



Teachers' Scientific Approach Implementation in Inculcating the Students' Scientific Attitudes

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Abstract

The study aimed at attaining an overview on teaching experiences by means of guided inquiry model of the scientific approach in order to inculcate the scientific attitudes among the students of Luqman Al Hakim International Integrated Islamic Primary School Yogyakarta. The study was a qualitative research using the ethnographic classroom approach. The subjects in this study were the headmaster, the homeroom teachers of Grade 4A students, and the Grade 4A students. In collecting the data, the researchers conducted interview, observation, and documentation. Then, the instruments that the researchers employed were the interview guidelines and the observation guidelines. The data in this study were analyzed using Lankshear and Knobel models and the analysis also included the data that had been attained from both the observation and the interview. In order to test the data validity, the researchers conducted the subject triangulation and the method triangulation. The findings in this study thus revealed that the teaching activities that make use of the scientific approach consists of seven strands of learning cycles and these strands include the spiritual, moral, intellectual, physical, interpersonal, cultural, and social aspects. Each aspect has specific purpose and, as a result, by implementing each aspect the students will have the scientific attitudes similar to those owned by a scientist in solving their problems. The recounted teaching experiences, which made use of the scientific approach, have shown similarities in that teaching activities become more meaningful if they are conducted realistically with various learning activities both inside and outside the classroom. The constraints in the application of the scientific approach are varying the teachers' ability in understanding the scientific approach, varying the learning styles and the learning abilities, and varying the learning process for the students who need special assistance.

Keywords: scientific approach, scientific attitudes, Luqman Al Hakim International Integrated Islamic Primary School Yogyakarta

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Introduction

Education is the fundamental pillar in upholding a nation. Through education, a nation will be able to uphold the national dignity. Education is expected to be able to give birth to well-educated, noble, and aware nation that pursues harmonious life, tolerance toward diversity, democratic and global national insights, and enlightenment and welfare. This statement is in accordance to the opinion by (Siswoyo, 2007, p. 17), namely that education plays a vital role in the life and the advancement of human beings. As a result, through the existence of education well-qualified human resources can be generated.

Education is ultimately vital within the national development. The national development that has been undergone up to date demands intelligent, skilled, trained, creative, and hard-working human resources who have positive attitude toward the job ethics. The statement has been in accordance to the idea that has been mandated in the Law of National Education System Number 20 Year 2003 Verse 3 namely: "National Education serves to develop the capability of and to shape the attitude of well-qualified national civilization in order to enlighten the life of the nation as well as to develop the students' potentials in being pious and faithful toward Lord the Almighty, noble,

healthy, knowledgeable, creative and also in being democratic, and responsible individual.” (Presiden Republik Indonesia, 2003).

The national education does not only emphasize the students’ intellectual ability but also the students’ attitude formation and, equally important, the students’ capacity to explore and to develop their scientific attitudes. However, in the practice the national education has become a boomerang and even a burden toward the students. The education has been reduced to teaching and, as a consequence, the education has been unable to meet the requirements stated by the Law Number 23 Year 2002 Verse 9 Article 1 regarding the Child Protection (Presiden Republik Indonesia, 2002). This law mandates that each child has the right to attain education and teaching in order to develop his or her personality and intellectual level in according to his or her talent and interest. In the same time, the reduction has also violated the Law Number 20 Year 2003 regarding the National Education System Chapter V Article 12 Verse 1-b which states that each student in every educational unit is entitled to attain educational service in accordance to their talent, interest, and ability (Presiden Republik Indonesia, 2003).

The problems in education become more complex because of the ever rapid and modern technological development and the more complex, dynamic, and globalized challenges provided by the 21st Century. This situation has even become more severe due to the moral decadence in the present time. Altogether, these conditions have become a peculiar challenge for the educational practitioners and developers.

According to Lickona (1991, pp. 13–18), there are 10 tendencies of problems among the school children or the youths namely: (1) violence and vandalism; (2) stealing; (3) cheating; (4) disrespect for authority; (5) peer cruelty; (6) bigotry; (7) bad language; (8) sexual precocity and abuse; (9) increasing self-centeredness and decreasing civic responsibility; and (10) self-destructive behaviors. These tendencies appear due to the lack of character education in the school. Up to date, the character education has been touching the level of norms or values introduction; the character education has not touched the level of internalization and actual action in the daily life.

