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PRINCIPLES OF ASSESSMENT: MATHEMATICS TEACHER PERCEPTIONS

Siti Maimunah[1] & Endang Cahya Mulyaning A.[2]

[1]Department of Post Graduate Studies, Universitas Pendidikan Indonesia, Indonesia

[2]Department of Mathematics Education, Universitas Pendidikan Indonesia, Indonesia

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ABSTRACT

As a practitioner in the educational field, having a deep understanding of assessment principles for mathematics teacher is a must. Their perceptions toward assessment principles and its applicability can influence the way they teach.The purpose of this study was to investigate their perceptions toward assessment principles and their tendency in choosing assessment instruments. In this case study, the subject involved where one high school teacher and one secondary school teacher. Major methods in this study were deep interview and classroom observations. The assessment principles used was adapted from Manitoba Education and Training. Results Showed that even though teacher understand the assessment principles and its importance well, the implementation and application in real classroom learning were still inconsistently applied. The tendency in using tools of the traditional assessment instrument that only assess student's cognitive rather than their effective and skill was still high. The difficulties and influence factors of the implementation were also revealed. Some practical suggestions on how to apply the principles in mathematics learning were presented in this study as the recommendation

KEYWORDS: *Mathematics Teacher, Assessment, Principles, Perceptions*

INTRODUCTION

The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

Apart from having a good skill in teaching, having a good capability in assessing student's learning also one of the basic things the teacher must acquire [1]. One of today's challenges for the teacher is how to run learning assessment in a more dynamic way. Assessing student by using static assessment (static tools, strategic, purposes, etc.) will only give the same result of student's level of knowledge without any potential improvement. This action implicitly judge student's as a static learner without any possibility to improve or without any potency to get the higher achievement [2]. By applying a more dynamic assessment gives advantages for both teacher and students. A teacher can improve their way of teaching during the learning process and the student's don't need to suffer any difficulties in learning any longer.

Today's educational curriculum around the world is trying their best to serve a better assessment for a better result and improvement. Some changes and concepts were built and analyzed for that purpose. Today's assessment focus has changed from only assessing student's knowledge, to assessing student's attitude and skills. Specifically, it assesses their character development. Authentic assessment is one of the newest concepts of assessment that bring conventional

assessment to more effective assessment for the 21st century. The authentic assessment also becomes a pilot concept of assessment in Curriculum of 2013 implemented in Indonesia. The basic focus in 2013 curriculum is to change the previous assessment, perception from assessment as the closing of learning activity to the assessment of learning, assessment for learning, and assessment as learning.

In fact, the implementation of authentic assessment in mathematics was still far from expectation. It was still difficult for teachers to plan a suitable assessment instrument for instruction, subject material, and target the students must achieve [3]. Implementation of learning assessment in Secondary school grade 7th in Sleman Yogyakarta was categorized as low quality because the competence qualities of knowledge, skill, and effective was still poor [4]. Another research showed that factors behind the barriers in implementing authentic assessment were the lack of teacher's creativity, students incompatible character with the assessment design, not enough time, and the lack of assessment training [5]. Basically, all of the factors the teacher stated was already there since the beginning. Those factors were also the reason why Indonesia Changed their curriculum 7th times[6]. It gives the researcher a big question, what is so hard from authentic assessment and another concept that the teacher suffers when applying it? Is it really because of the complexity of the assessment or because the teacher has given up to do their best? Meanwhile, Indonesia government has provided special fund and programs for teacher quality improvement [7]. If it is because of the assessment itself, then the assessment module should be analyzed and revised further so that the theory fits the practical expectation. But if it's because of teacher's lack of motivation, then we need to find the reason behind it and fix it. Researcher guessed that teacher's perception toward the basic concept of assessment was one of the factors. The assumption went further that teacher's perception also influenced their tendency in choosing types of assessment tools in mathematics learning. That's the reason why this study was conducted. A basic concept of assessment this study investigated was the principles of assessment.

