Elementary School Teacher Training Based on Needs and Interests of Teachers and The Effectiveness of The Improvement of Students Competence

A Suyitno¹, E Sugiharti and E Pugiastuti
Maths and Natural Sciences Faculty of Universitas Negeri Semarang
Gd. D-12 Kampus Unnes Sekaran Gunungpati, Semarang, Central Java - Indonesia
¹Corresponding author: amin.mat@mail.unnes.ac.id

Abstract. Teachers need always to improve their competence because of the growth of science very rapidly as well as elementary school teachers. However, the provision of training will not produce an increase in the competence effectively if it is implemented without considering the needs and interests of teachers. The novelty factor which is highlighted through this research results, want to answer a problem, namely: how to conduct an effective training based on the needs and interests of teachers so that the effects of training can improve the competence of teachers? After going through research for two years with a qualitative approach which was preceded by a visit to the school and a series of interviews, treatment of training model, FGD, and triangulation then have been produced a way to implement of training based on the needs and interests of teachers. The training model includes face to face training which structured and scheduled according to the needs of elementary school teachers, followed by workshops, simulations, then the coach holds guidance in the classroom, and ends with reflections.

Keywords: Teacher training, workshop, guidance.

1. Introduction

1.1. Background of Research

Teachers are agents of education. Science is also rapidly evolving. Therefore, teachers are always required to learn so that teachers can follow the pace of development of the science. If the teacher can keep pace with the development of science, the teacher will be able to bring their students to achieve the expected competencies, as well as elementary school teachers. Additionally, Regulation of the Minister of Education and Culture, No. 53/2015 of Republic of Indonesia, learning in elementary school should refer to the Integrated Thematic learning. Through integrated thematic, learners are invited and trained to associate one phenomenon with each other. Such occurrence in mathematics is known as mathematical literacy.

Teachers need to know about the mathematical literacy and integrated thematic. The teachers can gain this knowledge through training. However, the provision of training will not result in increased competence for teachers effectively if the training implemented without considering the needs and interests of teachers.

Vithal and Bishop (2006), and Doyran (2011) wrote that focus on teacher training was to raise issues that emerged at this time, for example, Mathematical Literacy. Vithal and Bishop also suggested that in solving problems related to mathematical literacy, teachers need to use an approach based on mathematical modelling. They said that to prepare the teachers who do not have adequate
math skills was a challenge so that finally the teachers have the knowledge to become the teachers who master of mathematics literacy[1,2].

On the other hand, for teachers in Indonesia, teachers must teach the contents of a curriculum, known as Curriculum of 2013 Revised Edition. In the Curriculum of 2013 Revised Edition, all subjects including mathematics should be taught through a scientific approach. However, not a few of the primary school teachers who do not understand the significance of scientific approach. In fact, elementary school teachers must know how to teach mathematics through this scientific approach. As a result, there is a gap between the knowledge and skills required elementary teachers with the reality of the school.

Therefore, it is natural that elementary school teachers in Indonesia at this time is in need of knowledge, skills, and mastery of materials associated with mathematical literacy and applying of the scientific approach. Elementary school teachers need to be given an effective training based on searches of teacher competence to its ability in mathematics taught through scientific approach is characterised by mathematical literacy. An effective training and has an element of novelty needs to be discovered through good research results.

1.2. Research Problems

The novelty factors wanted to be highlighted by this research results, want to answer a problem, namely: How to implement an effective training based on the needs and interests of teachers so that the effects of training can improve the competence of teachers?

1.3. Research purposes

The purpose of this research conducted was to find a model of how to conduct effective training based on the needs and interests of teachers so that after effects of training can improve the competence of teachers. The requirement is to implement the scientific approach characterised by mathematical literacy.

2. Literature Review

2.1. The Importance of Effective Training for Elementary School Teachers

In any country, the government's efforts to improve the quality of learning for the teacher always executed. The final goal is that the students who are taught can reach the target competencies expected.

Harwell (2003), Kramarz (2008) and Burns (2011) who frequently wrote articles about the training of teachers said that teacher training was very necessary so that teachers had the ability to develop the profession as a teacher and had a high quality in the learning process [2,3,4].

2.2. Ability of Mathematical Literacy as a Need for Teachers and Students

The definition of mathematical literacy in PISA (OECD, 2014) was as follows. Mathematical literacy is an individual's capacity to formulate, work, and interpret mathematics in a variety of contexts. The capacity of this individual includes using mathematical reasoning and mathematical concepts, procedures, facts and tools to describe, explain, and predict of the phenomena.

