ENHANCING STUDENTS' ECOLITERACY IN UTILIZATION OF SCHOOL AREA THROUGH AQUAPONIC PROJECT AS LEARNING MODEL IN SOCIAL STUDIES LEARNING

(CLASSROOM ACTION RESEARCH IN CLASS VII-B SMP PASUNDAN 2 BANDUNG)

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Abstract -Ecoliteracy comes as a solution to various environmental problems that occur. Understanding ecoliteracy should be introduced early, in order grow and development of every human being always has awareness to maintain the environment. Based on preliminary observations conducted by researchers in SMP Pasundan 2 Bandung in class VII-B, showed that the low Ecoliteracy of students, shown by the scattering of garbage in the classroom environment, students also never care for the classroom environment, school environment, or wilting plants around the school due to lack of care. Based on the observation, the researcher concludes that, it is necessary to increase the students' ecoliteracy in the utilization of the school area. By looking at the problems occurring in class VII-B, the researcher intends to conduct classroom action research by applying the aquaponic learning model of the Social Studies learning. The research design used in this research is a Lewin cycle model according to Elliot. During the execution, this study was conducted 2 cycles, with 5 actions in each cycle consisting of an understanding of ecoliteracy, aquaponic project creation, aquaponic project maintenance, aquaponic harvesting process, accountability report, and harvesting of crops into healthy foods. Based on the results of students' ecoliteracy research, in the utilization of school area on the cycle 1 results have shown an improvement, but the improvement is not maximal, with the average group assessment entered into the "Good" category. While in the cycle 2 experienced a significant improvement, making the percentage of group valuation to entered into the "Excellent" category. The conclusion of this research is the use of aquaponic learning model in Social Studies learning can improve the students' ecoliteracy in the utilization of the school area.

Keywords: students' ecoliteracy enhancement, aquaponic project, social studies learning

INTRODUCTION

School is one of formal education institutions. The primary activity of school is the learning and teaching process. Accomplishment of learning and teaching process is influenced by several components, they are; teacher, curriculum, supporting facility, etc. It is fitting that process and result of learning and teaching have become an indicator of school's quality. Qualified process and result is definitely supported by condition that promotes said quality learning. One of the determining factors is conducive learning environment atmosphere. Great teacher, curriculum, and facilities provided for students to learn will not matter much if the learning environment atmosphere is uncomfortable and discouraging.

School environment holds major authority over the implementation of learning and teaching process carried out by students. A comfortable and positive atmosphere will sustain optimal learning and teaching process. Clean, fresh, and pleasing atmosphere can be created by the school through making school yard. Aside from greener and more sheltered school environment, there are many more benefits that can be obtained through making school yard. A clean, comfortable, and pleasing environment cannot create itself. There needs to be knowledge and awareness from every elements of school to care toward environment, which is known today as *ecological literacy* or *ecoliteracy*. According to Soemarwoto (in Muhaimin 2014, p. 6), humanity's well-being depends on environment. Humans are shaped by their living environment and vice versa. This also being elaborated by Slameto (2003 p. 60) who mentioned that there are two factors which influence students' learning, they are internal and external factors. Internal factor consists of physical, psychology, interest, motivation, and way of learning. Meanwhile, external factor consists of family, school environment, and social environment.

According to Fitjof Capra (in Puspitasari 2013 p. 16) *ecoliteracy* is a term used to describe man that has accomplished utmost awareness of the importance of environment. *Ecoliteracy* is aimed to increase society's ecology awareness. *Ecoliteracy* attempts to introduce and update society's understanding of the significance of global ecology awareness, so as to create balance between society's needs and nature's supply. With *ecoliteracy,* each human is expected to not only rising awareness to care for environment, but also to understand how the principals of ecology works in sync continously. Developing *ecological literacy* for students can be applied both interdisciplinary and monodisciplinary. Every subjects can include environment issue and combined with interesting and contextual theme. Social study becomes one of the subjects that fits in developing *ecological literacy.* Philosophically, social study is integrated, score based, problem based, and contextual. This is supported with Goleman statement (in Supriatna 2016,p. 34) which said that through social learning, ecological literacy also becomes integrated for it is based on intellectual intelligence, social intelligence, emotion, and naturalistic. It also perceives empathy toward living being as a positive behavior to conserve environment.

