THE INNOVATION OF METHOD IN LEARNING BIOLOGY TOWARD PROFESSIONALISM

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ABSTRACT

This article contains the review of the study writer as an educator in Biology subject. Teachers and lecturers as professional educators have the primary task of educating, teaching, guiding, directing, train, assess and evaluate students in formal education. Their innovative action is required to support the professionalism. This is a challenge for educators in selecting teaching methods that can preserve what students have learned stored in their memory. The author has developed a model of learning called 'Iqro.' Syntax models are divided into three steps: exploration, conceptualization, and communication. The results of implementation show that the number of students who received grades of A and B were increase. The quality of grades A and B also increased. Students' performance grade with the category very good and good were greater than before. The study showed learning Biology with student-centered approach which was devoted to the exploration activities of the natural surroundings (*Jelajah Alam Sekitar/JAS*) can be done using a strategy based on active student and cooperative learning. These strategies were contextual learning, participatory, and inquiry. Thus, the strategy was appropriate to utilize in the development of PPG SM3T learning.

Keywords: innovation of methods, *JAS*, *Iqro* model, professionalism

INTRODUCTION

Pedagogical paradigm of the 21st century by Oon-Seng (2004) referred to the knowledge-based economy. This paradigm is a dynamic process in the growing of information acceptability, the speed of proliferation of technology where a technology will give birth to other technologies, globalization, and the need for new competencies. A teacher should abandon the traditional ways and dealing with new ways to deal with knowledge and to involve students in the learning process. Pedagogy of the 21st century should be content visible and teachers' thinking visible. Challenges in education is how to create an environment and a learning process to facilitate the way of thinking and how students build knowledge can be manifested actively, collaboratively, with self-regulated and self-directed learning.

Law No. 14 Year 2005 on Teachers and Lecturers Article 1 states that the teacher is a professional educator with a primary task of educating, teaching, guiding, directing, train, assess and evaluate students in formal education in the primary and secondary level.

Becoming a professional, systemic development of career is needed including in teachers' candidate education. Professional teacher is the key to success in teaching and learning at schools. The teacher's role is very significant for any successful learning process as stated in Goodlad and Klein (Suyanto & Djihad, 2012; Daryanto & Rahardjo, 2012) with the publication 'Behind the Classroom Door' and explanations van den Berg (2015). Quality of learning will affect the quality of education. The implementation of various relevant innovations through the adoption of various countries is one of the efforts toward improving the quality of learning.

Curriculum 2013, which aimed to transform and establish the knowledge, skills, and attitudes of the students or the curriculum of higher education developed based on the "*Kerangka Kualifikasi Nasional Indonesia*" (KKNI) is a form of innovation in education in Indonesia. The successful implementation of an innovation at school and college level is influenced by various factors, such as: management of innovation, facilities that support the innovation and commitment of

the school community or campus under the leadership of the principal or the rector even the chairman of the study program. The ability of innovation management at the level of educational institutions highly contributes to the successful implementation of innovation.

Reading the title, innovation, learning methods, and professionalism of teachers can be found as the keywords. These three keywords can be connected as questionable things as follows. What is innovation and who is the innovative person? What is a learning method and how is its position in the taxon of the learning process? Who are professional educators? Are educators who are able to innovate in managing learning is the professional one? Educators' duty in front of their students is to manage learning. Can it assume that professional educators who are innovative in managing learning or vice versa? What should be done in order to become an innovative and professional educator? From these three key words mentioned above the learning method became the focus of this study.

