

Analysis on Utilization of Biology Laboratory and School Environment in Biology Learning for Tenth Grade Students of Senior High School in Jepara Regency

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Abstract

The application of 2013 curriculum had teacher to do scientific oriented learning. In fact, scientific oriented learning has not been applied fully in real life. Some obstacle factors are the lack of facility and teacher preparation. This research aims for: (1) analyzing facilities of biology laboratory and school environment, (2) analyzing the utilization of biology laboratory, (3) analyzing the utilization of school environment as learning source of biology subject for first semester of tenth grade students of senior high school. This is a descriptive qualitative research done in seven senior high schools in Jepara Regency. The subjects of this research are tenth grade biology teachers, tenth grade science major students, and vice headmaster (facility division). Data tabulation uses observation, interview, questionnaire, and documentation. Data triangulation uses source and method triangulation. Data analysis uses descriptive. Analysis result provides: 1) the laboratory facility in seven senior high schools in Jepara Regency can be included in "good: category even though it does not fill all the standardization of Permendiknas Number 24, 2007; facility of school environment is in below good category, 2) the utilization of laboratory in biology learning for tenth grade in first semester is in good enough category, 3) the utilization of school environment in biology learning for tenth grade in first semester is in good category. Some factors that influence categories are management of facility, lesson plan made by teachers, teacher understanding about biology material in scientific approach, teachers and students customary to scientific approach, and time allocation.

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INTRODUCTION

There are 23 senior high schools in Jepara Regency, 10 state schools and the others are private schools which already apply 2013 curriculum. The application of 2013 curriculum had teacher to do preparation and application of scientific oriented learning. Some biology subject materials of tenth grade are effective to be done in laboratory and school environment so that students can understand well.

Introduction to laboratory activity and environment in learning process is very important for tenth grade students so that they are getting used to scientific activity. This research is based on earlier research result that provided the fact that not all (only some) school utilize laboratory facility and environment potential maximally in biology learning. Based on interview with biology teachers for tenth grade, in the previous research there were some factors behind those matters, they are the lack of facility, time limit, and tenth grades students that are not used to scientific activity yet.

Ministry of education and art issued a policy about the development and implementation of 2013 curriculum revised edition. There are five components of learning activity in scientific approach, they are observing, questioning, experimenting, associating, and communicating.

Curriculum development is a process to raise innovation capacity of teachers (Primrose & Alexander, 2013). According to Ridlo (2015), 2013 curriculum aims for changing and building knowledge, skill, and students behavior. This curriculum emphasizes on the development and balance of soft skills and hard skills including 3 aspects, they are behavior, knowledge, and skill. The development of 2013 curriculum is in the learning that emphasize modern pedagogic dimension. It is using scientific approach. (Wilsa et al., 2017; Wiyanto et al., 2017).

Science is mainly studying about nature phenomena and facts that happened in the environment through empirical activity. Those activities can be acquired by laboratory experiment or wild nature. Simply, laboratory is

a closed room where practicum activity is done. Laboratory room in this case is the place where learning activity that need special equipments which is hard to present in the classroom. Laboratory room standardization policy is Peraturan Menteri Pendidikan Nasional Republik Indonesia number 24, 2007 about facility standard for elementary school, junior highschool, and senior highschool. (Permendiknas, 2007).

Learning that utilize environment as the source of learning and followed by application of students centered learning is a type of exploring nature environment approach (Susilowati et al., 2008). Approach using nature and environment as learning source can provoke curiosity, activeness and motivations of students. Utilization of environment as learning source give students chance to explore. Students can analyze the nature of the environment directly, so learning is meaningful and more contextual. School environment can be potential resource for various learning activity. Those resources are made up from various elements both natural and artificial that potential to be used as learning source for students (Atmodiwirjo, 2013).

According to Mahmood & Gondal (2017), school environment has positive effect in students achievement. Good environment has good influence for students science understanding. Study by Ogwenno (2015) provided most of school do not have well environment facility. Based on that statement, school needs to prepare supporting environment for effective and efficient learning for students.