SMP Pasundan 2 geographically placed in Pasundan Street No.32, Balonggede, Regol, Bandung City. Located in the middle of Bandung which filled with pollution should be a cause for school to create green school yard. Thus, students will feel beautiful, pleasing, and clean school atmosphere which definitely will help students in their learning process. School yard that has been asphalted seems to be an obstacle in creating a green school yard. School party has tried to create a vertical

garden to actualize green, fresh, and pleasing school. However, the vertical garden is misused by students by putting trash into pots made out of plastic bottles. According to the predicament that has been observed in SMP 2 Pasundan Bandung especially in class VII-B regarding the lack of students' ecological literacy, researcher expects to improve students' ecological literacy in using school field through aquaponic project model in social study learning. Project Based Learning model requires students to create a product or project which can be assessed directly by the teacher.

Aquaponic project is a mixture of fish breeding with plant growing which forms mutualistic symbiosis relationship. According to Driver in Hermawan (2015 p. 80) aquaponic is a bio-integration of recirculation based aquaculture and production of hydroponic plant/vegetable which can be applied in narrow area and limited water resource, including urban area. Aquaponic system holds a role in decreasing nitrogen waste of feed which goes unconsumed and metabolism product of fish.

Through aquaponic project model, students are expected to possess thoughtfulness and responsibility in taking care of vegetable plant and fish cultivation in school field. Aside from that, the application of aquaponic project is also expected to be a new breakthrough that can make SMP Pasundan 2 be a green school in the middle of Bandung which is filled with pollution. Increasing students' ecological literacy does not stop with aquaponic project. Researcher also teaches students to live healthily through consuming vegetable and fish obtained from aquaponic project.

According to above elaboration, researcher will conduct a research entitled "**Increasing Students' Ecoliteracy in Using School Field through Learning Model Aquaponic Project in Social Learning of Class VII-B Pasundan 2 Junior High School Bandung."**

This research is aimed to answer a few research questions as the following; *First*, designing learning to increase students' ecoliteracy in using school field through learning model aquaponic project in social learning. *Second*, implementing learning to increase students' ecoliteracy in using school field through learning model aquaponic project in social learning. *Third*, reflection of learning in increasing students' ecoliteracy in using school field through learning model aquaponic project in social study. *Fourth*, increasing students' ecoliteracy after using learning model aquaponic project in social study.

METHOD

Analyzing above predicament, researcher uses descriptive research method through developing Classroom Action Research. CAR method is used as an activity carried out by teacher aimed to correct learning objectives. Meanwhile research design uses model which has been developed by Elliot. According to Wiriaatmadja (2005 p. 66) "Shape of the model is described in research steps but still inside the cycle that moves in spiral, with planning, acting, observing, and reflecting components. Data collection used is field notes, observation sheet, interview guide, and documentation.

RESULT AND DISCUSSION

1. Lesson Planning to Increase Students' *Ecoliteracy* in Using School Field through Learning Model *Aquaponic Project* in Social Study

Researcher composes suitable learning steps to accomplish the main goal which is increasing students' ecoliteracy in using school field. The first thing done by researcher is holding a discussion with partner teacher regarding curriculum and material which can be inserted with ecoliteracy. It is in line with Lickona's argument that states teacher must identify any gap in the curriculum which can be used to explore moral value. Subsequently, teacher has to create interesting lesson plan or effective unit related to moral value. This suggests that teacher must select good material to be developed later on with moral value that will be given to students.

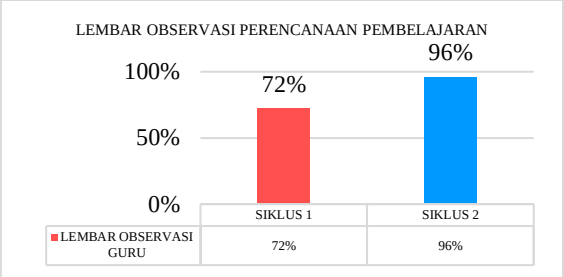
According to the above argument, researcher selects revision of curriculum 2013 with KD 3.3 which is analyzing the concept of interaction between human and space so as to create variety of economic activity (production, distribution, consumption, offer, and demand) and interaction between spaces for the well-being of Indonesia's economy, social, and culture. Through "Demand" material in the first cycle and "Science and Technology" material in Economy Activity in second cycle.

