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The Mathematics Learning at Schools: A Case Study of State Junior High Schools in Malang

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Abstract. **The objective of this research was to reveal the learning of mathematics in the Junior State Schools in Malang. The research was conducted in some State Junior High Schools, which were divided into three categories, namely: good, moderate, and low. A qualitative approach through a case study was used. The results showed that mathematics learning at schools mostly depends on the textbooks recommended by the Ministry of Cultures and Education, with only little innovation in the learning models to improve students' mathematics competence.**

Keywords: learning, mathematics, innovation

INTRODUCTION

Learning mathematics is not very different from learning other materials, although there are some differences in the implementation of the knowledge [1], [2]. In general, there are four factors determining the success of mathematics learning. The first factor is the students' ability. The second one is the school condition. Every school has a different condition, so the learning sources cannot be generalized. The third determining factor is the implementation of the curriculum, which may be similar or different depending on the teachers who conduct the learning activities. The last factor is the teachers' abilities in teaching the materials. The teachers may have received specific training to improve their teaching quality, but every teacher has a different ability to deliver the materials.

The results of previous studies showed that some of the mathematics class were taught by non-mathematics teachers [3]–[5]. Besides, there are also teachers mathematics whose capabilities are questionable. These teachers are asked to teach mathematics since no other teachers who are capable of teaching math's.

This present research aims to examine how mathematics teachers in State Junior High Schools in Malang teach and deliver their materials.

Literature Review

Some aspects that should be taken into account in the teaching and learning activities include strategy, approach, and method. These three aspects play an essential role in assisting students to understand the subject they are studying.

Learning strategy is a general pattern that may be used in learning activities to attain the designated goals, which can result in positive learning outcomes. The learning approach is the procedures used by teachers when teaching to make students understand the subject more easily [6]–[8]. Two approaches to learning activities may be employed, namely approach to methodology and approach to subject. The approach to methodology deals with the procedures taken by the students in implementing the concepts they have learned into their cognitive structure based on the teachers' procedures when teaching the subject. Another approach is the approach to subject, which means learning of mathematics based on the subject chosen and understood by the students. Some approaches to methodology include intuitive, inductive, deductive, thematic, and realistic.

A method is a procedure taken in presenting a subject in general; for instance, a teacher is doing learning activities using various ways such as question and answer, lecturings, and giving tasks. A learning method serves as the teachers' way of teaching a subject. In the teaching and learning process, a teacher has a wide variety of roles, such as presenter or the conveyer of information, and the manager of learning activities so that the students can study well in order to be able to attain the expected learning goals. A learning model is an interactional pattern between the students and the teacher in the classroom where this learning model includes learning strategy, approach, and method. A method is also a pattern used in designing classroom activities [9]–[11].

It is also essential to discuss learning theories serving as the basis of conducting the current study. The theory is a set of concepts, which are well formed and related to other theories that may be used to explain or predict a particular phenomenon. Learning is a process of obtaining knowledge. Therefore, it can be stated that learning theory is an opinion used to explain a process dealing with any activities see new knowledge and science, which will be useful for human beings.

There are two perspectives of learning theories. The first perspective follows behaviourism approach, stating that students may remember factual information, while the second one is constructivism, which aims to help students acquire knowledge more efficiently and optimally, and allowed them to share the knowledge with others. According to the constructivism approach, the

approach adopted may be constructed, giving meaning to any knowledge in line with one's experience. Therefore, knowledge is a direct human construction through new experiences obtained and has a particular characteristic. In this case, humans' understanding may, but new knowledge and innovation will always be there.

In implementing a constructivism-oriented mathematics learning, there are three characteristics: 1) students are actively participated in the learning activities; 2) new information received is usually related to other or previous information, so it is necessary to take into account the students prior knowledge or schemata, and 3) the learning activities focuses on problem-solving. These three aspects will help the students learn mathematics meaningfully and have a decent understanding of the mathematics concepts.

Jean Piaget and Vygotsky state that cognitive changes may be achieved if the previously learned concepts are useful when processing new information. According to this theory, students continuously examine new information which is not in line with their prior knowledge and then repair it. One f the main principles is that teachers not only give knowledge to students, but also oblige to do learning activities to make any information meaningful for and appropriate with the students needs by encouraging students to share ideas implement their own strategies in their learning activities.

METHOD

It is a qualitative approach through a case study. This research was conducted in some State Junior High Schools in Malang city. The schools were grouped into three categories, namely good, moderate, and low. This present research studied mathematics learning at schools under the low category.

Data were collected through documentation and interviews. The documentation recorded the mathematics learning activities, while the interviews were conducted to ask the mathematics teachers about the implementation of mathematics learning activities. Descriptively analysis for the documentation and interview results were done after the complete data were obtained.

RESULT

In general, the school curriculum implemented in Indonesia is *Kurikulum 13 (K-13),* a curriculum constructed and developed by paying attention to the concerned school. However, the making and implementation of the curriculum still observe the theme of each material to be implemented in each school. It is in line with the statement made by a teacher in a school: "*…this school adopts the K-13 so that the amount of lesson hours is adjusted to the school condition (*G3/T9/56-57)". The following was also stated by another teacher, "…the *school implements the K-13 so that the school makes policies in line with the school condition." (*G4/19/51052). The teachers' explanations show that each school is allowed to develop a basis of its own curriculum to improve students' achievement in line with the school condition. It also happens to the mathematics curriculum applied in the schools being studied, where the mathematics teachers in the schools developed a mathematics curriculum taking into account the students' condition. As explained before, the students' ability in mathematics was relatively low, since the school is located in the suburban area. Besides, the parents were in low socioeconomic status, which might influence the students' daily activity, including their bad learning habits. However, in some other areas in Indonesia, students come from low socioeconomic family are aware of the importance of going to school, thus have good achievement.