As the effort of human resources with characters, education is not apart from well-qualified learning process. In this regard, the

educational regard should be in accordance to the appropriate teaching process in order that the learning process will be conducted well. The learning process should be an effort to create smooth service and conducive climate toward the various students’ ability, interest, talent, and needs so that the will optimal interaction between the teachers and the students and among the students themselves.

In order to make the learning process more enthusiastic and more cooperative among the students, the learning process that will be conducted should be able to improve the students’ reasoning creativity. The direction of the learning process should not be one-way; instead, the direction should be more creative so that the learning process will be able to improve the cooperation between the teachers and the students and among the students themselves. Through such process, the students with poor conductance will be assisted by the students who have good conductance so that the learning results will be better.

Learning activities are not apart from interconnected components namely teachers, students, learning process, and curriculum. The teachers’ activities in designing a learning process for their students are an important matter. One part of these designing activities is determining the learning approach, strategy, and technique. If the teachers select the inappropriate learning approach, method, strategy, and technique then it can be assured that the learning process will not be effectively conducted. On the other hand, if the teachers successfully select the appropriate learning approach, method, strategy, and technique then it can be assumed that the learning process will be effectively conducted. Based on this assumption, the teachers are demanded to be able to select and to implement the appropriate learning approach, method, strategy, and technique according to the mandate of the governing curriculum so that the students may conduct the learning process enjoyably in order to achieve the learning objectives.

In order that the learning objectives can be achieved, the learning process is emphasized on the dimension of modern pedagogy namely a learning process that demands an approach that will be able to inculcate the scientific attitudes into the students. The scientific attitudes that will be inculcated are similar to those that the scientists have had in solving multiple problems of their daily life. Such approach is known as

scientific approach and it becomes the main catalyst in the learning process. The scientific approach is believed to be the golden bridge of students' attitude, skills, and knowledge growth and development in any approach or any process that demands scientific criteria.

The previous learning process made use of scientific approach and scientific approach is a combination of the learning process that has been focused on exploration, elaboration, and confirmation and the learning process that has been equipped with the activities of observing, inquiring, experimenting, reasoning, and communicating (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2013). However, some schools have developed a learning process that makes use of the activities of observing, inquiring, collecting data, processing data, communicating, innovating, and inventing (Kemendikbud, 2013). Despite these differences, the objective of the learning processes should be in the same corridor of the scientific approach namely to emphasize learning process does not take place only inside the classroom but also outside the classroom such as in the school environment and the community. In addition, through such learning processes the teachers will only need to serve as a scaffolding when the students have difficulties and the teachers will not only be sole learning source. Similarly, through these processes the scientific attitudes will not only be taught by means of verbal manner but also of example and role model. The results of several studies have mentioned that there are significant differences among the students before and after they have attended the scientific inquiry-based learning process; the difference lies in the fact that the students' have better scientific attitudes after they have attended the scientific inquiry-based learning process (Ikaningrum & Gultom, 2013). With the presence of scientific approach in each learning process, the students will be habituated to performing scientific reasoning in solving the problems that they should deal with so that the students will have scientific attitudes in drawing conclusions from their problems.

Based on the results of observation toward the Luqman Al Hakim International Integrated Islamic Elementary School, the researchers found that this elementary school has been implementing a learning process that inculcates the scientific attitudes toward their students since 2008. The inculcation of these scientific attitudes has been conducted from the

First-Grade students to the Sixth-Grade students through a thematic integrative learning process that makes use of scientific inquiry approach. This elementary school even used to be a model for the implementation of 2013 Curriculum throughout the Province of Yogyakarta Special Region in 2013.

Within the learning process, this elementary school has made use of scientific approach as the approach that trains the students to performing scientific reasoning as early as possible. The students have been taught to be little scientists through multiple learning methods and strategies such as Inquiry. In this regard, the school has been implemented the guided inquiry. The activities of guided inquiry consist of observing, enquiring, reasoning, experimenting, and communicating their findings through a presentation in front of the class. Even last month the elementary school held a mini expo as an event that expressed the students' work. In addition, based on the results of an interview with one of the Fourth-Grade teachers the researchers found that the elementary school has also made use of descriptive rapport as the report of the students' holistic learning result development. Completing the descriptive rapport is certainly not an easy task. The teachers should totally understand the background of each student in terms of their talent, interest, characters, and capacity. The completion of such descriptive rapport is interesting to study because through the learning experiences that have been attained by using the guided inquiry-model scientific approach the scientific attitudes might be inculcated into the elementary schools. Therefore, the researchers would like to conduct an in-depth review toward the learning experiences that have been attained by using the guided inquiry-model scientific approach in inculcating the scientific attitudes toward the students of Luqman Al Hakim International Integrated Islamic Elementary School Yogyakarta.