After knowing which material will be used and related to ecoliteracy, the next thing carried out by the researcher is to decide which learning model to be used for increasing ecoliteracy. In this research, teacher uses learning model *aquaponic project.* The reason why this model is selected is because this model deemed to be one of the learning models that requires students to be active in a gradual learning activity. Students are expected to apply ecoliteracy as a habitual routine. In composing this project based lesson plan, teacher composes learning steps which are in line with The George Lucas Education Foundation's argument (in Sutirman, 2013, p.46), which is;

a. Starting with essential question;
b. Creating project plan design;
c. Composing schedule;
d. Supervise students in project progress;
e. Assessing students;
f. Reflection

This research uses students' worksheet to measure their understanding. Afterward, researcher creates questionnaire that will be used to measure students' change in behavior after given understanding of ecoliteracy importance and performing aquaponic project which will be assessed in students' worksheet by partner teacher. Aside from assessing students' activity, in every cycle researcher also composes lesson planning assessment in teacher observation sheet which will be assessed by partner teacher regarding the lesson planning and lesson application.

Graph.1. Result of Teacher Observation Sheet



Based on the graph above, it can be seen that in the first cycle of lesson planning the percentage is 72%. This percentage obtained "Good" score but it can be improved by fixing a few weakness points in first cycle. In planning prior to learning, the chosen SK/KD and material are appropriate with the learning objective which is increasing understanding about ecoliteracy. In designing learning steps, it also suitable with the PBL (Project Based Learning) based aquaponic project. The shortfall of first cycle is in the application of aquaponic project which is unanticipated so that the result of lesson planning observation in the first cycle is not as expected.

After the first cycle is finished, partner teacher and researcher discussed about the inadequacy happened during the cycle. Partner teacher and researcher also discussed solution of several problems found in the first cycle. Afterward, partner teacher and researcher recompose the lesson plan and formulate learning steps considering the solutions that have been discussed so that the second cycle can run better.

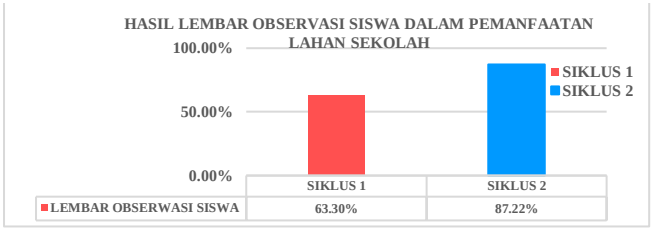
In the second cycle, lesson planning observation undergoes increase as much as 24% and becomes 96%. In lesson planning, teacher has prepared everything so well, from deciding which SK/KD suitable with the learning objectives, composing RPP with Science & Technology in economy activity material related to ecoliteracy, designing project based learning steps, and creating assessment format. In this cycle, teacher also has fixed mistakes in the previous cycle so that an increase occurs in the lesson planning observation sheet.

The Implementation of Learning to Increase Students' Ecoliteracy in Using School Field through Learning Model Aquaponic Project of Social Study

The implementation of learning to increase students' ecoliteracy in using school field through learning model aquaponic project of social learning is needed to achieve meaningful learning. Learning will be meaningful if students can receive benefits directly and the material given is applicable for daily use. In line with Sunal, in developing meaningful learning, a social teacher can start by giving chances for students to tell their daily activities in front of the class, followed by a reflection about observed events and objects and continued by gathering information through reading or observing real life situation. In other words, increasing students' ecoliteracy can be done through a meaningful social learning so that they can feel the benefits directly.

In the implementation, researcher tries to compose a more meaningful material through asking students directly to nurture and use school field by planting vegetables in aquaponic project. Thus, students' understanding of ecoliteracy is expected to increase and they can feel the benefits directly.