As the basic foundation of assessment, having a mastery understanding toward its principles should be urgently for a teacher to have. Implementing principles of assessment are on the 4th list of authentic assessment purpose in 2013 curriculum after to train the student to be a learner, to train a student's skill to apply their knowledge, and to give students a chance to face a real life problem. Even if the government doesn't really means that those lists is based on priority, it still gives the assumption that assessment principles are not necessarily needed to be understood first. Maybe this is also one the reasons why the research about principles of assessment is still a lack of number meanwhile the research about authentic assessment, formative assessment, etc. are developing. It's quite problematic when the teacher should implement all of assessment technique and tools with just a superficial understanding of its principles. The existence of principles is as a guidance for the teacher when they're having difficulties in applying the assessment. When teachers feel stuck doing an assessment of some subject material, they can go back to the principles and rearrange what aspect they want to assess through that subject. If the teacher doesn't strong foundation such as the principles, it'll be difficult for them to creatively arrange a fitness assessment for classroom learning.

Implementing assessment principles in learning activities somehow not as easy as the theories tell. It needs teacher's deep understanding to insert those principles in every single aspect of teaching and learning process. But once teachers understand it strongly, it'll be easy for them to modify the assessment to fit the students and instructions.

National Council of Teacher of Mathematics suggests that assessment should promote mathematics with its importance and accommodate a helpful information for both students and teacher.Therefore, NCTM serves six principles

of how mathematics assessment should obtained. Those principles are:

- *Reflect the mathematics that students should know and be able to do;*
- *Enhance mathematics learning;*
- *Promote equity;*
- *Be an open process;*
- *Promote valid inference;*
- *be a coherent process.*[8]

Indeed, those principles were created in 1995. But it's still suitable for today's mathematics learning assessment. The development is on how it can be a real action in real classroom learning.

Assessment principles applied in 2013 curriculum or assessment of learning, assessment for learning, and assessment as learning. From this, authentic assessment, formative assessment, summative and diagnostic assessment use as a guide for assessment practice. Since 2013 curriculum target is to adapt students into real life problem along learning, teaching and learning process in the classroom should contain not only about specific subject but also other relevant aspect. Students should learn not only mathematics content, but also another problem or knowledge related to it. It also should develop not only student's knowledge, but also their attitude and skills. Thus, understand general principles of assessment not only on mathematics, specifically is a must for mathematics teacher.

One of assessment principles that is accepted as one of the best is nine principles of assessment to assist learning and inform instruction developed by Manitoba Education and Training [9]. Since the first development on 1998, the assessment principles keep revised and developed. Now those principles are suitable for English, art, mathematics, and some other subject. They also developed indicators for each principle to make it easy to be implemented in the real teaching and learning process. Below are the explanation of nine principles of assessment.

- An integral Part of Instruction and Learning

Assessment should go in line with the strategy and material used. It should also direct to the goal setting and imply the definite purpose. Thus, the strategy, subject material, learning media, assessment,planning, and other learning aspect can support each other to achieve the target the teacher set.

- Continual and Ongoing

Assessment shouldn't be seen as a closing of learning activity. Assessment should be seen as a part of its learning. Once the learning activity starts, so does the assessment. It happens from the very beginning of learning activity until the end. Assessment also inseparable part of learning instruction. A good assessment is an assessment that fits the learning material, method, strategy, etc. This way, it can give a meaningful value for both students and teacher.

- Authentic and Meaningful Mathematics Learning and Context

Assessment should be able to build a strong relation between previous knowledge and current knowledge. It also need to give an essence to student, to train student facing an authentic problem and solving it by applying the knowledge

they have. Assessment should also reflects student actual achievement. Also, it influenced student's critical thinking skill in positive way [10].

- Collaborative and Reflective Process

It should invite student to reflect and collaborate together to make the learning becomes meaningful. Giving a feedback or reflection to student doesn't have to be done at the end of learning process. It'll be effective when it's done whenever it's needed during the learning process [11]. It also encourage teacher to build a communication with parents to control the student's learning activity at home. In 2013 Curriculum, teacher should collaborate with classroom teacher and counseling about student's evaluation. Having a professional learning community consist a group of mathematics teachers can improve teacher's capability in doing assessment and learning [12]. Sharing, discussing, and constructing assessment set together will be more effective rather than doing it alone.

