

Reflective Learning

Teachers' Failure in Choosing Learning Method is One Source of Students' Learning Problem and Misconception

Sandi Budi Iriawan

Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No. 229, Bandung, Indonesia
iriawan.sandi@yahoo.co.id

Keywords: Students' misconception, Students' learning Problem, Reflective Learning.

Abstract: Reflection is a meta-cognitive activity performed by teachers after learning process has finished. Through reflection, teacher can re-evaluate the learning process, in terms of whether or not the learning objectives are achieved. The achievement of learning objectives is inseparable from teacher's intervention in implementing appropriate and suitable teaching method based on the characteristics of the subject, the structure of the material, and the students' characteristics. Every subject has its own unique characteristic, which requires different methods for teaching the materials and topics of the subject (Subject-Specific Pedagogic). In addition, the structures of materials are also unique. The characteristics of these structure includes factual knowledge, conceptual knowledge, and procedural knowledge. All these knowledge requires teacher to implement suitable methods (Pedagogical Content/Knowledge). Teacher's error in selecting and implementing teaching method will affect students' achievement. Such error may cause students' difficulties in learning and results in students' misconception. Ideally, before teaching, a teacher should know the students' characteristics first, particularly concerning their prior skills and knowledge of the material to be taught. Students' difficulties of learning and their misconception about the pre-requisite materials will cause further misconception on future materials. It is because topics or materials of a subject are intertwined. A professional teacher will implement many teaching method during the lesson, because he realizes that the structures of materials the students need to master vary. Therefore, in planning a lesson as a form of pedagogic didactic anticipation, teacher should consider the characteristics of the material and the suitable teaching method for that material.

1 INTRODUCTION

Reflection is an important activity to be conducted after a lesson ends. Through reflection, teacher can obtain valuable information concerning the activities and difficulties of learning, as well as the effectiveness of teaching method implemented during a lesson. Continuous reflection will provide the teacher with information and knowledge about how students should learn, what teachers should do during a lesson, and what teaching method best suits the students' characteristics and the structure of material. Teacher cannot obtain this knowledge from formal education. It can only be acquired from daily teaching experience, forming a tacit knowledge for the teacher. Tacit knowledge represents your reflection on what works in your classroom, discovered over time and through personal experience (Borich, 2011). Through

everyday experiences such as observing other teachers, working with learners, lesson planing, and testing and grading, you will accumulate tacit knowledge and reflect on new ways of doing things that can guide your actions as effectively as knowledge from texts and formal training (Borich, 2011). This knowledge, if you take the time to reflect on it, will add to the quality of your planning and decision making by bringing variety and flexibility to your lessons, leading to revisions and refinements that can improve your unit and lesson planning (Borich, 2011).

Every subject or discipline has its own unique characteristics and structure of learning materials. The structure of learning materials in each subject generally consists of facts, concepts, principles or generalizations, and procedures. According to Shulman (1986), teacher needs to possess three kinds of knowledge; the subject matter knowledge, the

curricular knowledge, and the pedagogical content knowledge (PCK). He further explains that PCK is teacher's knowledge about how to teach certain content of material so that it can be understood by the students and embedded in their mind for a long time. He considers PCK as The most useful forms of content representation, the most powerful analogies, illustrations, examples, explanations, and demonstrations in a world, the ways of representing and formulating the subject that makes it comprehensible for others (Shulman, 1986).

The ways that teacher chooses and implements to teach students are called teaching (or learning) methods. Teaching methods vary in every subject; they depend on the characteristics of the students and the structure of the learning material. Teaching methods includes observation, experiment, discussion, demonstration, lecture, discovery, study trip, role playing, expository, assignment, modeling, presentation, simulation, and others.

Kurniawan (2014) notes that "method is way or technique to achieve certain specific objective; since in learning there is more than one objective, there should also be more than one method of teaching." He further states that teaching method is closely related with learning objective to be achieved. The learning objectives is formulated in the form of basic competencies the students have to master at the end of the learning. The Decree of Indonesian National Education Ministry No. 41 Year 2007 on the Standard Process of Education regulates that "basic competencies are a series of skills the students have to master in any given subject as the reference to formulate competencies indicator for that subject." Basic competencies are the description of the standard competencies set by the Ministry of National Educaion. Standard competencies are the minimum qualification of students that represents their mastery of knowledge, attitudes, and skills expected to be acquired by the end of each class and/or semester." Students achievement of standard competencies are measured using the competencies achievement indicators.