The meaningful learning experiences that have been attained by using the guided inquiry-model scientific approach are expected to expand the students' knowledge in order to prepare well-qualified future generation and human resources of Indonesian people. Due to the statement, the learning process in the schools should be the place for manifesting the four educational pillars (UNESCO, ...) namely learning to know, learning to become him-/herself, learning to do, and learning to live

together. By doing so, young mankind (students) are brought into the environment of their adulthood in order to meet the true nature of human beings. In the same time, Indonesia might be in competition with other advanced countries in the domain of education.

Method

The study was a qualitative research using ethnographic classroom approach. A study of ethnography might be performed in order to attain deeper understanding toward certain rules that based the phenomena that had been experienced or that had been possessed by a group of people who had interaction in a socio-economic, religious, political, and geographical environment such as belief, language, values, rituals, customs, and behaviors (Creswell, 2012, p. 473). In the context of education, a study of ethnography might be used in understanding the pattern of interactional relationship between the teachers and the students in the school. The ethnographic analysis was inductive and was established based on the perspective of the people who conducted the research.

The study was conducted in the Luqman Al Hakim International Integrated Islamic Elementary School Yogyakarta. The elementary school was selected as the research site after the researchers had observed and had analyzed the track records of the elementary school. Based on the results of both observation and analysis, the researchers might conclude that the elementary school had been implementing the guided inquiry-model scientific approach since 2008.

The study took place from February until March in the second semester of the 2014-2015 Academic year.

The subjects in this study were randomly selected. The subjects were selected based on the following criteria: the subjects should belong to the classroom that had been implementing the guided inquiry-model scientific approach for at least three years and the subjects were the teachers who had been experienced and who had understood how to inculcate the scientific attitudes toward the students through the learning process. Both criteria should be met in order to ease the researchers in gathering the data around the Luqman Al Hakim International Integrated Islamic Elementary School. Then, the subjects included: the principal, the Fourth-Grade teachers, and the Fourth-Grade students.

In gathering the data, the researchers implemented the following techniques: observation, interview, and documentation.

The instrument in the study was the researchers themselves. However, when the focus of the study had been clear the researchers developed a simple research instrument that might complete and compare the data that had been attained from both the observation and the interview. The instruments that had been applied in the study were observation guideline, interview guideline, documentation, and fieldnote.

Then, the techniques that had been implemented in order to validate the data in the study were participatory extension, observation persistence, and triangulation.

On the other hand, the data analysis techniques in this study were performed altogether with the data gathering process. The process of both the data analysis techniques and the data gathering activities would be elaborated in the following sections.

Data Processing

The data analysis in this study was conducted directly after the researchers had gathered the data from each participant. After the data had been gathered, the researchers conducted the process of intuiting, analyzing, and describing. The data processing activities that had been conducted were documenting the data that had been attained from the results of observation, from the results of interview, and from the fieldnotes. The documentation was conducted by replaying the results of the recording activities and by transcribing the speeches. Then, these data were encoded in order to ease the data analysis. The data should be encoded because the code would differentiate the keywords of each participant.

Data Analysis

After the overall data had been gathered, the researchers would conduct the data analysis. In this study, the data analysis would be conducted by implementing the techniques of interview data analysis and of observation data analysis. The activities in the data analysis began with listening to the participants' verbal description from the observation results and with reading repetitively the results of interview transcription. According to Lankshear & Knobel (2004), the stages of analysis should be as follows: (a) preparing and organizing the interview data and the observation data for the

analysis; (b) analyzing the code/category as the approach to analyzing the interview data and the observation data; and (c) conducting domain and taxonomic analysis. Afterwards, the researchers would compose the final description in a narrative form as the composite description of the experience meaning and essence so that the researchers could display the picture of experiences in a single unit.

Results and Discussions

Results

The results of the study that had been conducted in Luqman Al Hakim Integrated International Islamic Elementary School Yogyakarta regarding the use of scientific approach in inculcating the scientific attitudes toward the Fourth-Grade students would be elaborated in the following sections.

