

KEEPING MATHEMATICAL ASSESSMENT PROCESS ON TRACK

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Abstract

Idea in this paper was inspired by writings of William D. (2007) with the theme of *Keeping Learning on Track* in classroom assessment contexts. In his research, when teachers asked students how to assess, they are likely to cite tests, quizzes, portfolios, projects, and various other methods of formal tests. According to William D (2007), basically term of assessment is much closer to this more informal meaning. However, emphasis on assessment as a formal process is pervasive, and mathematics education is no exception.

Teachers ability to conducted mathematical assessment will have an impact on the learning process change. The facts indicate that many teachers are still having problems in conducted mathematical assessment process. These problems can be viewed from two aspects of learning, namely the mastery of content and ability to organize of students. These facts provide guidance that teachers need ability to assess the of the assessment process in order to keep the mathematical assessment process on track.

Development of teachers ability in assessment process can be viewed from various perspectives. Romberg (2004, h.230) offers four steps in developing teacher assessment process, namely: *initiate*, *investigate*, *interpret*, and *integrate*. The first step is oriented toward the teacher to begin with an understanding of assessment practices, the second step oriented teacher involvement in an investigation of assessment techniques. The third step suggest teachers have capability to interpret students' work, the fourth step provides opportunity for teachers to develop further assessment practices, including through workshops, other teachers professional activities. Referring to Battista (2007, h.836), reform of mathematical assessment process can be done by integrating the process of assessment in mathematical concepts learning.

Key words: *mathematical assessment, teachers development*

INTRODUCTION

Orientation of mathematics learning can not be separated from role of teachers to changes in learning process for themselves. In this case, teachers need to learn by different processes from the students, or the teacher needs to make the learning processes that is different from the experienced before. Similarly, teachers need to make changes in learning assessment process. Related to curriculum change, assessment process attributable to following questions:

(i) whether the teacher understanding assessment process appropriate demanded the new curriculum?

(ii) whether the teacher be able to implement assessment process appropriate demanded the new curriculum?

From the dimensions of teacher development, in general, teachers development theory rests on notion that teachers are adult learners whose development is derived from changes in

the thinking structure. Assumed that thinking pattern develops through interaction with the environment (Brown & Borko , 1992, p . 227) .

RESULTS AND DISCUSSION

2.1 Facts of Teacher Debility. Facts of teacher debility in the assessment process is reflected in some of the results of research on teacher debility in conducting the instruction. The results showed that not all teachers are able to communicate clearly and directly to students without digress (*wandering*) , speaks beyond the ability of the child or using destructive presentation clarity (Land & Smith , 1979 ; Smith & land , 1981, in Borich , 1992, p . 9) . The study results from Leinhardt (1989 , p . 173) show that many young mathematics teachers weak in analytical capabilities . Structure of lesson by young teachers dismembered with long transition, often confusion caused by missent signal and learning objectives are not clear . So it is advisable for teachers to develop teaching skills appropriate with desired objectives , namely : be open in lesson , flexible , responsive , based on the problem and not convoluted. Brown & Borko (1992 , in Hino & Shigematsu , 2002, p . 240) have compared ability of young teachers and experienced teachers. He said that experienced teachers more systematic and more capabilities in content and knowledge of teaching (pedagogical knowledge) compared to young teachers .

One of the aims of learning mathematics is to develop students' ability to solve problems . However , many cases occurred related to problem solving . These cases presented , among others, by Koplowitz (1979) , Lester (1982) , Schoenfeld (1985) and Victor (2004) . Koplowitz found an error of reasoning in the process of problem solving . Lester uses the term *process issues* in his research that found the error characteristic of students in solving mathematical problems . Victor argues that ,in general, failure of students to solve problems caused by a failure to understand the problem , organize mathematical operations , and failure analysis process .