Competencies achievement indicators are formulated by teachers in operational action words which can be observed and/or measured for the purpose of evaluating students' learning result (achievement) and evaluating the effectiveness of the learning. A competency achievement indicator consists of action verb/attitude and learning material that students have to master. Teacher needs to analyze the materials contained in the basic competency or achievement indicators before designing lesson plan. By doing so, teacher ensures that the materials (the

facts, concepts, principles, and procedures) can be identified and presented in sequential, interrelated, and gradual way to determine the appropriate teaching method for the material.

Learning material analysis is necessary to formulate pedagogic didactic anticipations about how students should learn and how teacher should teach. Through such anticipations, teacher predicts students' difficulties in learning certain material delivered with certain teaching method. This prediction will allow teacher to formulate and implement other teaching method to overcome students' difficulties of learning. Implementation of unsuitable teaching method for a certain topic may cause students' difficulties in learning the topic; which ends with the students have misconception about the topic. Since topics or materials of a subject are ideally intertwined, students' misconception about a certain topic will cause further misconception about the related topics. Hence, teacher's anticipation and intervention in selecting and implementing teaching method is important to prevent students' difficulties in learning and students' misconception about certain topics. Therefore, teacher has to develop his knowledge about various teaching methods and structures and characteristics of materials. Teacher also needs to adjust the teaching method to suit the structure of material. In other words, teacher has to develop his knowledge about the pedagogy of material for every subject (Pedagogical Content Knowledge/PCK).

2 MANUSCRIPT PREPARATION

Learning is a process of finding out and developing knowledge conducted by students with the help of teacher to achieve the learning objectives. Learning is more than mere information transfer from teacher to students; it is an active process involving students' body and mind to acquire the knowledge they need. This is in line with Vargas (2009) that unfortunately, presenting is not teaching. You could present a brilliant lecture in an empty room. Explaining and demonstrating is often part of the teaching process. The process of learning consists of a series of stages, phases, or syntax of students' activities, from the beginning to the end of the lesson, to achieve certain learning objectives. This process is called the learning model. In a learning model, teacher can implement various ways or methods; called the learning method; to ensure that the students master the material presented.

Teacher plays a very important role in learning process. Teacher's intervention in learning

determines the effectiveness of the learning process. Thus, a teacher should always re-examine and evaluate the learning process he has delivered. This activity is often called reflective teaching. Ryan and Cooper (2010), notes that Ideally, rather than relying on authority, impulse, or unexamined previous practice, teacher will continually examine and evaluate their attitudes, practices, effectiveness, and accomplishments. This process of examination and evaluation is often called reflective teaching.

On the same note, Orlich (2010) states that reflection is an active mental process that master teachers use consistently as they interact with students and the curriculum. Curriculum is everything related with learning, so that the objective of learning can be achieved and students can master the competencies.

Teacher’s reflection is a process to solve learning problems and to make strategic decisions integrated in teacher’s professional activities to ensure that learning processes in the future can be better. Reflective teaching (or learning) may begin with teacher’s reflective questions; the ‘what’, ‘why’, and ‘how’ of the learning process he has conducted.

- “What have I done during the lesson?”;
- “What have the students done during the lesson?”;
- “What difficulties do the students find during the lesson?”;
- “Why do the difficulties occur?”;
- “How should the teacher teach and the students learn in this kind of lesson?”.

These questions will guide the teacher to plan a more effective lesson; for example, by selecting more appropriate learning methods and strategy is based on students’ characteristics and the materials. Thus, a reflective teacher will always analyze the lesson he has delivered to improve future lessons. Orlich (2010) suggests that the characteristics of reflective teachers include:

- Care about students;
- Understand the social context of schooling;
- Curious and always question assumptions;
- Know content;
- Identify problems or issues;
- Collect relevant data;
- Construct a plan of operation;
- Use many instructional strategies;
- Practice problem-solving strategies;
- Think prospectively and retrospectively;
- Realize that reflection is cyclical;
- Evaluate the results and processes used.