Various peers discussion forums; FGD (focus group discussion) and lesson study with professors, teachers and supervisors; and lectures S1, S2, PPG and PLPG give experience that there are 'turmoil' teacher candidates even teachers/ lecturers when implementing learning methods. In line with Sentot Widodo, a supervisor of an exemplary school in Central Java province requested PS Biology Education Unnes to strengthen educational courses (Ridlo, *et.al*., 2013). van den Berg (2015) stated that one theme of education in teacher candidates should be concerned about how to teach science and construct pedagogical content knowledge not just from reading the literature. In relation to the word 'method' there is another word that actually refers to the taxon, namely models, approaches, strategies, methods, techniques, tactics, and the way that sometimes mounted on parallel taxa. The learning method is used by educators to create an atmosphere of learning and the learning process. Thus, learners can achieve the basic competencies that are tailored to the characteristics of learners and basic competence to be achieved (Department of Education No. 59, 2014). Even in Permendikbud No. 103 (2014) learning methods is interpreted as a way or techniques used by educators to deal with a learning activity. In developing lesson plans, educators are not asked to write specifically models, approaches, strategies, or methods to be used. But various characteristics of models, approaches, strategies, methods are expected to appear in the explanation of the learning activities, as implied in Permendikbud 103 (2014) mentioned above. Discussing learning innovations

will be freely discussed in the model taxon. However, in this study the aims of method in taxon is really as a method.

Teacher Professionalism

Teachers have a major role as an educator who demanded to be able to guide, construct, nurture, and teach. Therefore it is absolutely necessary for teachers to have integrity and a good personality. A teacher should be able to carry out their duties in a professional manner by sticking to the work ethic, independence, productive, efficient, and innovative, and ready for excellent service (Janssen, 2003). Therefore Daryanto & Rahardjo (2012) and Suyanto & Djihad (2012) suggest that in the era of educational autonomy, local governments need to create a system of recruitment and career to coach professional teacher.

Houle (Daryanto & Rahardjo, 2012) have described a so-called professional work. According to him, there are nine characteristics of professional work. Two characteristics that are relevant to the topic are having a strong knowledge base and having the selection and certification system. In accordance with these characteristics, there are four professional aspects for a teacher as follows.

1. Mastering the material, structure, concept, and the mindset of scientific support of teaching subjects
2. Mastering standard of competence and basic competences of teaching subjects
3. Developing subject matter of teaching creatively, developing professionalism in a sustainable manner by reflective teaching
4. Using information and communication technologies to communicate and self-development

Professional teachers are required to have three abilities as revealed by Suyanto & Djihad (2012), which is capable of cognitive, psychomotor, and affective. Cognitive ability is defined as four aspects mentioned above. Psychomotor ability means being able to implement cognitive abilities in everyday life. Ability affective means a teacher must be noble in order that they can be models for the students.

Innovative Teacher

Innovation is seen as the creation and implementation of 'new combinations'. The terms of this new combination can refer to products, services, work

processes, market, policies and new systems. The innovation can create additional value. Innovation includes the development and implementation of something new (de Jong & den Hartog, 2003). The term 'new' does not mean the original but rather to newness or novelty (Adair, 1996). In regard to novelty, Schumpeter (de Jong & Den Hartog, 2003) explains that innovation is the creation and implementation of something into one combination. Innovation is not the only thing that caused the changes. Axtell *et al*. (Janssen, 2003) and Daryanto & Rahardjo (2012) explains that the scope of innovations ranging from development to the implementation of new ideas that have an impact on the theories, practices, products, or lower scale, namely the improvement of processes and the design of everyday work. With innovation, it is possible to add the value of the products, services, and work processes not only for schools but also customers, stakeholders and the public.

Does novelty bound dimensional of space/ place and time? A product will be regarded as something new in one place but not anyother places. The progression of information technology narrow down the dimensions of space. When a new invention introduced to a particular community, then in a short time the world community will know about it. Novelty is also bound by time. Calculators as calculating machines never become a vital tool in teaching statistics, but the invention of computer technology with software at the present time is selected to deliver statistics lessons.

Wess & Farr (De Jong & Kemp, 2003) define innovative behavior as all individual behavior that is directed to produce, introduce and apply new things, which is beneficial in various levels of the organization. It requires to produce creative thinking. Courage to take risks and internal motivation will determine the course of creative ideas, as expressed by Byrd & Brown (2003). Thus the creative ideas need to be put in the work, through a series of risky tests introduced before it applied widely as an innovative work.