Some problems in the field are related with the lack of biology laboratory utilization and environment as the source of biology subject learning, mainly because of the rare facility. Most of the schools just yet implemented 2013 curriculum, so teachers and students are not used to it yet. Time allocation is not enough because the materials are so many. Considering those problems, an analysis about biology laboratory utilization and school environment as the source of biology learning for tenth grade students of senior high school in Jepara Regency needs to be done.

METHODS

This research uses qualitative descriptive approach. Researchers participated in the field and noted carefully what happens, do a reflective analysis against various documents found in the field and make a research report in detail about individual or place where such research is done (Creswell, 2015). Qualitative research is used to analyze Biological Laboratory infrastructure availability, the availability of the infrastructure environment, analyze the utilization of biological laboratory, and analyze the utilization of the environment school as a learning resource Biology class X semester gasal high school in jepara Regency. Background this study was public and private high schools located in Jepara Regency. Seven high coded S1, S2, S3, S4, S5, S6, and S7.

The subjects of this research are tenth grade biology teachers, tenth grade science major students, and vice headmaster (facility division). The data source in form of documents used to planning and execution of learning biology by making use of the use of the lab and the surrounding environment as a source of

learning Biology class X on first semester. Data collection starting from the planning of learning, implementation of biological observation instruments in form of learning as well as interviews to the tenth grade biology teachers and students of tenth class. Data about the bearer of the supporting factors and factors obtained from the results of the interviews to the tenth grade biology teacher and vice headmaster (facility division). Data collection techniques in the study using interview techniques, questionnaires, observation, and documentation. Data about the availability of laboratory infrastructure and school environment is analyzed using descriptive percentage analysis, by the following formula:

$$P = \frac{n}{N} \times 100\%$$

Description:

P = percentage score obtained

n = number of score obtained

N = the number of the maximum score

Subsequently converted in a category on Table 1.

Table 1. Availability Criteria of Infrastructure Facilities and Utilization of Biology Laboratory and School Environment

Percentage Score obtained (%)	The criteria
85,01 < P ≤ 100	very good
70,01 < P ≤ 85,00	Good
55,01 < P ≤ 70,00	Good enough
40,01 < P ≤ 55,00	Less good
25,00 ≤ P ≤ 40,00	Not good

Data validity was tested so completely in accordance with objective and purpose of this research, then used the technique of triangulation. As for the triangulation used in this research is source and triangulation method. Triangulation with a source which means compare and check the degree of confidence behind an information obtained through different sources in qualitative methods (Moleong, 2013:330). Triangulation method of business is checking validity of data, or checking

validity of research discoveries. Data analysis in this study uses descriptive analysis techniques. The analysis of qualitative data in this study performed using analytical techniques adopted from Miles and Huberman model (2014) which covers activity in data analysis, data collection, reduction of data, presentation of data and verifying.

RESULTS AND DISCUSSION

Availability of Biology Laboratory Infrastructure and School Environment

1. The Biology Laboratory Infrastructure

Biology lab infrastructure availability at each school is analyzed with guided Permendiknas Number 24 year 2007 which regulates about school infrastructure. The results

of interviews to the tenth grade biology teacher and vice headmaster (facility division). The Biology lab infrastructure observed include furniture, props, tools and materials experiments, media education, consumables and other equipment. The results of observations against the availability of biology laboratory infrastructure presented in Table 2.

Table 2. Biology lab Infrastructure Availability

School	Category	Score Percentage	Criteria
S1	State school	82,31	Good
S2	State school	79,25	Good
S3	State school	92,59	Very good
S4	Private school	68,38	Good enough
S5	Private school	78,70	Good
S6	Private school	73,05	Good
S7	Private school	66,66	Good Enough

The average availability of laboratory infrastructure in seven schools categorized either. Six schools have had special laboratory of biology, while one school still has a biology laboratory joined the physics laboratory, namely school S4. Laboratory furniture in seven Labs already meet standards. Tools and materials experiments on some schools do not meet specified standards especially the availability of binoculars microscopes. Consumables are not available at the two schools, while other schools have not been fully met.

