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A Case Study of Biology Teaching Models in Rattaphumwittaya School Thailand

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Abstract

Science and technology has been included in all aspects of life not as well as education. Rapid changes of science and technology encourages the development and the use of effective teaching model. Thailand, one of the big countries in Southeast Asia, has developed a new curriculum and education system in 2008. This new curriculum and educational system impact on teaching models used. The purpose of this study was to describe the Biology teaching model applied in Rattaphumwittaya School Thailand. This study was a case study by qualitative research. Data were collected by observation, interviews, and documentation. Data were organized in five elements of the teaching model includes syntax, the social system, the principle of reaction, support systems, and the effect of teaching. It was found that the teaching models used includes direct instruction, group investigation, and inquiry training. The selected models for each level Mattayom depend on the student's character. Also, the higher grade , the less teacher dominance during learning.

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INTRODUCTION

Science can be found in almost every aspect of life. Science has a role in developing education system. Learning science can be implemented with a variety of approaches, strategies, models and methods of learning. Each approaches, strategies, models and methods produce different effects. Science method is the prime determinant of its potential to reach the conclusions with substantial worldview meaning. Public view about science and literature is that they can contribute to a meaningful worldview. Across the nations and over the centuries, various worldviews about science meaning have developed well (Gauch, 2009).

Nowadays, various models of learning grow rapidly. Models of learning develop based on the basic theories such as information process theory, social theory, personal theory, and behavioral theory. The development of learning models has led many countries in the world to reform their education system. Similar reforms have been seen elsewhere in the world. This worldwide trend began in the 1960s, focusing on curriculum renewal and pedagogical innovation in teaching and learning. Changes in the pedagogical practices have a basis with Dewey and Piaget's progressive approach to organize learning activities. In these approaches, students are placed at the center of learning process and control the learning process, not a teacher (Law & Miura, 2015).

Indonesia has made several changes to the curriculum. The recent change is the revision of Curriculum 2013. Based on the paradigm of Curriculum 2013, learning implementation also changes. According to Sinambela (2013), these changes demand scientific approach as the main learning approach.

Based on OECD/UNESCO (2016) report in a document of Education in Thailand, an OECD DA/UNESCO Perspective, Reviews of National Policies for Education, Thailand applied the Basic Education Core Curriculum 2008 to support the program of the National Economic and Social Development Plan. The purpose of this reformation system is to support the establishment of Thailand as one of the developed countries in the world. Thailand changed the curriculum in 2008. Improved Aspects in the standard Basic Education Core Curriculum 2008 are the signific of the capacity of students, the desired characteristics, learning standards and indicators, time for each subject to each grade level, and evaluation criteria which associated with learning standards and facilities in the implementation of the curriculum.

RESEARCH METHOD

This is a qualitative research to understand a phenomenon by focusing on the total picture of implemented models of learning in Rattaphumwittaya School (Ary *et al.*, 2010). Case study chosen as the research approach in order to explore detailed description and understanding the entity of the case.

The subjects of this research were a biology teacher (TM6), two biology training teachers (TM4 and TM5), and 12 students of class M4/1, M4/2, M5/1, M5/2, M6/1, and M6/2 which consists of two students from each class. Researcher descriptively discussed the data and concluded based on the results of observations, interviews, and documentation using triangulation techniques.

RESULTS AND DISCUSSION

Based on data analysis, it is known that Rattaphumwittaya School of Thailand applies various types of teaching model in biology learning process. The Description related phenomena obtained from the study are presented as follows.

Biology learning in Mattayom 4

The syntax in learning topic "Diversity of Living Things" can be divided into four main activities. First activity was an orientation that contains learning objectives and the disclosure of binomial nomenclature, classification and identification as the first subtopic. In Learning Plan Management this first activity was called as creating interest. Teacher mentioned things what will be discussed and must be mastered by students. This activity had an aim to draw students' attention to the main topic. The second activity was the division of students into groups and sub topic presentation material for each group. In this activity, students make a team, search and explore the learning resources and also give a presentation about the result. During students' presentation, teacher corrected students' misconception about the concept and followed with discussion by the teacher. The discussion was done after each group finished the presentation. The third activity was about discussion between teacher and students led by the teacher. At the end of discussion, conclusion was formulated by students with teacher guidance. The teacher mentioned the main topics and students draw the conclusions based on the topics. The fourth activity was giving tasks to the students to make kingdoms of living things concept map and its benefits in life. These tasks must be done independently and individually. These concept maps were used as learning assessment instrument.

Teacher controlled learning process entirely and dominated the class. The teacher had a role as the learning center and students learning resources. Nevertheless, students had opportunities to actively contribute in the classroom by asking them to seek the learning resources, explain the materials, and give conclusion after learning process.