In many countries, the term of mathematical literacy is different from each other. Among them, according to Brown (2003) in England mathematical literacy was called numeracy [5]. While in America, according to Steen (2001), mathematical literacy was called qualitative literacy[6]. In South Africa, according to the DOE (2003) and Vithal and Bishop (2006), mathematical literacy was defined by the mathematical activities that were able to provide students with the awareness and understanding of the role that mathematics was very useful in the modern world [6,7].

So, mathematical literacy is the subject of activity of math applications that related to life. This allows students to develop the ability and confidence to think numerically and spatially. Furthermore, students can interpret and analyse critically in everyday situations, and also solve the problem. Sahlberg (2010), Stacey (2011), UNESCO (2014), Tai and Lin (2015) also wrote about the need for mathematical literacy was mastered by the teachers and students[8-11].

Here is presented an example of a problem which is a form of mathematical literacy. The problem was taken from the writings by Setiawan, Dafik, and Lestari (2014):
For a rock concert, a rectangular field measuring 100 meters long and 50 meters wide was prepared for visitors. Tickets were sold out even a lot of fans standing. What is the approximate number of visitors to the concert?

a. 2000  b. 5000  c. 20,000  d. 50,000  e. 100,000

Answer:

The problem above, require higher-level thinking for the level of the elementary students. Students need to read and understand the complex situation carefully. Students must be able to measure the area of the field and understand the situation that was because the tickets were sold out even a lot of fans standing [12].

Subsequently, in the next step, the student was required to evaluate options that may suit situation described in the problem. The first step, looking for the area of the field. Field area = (100 × 50) m² = 5000 m². After this stage, the students need to think a high level to continue the next process. The right step, the students need to evaluate multiple choices that possible. With the area of the field was 5000 m², students must be able to imagine, how many people might be at a site of each 1 m²?

Students must pay attention to the problem where many fans were standing. For alternative answers A, i.e., 2000 people unlikely to happen, because the problem was mentioned that the field was full and many fans standing. If it is only 2000 people, then each person occupies 2.5 m², i.e., 5000: 2000 = 2.5.

This answer can not be happened because the problem was explained that the visitors are so many where the fans had to stand. For an alternative answer B, the 5000 is also unlikely, since 5000 means that each 1 m² occupied by one person, namely 5000: 5000 = 1. For an alternative answer C, it was written that there were 20,000 people, so the meaning is that each 1 m² were occupied by four people, which was obtained from 20,000: 5,000 = 4, and this answer was reasonable. For answers D and E, the student should see that the selection of D shows every ten people will occupy 1 m², this was clearly not possible unless the audience was forced overlap, but the information was not the case. While alternative answer E is no longer possible because it means that there were 20 people in 1 m², for 100,000: 5000 = 20. Thus, the correct answer was C.

So that students can work on the problems mentioned above with good, elementary school teachers and students need to practice with math problems containing elements of mathematical literacy. Thus, the ability of Mathematical Literacy is a necessity for elementary school teachers and students.

2.3. Scientific Approach in the Curriculum in Indonesia

The curriculum that conducted in Indonesia today is Curriculum of 2013 Revised Edition. Implementation was done with a scientific approach. It is based on the General Guidelines for Learning that stipulated in Regulation of the Minister of Education and Culture, No. 103/2015 of Republic of Indonesia. Scientific approach covering a range of activities to observe, ask, gathering of information, associate, and communicate. This approach must be controlled and implemented by teachers when teaching.

Description of the steps of the scientific approach is as follows. (1) Observing: activities such as reading, listening, viewing (without or with a tool) to identify the things that the students want to know. (2) Asking: students ask questions about things that the students were not understood from what that observed or making inquiries to obtain additional information about what was observed. (3) Gathering of information: that can do experiments, read other sources and textbooks, observing the objects/events/activities, or interviews with sources. (4) Associating: students process the information that had been collected was either limited results of collecting activities/experiments would also result from the activity observed and information gathering activities. This associating link the phenomena/information that was relevant to find a pattern and conclude. (5) Communicating: students communicate their product of observations or conclusions based on the analysis of oral, written, or other media. Students can present their report in the form of charts, diagrams, or graphs.

Thus, at this point, the knowledge and practice of implementing the scientific approach are the need for teachers, especially elementary school teachers in Indonesia.
3. Research Methods

3.1. Approach and Research Subjects

To answer the problem and achieve the goal of this research, the author had conducted research with a qualitative approach. Research subjects are selected from the elementary school teachers in the city of Semarang, Central Java, Indonesia.

