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HYPOTHETICAL MODEL OF LEARNING CYCLE AS PEDAGOGICAL TRANSFORMATION IN BIOLOGY LEARNING TO IMPROVE PROFESSIONALISM OF BIOLOGY TEACHER CANDIDATES

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Abstract

The 21th century as the era of globalization provides opportunities and challenges of living and working in a diverse world and rapidly changing demand patterns of thinking and behaving to information and challenges. Life challenges mainly include economic and social change in this century called for a fundamental transformation in the skills, abilities, and attitudes. This transformation can be done through learning (including learning biology). The main lesson in pedagogy refers to the hue / teacher teaching styles which include: 1) The process of planning, 2) The process of teaching, and 3) The process of assessing and evaluating.

The learning that is used for the transformation, particularly through the learning cycle models. The learning model learning cycle in biology learning in order to improve the professionalism of teacher candidates based on: 1) the development theory and the constructivist theory of Jean Piaget, 2) the concept of Vygotsky's scaffolding learning, 3) reflection, and 4) immersion.

Keywords: *Learning cycle, Pedagogic transformation, and Professionalism of biology teacher candidate*

21st century as the globalisation era exerts a chance and life challenge in working at diverse world and rapidly changing force mindset and act towards various information and challenges. Life challenge mainly covers economy and social which experiences fundamental alteration in this century mentions the transformation in skill, ability, and society's attitude.

The aforementioned life challenge needs a fundamental alteration which based on competence or skill that is needed for 21st century's society, students as the generation that is going to compete in that century needs to be equipped with not only core subject (The Partnership for 21 Century Skills, 2008), but also supplied as follows: 1) Global Awareness, 2) Creativity and Innovation Skills, and 3) Information literacy (Lee and Atkinson, 2006), through directed learning: 1) think critically in making score, 2) complex problem solving, multi discipline, opened problem, 3) creativity and entrepreneurship thinking, 4) communicating and collaborating, 5) harnessing innovative knowledge, information and chance, and 6)

taking care of money, health, and social responsibilities (The Partnership for 21st Century Skills, 2008).

This demand of 21st century requires education system to be able to prepare their students to be successful in global competition and economic problem for the next decade (The Partnership for 21st Century Skills, 2008) so that the students are ready to think, learn, work, solve problem, communicate, and contribute effectively in their whole life (Kay, 2010), with high thinking ability to improve creativities and innovation (AACTE, 2010).

Therefore, higher education (especially LPTK which creates teachers' candidates) must prepare their students to understand and handle the global issues. The lecturers have to re-check the curriculum and learning strategy so that the students can develop in global society. Dewey mentioned "If we teach today because of we have been taught yesterday, so we are going to rob our children tomorrow" (Kemendikbud, 2010). Thus, teacher candidate should be equipped with pedagogy on how they should guide their students in learning. The teachers who have been prepared well when they become teacher candidates in LPTK and teachers who have motivation are the most important variables in the success of learning (Kemendikbud, 2010). For that reason, alteration in pedagogy that is used in education system is needed. The intended pedagogy refers to teacher's teaching style which covers: 1) Planning process, 2) Teaching process, and 3) Assessing and Evaluation process.

Arts and knowledge about teaching skill that based on knowledge in the 21st century have to be taught towards teacher candidates (including biology teacher candidates). These knowledge and pedagogy skill are functioned as alteration or transformation from the previous learning format to learning skill-based in 21st century needs to be taught to teacher candidates. As Wetzel said (2001) from his research that to change (learning pattern) pedagogy of a teacher is done through transformation process and learning plan (curricula).

Pedagogy transformation will give benefits to teacher candidates i.e. 1) revise or fix learning that is not simply doing routines, and 2) able to implement learning models that is available then formulated in relation with the necessity and IT support that are available at school later on after becoming a teacher. Therefore,

biology teacher candidates need to be trained in order to implement biology learning by using scientific approach supported by IT tools. Biology learning with scientific approach can be done by various models and learning strategies e.g. through learning based on experiment, investigation, even problem based learning, so that later on after becoming a teacher, they are capable on implementing them in the class. To support that kind of learning, laboratory (either class laboratory or field laboratory) is really necessary in order to shape biology concept and its relation between the first concepts to another (Atav and Altunoglu, 2010).