- Multidimensional Incorporating a Variety of Task

Since there is variety aspect in mathematics a student needing to learn, the learning itself needs to sync with varied aspects especially real-life aspect. Then the assessment used should be rich in vary based on the learning strategy and the goal set.

- Developmentally and Culturally Appropriate

Assessment applied should fit with the student's developmental state, promote multi-diversity in social, cultural, and language. The eacher shouldn't promote their ideology through learning and assessment, they should encourage students in a neutral state.

- Focused on Student's Strengths

In heterogeneous class, the teacher need to know student's ability and potential. For that, the teacher can arrange the most suitable assessment that can improve student's ability and develop student's potential aspects. The assessment should also be based on not only product but also the process. Giving a feedback such as awareness, reflection, praise or respect toward what the student has done, no matter how low or high the quality is, can build a self-pride and motivate their learning and self-construction [13]

- Based on How Students Learn

Use the current learning theory with a variety of learning strategies, models, tools, and purposes. The teacher should flexibly serve a learning activity and assessment in a way the student can learn effectively.

- Offer Clear Performance Target

The focus of achievement in assessment is not by comparing the student's result with another, but with their previous achievement. So assessment should support students to win overtheir previous level. It'll create a healthy competitive environment. The goal setting can be set together with the students. This way, their sense of belonging and responsibility will increase. They'll know what to do to achieve the clear target they set by themselves. Further purposes of the assessment were to motivate students to learn more [14]

From the description of nine principles above, it's clear that having a good understanding toward assessment

principles lead to a better assessment practices. Teachers know what they need to do to form a good assessment in classroom by relying on what they believe about its principles. In the end, this understanding leads to the teacher decision in choosing what kind of assessment tools they're going to use.

Another important part in assessment is the instrument used. There are many types of assessment tools that have been developed till now. Those tools are categorized as two groups; tools for traditional assessment and evaluation and for alternative assessment and evaluation. Open-ended, short answer, true-false, multiple choice, are categorized as traditional assessment and evaluation tools because it only focuses on student's cognitive aspect. Meanwhile Portfolio, performance task, project, concept maps, structured grids, word association, descriptive branched trees, self-evaluation and peer evaluation are categorized as instruments of alternative assessment and evaluation [15]. Those categorization was based on social studies.

Specifically, Alternative assessment tools in mathematics learning are any form assessment that requires students to answer the task by using their own understanding or word. It encourages students to actively construct their knowledge rather than only do some recognition activity. One of the tools for alternative assessment is authentic assessment, performance assessment, portfolios, exhibitions, demonstrations, journals, technology-enhanced items, etc. [16]

Another way in categorizing assessment tools is based on classroom assessment method classification. Methods of assessment are classified as selected-response, constructed-response, teacher observation, and the student's self-assessment. Selected-response methods, sometimes called objective tasks, ask students to give the best answer over a certain possible answer served. Usually there is only 1 correct answer for each question in this method. Constructed-response methods require students to answer the task by using their own word or opinion. This methodisoften seen as a semi-subjective method because somehow the student's answer may be vary. Teacher observation is one of the most familiar assessment methods for teacher even though they don't see it that way. Mostly, consideration in planning next learning activity or in making a test for student is based on teacher observation in the classroom. The last method is student's self-assessment. It can be used as a tool to help students reflect their own level.

Today's teacher still tends to choose traditional assessment tools that mostly focus on cognitive knowledge rather than alternative assessment [15]. One of the reasons maybe their lack of experience in using the alternative or their lack of understanding of assessment conception. The purpose of this theory is to investigate the proof of the assumption of the theory above about teacher perception toward assessment principles and their tendency on choosing assessment tools. Perception here is talking about teacher's understanding and implementation of assessment principles in classroom learning.