The Implementation of Learning Process

The scientific approach within the learning process of 2013 Curriculum is similar to the implementation of scientific learning stage within the elementary school. This learning stage is known as "7M Learning Cycle." The 7M Learning Cycle refers to the standards of scientific learning process that has been developed from the dimension of literacy within the curriculum of the elementary school and the dimensions in this cycle are spiritual, moral, intellectual, physical, interpersonal, cultural, and social (Tim Kurikulum, 2012, p. 9). Then, the 7M Learning Cycle itself consists of seven stages that have been developed from the seven fundamental learning potentials namely: (1) *mengagumi* (admiring); (2) *menghayati* (contemplating); (3) *meneliti* (researching); (4) *merealisasi* (realizing); (5) *mengkolaborasi* (collaborating); (6) *mengaktualisasi* (actualizing); and (7) *memberi* (contributing).

The implementation of each stage in this learning cycle has respective objective and benefit. Multiple learning activities that the students conduct will be able to shape strong personal characteristics within the students. In addition, these activities are also able to inculcate the students' scientific attitudes in the form of curiosity toward scientific truths, critical thinking toward the given assignments, diligence and persistence in searching the information truth, teamwork, environmental sensitivity, and alike. These scientific attitudes

may serve as the students' guide in dealing with their both present and future problems.

Based on the results of the observation, prior to implementing the 7M Learning Cycle the teachers designed a unit plan. The steps that the teachers conducted in designing the unit plan would be provided in the following paragraphs.

First, the teacher mapped the Competence Standards/Basic Competences. The mapping of competence standards/basic competences was conducted for each lesson that might be integrated in order to see what themes that would be suitable for serving as the main theme and whether it would possible to integrate the competence standards and the basic competencies of each lesson under the main learning theme or not.

Second, the teacher designed the questions. In this stage, the teacher would start from fundamental questions. The questions could be such as: "Why should the students learn certain topics?" "What are the benefits for the students in the future?" "What is the relationship between the learning process and the real life that the students will encounter?" Through these questions, the teachers would involve the students in discussing certain matters in order that they would harness the essence of the subjects that the students would study.

Third, the teacher designed a plan. In this stage, the teacher would define which content standards that he or she would discuss when they answered the questions from the themes that had been defined. Through this activity, the teacher would involve the students in a process of composing planning questions and of developing projects.

Fourth, the teacher designed an activity schedule. Both the teacher and the students designed an activity schedule for the project components. Then, they would define which standards that they should acquire. In this stage, the teacher should pay attention that the activity schedule should be made simple and in accordance to the age of the students.

Five, the teacher conducted monitoring. The teacher facilitated the process that the students needed to carry out their projects. The teacher served as a mentor or a consultant within the learning process. In this stage, the teacher could make use of criteria standards for monitoring the students' conductance.

Sixth, the teacher conducted assessment. The teacher devised an authentic assessment

without various types of assessment. The authentic assessment would demand lots of times and efforts from the students.

Seventh, the teacher conducted evaluation. The teacher should devote their time to reflect on the students' work both in persons and in groups. The teacher should ask the students to express their various experiences and feelings. Then, the teachers should also discuss which matters that went well and which matters that should be improved. The students might also share ideas that would lead to the new questions so that new projects could be created in the future.

Learning Experiences

Based on the data from the observation and the interview within the classroom, the participants expressed their teaching experiences. There were several learning models that had been implemented in the elementary school. However, these models were collaborated in a container namely the project-based learning unit plan.

Each project in the unit plan also contained other learning models such as discovery learning/guided-inquiry learning and problem-based learning that had been adjusted to the activity of each stage within the 7M Learning Cycle such as: understanding the verse of the Koran as the basis of a research, discussions, video playbacks, exhibitions/mini expos, and alike. These multiple learning activities provided direct experiences to the children so that the knowledge that they grasped would always be remembered. In addition, these activities also trained the students to inculcate their scientific attitudes in encountering the problems in their life, to share from one to another, and to be aware of their surrounding environment.

Obstacles within the Learning Process Implementation

Also based on the data from the observation and the interview within the classroom, the researchers found several obstacles within the learning process implementation. These obstacles came from both the teachers' party and the students' party. The obstacles that came from the teachers' party covered the planning and the technical problems. The planning problems were: the different teachers' capacity regarding their understanding toward the scientific approach, the limited time in designing

the classroom administration, the inappropriate project planning within the unit plan that led to the activity replacement so that the related project would be more appropriate to the learning theme. On the other hand, the technical problems were: the various students' capacity, the teachers' replacement due to certain circumstances that occurred within the learning process, and different students' learning styles.