Analysis about the availability of laboratory infrastructure shows that most schools are already good even though not yet fully meet the standards set by Permendiknas No. 20 years in 2007. This is in accordance with the research of Darsana et al. (2014) standard analysis of needs of the chemical laboratory in 2013 on curriculum implementation of senior high school in Bangli showed the same result not all schools meet the standards criteria previously set by Permendiknas. Meanwhile Mastika et al. (2014) indicates that the power state support facilities tools Biology lab at senior high school in Denpasar showed that his condition is very good at intervals of 90%. This should be a consideration so that teachers can make use of

existing means and maximized as a learning tool for students. The results of Nasution and Hasairin (2016) showed that the laboratory conditions in sample schools were very good with percentage of 81.72%. Detailed advice on laboratory infrastructure should be a consideration of teachers in order to utilize existing facilities and be maximized as a learning tool for students.

2. Schools Environment Infrastructure

The results of interviews to the tenth grade biology teacher and vice headmaster (facility division). The observation is done include the availability of garden, outdoor, greenhouse/shading house, and shading which can be utilized as a source of biology learning. The results of the observations against the availability of the infrastructure environment around schools presented in table 3.

The Average availability of environmental infrastructure in seven schools are less good. Only two schools that have very good environment infrastructure, namely the school of S2 and S3. The average school already has good which can be utilized in biology learning. Shading house owned by only two schools. In the meantime, there is a school that already has a collection of rare plants and flagship areas,

namely school S1. The garden were very potential to be utilized in the study of biology. Unfortunately there is one school that does not have the availability of the infrastructure environment is good, making it difficult for biology teacher to invite students to explore the environment around the school.

Table 3. Availability of Environmental Infrastructure Around the school

School	Category	Score Percentage	Criteria
S1	State school	68,75	Good enough
S2	State school	87,50	Very good
S3	State school	81,25	Very good
S4	Private school	31,25	Not good
S5	Private school	75,00	Good
S6	Private school	43,75	Less good
S7	Private school	50,00	Less good

The results of Situmorang research (2016) indicate that the environmental conditions are in state highschool 2 Wonosari has a lot of potential for them is the availability of local facilities and infrastructure for the management of organic waste (composter), various ornamental plants that are in the green house, the page is quite extensive. Hidayah et al. (2014) indicates that the environmental pollution comic developed has received highly valid judgment by media and material experts, but the average gain value that entered the criteria is showing the comic has not been effective enough to give the change of learning result and the environmental caring character of the seventh grade students on environmental pollution material.

The Utilization of Laboratory in Biology Learning for Tenth Grade

Analysis of the utilization of laboratory for first semester of tenth grade student seen from planning, utilization of biological material in 2013, scientific approach to curriculum, time allocation, evaluation and practical reports. In terms of planning, yet all the teachers prepare it in accordance with the curriculum of 2013, this is because the new 2013 curriculum implemented a semester so teachers have not fully understanding of the new curriculum.

Utilization of biological laboratory analyzed on the scientific work of the introduction material, observation of bacterial colony, creation of paramecium culture, and

microscopic observation of water. Laboratory utilization score on the S3 category school very well, this is because the S3 has good laboratory facilities and have three years to implement the curriculum of 2013. The school is a pilot implementation of the S3 curriculum 2013. The results of Khamidah and Aprilia (2014) showed that planning and process of practicum in Umbulharjo Yogyakarta state high Schools have been included in good category. In the implementation of the lab has seen the cooperation between teachers, labors and students.

If seen between score laboratory infrastructure is not significantly associated with its utilization in learning Biology class X high school (Figure 1). S1 and S2 have good availability has not yet been able to utilize the lab properly. So it is with the school of S6 and S7. This can be due to various factors, among others, the motivation of the teachers in giving the opportunity to the students to take advantage of existing laboratory facilities. Only the S3 has a school facilities and utilization. This is because the S3 has long been implementing Curriculum 2013 so that the teacher had gotten used to teach biology learning in accordance with 2013 curriculum.