An error of reasoning in problem solving process proposed by Koplowitz (1979) is based on following problems: *I go to a certain place with 40 miles per hour and required 20 minutes to get there . I go back to 50 miles per hour . How long ride home that I need?* Koplowitz reported that various wrong solution one that often arises done his students is 15 , 17 , and 25 minutes . In the learning process , Koplowitz give students the opportunity to discuss the solution of the problem, and they are not surprised by the various answers within the group . Furthermore Koplowitz guide the group that leads to the correct answer of the problem . But the way of thinking delivered by Koplowitz is not seen as a more logical answer by students mind . Even the students looked at what was presented Koplowitz as another way to solve the problem .

On the other hand Koplowitz said that although his students have the skills necessary to solve the problem , they do not know whether they have capability to solve the problem or not . The students stopped working to resolve problems when they have feeling to solve it .

2.2 Mathematics Teacher Development . In learning process, teacher has different characteristics to the students. The learning process for the teacher as an adult human can be evaluated based on development theory. Development theory in the mathematics education can be classified in two dimensions , namely psychological dimensions of learning mathematics for students and teacher development dimension . In terms of psychological dimensions of learning mathematics for students , in general, the theory rests on the development theories from mathematics psychologists , among others : Jean Piaget , JP Guilford , Robert Gagne , Zaltan Dienes , David Ausubel , Jerome Bruner and BF Skinner (Bell , 1978 , p . 98-157) . In terms of teacher development dimation , in general, the development theory rests on the notion that teachers are adult learners whose development is derived from changes in thinking structure.

Assumed that pattern of thinking develops through interaction with the environment (Brown & Borko , 1992, p . 227) .

Theories about teachers ability development include: Piaget's theory of cognitive development (1972) , Kohlberg's theory of moral decision (1969) , The Loevinger theory of self-development (1976) , Hunt theory of conceptual development (1970) Perry theory on ethics and intellectual development (1970) , Fuller theory about levels of attention (1969) (Brown & Borko , 1992, p . 227) . In this paper will be presented briefly on Perry theory, because it has close links with regard to the assessment process as for teachers of mathematics .

Perry's theory of intellectual and ethical development is the level of development of a useful in determining levels of development for math teachers . In Perry theory introduced the term Perry's scheme , the evolution of interpretation a person's life experience gained from many years . In Perry scheme introduced 9 development levels compressed into 4 categories: dualism , multiplicity , relativism and commitment . Someone at dualism holds that every question has an answer , or every problem has a solution, and each expert will determine and provide the answer . A teacher at this level have a tendency to dominate the learning process , as central in resolving any problems encountered in the classroom . In mathematics learning process , teachers tend have internal authority while students has an external authority .

Teachers at multiplicity level view that everything appreciated by each thinking and beliefs. Teachers makes his students think appropriate role in their own way . A teacher at this level tend to conducted democratic learning. In learning process , teachers tend to appreciable the student even contrary to the teacher. Someone at relativism level holds that not all ideas are worth well together , there are criteria for evaluating these ideas. At this level relativism teachers is not just being able to create democratic learning , but also more objective . In learning process , teacher will not look at the opinion contrary to his pupil , teacher is not easy to blame students as opposed to opinion. Teachers will see that conflicting opinions of students can not be blamed, because the context of students think differently in context of thinking that teachers have .

Teachers at relativism level would be easier to implement changes to the curriculum than teachers in multiplicity level . At this relativism level, the teacher does not use true or false criterion is oriented to his own opinion . Criteria in determining something is right or wrong depending on context at hand. In giving judgment, presumably will conduct a more thorough assessment to students . Teachers can not do assessment based on subjectivity owned . However, the assessment considers various factors need to be done in context of student thinking .

Teachers at commitment level view that a decision can only be made based on uncertainty. At this level , a person will receive something is alternative ideas , and knowledge is seen as individual structures in interpreting experience . Teachers at this level would be better to implement curriculum. Each of learning process will be designed very carefully , because there are many factors to be considered in preparing lesson plans . Various alternatives occur in the learning process will be designed carefully . In learning process the teacher is not an easy claim any decision by true or false decision. Even teachers tend not saying right or wrong to decision , but it tends to argue against any decision made by teachers and students .