Graph.2. Students Observation Sheet Result



(Source: Researcher Data 2017)

From the graph about learning process implementation, it shows that there is an increase in each cycle. In the first cycle, students observation sheet's score still indicates low percentage, which is 63,30%. It is caused by teacher's lack of skill in explaining material, project application, or overseeing students' projects. Moreover, *ecoliteracy* is still a new thing for students. Doing a project based assignment is also still unfamiliar for students so as to cause them to receive low percentage.

In second cycle, the percentage of students observation sheet undergoes a significant increase which is 23,92% and the final percentage becomes 87,22%. This increase shows that there have been several reparation to fix previous cycle's mistakes. In the second cycle, teacher gives Science and Technology material in economic activity related to aquaponic project as one of the examples of technology advancement in agricultural field which still focuses on environment amidst horde of non environment-friendly technology advancements. Good material mastery affects students to understand ecoliteracy more than previous cycle so that an increase in students' observation sheet percentage happened. Aside from that, in every cycle, there are a lot of teachers that possess an interest to learn aquaponic project and want to apply it at home. Several students also have the same interest so that it can be said that through learning model aquaponic project, not only able to increase students' understanding of ecoliteracy but also make other students interested of aquaponic project.

Reflecting Obstacles in Increasing Students' Ecoliteracy in Using School Field through Learning Model Aquaponic Project in Social Study

In this reflection stage, researcher analyzes findings after the implementation of aquaponic project to increase students' ecoliteracy in using school field is done. Researcher divides the findings into several categories which are;

Obstacles Appeared in Implementing Aquaponic Project to Increase Students' Ecoliteracy in Using School Field

Every research will meet obstacles especially in the implementation stage. In this research, obstacles found are as follow;

1) Students still possess low concern for school environment which indicated by coarse school field and withered potted plants. However, if it is maintained, school field can be

changed into something useful for students and school environment.
2) Students still not getting used to project assignment that requires them to active continuously during the project. This can be seen from the number of students who skive plant nurturing duty.
3) Teacher still having difficult time to divide time between giving demand material and relating it to students' ecoliteracy.
4) Teacher still having difficult time to organize students during aquaponic project and plant and fish nurturing process because many students from other class join in and create havoc.
5) Ecoliteracy awareness is different for each students. Some students still have low awareness which cause major value gap especially in the assessment of student worksheet in the first cycle.
6) Students still incapable of implementing aquaponic project optimally. This can be seen from the first group who have not yet able to nurture plants well and is not ready to make a responsibility report of aquaponic project.

b. Repair Done by Researcher to Solve Obstacles during Implementing Aquaponic Project to Increase Students' Ecoliteracy in Using School Field

After finding several obstacles happened during implementing aquaponic project, researcher and partner teacher composes variety of plans to repair weaknesses in the previous cycle. The plans that will be done by researcher are as follow;

1) Teacher prepares more to give Science and Technology material in economic activity which will be related to ecoliteracy understanding. Teacher fixes the way of giving material, recomposes learning steps, so that the application of ecoliteracy is better than previous cycle
2) To achieve more efficient time use, teacher plans to create aquaponic project in turns for every group of students. This is also aimed to ease partner teacher in observing and assessing students' behavior during aquaponic project implementation
3) There will be penalty for skiving students during plant nurturing duty. This means to make students get used to take care of environment
4) Responsibility report of aquaponic project is held orally to help teachers understand obstacles of every group better

c. Improvement Achieved during Implementing Aquaponic Project to Increase Students' Ecoliteracy in Using School Field

After several actions have been done to solve weaknesses happened in previous cycle, there are some improvement as follow;

1) Students' understanding of Science and Technology in economic activity and ecoliteracy understanding increase. This can be seen from questionnaire result that improves every cycle and students' questionnaire of behavior that indicates students' concern of environment is getting higher.
2) Implementing aquaponic project is more efficient than the previous cycle. It is easier for teachers to assess student observation sheet and observe because the application of the project is in turn
3) Students are better behaved in doing plant nurturing duty. More students realize that taking care of environment and plants is an obligation for every human being because humanity depends heavily on nature. This is in line with the indicator of ecoliteracy according to Goleman; "Understanding How Nature Sustain Life"
4) Aquaponic project inspires students to be able to work together in taking care of plant, reminding each other to always nurture environment, and to caution anyone who damaged environment.
5) Aquaponic project responsibility report is more conducive compared to previous cycle.
6) Increasing Students' *Ecoliteracy* in Using School Field through Aquaponic Project Learning Model in Social Study