However, it is impossible to hope that science teachers in field would conduct a good activity in teaching and learning process, if when they are studying in LPTK, they only listen, and not experienced it by themselves (Nuryani, 2005). It is believed that LPTK institution can help teacher candidates to develop content related knowledge, pedagogy skill, and social concept which benefits the students' future (Spencer et al., 2005), and promote the knowledge and skill that is possible to make them learn in entire life time (Ghodke, 2013). LPTK have to often give experience through teaching practice, practice, or teaching students (Grootenboer, 2005/2006), so that teacher who can facilitate students to achieve desirable competence can be created (Devi, 2010), effective teacher would be: 1) as a very good class manager, 2) understand the concept of how to teach, so that students will master what they learn, and 3) have a high hope towards students' success (Kemendikbud, 2010). To be the effective teacher, it is necessary to have pedagogy competence which covers: 1) the ability to plan teaching and learning program, 2) the ability to interact or manage teaching and learning process, and 3) the ability to make an assessment. Therefore, teacher should be equipped with life process of 21st century which is needed to implement 2013 curriculum (Susilo, 2013).

The students of biology education in which one of them would be prepared to be biology teacher should be prepared well and seriously, so that professional graduates are created. National Constitution number 14 in 2005 about teacher and lecturer stated that teacher is a profession which requires the competence of that position. The needed competence to be professional teacher is pedagogy competence, personal competence, social competence, and professional

competence which are acquired from profession training. This means that pedagogy is the ability to manage the students' learning.

Armed with positive thinking that 2013 curriculum is planned and developed to prepare students in facing the life in 21st century and in the right time, teacher is necessary to develop the life process of 21st inside his students' mind, so that development of biology learning model is required in order to facilitate that process. It is the model of biology learning which oriented on the active and direct involvement of the students.

The learning process which involves students actively is a model which is based on constructive ideas of science and development theory of Jean Piaget. A constructivist paradigm, learning is a process of regulating ourselves in solving cognitive conflict which often occurs through the real experience, collaborative discourse, and interpretation. Therefore, learning is the active activity of students to establish their knowledge in which the learners itself who are responsible for all activities and learning results. The students themselves who are doing the reasoning through selection and experience organisation, also needs to integrate them to the matters that have been learned. Meanwhile, according to Piaget development theory is how humans gradually learn to achieve, build, and use their knowledge. The learners build their own knowledge and respond their experiences. Piaget stated that learning is the cognitive aspect development which consists of: structure, content, and function (Renner et al., 1988). The intellectual structure is the organisation with higher mentals that is owned by each individual to solve problems. Content is individual's characteristic in responding towards the problems' faced. Meanwhile, function is the intellectual development process, which consists of adaptation and organisation.

Based on the thought and the aforementioned fundamental theory, so that one the learning processes that is Learning Cycle model. Learning Cycle is the research based learning that is useful for teachers in planning the curriculum material and learning strategy in science (Abraham, 1997). Learning cycle model divided the instruction activity in the phase that is organized clearly so that the learners can master the necessary competences that have to be accomplished by

active involvement. In this approach, the lowest score students are given experience with the concept about what is necessary to be developed (Abraham, 1997).

The implementation of learning cycle model is hoped to be able to improve the quality of natural science learning (including biology) and able to improve the students' ability in their thinking, attitude, and skill management. Through the implementation of learning cycle model, it gives a logic framework to the steps of teaching and learning (Education and Child Development Department, 2007), students are good in solving problems as one of the efforts to improve learning quality and learning result (Widhy, 2012). The continuously teaching and learning (Benson, 2012) are focused on four main questions i.e. as follows:

1. What is the thing that the student needs to know, understand, and able to do? (Plan)
2. How can we teach effectively to make sure that the students learned? (Do)
3. How can we know whether the students learned or not? (Reflect)
4. What is the thing that we should do when the students were not studied or had not reached the desirable understanding? (Revise).