The obstacles that came from the students' party were covered the learning preparation problem and the learning activity problem. The learning preparation problem was the students' neglectfulness in bringing the objects that would be necessary for their projects while the learning activity problem was the students' difficulties in understanding certain materials; some of the students even disliked certain subjects. Despite these obstacles, the students still had high enthusiasm in reaching their dreams because they gained good support from the environment.

Discussions

Based on the results of the study, the researchers found that the Luqman Al Hakim Integrated International School Yogyakarta had been developed into an elementary school that created the scientific based learning system and atmosphere. The basis of this development was the religious values that had been in accordance to the Koran, which had been fundamental since the establishment of the elementary school. The elementary school believed that each student has different potentials and characteristics.

Appropriate education may develop the best potentials that the students have; as a result, such education may give birth to the perfect human beings. Therefore, educational objective should be defined more practically and systematically. Tauhidi (2001, p. 42) argued that education should have certain objectives for developing 7 fundamental potentials that have been aware by God the Almighty. These 7 fundamental potentials are as follows: spiritual, moral, intellectual, physical, interpersonal, cultural, and social. The 7 fundamental potentials that have been developed by the elementary school into the 7M Learning Cycle that includes: *mengagumi* (admiring), *menghayati* (contemplating), *meneliti* (researching), *merealisasi* (realizing), *mengkolaborasi* (collaborating), *mengaktualisasi* (actualizing), and *memberi* (contributing).

The 7M Learning Cycle is actually a scientific approach that has been implemented in the elementary school. The name of 7M Learning Cycle is selected because the learning stages in this cycle are similar to those that have been implemented sequentially from the first M (*mengagumi* or admiring) until the seventh M (*memberi* or contributing). This scientific learning process has been implemented from the First Grade to the Fifth Grade. Consequently, each classroom will certainly have experienced the learning cycle and as time passed by the learning cycle have become the part of the students' culture.

The differences between the 7M Learning Cycle and the scientific approach within the 2013 Curriculum lie in the stage number and the implementation period. The scientific approach within the 2013 Curriculum consists of six stages namely *mengamati* (observing), *menanya* (inquiring), *menalar* (reasoning), *menyaji* (presenting), and *mencipta* (inventing) (Permendikbud No. 65 Tahun 2013). In the recent policy, these stages might be conducted randomly and the implementation of the six stages might be conducted daily. On the other hand, the 7M Learning Cycle refers to the learning sequences that have been designed through integrative-thematic manner through seven stages of learning process that should be conducted monthly. These stages are namely *mengagumi* (admiring), *menghayati* (contemplating), *meneliti* (researching), *merealisasi* (realizing), *mengkolaborasi* (collaborating), *mengaktualisasi* (actualizing), and *memberi* (contributing). In the implementation of these stages, the teacher might make use of several learning models such as project-based learning, guided-inquiry learning, and problem-based learning.

From these differences, it is apparent that the 7M Learning Cycle that has been implemented in the Al Hakim Integrated Islamic International Elementary School is more prominent than the scientific approach that has been designed in the 2013 Curriculum. In terms of stage number, implementation process, learning activities, and also according to the students' learning styles, the 7M Learning Cycle is more variative. As a result, the students' learning motivation and cognitive development can be improved and the students' scientific attitudes can be inculcated. The reason is that the cycle learning has been a thinking and acting manner that is consistent to how the students

naturally conduct exploration and investigation (Sole & Wilujeng, 2013, p. 48).

The 7M Learning Cycle has been programmed in the learning themes through the project-based learning (PBL). In each theme, the project-based learning is implemented for approximately one month in order to complete all of the stages in the learning cycle. Then, in each learning stage there are learning activities that contain other learning models namely guided inquiry learning model and problem-based learning model; the two learning models are adjusted to the activities in all stages of the learning cycle. All of these learning activities are summarized in the learning plan known as the unit plan. Unit plan refers to the lesson plan that a teacher has designed in order to implement the 7M Learning Cycle; the unit plan consists of: theme, time of implementation, learning activities (sequence and types) in each stage of the learning cycle, and the possibly integrated subjects.

The use of project-based learning enables a scientific learning process to be integrated. The curriculum of each subject has its respective functions and supports one another in completing a project. Consequently, a more effective learning process may be enabled in terms of time, teaching process, and students' learning results.