The use of laboratory tools are insufficient in the learning process can be the reason why learning science in school tend to be monotonous because it is dominated by the application of the method of lecture and

classical. According to Bedhoni *et al.* (2014) there is a positive influence of implementation of activities towards laboratory activity and learning outcomes grade X senior high school. It also factors in the availability of time and engineering teachers in leveraging the time available. If the teacher can divide the time by effectively and efficiently so teachers can engage students learn biology by making use of the lab. Utilization of biological laboratory equipment

significantly affects the students' academic achievement. Student learning process will be better if utilizing laboratory equipment than not using at all (Ihejiamaizu & Ochui, 2016). In addition, the factor of availability of time and techniques of teachers in dividing the time available. If the teacher can divide the time effectively and efficiently then the teacher can invite students to learn biology by utilizing the laboratory.

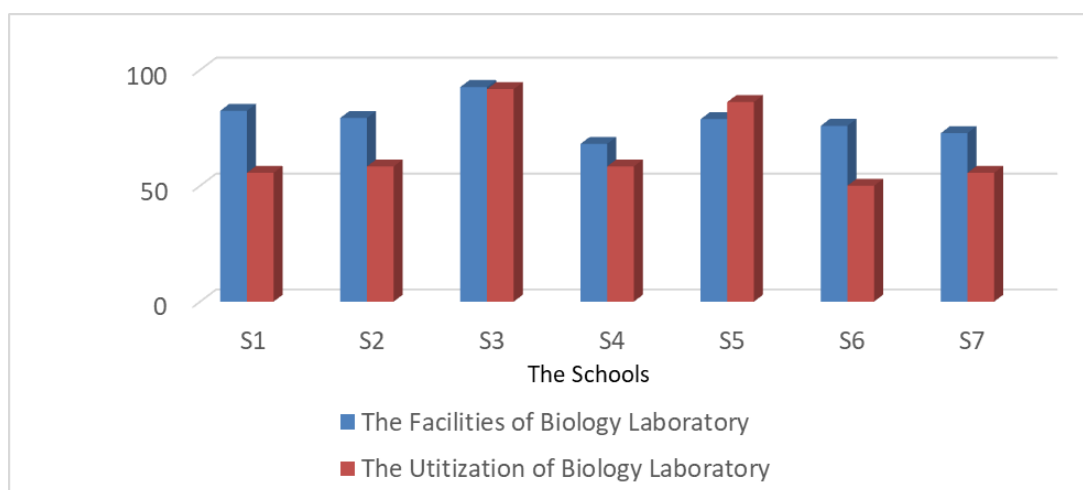


Figure 1. The Facilities of Biology Laboratory and The Utilization of Biology Laboratory

Utilization of School Environment

Analysis of the utilization of the environment around the school in learning Biology class X was conducted on material observations on the problems of biology in biological objects and levels of organization of life in nature, observations of the various levels of Indonesia biodiversity and utilization of pond water and water marinade straw for observed microscopically. The utilization of the environment around the school semester gasal X class in Jepara Regency high school has been running pretty well. One high school has yet to carry out environmental activities during semester gasal, this is because the lack of availability of the infrastructure environment. Actually this can be replaced with environmental activity outside of the school area, however due to security reasons this was not done. Observation about the utilization of the environment around the school are present in Figure 2.

Based on the results of studies Samitra *et al.* (2016) in class X SMA Negeri 5 Lubuklinggau, student learning outcomes in experimental class higher than the class of the control because the experimental class students learn approach to hike around. The study skills are strongly influenced by the skills of the process undertaken by the students, because it involves cognitive skills, manual and cruise through the activities of the social environment. Learning with the utilization of school environment as a learning resources provide opportunities to students to learn through discovery and experience directly against objects and phenomena in biology, making learning more interesting and fun. Utilization of school environment as a source of learning can improve student learning results content classification of living beings (Khanifah *et al.*, 2012).