According to Miles and Huberman (1994 and 2014), the research methods include (1) data reduction, (2) the display of data, (3) the interpretation of data, and (4) conclusion/verification [13].

The data obtained were analysed through a series of Focus Group Discussion (FGD), reinforced by the findings of the interviews and triangulation. After obtaining a draft of a training model based on searches of competence of the teachers related to mathematical literacy that taught through a scientific approach, it was then conducted the trial test of the draft. The result of the trial was analysed in FGD forum to get an effective training model, based on searches competence of the teachers related to mathematical literacy that taught through a scientific approach.

3.2. Trial against Prototypes

The trial, the prototype of training model, had been held at the beginning of the second year of the study. The training was based on searches of competence of the teachers related to mathematical literacy that taught through a scientific approach. The trial of training model was conducted in Semarang for elementary teachers. Figures 1 and 2 show the atmosphere of the trial implementation of the training model.

![Figure 1: The executive committee of training, taking a picture together.](image1)

![Figure 2: Atmosphere during the ongoing trial and a team of researchers of the implementation of its training models.](image2)

To deepen to analyse the trial results, selected six of elementary school teachers as subjects of this research. As the follow-up, the trial results are re-analyzed in FGD forum to get an effective training model, based on searches competence of the teachers related to mathematical literacy that taught through a scientific approach.

Elements of FGD members are drawn from 3 of the elementary school teachers who become the subject of this research, two lecturers from the Department of Mathematics Education of Universitas Negeri Semarang (UNNES), and all members of the research team.

To strengthen the results of this study, then the result of research has also been presented in a seminar at the international level, namely in ICMSE at the Universitas Negeri Semarang - Indonesia, on 3 September 2016. Through seminars International level, researchers were expected to have an additional input from the audience.

4. The Results Achieved as A Form of Novelty

To test This research has been conducted for two years with a qualitative approach. The first year was preceded by a visit at the elementary school and a series of interviews, FGD, and triangulation. Furthermore, in the first year has produced a draft on how to implement the training based on the needs and interests of teachers.

In the second year, the draft of training model had been tested and passed with FGD back. The result, had produced a training model based on the needs and interests of teachers, which includes: (1) face to face training that structured and scheduled in accordance with the needs of elementary school teachers the training of mathematics characterized by mathematical literacy and a scientific approach,
(2) forwarded by workshop activity, (3) It is then forwarded to the simulation after the workshop is completed, (4) then trainer conducts mentoring in the classroom, and (5) training activities and then ends with a reflection.

Referred face to face training is structured and scheduled according to the needs of elementary school teachers as follows. At first, conducted a survey to look at the needs of elementary school teachers. Also, the needs of elementary school teachers can also be obtained from various sources, for example through to the Head of Education Office, Supervisory of Elementary School, Principal of School, teachers, or parents.

The face to face training that structured and scheduled means that the implementation of such training should be designed carefully; therefore, it is not to harm the students in the learning, scheduled, and the teachers know what material will be received. The training is followed by a workshop, which means that teachers must be trained to be able to produce the products such as Lesson Plan or other product related to the improving of learning quality. For example, capable of generating problems that contain mathematical literacy, make a teaching aid as learning support, or a student activity sheet.

The product of workshop will look in vain if it is not implemented in the simulation of study. Therefore, it is then immediately conducted a simulation to practice one workshop products after the workshop was completed. Once teachers have adequate provisions for the implementation of the simulation, the trainer can provide guidance in the class, so the teacher is getting ready to implement their product of the training.

After the guidance is completed, then trainers and trainees can meet again for conducting reflection. With this reflection, teachers can discuss all of the weaknesses, strengths, and the benefits of their training.

5. Conclusions and Recommendations

5.1. Research Activities Performed

The conclusion is as follows. This research has produced a way to implement training based on the needs and interests of teachers. The training model includes: (1) Face to face training was structured and scheduled according to the needs and interests of elementary school teachers, (2) It is followed by a workshop, (3) after the workshop is completed then forwarded to the simulation, (4) after that the trainer accompanying a teacher in the classroom, and (5) then the training ends with reflections.

The recommendation, the training will not result in increased competence effectively if the training is done without considering the needs and interests of teachers. Therefore, before the training should be preceded by a study conducted to reveal the needs and interests of teachers.

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