RESEARCH METHOD

The subjects of this descriptive qualitative study were 2 mathematics teacher, one teacher from public high school, one teacher from private secondary school. The Instruments used to collect the data were classroom observation, deep unstructured interview, and documentation. There were two major data in this study, teacher's perception of assessment principles and assessment tools the teachers used in the learning activity. Another additional information conducted through an unstructured interview. The indicator of assessment principles used was adopted from nine principles of assessment constructed by Manitoba Education and Training.The list of Assessment tools was adopted from questioner constructed by Caliscan [15] with some minor modification.

RESULT AND DISCUSSIONS

Results

Classroom observation was held 4 times for each teacher. Teacher A is from public high school and teacher B is from private secondary school. Generally, both of the teacher used the same learning strategy, teacher lecturing and class discussion. But teacher B still used another variety of strategies such as worksheet based group discussion, independent learning in library, mini project, etc. As an opening, both of the teacher gave instruction about material they're going to learn and the target. During the study, both of the teacher often gave some problem to be solved by the students. The ones who answer the problem and write it on the board will get rewarded. Teacher A gave different levels of reward between students with the right answer and the wrong one. Meanwhile, teacher B gave the same reward for all of the students who answer the problem, whether the answer is wrong or right. Both of the teacher always evaluates the student's answer in front of the class to ensure that the student's got the right understanding.

Assessment tools used by teacher A were multiple choice, short and long answer test, attitude scale, and word descriptive. Attitude scale was made, along with learning plan. But not all of the attitude scale used because of time and condition factors. Assessment tools used by teacher B were short and long answer test, multiple choice, attitude scale, presentation, portfolio, word description and observation form. Both of the teacher showed their assessment instrument on the lesson plan. Both of the teacher used the same design for each attitude scale, they're going to assess, the differences were on the indicators. In public high school where a teacher At work, duration of 1 hour of learning was minutes and start at 13.00 PM until 15.30 PM. Meanwhile, in a private middle school, the duration of 1 hour of learning was 45 minutes and start at 7.00 AM.

From interview, teacher A told that she rely on everyday assessment more than test or final exam. She believed that everyday assessment is more valid and show the real ability of the students, especially for attitude and skill aspects. This opinion was agreed by the teacher. They used reward role and task for everyday assessment tools. Both of the teacher used the same test instrument for classes with the same level of ability. For those who are failing on the test, will get remedial such as retest or a task. Teacher A focused on building student's mathematical ways of thinking while teacher B focused on the building student's character through mathematics learning.

Teacher Perception toward assessment principles and tools ware collected by interview and documentation method. Toward the first principles, as an integral part of learning and instruction, teacher A understanding that learning and assessment should give a meaning to students. She corrected the student's wrong concept, aware them their lack points in solving the problem. Teacher A also emphasized the student to focus on the target set. Teacher B believed that to start a new lesson in mathematics, she needs to ensure that the student's prior knowledge is homogeneous. She always gave the students an introduction task as a brainstorming. The result of the task was used to determine what the student need to learn the lesson effectively.

Seeing assessment as an ongoing and continue processing, teacher A basically did the assessment during and after the lesson. She rarely did some pretest to start the class. Teacher B did assessment before the lesson only if the lesson if the first meeting of new material, especially if the concept is new to the students. During and after the class, teacher B used rewarding rule, observation, task, etc. for assessment tools.

Both of the teacher stated that they understand that a learning should be meaningful to the student. Teacher A focused on students' mathematics way of thinking and teacher B focused on the student's character. Both of them believed that not all of mathematics lesson can be connected with everyday life and its application. Therefore, they rarely used contextual problem during the lesson. Both of the teacher made test question based on the student's level in the classroom, the classes with the same level of ability will get the same test.

For the 4th principles, assessment as collaborative and reflective process, teacher A didn't do collaboration fully. She didn't communicate with parents or counseling teacher. She didn't discuss the learning target with the students. It means she didn't involve the students into it. The only collaboration she did was with another mathematics teacher discussing about the assessment in general mathematics. Meanwhile, teacher B stated that to do assessment and evaluation, she discussed it with the counseling teacher and homeroom teacher. The teacher didn't collaborate the assessment with parents directly. Collaboration with parent will be done via homeroom teacher.