How to overcome the above-mentioned matter, especially for biology teacher who is going to implement the learning process based on 2013 curriculum (or often called K-13)? One of the ways in preparing biology teacher candidate in LPTK is taught by various biology learning process examples. As understood by all people that to help teacher candidate and teacher promotes knowledge or new skill, so that it is necessary to be trained. In the concept of scaffolding from Vygotsky, by the help of adults or persons who know more, so that the students can finish their tasks that have not been finished by themselves yet (Lakin, 2012, and Van Der Stuyf, 2002), they believe that the thing that the students can do with help today, they can do it by themselves tomorrow (Education and Child Development Department, 2007). In other words, if teacher candidates are not able or wrong in training of learning process, so that lecturer will directly help or support until they can implement new skill and strategy by themselves, so that biology teacher candidates have the experience with process, practice, and that model, thus the teaching skill based on model will be improved.

Besides, the result of the research by Robichauxand and Guarino (2012) showed that if teacher candidates are officially trained to immediately get reflection and think about their teaching skill, so that it is evident if they reflect important issues to be effective educator. By reflection, they can improve and enrich their teaching style (Neas, 2012). It is when reflection is needed to know the success of many purposes in many programs of teachers' teaching preparation (Hatton & Smith, 1995). Reflection can be done to improve learning and professional practice (Moon, 1999). The reflection can be used in cooperative learning to support learning practice (Harvey et al., 2010); reflection enables the experienced facility that can be understood publicly either during (inner reflection) and after (reflection) action (Schön, 1983). If managed well, reflection will support students to the knowledge about their practice, so that it adds their work experience based on learning (Harvey *et al*., 2010); produce reflection to reflect their own learning and by teaching them to think critically and philosophically (Moon, 1999). The reflective learning strategy can also be used by the teacher in class who wants to improve their teaching skill (Neas, 2012). The reflective teaching provides teacher with the chance to look into his or herself through their philosophical learning of them (how they teach), so that it challenges them to know their strength and weakness (Neas, 2012). Critical reflection is the important aspect of both teaching and learning (John Hopkins University, 2014). The feedback, comment, and discussion about reflection might come from mentor or adviser, observer, and coordinator and/or fellow teachers (John Hopkins University, 2014). As a reflection in the process of learning, it makes possible for the students to learn and observe their practices, reflection makes the students think critically in developing or understanding knowledge and new solutions to solve the problem (Park & Son, 2011).

The understanding and new knowledge will make them skilled and it is necessary to have a continuous practice or immersion in that activity (Melear & Lunsford, 2008). Immersion can improve professionality, process, and content for science teacher (WCER, 2006). Immersion model is needed for collaborative development and facilitation of professional development, so that the door of success would be opened, expanded, and sustainable of implementation of high

quality science instruction (WCER, 2006), prepare the description of instructional situation from their context by combining, revising, or completing them by technology to improve learning, and then implement strategy, use tools, and their scenario concepts in the whole teachings (ACRL, 2013).

Learning cycle model that is offered to overcome the above-mentioned problem based on Morrison, Ross, and Kemp thinking (2007) that designing learning if the purpose is to identify instructional, so that the components are as follows:

1. Need assessment (assessing the necessity) by the description: normative, comparative, feels, states, future, critical, incidental needs.
2. Goal analysis (the analysis of purpose) by the description: purpose, target, improvement, ranking, last rank.
3. Performance assessment by the description: knowledge or skill, motivation or incentive, management, interpersonal.

To handle the above-mentioned problem, the development of transformation model pedagogy of biology content integrated with IT in learning cycles at biology teacher candidates with the stages:

1. Need assessment, biology teacher candidates making an assessment based on needs (learning model, media, etc) the inquiry of students in learning.
2. Planning, teacher candidates make a plan to reach the desirable competence.
3. Implementation & Monitoring, implementation of learning is appropriate to the prepared plan, which then doing monitoring to the implementation of students' learning at once.
4. Evaluation, the final of the learning implementation is evaluated to know whether the purpose of integrated IT learning has achieved.

This stage is in the form of cycles, so that after evaluation, it is continued to need assessment, planning, implementation and monitoring, and evaluation, and so on. Among each stage, reflection is done to know the flaws and weakness, thus it would immediately be strengthened (as like scaffolding does) and immersion is done to strengthen the skill of biology teacher candidates.

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