Based on these statements, the process of reflective teaching (or learning) is highly influenced by the teacher’s knowledge of curriculum, content of the material, and pedagogy (pedagogical content knowledge/PCK). The lack of this knowledge will prevent a teacher to effectively reflect about lessons and to develop learning. A third type of knowledge shown by effective teachers is pedagogical content knowledge, the knowledge that bridges content knowledge and pedagogy (Ryan and Cooper, 2010). Pedagogical content knowledge represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction (Ryan and Cooper, 2010).

According to Ryan and Cooper (2010), PCK is teacher’s knowledge about how to deliver certain topics, problems, and issues so that students can understand them. Teacher who lacks PCK tends to find it difficult to implement teaching methods, which causes him to err in selecting the appropriate and suitable learning method based on students’ characteristic and materials. This error leads to students’ difficulties in learning the topic which, in turn, results in students’ misconception about the topic, and the future related topics, as illustrated in the following diagram in figure 1.

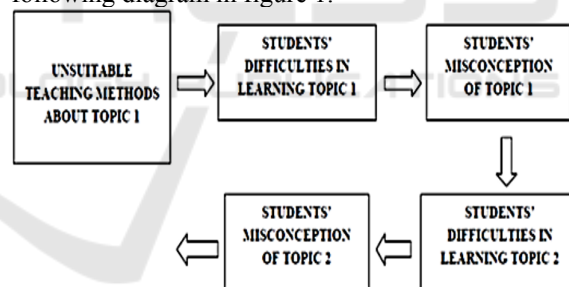


Figure 1: The effect of unsuitable teaching methods.

The diagram illustrates how a teacher’s error in determining and implementing appropriate and suitable teaching method for a certain topic may cause students’ difficulties in learning the topic; which ends with the students have misconception about the topic. Since topics or materials of a subject are ideally intertwined, students’ misconception about a certain topic will cause further misconception about the related topics. Cockburn and Littler (2008) note that you feel that simply knowing the misconceptions children hold is not enough and are intrigued to delve further into why children experience these particular difficulties. Teacher’s follow up to handle students’ misconception may be

translated into actions to investigate the underlying causes. They further states that “we will now illustrate each stage of the theory to help you develop your teaching strategies to enable children gain a deeper mathematical understanding and, in so doing, lessen the chance of them developing misconceptions”. To lessen students' misconception about a certain topic, teacher has to construct a strategy and develop a suitable teaching method so that the students can have deeper understanding of the topic.

Ideally, reflective teaching of a teacher should focus not only on the learning process and materials he has delivered, but also on the students' characteristics and students' interaction with the material. Orlich (2010) notes that “teachers sometimes forget about the learner and concentrate on the teaching process or on what is being taught; if

lesson planning is to be a useful task; it must always focus on the interaction between what is to be learned and the learner”. This means that before a teacher teaches, he should know the students' characteristics first, particularly concerning their prior skills and knowledge of the material to be taught.

Reflective teaching may begins with what the teacher finds after the lesson; including students' achievement. Then, the teacher reflects the learning process he has delivered, in terms of what he finds after the lesson. He then should reexamine the learning objectives to ensure that the learning process is suitable to achieve those objectives. In short, reflective teaching is a reciprocal activity; from formulating learning objectives, implementing learning, to evaluating students' achievement. The following diagram illustrates the process in figure 2.

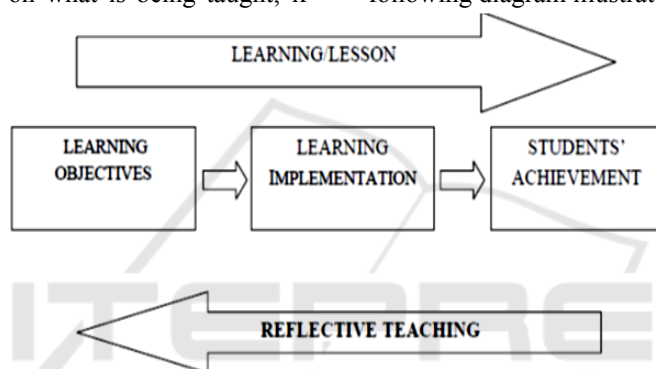


Figure 2: Reflective teaching process.