How to make learners active from the beginning? The question is appropriate raised by professional innovative teacher. Silberman (2002) stated in order to make students actively participate in the learning even from initial phase of teaching can be done as the following way. First, establishing group to familiarize the students with each other and work together. Second, assessing students work immediately so that the teacher can measure the student's ability in term of behavior, knowledge and experience. Third, engaging students in learning.

Education transformation era and the current of change require teachers and students to participate actively in learning. Teachers, as facilitators should be active to trigger the students' potential. Knowledge, skills and experience of teachers integrate learning process become more memorable. Therefore, teachers must pay attention to students' potential according to multiple-intelegences theory of Howard Gagner. In addition, the integration of information and computer technology in the learning process is a certainty. Because the world has changed more in 10 years than during the past 1000 years, it is an important concept that should be implanted completely within the school system may soon become obsolete. The rate of change, if there is ever-increasing, because it adapts to the changes that should be the core of a new teaching method as described by Ornstein and Erlich (Rose & Nicholl, 2002). Teachers need to update in teaching as well as students in their learning time. It is necessary for creative and innovative teachers.

Ditkoff (2004) director of Idea Champions explores the quality of an innovator to have 20 traits. All of these 20 traits are challenges the status quo, curious, self-motivated, visionary, entertains the fantastic, takes risks, Peripatetic, playful/ humorous, self-accepting, flexible/ adaptive, makes new connections, reflective, recognizes (and re-cognizes) patterns, tolerates ambiguity, committed to learning, balances intuition and analysis, situationally collaborative, formally articulate, resilient, and persevering. The number of positive features indicates how high the value innovator innovative work. Preparing innovative candidate teachers and innovative method becomes an important task for the candidate teacher education institutions. One or a few traits that can be owned by the teacher will produce a good learning atmosfer.

Teaching Method and Innovation

Silberman (2002) modifying the Confucius statement about active learning. What I hear, I forget. What I hear and see, I remember a little. What I hear, see, and ask questions about or discuss with someone else, I begin to understand. What I hear, see, discuss, and do, I acquire knowledge and skill. What I teach to another, I master. These popular statements provide a challenge for teachers to select teaching methods that can preserve what they have learned in the students' memory. Professional teachers want their students can learn comprehensively. Therefore, the size of which easily is if the teacher can provide new teachers with the innovations.

The success of the teacher in the learning process is influenced by the methods of teaching. The learning method is defined as how to teach or how to convey the subject matter to students who are studying (Suyanto & Djihad, 2012). There are many methods of learning which is affiliated to the approach of student centered learning (SCL). Nevertheless, the phases can be distinguished in the introduction; there is a core part of the 'cycle' scientific approach; and the final part or cover as stipulated in Permendiknas No. 103 2014 (Department of Education, 2014). Selection methods are influenced among others by the subject matter, the learning environment with available facilities and infrastructure, the students and teachers circumstances. Twenty methods that can be selected from Suyanto and Djihad (2012) theory, namely: lectures, discussions, problem solving, panel discussions, buzz groups, syndicate group, symposia, informal debate, fish bowl, brainstorming group, colloquia, demonstrations and experiments, socio drama, games, drill, field work, field trips, group work, exploration and investigation/ inquiry. Some of the popular methods are used by teachers will be described as follows.

1. Lecturing

This method in many occasions classroom action research and research development used as 'scapegoats' or 'source' which leads to lower student learning outcomes. Moreover, if research refuge in the student center. Is it true? Of course not everything is true. This method is effective for conveying information and new knowledge and connecting material that has been studied with new material that will be taught. When using this method the teacher needs to prepare what will be lectured, the teacher made the subject, and teachers present the material coherently. Unity of teaching materials that can be served by this method is a useful material for the formation of attitudes and essential ingredients that are not found in textbooks or difficult to understand although stated in the books.