According to the data that have been attained from the documentation, the followings have been the reason why the Al Hakim International Integrated Islamic Elementary School has been implementing the project-based learning through the 7M Learning Cycle. The first reason is related to objective visualization. Through the objective visualization, the students are able to imagine a brighter future. The idea is that if the students where they are heading to then they will be more able to find out the ways to get to their destination. Then, the second reason is related to critical and reflective thinking. Through the critical and reflective thinking, the students are able to question the existing system and belief. In the same time, they are also able to understand the assumptions that underlie knowledge, perspective, and opinion. Critical thinking helps people to learn to evaluate economic system, environment, social structure, and culture in the context of continuous development. Next, the third reason is related to systemic/holistic thinking. Through the systemic/holistic thinking, the students are able to understand complexity, identify

association, and to conduct synergy as they are trying to find the solution for a problem. The fourth reason is related to partnership/teamwork building. Through the partnership/teamwork building, the students are able to promote dialogue and negotiation and also to learn to cooperate. Last but not the least, the fifth reason is related to participation in decision-making process. Through the participation in decision-making process, the students are able to empower each of their peers.

These characteristics certainly cannot be attained in a passive learning process where the students just sit and wait for the information that the teachers will provide. While the students' skills cannot be shaped overnight, Anindyta & Suwarjo (2014, p. 220) has stated that the students' critical thinking skills will not be developed immediately without the teachers' supports. Darmayanti & Wibowo (2014, p. 31) has also stated that in the context of character education habituation is created in order to enable the students to habituate themselves so that they will behave according to the characters that have been inculcated and personalized from the through the intervention process. Therefore, all skills should be trained since the beginning of the learning process and such training also includes the attitudes of conducting scientific skills. Conducting these attitudes such as the scientists will take a long time in terms of learning implementation so that the students will be habituated to conduct such attitudes in their daily life.

Based on the results of the study, the process of implementing the 7M Learning Cycle and of inculcating the scientific attitudes for each stage will be elaborated as follows.

First Stage: Mengagumi (Admiring, Spiritual Aspect)

Mengagumi (Admiring) is the first stage of the learning cycle. This stage is ultimately important to complete because throughout this stage the students will build their curiosity by conducting various interesting learning activities such as: listening to stories, watching videos, outing to certain places, and alike. In this first stage, the emphasis will be highlighted to the objective that the students admire the creation of God the Almighty. The objective of this stage is to develop the God-Conscious Spirit among the students. In this stage, the teachers will lead the students to find their admiration toward the signs (the verses) that He has made. This

admiration might be attained through the signs (the verses) that they can identify and grasp through their five senses. According to the scientific approach of 2013 Curriculum, this stage is known as *Mengamati* (Observing).

Second Stage: Menghayati (Contemplating, Moral Aspect)

Menghayati (Contemplating) is the second stage of the learning cycle. In this stage, the students are exposed to the facts that have been in contrary to the existing excellence and miracle. These facts show the opposites of the information that the students have attained in the "*Mengagumi* (Admiring)." The objective is to make the students aware of the fact that these excellent or miraculous signs may change anytime. Human beings may also change these signs into the better one or they may even destroy these signs. From the activities that have been conducted in this stage, the students learn to behave critically, to be humble, and to understand the governing values in the real life that surrounds them until the moral principles of self-directed individual have been inculcated in their personality. According to the scientific approach of 2013 Curriculum, this stage is known as *Menanyai* (Inquiring).

Third Stage: Meneliti (Researching, Intellectual Aspect)

Meneliti (Researching) is the third stage of the learning cycle. The objective of this stage is to demand the students to conduct research in accordance to their age level. When the students are children, they can be quite trained in conducting simple research. As the students grow up, they are demanded to conduct more complex research. There are many things that can be researched with regards to the signs (topics/themes) under study. This will depend on the perspective that bases the research plan of both the teachers and the students. The more perspective that they refer to, the longer the time of implementation will be. Therefore, the teachers and the students would select the relevant perspective as the focus of their research. In this stage, the students' cognitive knowledge has been improving as they are able to think critically, to be creative, and to be encouraged in making decisions. As a result, the students will grow along with the complex thinking skills (complex thinker). According to the scientific approach of 2013 Curriculum, this stage is known as *Mencoba* (Experimenting).