Concerning experienced teachers, Stringer (2009) argues that They understand the need to take into account the diverse abilities and characteristics of their students, the complex body of knowledge and skills that students must acquire, and the diverse learning activities that need to be engaged. An experienced teacher will begin the lesson by identifying students' skills, knowledge, and characteristics, to ensure that the learning process is not merely a transfer of teacher's knowledge, but also a process through which students can acquire the information and knowledge they need.

The types of knowledge students need to master or acquire, according to Anderson, include factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. This paper will focus its discussion on the factual, conceptual, and procedural knowledge. Sapriya et al. (2009) defines facts as information that exists/happens in daily life, which is guaranteed to be true. Facts are the foundation of concepts, principles, and theories. Facts represent the truth or nature of things. Since facts are obtained from observation,

they reflect observable phenomena or objects. Concept is an abstraction of events, objects, or phenomena that have certain characteristic or symbol or label which help people to recognize, understand, and comprehend the events, objects, or phenomena. Principles are the result of generalization of relationship among concepts. Procedures are related with how to do or conduct certain activities.

An experienced teacher will choose his teaching method based on the characteristics of the material to be taught. Joyce (2009) argues that teaching and learning have two main targets; the material target and the process target. Material target includes information, concepts, theories, mindset, values, and other materials students need to learn. The process target includes students' way of learning, facilitated by the teacher, to actively and effectively participate in the lesson. In addition, Joyce (2009) notes that learning process is inseparable from the material target that the students need to master. The following table 1 contains the overview of relationship between teaching/learning methods and the characteristics of

learning material or knowledge the students are expected to acquire.

Table 1: The overview of relationship between teaching/learning methods and the characteristics of learning material or knowledge the students are expected to acquire.

Structure of Material		Teaching/Learning Methods			
Factual		Observation, Simulation			
Conceptual		Lecture, Discussion, Question and Answer, Discovery			
Principles		Experimentation, Observation, Discovery			
Procedural		Demonstration			
Structure of Material	Subject				
	Mathematics	Indonesia Language	Science	Social Studies	
Factual	A dice has six	A poem has a rhyme	Pushed table is moving	Jakarta is the most populated city in Indonesia	
Conceptual	Side are the outer most part of a geometric shape	Rhyme is the last sound of every line in a poem	Force includes pull and push	Population is a group of individuals occupying certain area	
Principle	The longer a side of a geometric shape is the bigger its area and circumference will be	The more students' vocabulary is the easier it is for them to write a poem	The bigger the force applied the faster an object moves	The bigger the population, the higher the level of unemployment is	
Procedural	How to measure the area of irregular shape	How to read a poem aloud	How to push an object with minimal force to make it move	How to read a map accurately to determine the distance between two places	

Teacher need to analyze the learning material contained in a basic competency, so that no important material is missed in the lesson. Arends (2009) states that "...choosing content can only be done after careful analysis and inquiry into students' prior knowledge, the teacher's understanding of the subject matter, and the nature of the subject itself". Students' prior knowledge concerning certain topic may be pre-requisite competencies to master a basic competency; which is the minimum competency students have to master after learning. The achievement or acquisition of pre-requisite competencies and basic competency is indicated by competency achievement indicators. Teacher needs to implement appropriate and suitable learning method, by considering the indicators and pre-requisite competencies, so that students can acquire certain basic competency. Salend (2011) suggests that "When choosing methods to differentiate instruction, you should address students' learning style and preferences". Students' prior knowledge about certain topic determines teacher's success in implementing appropriate teaching methods.

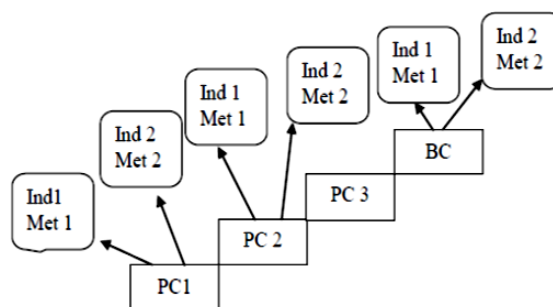


Figure 3: Different prior knowledge about any given topic.