This case may be compared with those who do not have a great desire to go to school, either primary or secondary schools. Based on the existing habits in society, the majority of children who have graduated from elementary schools will help their parents work in order to support their family. This condition is worsened by the fact that studying in the higher level of education needs much money, and some people think that it is enough to graduate from the elementary school level because with the school level they would be allowed to help their parents earn some money. This condition is supported by the results of the interview with a teacher below.

> *In terms of academic affairs, this school is somewhat apprehensive. The majority of the parents are poor, their economic condition is not good, and some learning aids like books are still in trouble, and this condition is worsened by some habits existing in the village where learning habits are not something that should be done, and even the parents do not give any direction to their children to learn. Often times, students' willingness to go to school is considered to be a good achievement.* (G1/T7/53-58).

The results of the study also showed that the students' achievement was relatively low because the environmental factor does not support the students to study more diligently. It is considered a good achievement for students to be willing to attend the school, as stated by a teacher "*….for a school located here…usually, the achievement is rather low…..since its learning environment is usually less conducive where the parents rarely control their children's learning activities, and it is called an achievement when they children are willing to go to school* (G4/T10/39-42).

Due to such condition, from the results of the evaluation of the students' mathematics competence, the students' ability in mathematics was relatively low. In school, it was found that the number of lesson hours for mathematics is 5 lesson hours per week, although it should be 4 lesson hours per week. The condition is supported by the statement made by a teacher below:

> *Our school is located in the suburban area, in the border between the regency and the city, so*

> *that the condition of most students in this school is at the transitional society. Due to this condition, the curriculum adopted in this school, especially the mathematics curriculum, the lesson is created to fit the current condition. The lesson hours that should be 4 lesson hours per week are extended to 5 lesson hours per week in this school….or one extra hour per week* (G1/T7/72-79).

As stated in the research method, 24 Junior High Schools in Malang city can be categorized into three types, namely A (good), B (moderate), and C (low). The schools used at the setting of this research study happened were under C (low) category, meaning that the students in the school, in general, are included in moderate and low groups. As stated by a teacher, "… *in Malang, there are 24 state Junior High Schools, and the location of this school is in the Regency area, which then becomes a city area so that it can be stated that this school is under low category* (G1/T7/32-34).

It is the basis used by the school to allocate 5 lesson hours per week to mathematics lesson. This condition is supported by an interview with a teacher, who said, "*to my knowledge, for any materials dealing with the national examination…. Their hours are extended, including mathematics with 5 lessons hours per week."* (G3/T9/61-62). From the transcript of the interviews, it can be stated that SMPN 10 Malang where the research was conducted is located at the border of city and regency, so that the condition of the students, in terms of the achievement, is under the low category. Based on the fact and the implementation of the school-based curriculum, this school changed the time allotment from 4 into 5 lessons hours per week for mathematics lesson. This policy was made as an effort to improve the students' achievement in mathematics.

CONCLUSION

The learning of mathematics in State Junior High School in Malang may vary due to different facilities possessed by different schools and various abilities of the students. Schools make policies as one of the solutions to improve the students' abilities in mathematics. The research findings showed that for schools under the low category, the students' quality in mathematics is rather low. The cause of such condition is the inputs (students), who belong to the lower category in their academic achievement. This condition is also worsened by the parents' low socioeconomic status, in which education is not the main priority.

REFERENCES

[1] E. R. Ottmar, S. E. Rimm-Kaufman, R. A. Larsen, and R. Q. Berry, "Mathematical Knowledge for Teaching, Standards-Based Mathematics Teaching Practices, and Student Achievement in the Context of the *Responsive Classroom* Approach," *Am. Educ. Res. J.*, 2015.

[2] A. Mizala, F. Martínez, and S. Martínez, "Pre-service elementary school teachers' expectations about student performance: How their beliefs are affected by their mathematics anxiety and student's gender," *Teach. Teach. Educ.*, 2015.

[3] L. T. Goldsmith, H. M. Doerr, and C. C. Lewis, "Mathematics teachers' learning: A conceptual framework and synthesis of research," *J. Math. Teach. Educ.*, 2014.

[4] D. J. Stipek, K. B. Givvin, J. M. Salmon, and V. L. MacGyvers, "Teachers' beliefs and practices related to mathematics instruction," *Teach. Teach. Educ.*, 2001.

[5] A. G. Thompson, "The relationship of teachers' conceptions of mathematics and mathematics teaching to instructional practice," in *Mathematics Education: Exploring the Culture of Learning*, 2003.

[6] H. C. Hill and D. L. Ball, "Learning Mathematics for Teaching: Results from California's Mathematics Professional Development Institutes," *J. Res. Math. Educ.*, 2010.

[7] J. Anghileri, "Scaffolding practices that enhance mathematics learning," *J. Math. Teach. Educ.*, 2006.

[8] B. Jaworski, "Theory and practice in mathematics teaching development: Critical inquiry as a mode of learning in teaching," *J. Math. Teach. Educ.*, 2006.

[9] M. Lampert, "When the Problem Is Not the Question and the Solution Is Not the Answer: Mathematical Knowing and Teaching," *Am. Educ. Res. J.*, 2008.

[10] M. L. Franke, E. Kazemi, and D. Battey, "Mathematics teaching and classroom practice," in *Second Handbook of Research on Mathematics Teaching and Learning*, 2007.

[11] B. Jonsson, M. Norqvist, Y. Liljekvist, and J. Lithner, "Learning mathematics through algorithmic and creative reasoning," *J. Math. Behav.*, 2014.