Fourth Stage: Merealisasi (Realizing, Physical Aspect)

Merealisasi (Realizing) is the fourth stage of the learning cycle. In this stage, the students are demanded to realize their new understanding by practicing it in the form of a project. The students are encouraged to create real work in relation to the topic that they have been studying. The project may involve individual work or group work. The objective of the project is to strengthen and to consolidate the new understanding that the students have attained from the previous stage. Here, the students learn to express themselves and to develop their creative skills in visual and kinesthetical form. From this stage, the students with well-balanced personality might be shaped. According to the scientific approach of 2013 Curriculum, this stage is known as *Menalar* (Reasoning).

Fifth Stage: Mengkolaborasi (Collaborating, Interpersonal Aspect)

Mengkolaborasi (Collaborating) is the fifth stage of the learning cycle. This stage collaborates the knowledge that have been attained from the previous stages namely *mengagumi* (admiring), *menghayati* (contemplating), *meneliti* (researching), and *merealisasi* (realizing). In this stage, the objective is to demand the students to benefit the cooperative learning (collaboration) strategy. The students are divided into several groups and they are encouraged to share and discuss what they have learned. The teachers will structurally lead this sharing and discussion activity. Another example of this stage is the teachers ask the students to create posters that contain their experience from the stage of *mengagumi* (admiring), *menghayati* (contemplating), *meneliti* (researching), and until *merealisasi* (realizing). All of the students' experiences can be put in a single poster within the group discussion. In addition, the teachers may also invite the students to share the results of their discussion through wall magazine, school magazine, newspaper, website, and alike. With this collaboration, the students will learn the good communication manners, mutual sharing, cooperation, difference embracing, friendliness, and social spirit so that they will have the capacity of serving as a partner in the collaborative (Collaborative Partner). According to

the scientific approach, of 2013 Curriculum, this stage is known as *mencipta* (inventing).

Sixth Stage: Mengaktualisasi (Actualizing, Cultural Aspect)

Mengaktualisasi (Actualizing) is the sixth stage of the learning cycle. In this stage, the students are demanded to actualize the new understanding that they have learned. The students are provided with feedback in order to understand the important meaning of what they have learned. The expectation is that the students will afford to apply the new understanding in the real life (transformation). In addition, the students are also directed to promote their new understanding to the other people, for example: their peers, their teachers, their parents, and even their community. The form of such promotion may be oral (dialogues, presentation, and alike) or written (poster, magazine, blog, and alike). Through this learning stage, the students' cognitive capacity will develop more and the students will be able to adapt themselves, to manage their skills, to take risks, to have integrity, to be committed, to be active, to be persistent, and to have high standards so that they will have the capacities of being a Committed Person. According to the scientific approach of 2013 Curriculum, this stage is known as *Mengkomunikasikan* (Communicating).

Seventh Stage: Memberi (Contributing, Social Aspect)

Memberi (Contributing) is the seventh or the final stage of the learning cycle. This stage serves as the form of knowledge sharing or students' contribution to other people. The objective of this stage is to demand the students to contribute what they have learned in the form of goods or service that is related to the theme. The students are invited to contribute their goods and service to other people in accordance to the desired learning targets (caring). These goods and service may also be contributed to the environment. Through this learning stage, the students will have the capacities of contributing to the community (Community Contributor).

From all of these learning stages, through the repetitive implementation of each stage the strong characters within the students may be inculcated and be shaped. From the observation results, it is apparent that the students' scientific attitudes have been manifested from the behaviors that they conduct before and after the

learning sessions. The scientific attitudes that the 4th Grade students have developed are similar to those that have been developed by Harlen (1996, p. 12) namely: curious, respecting data, critical, persistent, creative and inventing, open minded, cooperative to other people, and environmentally sensible. Through the possession of these scientific attitudes, it is expected that the students will have strong characters as their capacity in dealing with the rapidly changing century.

After completing all of the stages in the 7M Learning Cycle, the teacher then will conduct a learning evaluation, both the oral and the written one, in order to measure the students' cognitive capacity and development. In this evaluation, the teacher will assess the students' learning results by means of worksheet, energy-efficient house display, and energy-efficient monitoring record at the end of the learning process. For assessing the students' learning process, the teacher will only score the students' worksheet and display. Furthermore, in this elementary school the researchers did not find any process nor attitude assessment as part of authentic assessment such as the one that has been implemented by 2013 Curriculum. After crosschecking the data to the subjects, it turns out that the elementary school has not designed any scientific attitudes assessment in each learning stage of 7M Learning Cycle. Therefore, the teachers in this elementary school should develop the instrument of process assessment while the learning process is taking place so that the assessment will not solely involve the cognitive one but also the affective one and the psychomotor one. By doing so, the assessment that the teacher conducts will be authentic. The assessment process has a vital role in the scientific learning process because the assessment has been intended to measure the students' scientific attitudes. This statement has been proven in a study by Putri, Candiasa, & Marhaeni (2014) which found that the Natural Science Subject scores from the students who had been exposed to the assessment-based guided inquiry learning method were significantly better than the students who had been exposed to the conventional learning method. With the presence of process assessment, the implemented scientific learning process will be able to measure the students' achievement on scientific attitudes.