This research is carried out in class VII-B of SMP Pasundan 2 Bandung to increase students' *ecoliteracy* in using school field through aquaponic project. This research starts from researcher's concern of school's condition which requires its students to nurture and tend to environment, especially school environment. According to researcher, after reading Supriatna's book, ecopedagogy is a new discipline, which specifies on human and nature balance, to prepare students to have a wide perspective about the importance and benefit of living side by side with nature. *Ecoliteracy* teaches students how to behave positively in everyday live and always mindful of the impact of their behavior toward environment.

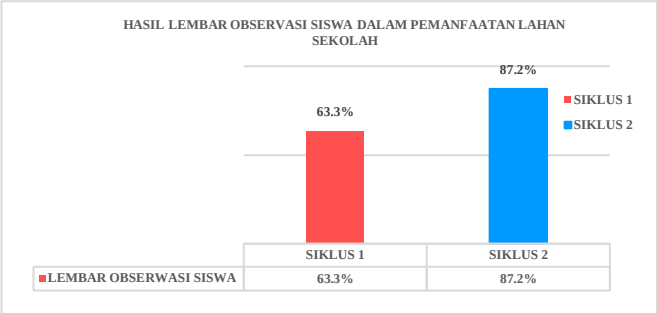
Thus, researcher wants to improve students' ecoliteracy understanding so that students obtain wide perspective about the importance of living together with nature or in other words taking care of nature. Aside from that, in this research, researcher uses project learning model aimed so that students are more active on performing ecoliteracy understanding. With direct practical experience, students are expected to get used to act out ecoliteracy in daily life. This is in line with Thomas in Made Wena that states project based learning is a learning model that gives chance for teachers to organize project related learning in class. Project work includes complex assignment based on challenging question and problem and requires students to plan, solve problem, make decision, and give chance for students to work independently.

The project that will be created by students in this research is aquaponic project where students are asked to breed plants and fish subsequently in aquaponic media that will be built by students. This is aimed to increase students' ecoliteracy in using school field. Using plants and fish will educate students to always have concern toward environment. This is in line with Lickona;s argument that states the most exact thing in developing concern over environment is by rising concern over animal. Almost every student possesses natural empathy toward animal. Thus, with animal object (breeding fish) of aquaponic project is expected to rise students' responsibility of environment.

To see development of students' ecoliteracy behavior during research, researcher creates observation sheet and taking 5 indicators of ecoliteracy according to Goleman which are:

developing empathy toward any form of life, embracing sustainable as society's habit, making invisible becomes visible, anticipating unexpected, and understand how nature sustains life. Afterward, researcher creates detailed aspects in observing students' behavior during aquaponic project and obtained below percentage.

Graph.3. Students Observation Sheet Result



(Source: Researcher Data 2017)

Based on the above graph in students' observation sheet in using school field with learning model aquaponic object in social study shows that there is an increase in the second cycle. In the first cycle from students' observation sheet shows 63,3% which indicates that students' ecoliteracy in using school field is still low. There are indeed several groups that have achieved 'Good' category. However, researcher considers that they can be improved. Meanwhile, several groups are still in 'Sufficient' category so they need guidance in order to increase their ecoliteracy. In the first cycle, there are still faults from students and teachers because they still try to get used to the given project. Thus, the percentage is still low. To fix several shortfalls happening in the first cycle, researcher and partner teacher holding a discussion in order to not repeat those shortfalls in the second cycle.