In figure 3 illustration shows that students have different prior knowledge about any given topic. An experienced teacher will identify students' prior knowledge first before beginning the lesson about the core topic of the basic competency. This is necessary so that teacher knows exactly where to start the lesson. In the illustration above, the acquisition of the basic competency (BC) at the top-most ladder depends on the acquisition of its pre-requisite competencies (PC 1, PC 2, and PC 3). Students' learning begins at the lowest step and ends at the highest step. It goes through several stages of teaching (or learning) model. The steps are teaching method; the activities of teacher to facilitate students achieving the BC. Concerning this, Borich (2011) states that some of the characteristics of your learners that will influence your instruction are their specific abilities, prior knowledge, learning styles, and home and family lives. These are the "windows" through which you will see the special needs of your learners and begin to plan for them (Borich, 2011). Planning with respect to your learners begins by consciously noting their unique abilities and experiences that can provide you the opportunity to select content, materials, objectives, and methods that match their current level of understanding and meet their special learning needs (Borich, 2011).

The following is an example of the implementation of basic competencies analysis process until it becomes anticipatory learning experience. In this example, the subject is Mathematics and the topic is Characteristics of Simple Geometric Shapes of Cube and Cuboid. The Basic Competency for this topic is 'understanding the characteristics of simple geometric shapes of cube and cuboid'.

Before the teacher begins the lesson about Characteristics of Simple Geometric Shapes of Cube and Cuboid, he has to realize that students will not be able to master the characteristics if they do not know cube-shaped and cuboid-shaped objects, and their building blocks; including sides, edges, and corners.

This means that the teacher will have to think about the pre-requisite competencies the students have to master before they learn about this basic competency.

The following figure 4 illustrates the relationship between the dimensions of knowledge and the six dimensions of competencies in this topic.

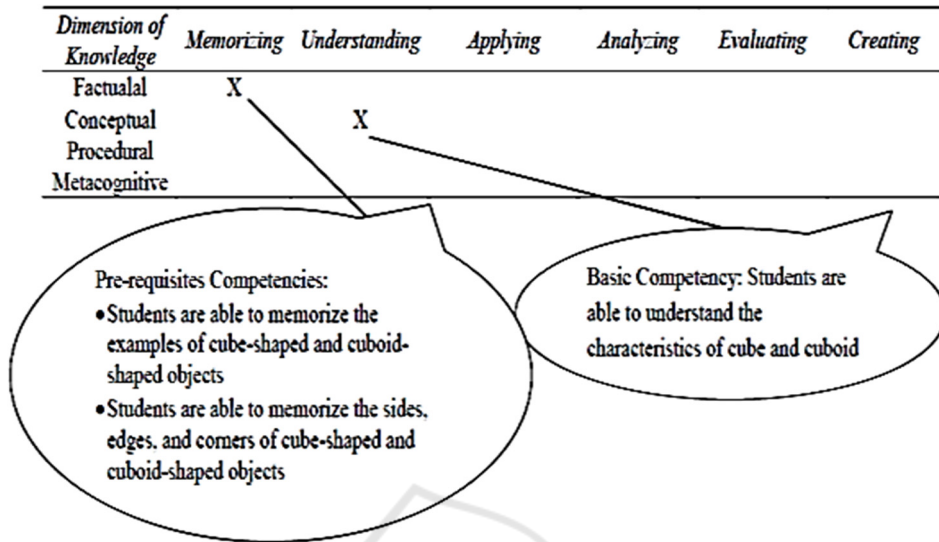


Figure 4: The relationship between the dimensions of knowledge and the six dimensions of competencies in this topic.

Each indicator, in pre-requisite competencies and in basic competencies, is facilitated by a package of learning process consisted of teacher's and students' activities. A learning process for an indicator consists of several learning methods. The sequence of learning process, from the pre-requisite competencies to basic competencies, is the learning model that facilitates students to master the minimum competencies (basic competencies). The learning model consists of observation, question and answer, lecture, and discovery methods.