Based on the results of the study, the researchers would like to conclude that the

participants' scientific learning will be more meaningful if they conduct the learning process in actual manner. For example, by conducting multiple activities both inside and outside classroom such as understanding the Koran verses as the basis of a research, having discussions, watching videos, outing, investigating, verifying by experimenting, holding mini expo/exhibition, giving presentations, and alike, the students will be able gain more meaningful experiences. With various learning activities, the students will be encouraged to gain more achievement and to improve their creativity and also to pursue maximum learning. This is in accordance to the results of a study by Abdelraheem & Asan (2006) which found that learning process by means of inquiry-based technology with the support of collaborative learning environment might improve the students' learning experiences. Similarly, the results of a study by Machin (2014) showed that the implementation of scientific approach has positive influence toward the cognitive, affective, and psychomotor learning process and has achieved the classical cut score that has been set. Thereby, attaining learning experiences by means of guided-inquiry model scientific approach might inculcate the scientific attitudes toward the students.

Based on the results of interview with the teachers and the observation on the learning process within the classroom, the researchers has found that the obstacles of the learning process implementation come from both the teachers and the students. The obstacles that come from the teachers are as follows: the teachers have different capacity in understanding the scientific approach; the teachers suffer from limited time in designing the classroom administration; and occasionally the unit plan that has been designed contains inappropriate activities and consequently the teachers should replace these activities with the ones that are more appropriate to the theme. On the other hand, the obstacles that come from the students are as follows: the students have various capacity; the students have different learning styles; and some of the students need special assistance in attending the learning process. Despite these obstacles, the teachers always evaluate the learning process in order to overcome these obstacles so that the obstacles will not inhibit the students to keep pursuing their aspiration with supports from the good environment.

Conclusions

The process of implementing the scientific approach-based learning process in order to inculcate the scientific attitudes among the 4th Grade students in the Al Hakim Integrated International Islamic Elementary School Yogyakarta has been conducted through several stages/scientific phases known as “7M Learning Cycles.” The implementation of the 7M Learning Cycle, in accordance to the unit plan, consists of seven stages namely: *mengagumi* (admiring), *menghayati* (contemplating), *meneliti* (researching), *merealisasi* (realizing), *mengkolaborasi* (collaborating), *mengaktualisasi* (actualizing), and *memberi* (contributing). Each of these stages has certain objective. When these stages are conducted repetitively, the scientific attitudes that are similar to those whom the scientists have made use in dealing with their problems will be inculcated within the students. The scientific attitudes that might have been inculcated within the students are as follows: curious, thinking critically, validating scientifically, responsible, persistent in looking for and confirming information, cooperative, and environmentally sensible.

According to the 4th Grade students with regards to the implementation of scientific approach in inculcating scientific attitudes into the students, the researchers has found similar statements namely that the learning process will be more meaningful if it is conducted in actual manner. For example, the learning process might involve activities such as understanding the Koran verses as the basis of a study, having discussions, watching videos, outing, investigating, verifying by experimenting, holding mini expo/exhibition, giving presentations, and alike. By experiencing the exposure toward the guided inquiry model-based scientific approach through the various learning activities, the students will be more encouraged to attain more achievement, to improve their creativity, to improve their scientific attitudes, and to pursue maximum learning results.

In inculcating the scientific attitudes toward the 4th Grade students of Al Hakim International Integrated Islamic Elementary School, there are several obstacles that should be dealt with. From the teachers, the obstacles are as follows: the teachers have different capacity in understanding the scientific approach, the teachers suffer from time limitation in designing

the classroom administration, and occasionally the activities that have been designed in the unit plan should be replaced with the ones that are more appropriate to the theme. On the other hand, from the students the obstacles are as follows: the students have various capacity, the students have different learning styles, and some of the students need special assistance in attending the learning process. Despite these obstacles, the teachers always evaluate the learning process so that the students will be more encouraged to pursue their aspiration with supports from the good environment.

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