Research results Marlina (2013) shows that the activities of the laboratory-based local environmentally inkuiri gives better results

compared to traditional laboratory activities. The research by Mulyono et al., (2012) about the development of biological learning device that combines the scientific approach to skills-based fermentation technology of environmental issues on waste production of tempe-know. Learners are faced with and resolve scientific problems are real, so that learning can improve scientific skills learners. Research Marlina (2013) and Mulyono et al. (2012) that combines laboratory and activity-based approach to environmental issues. So if the teacher is able to combine these two things in biology learning then the result will be more optimally.

The availability of laboratory infrastructure and a good environment is not always directly proportional to its utilization. Many factors that affect it, among other things: 1) Planning study conducted by the teacher; 2) Understanding the teacher about the material in the curriculum of biology 2013; 3) Conditioning of teachers and students towards scientific approach; 4) allocation of time. Meanwhile, based on Nuada and Harahap (2015) research, laboratory inhibiting factors consist of incompleteness, lack of training for laboratory use, teacher competence in understanding the function of tools and materials, and lack of time for laboratory practice.

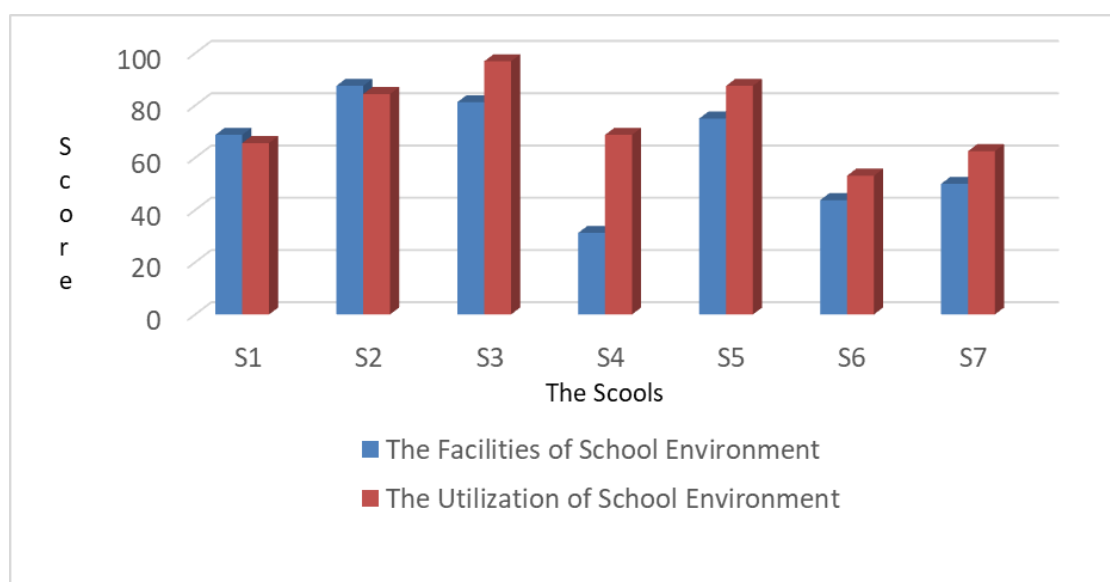


Figure 2. the availability of Infrastructure and utilization of the environment around Schools in Class X Biology Learning

CONCLUSION

The availability of laboratory infrastructure in seven high school Jepara Regency is included in the category of good though not yet fully meet the standards Permendiknas Number 24 year 2007. The availability of the infrastructure environment around the school belongs to the category. Utilization of laboratory in biology class learning X gasala semester entry in the category quite nicely. The utilization of the environment around schools in class X biology learning

semester gasal fall into the category of good. Some of the factors that affect it, among other things: 1) the procurement and management of infrastructure carried out by schools, 2) Planning study conducted by teachers; 3) Understanding the teacher about the material in the scientific approach; 4) Conditioning of teachers and students towards scientific approach; 5) allocation of time.

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