The learning activities for the basic competencies above can also be done through observation and Q & A (question and answer) activities, as illustrated below:

- Teacher: "Could you give me an example of cube object in this classroom?"
- Student: "The box of chalk"
- Teacher: "Observe! Which part is the sides of this box?"
- Students: "the flanks"
- Teacher: "Now, tell me, how many sides does this box of chalk have?"
- Students: "six"
- Teacher: "What is the characteristic of this box?"
- Students: "it has six sides"

- Teacher: "Now, could you give me an example of cuboid object in this classroom?"
- Student: "Pencil case"
- Teacher: "Observe! Which part is the sides of this pencil case?"
- Students: "the flanks"
- Teacher: "Tell me, how many sides does this pencil case have?"
- Students: "six"
- Teacher: "What is the characteristic of this pencil case?"
- Students: "it has six sides"
- Teacher: "So, what is the characteristic of cube and cuboid shapes?"
- Students: "they have six sides"
- And so on.

Both series of activities can be used to guide the students until they are able to find the characteristics of simple geometric shapes of cube and cuboid; i.e. they have six sides, twelve edges, and eight corners.

Teacher's error in determining and implementing the appropriate learning method in this topic, for instance only lecturing the class, may result in students' difficulties in learning the topic. For the instance of the characteristics of cube and cuboid shapes, the knowledge may not be well-structured in students' minds, which leads to their misconception

about the topic. For example, students may think that “cube-shaped objects are NOT cuboid,” while the correct concept is “cube-shaped objects ARE also cuboid-shaped objects.”

3 CONCLUSIONS

Reflecting about learning (lesson) is an important activity for teachers in their efforts to improve the quality of learning process. Teachers’ finding concerning students’ achievement or learning result will be examined in a series of continuous, reflective activities. For instance, if a teacher finds that students have misconception, he can review the students’ difficulties in learning, and review the learning process that causes students’ difficulties and misconception about certain subjects. The quality of learning process is determined by teachers’ accuracy in implementing learning method based on students’ characteristics and teaching materials. Teachers’ error and failure in selecting and implementing the appropriate learning method is the source of students’ difficulties and misconception in learning.

REFERENCES

- Arends, R. I., 2009. *Learning to Teach*, McGraw Hill. New York.
- Bjorklund, D. F., 2012. *Children’s Thinking Cognitive Development and Individual Differences*, WADSWORTH CENGAGE Learning. Canada.
- Borich, G., 2011. *Effective Teaching Methods*, PEARSON. Texas.
- Bruff, D., 2009. *Teaching with Classroom Response Systems*, JOSSEY-BASS. San Fransiso.
- Cockburn, A. D., Littler, G., 2008. *Mathematical Misconceptions*, SAGE. London.
- Essa, E. L., 2011. *Introduction to Early Childhood Education*, WADSWORTH CENGAGE Learning. Belmont.
- Garrel, D., 2011. *A Guidance Approach for The Encouraging Classroom*, WADSWORTH CENGAGE Learning. Belmont.
- Joyce, B., 2009. *Models of Teaching*, PEARSON. New Jersey.
- Kurniawan, D., 2014. *Pembelajaran Terpadu Tematik*, Alfabeta. Bandung.
- Newsome, J. G., Lederman, N. G., 2002. *Examining Pedagogical Content Knowledge*, Kluwer Academic Publishers. New York.
- Orlich, D. C., 2010. *Teaching Strategies: A Guide to Effective Instruction*, WADSWORTH CENGAGE Learning. Boston.
- Peraturan Menteri Pendidikan Nasional Nomor 41. 2007. *Standar Proses*, Depdiknas. Jakarta.
- Ryan, K., Cooper, J. M., 2010. *Those Who Can Teach*, WADSWORTH CENGAGE Learning. Boston.
- Salend, S. J., 2011. *Creating Inclusive Classrooms: Effective and Reflective Practices*, PEARSON. Boston.
- Sapriya, 2009. *Konsep Dasar IPS*, UPI Press. Bandung.
- Shulman, L. S., 1986. Those who understand: Knowledge growth in teaching. *Educational Researcher*. 15(2), 4-14.
- Stringer, E. T., 2009. *Integrating Teaching, Learning, and Action Research*, SAGE. London.
- Vargas, J. S., 2009. *Behavior Analysis for Effective Teaching*, ROUTLEDGE. New York.