About multidimensional principles, teacher A tended to do learning and assessment statically. She used reward rule, observation form, task, and final test. She stated that she rarely connected mathematics lesson with another subject or everyday life because mathematics lessons in high school mostly contains abstract subject. For her, those materials were hard to be applied in everyday life. Teacher B said that connecting mathematics lesson in real life can help students understand more. She tried to give some examples about the use of learning mathematics in everyday life. But for some abstract subject, such as algebra, she felt it hard to connect it with contextual aspect. Usually in the first meeting of new material, teacher B gave the students a task to some mini observation about the material they're going to learn. The task can be literature, observation in library or environment observation around the school or their home. This way, teacher B tried to make student's prior knowledge become homogeneous.

Teacher A said that she didn't know all of her students individually. She didn't have enough time for that and the number of students in class was too much. Thus, she never used student's background or culture in arranging assessment. She saw a student's level as general in class to construct a test for them. Since the number of students in teacher B class only 20-25 people, she knew all of her students specifically. From that, she can give a task for students specifically based on the student's background. She also can usea student's background in the classroom learning to give a meaningful learning for them.

Instead of focused on student's strength, teacher A tended to emphasize student's weakness. She aware student' to be careful on some step where they usually stripped. She has never supported student's strength nor potential. She rarely praised student for their effort in learning or solving the problem. Meanwhile, teacher B stated that she always gives a reward for every effort the student did and give reinforcement whenever the students did something wrong or bad. It also reflected in classroom observation.

Since teacher A only run the learning activity statically, the assessment she used only based on her point of view. She believed that the assessment tools used till now was the most suitable and effective one. She didn't plan to change it except the condition and policy from school changed. She knew that students have different way in learning and different condition to learn effectively. But the condition now didn't support to fulfill it well. Meanwhile, at last meeting on every term, teacher B gave questioner to the students about their opinion toward 1 term learning.

The result of the questioner will be used by teacher B to consider and plan a better learning activity for the next semester. It shows that the teacher B at least try to flexibly fit their way of teaching with the way her students learn.

Generally, both of the teacher didn't serve a clear performance targets in their assessment. They didn't discuss it with the student, asked them their agreement about the assessment rule. They only explained the learning purpose, give the task or other assessment tools without explaining the target or scoring rubrics in a detail way. Teacher A see an achievement as the student's ability to give the correct answer, meanwhile teacher B see achievement as student's effort and willing in learning.

DISCUSSIONS

From observation and interview, it is shown that teacher A mostly focused on assessing students cognitive. The assessment tools used mostly for cognitive aspect. Reward rule teacher A applied in classroom learning activity used to assess student's knowledge only, the correct answer gets the highest reward. It's contradict with the concept of meaningful mathematics learning stated by teacher A. She said that the purpose of mathematics learning she did was to construct student's mathematical thinking skill. But the assessment, teacher A used didn't reflect that purpose at all. It means that even though the teacher A understand the assessment principles well, she didn't use it as a basic foundation to construct an assessment. The assessment, implementation itself didn't reflect the concept of assessing the 2013 curriculum served. In her opinion, applying a dynamic assessment by using the variety aspect and authentic assessment was hard to do. Besides, dynamic assessment should be supported The factors affecting it were the duration of 1 hour of learning, the number of students in class, the difficulties and amount of mathematics material in 1 term/semester, classroom condition. Those factors were also the reason why the teacher A run the assessment statically without any variation or improvement. Assessment tools she used also static and mostly for cognitive aspect. Meanwhile, teacher B did realize that applying a good and authentic assessment is hard to do. The principles itself somehow wasn't something that easy to be done in mathematics learning. But she still tried to run an assessment as good as she can. She didn't give up on the inhibited factors in assessment.

Understanding assessment as a part integrated with learning and instruction, means that teachers understand that specific material needs specific strategy and need specific assessment method for it. Apart from the difficulties in designing it, its teacher responsibility to make an effort for it. This principle can be collaborated with the 7^{th} and 8^{th} principles, assessment based on student's strength and how students learn. Learning activity shouldn't be constructed based on what the teacher wants, but based on what the students want and need. The teacher also can discuss the assessment method with the students or other stakeholder outside the class. This way, the teacher will know how their point of view. Involving students in decision making can motivate them to responsibly fulfill the decision made. It also makes the students know the target of the learning clearly. Then the 9^{th} principles fulfilled.