All student's activities were under teacher's instruction. Mattayom 4 students have been considered does not have a good ability at thinking, so teacher controlled the class. For example, students cannot summarize what the characteristic of gymnosperms and angiosperms based on its breeding organ is.

Learning designed by teacher required a lot of sources and learning media. Learning resources that can be observed on the topic of Living things diversity included biology books, powerpoint slides of Living Things Diversity, and E-book prepared by the teacher.

Through learning designed by the teacher, students were expected to be able to understand topic discussed. Moreover, students were expected could improve their learning skills. The documentation of Learning Plan Management 13th stated that learning objective includes students are able to show their skills of thinking and communicating in the learning process and students have a sense of curiosity and methodical thinking.

Based on Joyce & Weil (2016), teaching model used in biology learning in Mattayom 4 is a direct instruction model. Direct instruction model consists of five steps activities, they are orientation, presentation, structured practice, guided practice and individual practice. The social system formed during learning process with direct instruction model is very structured. This model emphasizes the application of small groups to deal with and learn instructions given by teacher and use those instructions in the learning process. The teacher encourages students to keep forward with their realistic achievement assessment.

Curriculum of Basic Education Core Curriculum B.E. 2551 mandates to use Student-Centered Learning (SCL) approach. SCL approach emphasizes on the shift of teacher responsibility that become smaller and allows students to take control in learning process (McCabe & O'Connor, 20014). Nevertheless, seen from the dominance of teacher in a learning process that is big, direct instruction model is a learning model with Teacher-Centered Learning approach. It may be influenced by students' characters that do not have a good thinking skill. Joyce & Weil (2016) stated that direct instruction learning model is aimed at students with low skills. Teaching student with low

thinking skill by SCL approach takes more time. Meanwhile, topic of Living things diversity was only taught in 4 hours lesson.

Lee in Meyer & Crawford (2011) stated that direct instruction required students as clear guidelines to learn science. Direct instructions helped students to get used to the scientific language and scientific activity in learning process. Hence, students in Mattayom 4 tend not to understand knowledge and skills were taught in learning process. It indicated that instruction given by teachers were not clear enough for students to be understood.

Learning Plan Management 13th document explained that skill of thinking become the expected learning outcomes. Direct instruction teaching model could improve metacognitive skills and critical thinking if this learning plan model can be applied maximally. Students ability to choose the way of solving problems, deliver new idea in learning, and critical thinking development can be well stimulated in learning using direct instruction model (van de Kamp *et al.*, 2014; Tiruneh *et al.*, 2015).

Biology learning in Mattayom 5

The researcher's interpretation result shows that syntax in learning topic "Kingdoms of Living Things" can be divided into five main activities. The first activity was opening, explaining about learning activity, and learning objectives. Here, teacher presented an explanation about kingdoms of living things completely. Initial expalanation from TM 5 was only about groups of living things based on 5 kingdoms without explaining the characteristic of each kingdom. The second activity was dividing students into groups and choosing a learning source. Students chose their group members and the learning source that would be used in learning process. The third activity, students had worked with their own groups. Each member of a group chose their own task. Students started to choose and sort the learning source to arrange mind map. In this activity, TM5 Teacher had a role as facilitator and counselor. If there was a student asks about something, teacher did not answer the question directly yet only gave them how to get the answer. Fourth activity was about presentation and session for question and answer. Teacher gave questions to students based on mindmap whether related to the context or in the form of mind map. Fifth activity was an oral test. This test was done by face to face and individually.

Teacher did not dominate to create a situation in class or cooperative and democratic social system. Teacher allowed students to work and determine how to learn by highlighting topics had been determined by teacher. Students became the center of learning, explained the material, and gave their conclusions.

The teacher responded positively individual students' activity in finding materials. Teacher provided cooperative atmosphere so students could do their work, discussed and helped each other in a group.

Learning was arranged by teacher by using various tools and material including A2 sized paper, stationaries, books, and learning resources. Those tools and materials were used to make a mind map. Students activity in making mind map supported active learning activity, co-operative and democratize.

Learning outcomes which could be observed such as material mastery, students ability at working in a group, discussion and speaking skills. In Learning Plan Management 21st documentation stated that learning objectives includes students could show their creative thinking and communication skills.