Silberman (2002) mentioned that when listening continuously for a certain time at a teacher, students tend to get bored and their minds will drift everywhere. Student learning would be better if they were asked to do the following things: expressing information in their own language, giving examples, introducing things in all conditions, see the connection between one fact to another, using a variety of ways, predicting consequences, revealing opposing or opposite. Some tips when choosing this method need to be considered.

a. At the initial phase ask students' experience in their everyday life (contextual). Example: Ok class, who did watch the news on TV about the drought in some areas in the country yesterday? This question is asked when the teacher wanted to teach the theme 'Disaster.' Or conversely, children were asked to ask. This method is used to stimulate students' curiosity and encourage the students about the possible relationship between everyday experience and lessons to be taught.

b. Teachers provide new material or explain the tasks to be completed by the student. Students are invited to read the new material or tasks. For example: "Open your book on page 23 and look at the picture of voluntary work in the village. Try to explain the picture! "Of course there is no right and wrong answer.

c. Looking for a relationship or a comparison of some subject matter that has been described by the first way, then mention the new concepts or ideas before. For example, previously students study about circles, for further discussion mention that in the circle there are other elements such as the radius and diameter. Second, classify and create categories to make a difference. For example, students were asked to name all sorts wake of leaves of various plants in the surrounding areas and written on the blackboard. Furthermore, students were asked to classify them according to similarities or differences in their characteristics.

d. Students are invited to make abstractions and generalizations, such as: students formulate the conclusions with their own sentences; students demonstrated that there is consistency of generalizations that have been made with the previous knowledge

e. Teachers apply what has been taught. For example: the teacher asks the students to apply the concept in different situations, the teacher asks the students to give some examples of the new situation and asked to name as the previous step (making the analogy).

f. Teachers thought to insert or integrate the values of character education in speech

2. Discussion

This method is a process of exchanging information, opinions, and the elements of experience on a regular basis with a view to obtain a clearer common understanding about a topic. Discussion provides an opportunity for students to express their views on interesting topic while teachers gain the information of

what make the students interested in. Discussion method can be selected when teachers want to take advantage of the various capabilities of the students, provide an opportunity for students to show their ability, and get the feedback learning objectives. This method was also selected to help students think theoretical and practical, trained students to assess the ability and the role himself and his friends, and help students recognize and able to formulate a variety of problems encountered either from his own experience or others.

Some tips when teachers apply the method of discussion.

a. Students are given free time to discuss regularly and form small groups

b. Teachers (with students) create a rule that can be agreed upon

c. Teachers make a diary if you want to make a general analysis of the role of the student

d. Make quantitative analysis for individuals

e. Integrate the values of character education in discussion and group performance

3. Demonstration and Experiment

These two methods are stated in one points because in practice often used successive or complementary. Experimental method is usually used in science learning. The success of the experiment is in the hands of teachers so it takes planning and management experimental activity. Given time, how to do, and difficulty when experiment are important matters considered by the teacher. The purpose of the experimental activities is to reinforce concepts of learning and develope the concepts. Note the table that describing experimental method based on the specified category or purpose, tools and materials, procedures and the results by the teacher. Category 0 means that students gain skills and results with certain qualifications. Category 0 is known as a prescription task. Category 4 implemented in the form of the final work.

Some tips for developing an experimental method can be considered from the following question. What is general purpose of the experiment? What are the specific objectives of the experiment? What are the learning objectives of each part of the experiment? What does student task? What assignment strategy to be used? How the task sequence experiment? What is the need/ ability of the students before the beginning of the experiment and how students get it? What is the duty of students after the experiment is finished? How is form/ way of his judgment? How is the course of the experiment monitored? Methods of experimentation and demonstration are a multi-domain method hence the

establishment of character values (multi value) should be teacher's creative thinking in managing learning.