The research results showed that teachers tend to be at lower levels of Perry Pattern, and difficult to move to a higher level . Also stated that the study indicate that teachers are less likely to accept the concept of constructivism in mathematics learning in which make all individuals has authority (Brown & Borko , 1992, p . 229) . This condition is a serious challenge for teachers in implementing any changes in the curriculum . Teachers at lower levels tend to implement learning process is centralized , whereas in curriculum development demand democratic learning process. Teachers who will implement assessment process must be improve

high level of Perry Pattern. Efforts to increase higher level would be done through a series of professional activity of teachers.

2.3 Mathematical Assessment Process Reform. Mathematical assessment process reform to improve professionalism teachers deal with learning paradigm shift can be done through variety viewpoints. Romberg (2004, h.230) offers four steps that need to be done in developing teacher assessment process, namely: initiate, investigate, interpret, and integrate. The first step is oriented toward teacher to begin with an understanding of assessment practices, second step oriented teacher involvement in an investigation of assessment techniques. third step expect teachers have capability to interpret students' work, fourth step provides the opportunity for teachers to develop further assessment practices, including through workshops, teacher or other professional activities. When referring to Battista (2007, h.836), reform of mathematical assessment process can be done by integrating learning concepts in assessment process. Idea concept learning requires teachers investigating mathematics concepts spesically , prior to implementing learning process. Assessment of mathematical concepts can be done by identifying the concept and asked question.

Ability to identify concepts in this paper is associated with two things, namely ability to understand characteristics of concept and provide examples and not example. Constructing the concept means to analyze characteristics of concept properties. Analysis of concept properties provide support in pattern recognition. (Kellas, Ferraro & Simpson, 1988; within Bruning et al, p. 26). Patterns recognition process is critical element in learning mathematics learning (Burger & Murser, 1991, p. 11; Fendel, 1987, p. 104). Ability to provide examples and not example of an concept be important owned by a teacher, to help students be understand in depth of the concept being studied. Teachers with have habituality in preparing examples and not examples can create mathematical activity in classroom. Booler (Lester, 2007, p. 411) considers that present of example and not an example of an activity in classroom can inspire learning reform. According Booler, studied mathematics actively just not having procedural knowledge, but will be able to develop conceptual understanding, (Lester, p. 411)

It is recognized that mathematics teachers in secondary schools are not only required to be able to identify concept, but are also required communicating to students. Communication has an important role in constructing child's understanding, evaluate, and interpret ideas (Bloomer & Carlson, 1993, H.2). In an effort to be able to communicate mathematical concepts to students, teachers need to have the ability to formulate verbal statements related to the concepts studied. Someone learn math be better when able to use problem-solving strategies, and can make creation to problem solved (Moses, in Brown, 1993, p. 187). Students are able to use problem-solving strategies, greatly influenced the role of teachers in choosing instructional strategies in classroom. Teachers ability to asked question in classroom will have an influence on creativity of improvement student. A well-formulated questions by teachers can improve classroom participation and makes students feel themselves to have an important role in classroom. Cobb & Hadge (2002, h.408) reinforces the need to increase the participation of students with using the term relational perspective. In relational perspective principle , children's participation is not only developed in classroom, but it needs to be the establishment of a relationship between participation in class and practice outside the classroom, where students act as members of society.

CONCLUSION

Main ideas in supporting the ability of teachers in mathematics assessment process in order to learning paradigm shift as follows.

1. The facts suggest that many teachers are still have problems in assessment process, however, we need to realize that development teachers ability to assess will have an

impact on learning process change. Teachers need to build a conducive learning environment for students, learning is conducted in be open, flexible, responsive, based on the problem, and not convoluted.

2. Teachers who will implement assessment process as well, need to increase range of professional activities, to accept and carry out the conception of constructivism, and may put individuals including students as someone has authority.

3. In developing assessment process, teachers can perform four steps, namely: initiate, investigate, interpret, and integrate. The first step is oriented toward the teacher to begin with an understanding of assessment practices, the second step oriented teacher involvement in an investigation of assessment techniques. The third step suggest teachers have capability to interpret students' work, the fourth step provides the opportunity for teachers to develop further the assessment practices, including through workshops, or other professional activities.

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