Research result shows that learning model used in Mattayom 5 was group investigation model. The model involves students in arranging topics will be discussed and how-to investigation (Arends, 2008). Siddiqui (2013) stated that group Investigation Model tries to combine in one teaching strategy the form and dynamics of the democratic process with the process of academic

inquiry. Joyce & Weil (2016) added that social system in group investigation model learning requires democracy and interaction among students. The teacher encouraged students to move forward with realistic score achievement. Implementation of this model should be supported by many learning resources and interactive learning media. Students are expected not only understand the material but also have the ability to work in group and build knowledge. Besides, students are also expected to be able to improve their independence in learning and respect each other.

Each group found and transferred knowledge to other students so all groups had same knowledge and based on outline given by the teacher. Then automatically, interaction among students are formed. Akçay & Doymuş (2014) stated that these models have the aim to give responsibility to the students, students learning, and students interaction to others.

Decentralization of learning procedures give students freedom to set appropriate cooperative rules, functional, and acceptable (Koutrouba *et al.*, 2012). Decentralization that occured in learning kingdoms of living things in Mattayom 5 could be seen in the freedom of students to determine how to study, and choose their learning resources.

Biology learning in Mattayom 6

The syntax in learning topic "Respiratory System" could be divided into five main activities. First activity was a topic explanation by teacher. Teacher explained the topic used presentation media. Teacher also presented by contrasting facts about respiratory system. Thus, students argued their argument. The second activity was teacher verification on matters claimeding by students. This event included in the presentation given by TM6 teacher. Third activity was practical work about a pig lung surgery. Two students had a role as doctor and nurse who operated the lung. Other students observed and discussed the findings obtained during the surgery. This was due to limited costs and practical work supporting facilities. Fourth activity was drafting the findings during the surgery into concepts. Teacher guided and explained findings in the activity. This was done to facilitate students to associate the surgery result into obtained theory. Fifth activity was about making a report of surgery result. Reports were written in students' note books. This report had aim as the instrument of learning assessment.

Teacher controlled the activity and class situation through instructions and research procedures designed by teacher. However, students were free to explore knowledge during the learning process. It could be seen in presentation activity about topic discussed. Students had a role as the subject to convey some of sub-topics that have been determined. In the activity of lungs pig surgery, students also played an active role by joining to dissect, questioning, and delivering opinion about the findings in the surgery session.

Teacher's positive responds to the students created intellectual atmosphere. Every student allowed to ask questions and give opinion about surgery findings. Teacher facilitated students' needs and guide students to think critically. Teacher also encouraged interaction among students by asking students to share their knowledge and through discussions.

Teacher designed learning by using various tools and materials including lungs pig specimen, surgical instrument, and laboratory safety equipments that were used as supporting surgery practicum learning. Procedures of lungs pig specimen were arranged by teacher. Powerpoint and biology book as students learning resources. Practicum result report about lungs pig surgery were made by students individually and as students' assessment work.

Visible outcomes in learning process were students' understanding about the topic discussed, and scientific skills. Besides, in Learning Plan Management 10^{th} documentation, students encouraged to think logically.

Interpretation result indicated that the model used in biology learning in Mattayom 6 was a inquiry training model. The inquiry training model put students as the center of the learning process.

Students seek and discover their own knowledge. Teacher acted as a mentor and learning facilitator. Joyce & Weil (2016) explaine that the inquiry training model consists of five stages of activity. They are the stage of dealing with problems, verification, experimentation, process data, and process the research. The social system was formed in the model of inquiry training was controlled by the teacher through the interactions formed by the teacher-designed research procedure. This model emphasizes the scientific processes.

According to Banchi & Bell (2008), in learning the topic of the respiratory system in Mattayom 6, the inquiry training model used was at the structured inquiry level. This was seen from the questions and procedures that were still provided by the teacher.

The inquiry training model has enabled teachers to conduct continuous and comprehensive evaluations by observing and recording students' learning abilities during various activities conducted in the classroom (Latchanna & Swarnalatha, 2016). However, students' evaluation in understanding materials were only obtained from result report of pig lung surgery. This was influenced by facilities and infrastructure that support the laboratory activities. Only two students were able to perform surgery directly because of limited facilities and infrastructure. Thus, a comprehensive assessment by observing and recording all students' learning abilities during surgical activities can not be performed.

After using the inquiry training model in the learning process, students got skills to use scientific method. The scientific method is a modified form of scientific steps in science. Students were involved in the scientific process of learning activities. Students, indirectly hadalso acquired the skills of the science process.

CONCLUSION

Rattaphumwittaya School Thailand implemented various types of teaching models in the biology learning process. Based on the analysis and discussion of the results of research, teaching models used were direct instruction, group investigation, and inquiry training. Selection of models for each level Mattayom depend on the student's character. The higher level of Mattayom, the less dominance of the teacher during lessons. Besides these models, other types of teaching models also used.

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