Indeed, it is difficult to do an ongoing and continual assessment, especially if the duration is too short and the number of students in the 1 class is too much. Basically the teacher doesn't have to do the assessment of herself. She can modify it by using self-assessment or peer assessment. Once the teacher has self-observation form about 1 aspect, she just needs to ask the students to fill the form after the learning activity and use peer assessment as triangulation. Another problem arosen is it cost money for printing a lot.

Applying multidimensional principles of assessment, 5th principles, doesn't mean all subjects in mathematics should be related to everyday life. But at least, the students need to know what is the meaning behind learning mathematics subject. It's also in line the 3rd and 6th principles, authentic and meaningful learning, and culturally appropriate for students. The teacher can use questioner to know student's background anything related to them. She can use it to create a learning environment that is close to students. The it'll give them an impression toward the learning and make it saved in memory longer.

Teacher tendency in using only multiple choice and short/long answer test for summative assessment once again showed the teacher still lack of willingness on using a variety types of assessment tools. Asking student to make a problem and answer it by themselves, using open-ended problem, matchmaking test basically is still applicable in for mathematics assessment tools. Asking students to make a 1 sheet of summary about today's learning can be one of the ways to assess student's knowledge, difficulties, and opinion. This summary sheet also can be used as a consideration in preparing next lesson.

Teacher A stated that 30 minutes as 1 hour learning was not enough to deliver all subjects in mathematics. That duration was also the reason why some principles can't be implemented well. Meanwhile, cognitive psychology said that the duration of focus of someone is 3 minutes× age. For high school students with age 15-18 years old, their focus can last 45-54 minutes. 30 minutes is far from that. It means that the classroom learning has a higher possibility to be effective if it's prepared well. The problem is on how far the teacher try to prepare the learning and assessment as effective as it can be. On the other hand, 2013 curriculum has ruled that 1 hour of learning is 45 minutes with tolerance 5 minutes. So basically it's also the school responsibility that changing the policy can affect the learning quality drastically.

As a whole, both of the teacher has a different attitude toward their perception in assessment. Teacher A saw an assessment as something troublesome and hard to implement in mathematics learning. She knew the essence of making a good assessment, but she didn't give any effort in facing the obstacle of its implementation and keep doing the static assessment. It showed that her perception leads to negative belief and didn't motivate her to improve. Meanwhile, teacher B has shown a more positive motivation regarding her perception toward assessment principles. Even though she knew it was hard, she still tried to conduct the best assessment as well as possible for the sake of her students. In the end, this positive motivation leads her to keep implement assessment principles in classroom learning. And it leads to a better authentic assessment well.

Indeed, applying a variety of assessment in mathematics is not as easy as in another subject. The abstract components make it harder to do. The existence of the principles is no other than as a basic foundation for the teacher to start all of assessment activity. The teacher can go back to the principles once she feels it hard to arrange a suitable instrument. It doesn't mean that all of principles should be applied simultaneously. But the existence of its essences should be kept

CONCLUSIONS

As the basic foundation of practicing assessment in school mathematics learning, having a mastery understanding of assessment principles is a need for the teacher. It is also a teacher's job to develop their creativity in designing an effective and diverse assessment. No matter how great the assessment theoretically, without the teacher capability to implement, it still won't help the learning development. Teacher obstacle in constructing a fitness assessment integrated

with learning model and instruction can be solved by improving their understanding toward assessment principles. Having a positive perception toward its principles enable teachers to be more positive and motivated to do a better assessment activity.

Although both of the teacher understands the importance of a good assessment for students' learning, their perception and motivation was the ones that lead them on how big their effort on serving students the best assessment facilitation. In the end, it's not only about how well a teacher understands the assessment concept, but it's about how bigis their motivation in serving the best assessment for the sake of the student. This motivation leads them in action of implementing the assessment as well as possible.

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