In the second cycle of students' observation sheet, there is a significant increase as much as 23,92% so that the final percentage becomes 87,2%. In this cycle, every groups undergo improvement. This result indicates that aquaponic project has managed to increase students' ecoliteracy in using school field. Overall, students' behavior toward ecoliteracy in using school field is a maximum result done by both students and teachers during giving ecoliteracy material are fitting with ecoliteracy indicator. From total result of both cycles it can be concluded that through using learning model aquaponic project, students' ecoliteracy in using school field can be improved. This is also in line with Moursund's argument in Made Wena that states several benefits of project based learning are increasing motivation, problem solving skill, finding information skill, teamwork, and organizing project.

From elaboration above, it can be concluded that by using learning model aquaponic project, students can learn to solve environment problem through taking care of environment and inviting people to work together in taking care of environment. So that this can improve students' ecoliteracy in using school field of class VII-B SMP Pasundan 2 Bandung.

CONCLUSION

First, teacher designs learning to increase students' ecoliteracy in using school's field through learning model aquaponic project in social learning. During designing social learning, researcher carries out planning first with partner teacher before implementing learning. After deciding which SK/KD that suitable to researcher's objective, then researcher composes lesson planning as a guide during learning process so that research objectives and good application of learning method can be accomplished. After lesson plan is well composed, the next step is to compose lesson planning that uses learning model aquaponic project so that it can runs well and able to increase students' ecoliteracy in using school field. Researcher also prepares learning media which is expected to be able to sustain research objectives. Besides that, researcher also prepares assessment format which is student's observation sheet in using school field which used to measure how far students' develop during the application of learning model aquaponic project. The student's observation sheet will be filled by partner teacher as observer.

Second, teachers implement learning to increase students' ecoliteracy in using school field through learning model aquaponic project in social study. Through implementing composed learning steps in lesson plan and then applying first cycle with giving social material related to ecoliteracy understanding suitable with research objectives. In the first cycle, there are still a lot of students confused when hearing the term ecoliteracy. Aside from that, the way teacher gives the material is still lacking. Students' lack of ecoliteracy understanding can also be seen from creating, planting, nurturing, and responsibility stage that achieves low percentage in students observation sheet which assessed by partner teacher. This is reinforced with average value of students' worksheet which shows that several students still haven't understand material and ecoliteracy. So that the research objectives can be reached, researcher finally repeat learning the aquaponic project through explaining again Science and Technology material in economic activity related to ecoliteracy understanding. In the second cycle there are many changes done by teachers to make students understand the material better. Teachers give the material through relating it with student's daily activity, so that they are interested. The implementation of aquaponic project also runs better than previous cycle. This can be seen from students' behavioral change observed by partner teacher and written in student's observation sheet which undergoes significant increase from previous cycle. From the first cycle's percentage which is 63,3%, it rises as much as 23,89% in the second cycle into 87,22% or categorizes as "Very Good". Other than that, average value of students' worksheet also undergoes increase. In the first cycle, the average value is 66,4%, it rises as much as 19,4% in the second cycle into 85,8% which also categorized as "Very Good".

Third, reflecting learning to increase students' ecoliteracy in using school field through learning model aquaponic project in social study. Every action done needs reflection to repair any shortfall and mistake so that they will not be repeated. In this research, there is also reflection in increasing students' ecoliteracy in using school field through learning model aquaponic project of social study in class VII-B

SMP Pasundan 2 Bandung. There are a lot of mistakes found such as unclear material, students still unfamiliar with understanding ecoliteracy, and uninterested students during material related to ecoliteracy. However, through fixing those mistakes by holding a discussion with partner teacher regarding the solutions, those shortcomings can be handled well. Not to miss always motivating students to apply ecoliteracy in daily life.

Fourth, increasing students' ecoliteracy in using school field through learning model aquaponic project of social study shows improvement in every cycle and has been categorized as 'Very Good'. In the first cycle there are still low understanding of ecoliteracy indicated by low percentage of 63,3%. However in the second cycle, there is a significant increase as much as 23,92% into 87,22% which is categorized as "Very Good". Aside from that, there is a change in students' behavior. Students are having more concern and care toward environment based on students questionnaire result. In the first cycle, the average value is only 66,4%. However, in the second cycle it undergoes increase as much as 19,4% into 85,8% which means it has reached average value of 75. This indicates that aquaponic project able to increase students; ecoliteracy in using school field.

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