and also for non government employees teachers do not carry out CPD activities because there are no demands like civil servants. Motivation is also an obstacle in CPD according to [15] where this is because teachers have not felt the benefits of CPD on their work or in other words the teacher does not benefit from supporting his career as a teacher.

c. Time

Overall, teachers experience problems in terms of time. Some of the causes are the large number of teaching hours which reduces the teacher's time in preparing other activities, the teachers are also actively involved in the community as well as in worship activities which also require time. In addition, the source of the teacher's income is not only from teaching. Some teachers besides teaching also farming and gardening to fulfill their needs. So, the time that can be used to make learning tools and make other innovative works has been used to go to the
garden or to the fields. In line with the results of research conducted by [14] who said that time is one of the biggest obstacles faced by teachers. This is because the teacher's teaching hours are so tight that there is no more time for CPD.

d. Skill
As [6] said, mathematics is not a subject that only prioritizes problem solving but the process and application of the material being taught becomes an important part of mathematics. Therefore, the teacher's skill in presenting material is very important. However, the results showed that one of the obstacles experienced by almost all respondents was skill. Skills that become constraints are teacher's skills in presenting materials using simple teaching aids and skills in optimizing applications that support learning. So, the teachers are still not active in producing innovative works. This is in line with the results of research that suggests that teachers still have problems in making instruments that can maximize learning in the classroom [16].

e. Fund
Funds are one of the obstacles experienced by teachers in Poso district. This is because the amount of life needs must be met every month. So, sometimes the teacher does not take part in some CPD activities such as seminars, both city, national and international, which require a lot of money.

f. Information
Information related to self-development activities such as seminars, workshops, and other activities is sometimes delayed by teachers. In addition, teachers also do not have enough information related to the container to publish their writing. According to [15], information is something that can cause teacher participation in CPD to be low. This can be attributed to inadequate communication media. With regard to limited communication media, this situation will not only have a negative impact on the teacher, but will have an impact on students. This is because with the lack of knowledge of the development of information technology, students will find it difficult to prepare themselves to face computer-based national exams [17].

g. Internet Network
In connection with the lack of information received by the teacher, one of the main obstacles is the unavailability of the internet network. Eight teachers who experience problems in the internet network are domiciled in areas far from the center of the district capital, and access to the area is difficult. Even electricity is still difficult. Indirectly, this results in teachers often having difficulties in finding information related to the development of the world of mathematics education which has implications for the low percentage of teacher involvement in CPD activities. In addition, this will have an impact on the preparation of students in taking computer-based National Exams. Teachers who do not have skills that are capable of using computers will find it difficult to guide students [18].

3.2. Teacher's Strategy in Overcoming Obstacles in the Implementation of CPD
With regard to the constraints experienced by some preschool teachers, there are several teachers who have strategies to overcome these obstacles. Based on the results of interviews with the teachers concerned, the following strategies were obtained.

a. Search and read literature to increase knowledge.
Limited knowledge is one of the obstacles experienced by teachers in Poso district. However, some teachers have strategies to overcome these obstacles. The strategy used is the teacher looking for some literature in the library. If books in the library are still inadequate, internet services are used to find additional information. Not only that, another effort made to increase knowledge is to find information related to mathematics education seminars conducted outside the region by searching internet. In addition to increasing knowledge related to scientific writing, reading literature is also used to find information and increase knowledge related to
mathematical learning models that can be applied in the classroom to improve students' knowledge of mathematics. Behavior indicates that the teacher has realized the use of varied and appropriate learning models will build students' knowledge and improve students' thinking skills related to mathematics. This is in line with research [19].

b. Asking fellow teachers.
Obstacles experienced by teachers also include the ability of teachers in preparing learning tools as expressed in the above constraints. Therefore, for some teachers to solve these obstacles by trying to ask the fellow teachers who are considered to have knowledge and experience related to the constraints experienced. In fact, some teachers did not only ask fellow teachers in the same school, but they also asked fellow teachers who worked in the province. This is done because the teachers in the province must have more knowledge and experience in handling their obstacles. In addition, collaborating with teachers from other fields of study was also conducted by several respondents, this was intended to obtain a more innovative learning strategy and was used as a means to exchange information that could solve learning problems. This behavior is in line with the results of research conducted by [20]

c. The school brings in professionals.
The constraints of teachers regarding the use of technology are also still a major obstacle in the region, especially for teachers who are senior. Seeing this, the school did not remain silent. The school, in this case the headmaster, invites fellow teachers who still need guidance to attend courses held by the school without the need to pay for the course fee. Teachers brought in to teach are fellow teachers who master technology both from school and from other schools. This collaboration has a good impact on improving teacher performance. Like the results of an interview with one of the teachers who took the course, he said that with the course he could make learning tools quickly and also be able to present interesting learning for students because they had used IT-based learning. Improving teacher skills in using technology in learning mathematics in class provides great benefits for increasing students' understanding of the material being taught. This is in line with research which states that students' abilities will increase if the teacher can involve software in the process of learning mathematics in class [21].

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d. Set aside certification salaries.
With regard to funds, almost all teachers experience these obstacles. Many teachers think that everything related to teaching and learning activities in schools uses fees from schools or government alone. So, when a school in an area that is still developing like Poso, the views of teachers like this will make it difficult for the teacher itself and also this will make the teacher difficult to develop. Based on this, a number of teachers took the initiative to provide learning tools such as laptops, LCDs and other electronic devices using salary certification. The reason for this is that the teacher wants to make learning more attractive so that students are easier to understand. In addition, with the availability of laptops and LCD teachers, it is easier to prepare teaching materials and also save time compared to having to write material on the board. The remaining time can be used by the teacher by giving deepening material to students through discussion or teaching students the application of the material being taught.

e. Active in teacher forums.
One of the teacher forums in Poso district is MGMP. Based on the research, the last few years the MGMP in Poso district has not run as it should. In fact, MGMP has a role to improve teacher quality. Therefore, one of the teachers who was also the head of the MGMP in one of the rayon in Poso regency again held MGMP activities. He even directly met mathematics teachers who were members of the MGMP rayon to participate in MGMP activities. Every complaint submitted by the teachers in the forum tried to find a solution, so that in the end the teachers who were initially not interested in participating in MGMP activities became excited and were always actively involved in every activity in the forum.
f. Complete all tasks at school.
Some teachers say that time is an obstacle. However, some teachers provide strategies to overcome these time constraints. They do all the work related to teaching while in school, both using breaks and when the teacher does not have teaching hours. This makes, they have free time to work on the paper for the purpose of promotion or working on teaching aids that can support learning. The results of the implementation of this strategy are that the teachers did not experience problems in the framework of promotion and they often became regional delegates to participate in competitions related to the profession as mathematics teachers.

4. Conclusion
Based on some of the constraints described above, it can be concluded that the level of activity of teachers in CPD activities in Poso district is still low. This was caused by several constraints, namely obstacles related to teachers' knowledge of CPD activities, lack of information, teacher skills, lack of internet access, limited funds and time, and the motivation of teachers in participating in CPD activities that were still low. Therefore, teachers in Poso district still need guidance and assistance related to the implementation of CPD activities so that they can be actively involved in CPD implementation activities which have an impact on improving the quality of teachers themselves and improving the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district. The strategy that has been applied by several teachers to solve these obstacles is to add insight by searching for literature to improve the quality of education in Poso district.

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