Empirical Experience

According to the explanation above, it would be easier to talk about innovation in the model rather than the method. Model is characterized by the syntax or steps. Novelty models may be revealed at the beginning or the core or the end of learning. In 2005 the authors have developed a learning model named "Iqro" to actualize *jelajah alam sekitar* (JAS) approach. This model is inspired by the first commandment in the Qur'an. Syntactic of the model is organized in three steps.

1. Exploration

The initial phase is done by developing understanding of the nature of divinity, begins to instill confidence that something is exemplary in learning. Then, motivated students with divinity such as honesty, fairness, wisdom, social, affectionate and so on to give a vision that fit in the object to be studied. The next phase, growing quest of human nature, starting with the growing mistrust that can lead to hypotheses / allegation. Then, encourage students to be able to determine the answer in various ways such as observation, experiment, reading, simplify, modelling, and so on.

2. Conceptualization

In this phase, the student is motivated again that the answer is correct based on the hypothesis with the divine nature mentioned above. Next do affirmation and redefinition.

3. Communication

In this phase, students report their answers in the form of text, images, papers, and so on. Furthermore, they present it to friends/ others.

If observed its step, the model that has developed by the writer 10 years ago offers value implementation of character as stated in character education. Syntax exploration, conceptualization, and communication built 10 years ago also in harmony with the stages in the core part of learning known as EEK (exploration, elaboration and confirmation), or present as a scientific approach. Syntax conceptualization provides opportunities for teachers to use a variety of teaching methods depending on the nature of matter and the availability of facilities/ infrastructure of learning. At that time (see 2005), the writer developed a model that may be deemed innovative work to address the SCL paradigm

in higher education curricula. Several students's essay and thesis write at least once using the model in the study.

Through joint research Sukaesih and Rudyatmi (Sukaesih, *et al.*, 2008), the writer has tested the use of models of innovative learning. Model attainment of concepts, brainstorming, problem-based learning, cooperative, direct teaching, and Iqro simultaneously applied in the lecture in one semester. The use of a variety of innovative models including a model developed by the writer used to elaborate the various abilities of students according multiple intelligences theory and the theory of opportunities. The impact of learning is observed using classroom action research (classroom action research) from the test scores cycle 1 to 4 and a reflection 1 and 2 using various forms of assessment and continuous assessment. The results showed the number of students who received grades of A and B increased. Quality grades A and B were also increasing. The value of students' performance with very good categories and a good was 67.47%. The divinity which are now known as the value of a character as an honest, intelligent, strong, democratic, curiosity, and discipline successfully applied.

Ridlo & Alimah's research results (2012) showed that learning will be orchestrated effectively when lecturers provide interactive environment between faculty and students; metacognitive; using direct learning strategies; using analogies and examples; group study; problem-based learning and analysis tasks. A suitable method is affiliated on participatory learning, contextual, and inquiry. The same thing happened in learning Biology Professional Teacher Education program (PPG) for undergraduate teaching in the outermost regions, lagging and leading (SM3T) (Ridlo, *et al.*, 2013). Students will be creative when the lecturer gives sufficient environment to actualize their potential and exchange ability with other students.

CONCLUSION

According to research questions above, there was a relationship between professional teachers and innovative teachers. However, there is no question which one must be reached first, to be an innovator or professional? Doing innovative learning methods the following matters should be considered: 1). Follow the development of science and new paradigm in the field of education, 2). Conduct classroom action research, 3). Prepare scientific papers, 4). Have skill to create alternative learning aids, and 5). Understand government policies in the field of education. Iqro as a learning model based on JAS approach is able to improve the quantity and quality of the students' scores. The study showed Biology learning with student-centered approach which is devoted to the exploration activities of the natural surroundings can be done using a strategy based on active student learning and cooperative. These strategies are contextual learning, participatory, and inquiry. Thus, the strategy was appropriate to utilize in the development of PPG SM3T learning.

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