



Correlation of Epistemic Curiosity and Cognitive Understanding Biology's Student in Health and Pharmaceutical Biotechnology

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Info Article

History Article:

Received : December 2017

Accepted : March 2018

Published : April 2018

Keywords:

Case study, Environmental

Caring character,

Extracurricular, Potential

studies, Waste management

Abstract

SMAN 13 Semarang is one of the schools in Semarang that develops waste management as an extracurricular activities. However, students at SMA N 13 Semarang are still seen littering, using plastic as food wrappers, and have not sorted out garbage. Students are expected to have high awareness to contribute to reducing environmental damage by participating in waste management. This study aimed to examine the extracurricular potential of waste management in developing the environmental caring character of the students. This research was done by qualitative approach with case study research type. The number of primary informants is 15 students who are active in extracurricular waste management. The results showed that students have basic knowledge about the environment through the subject of PLH but have not been able to develop it. Curiosity has been formed because students have an interest in watching television shows and reading environmental related articles, but in terms of providing information media is still limited through teachers. Students throw garbage at the place provided, but to sorting garbage still less. Based on the results of research and discussion can be concluded that the characters that have been formed is used to maintain the cleanliness of the environment, used to dispose of waste in place, the school provides cleaning equipment, and responsible for maintaining environmental cleanliness. Character that has been formed and still requires teacher assistance is the character to sort out garbage, provide communication media and explore knowledge about the environment.

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p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

Garbage is one of the big problems in Indonesia, especially Semarang. Based on data from the Department of Population and Civil Registration (2016), Semarang has \pm 1.6 million inhabitants. One of the impacts of the density of population in Semarang is the extensive production of garbage. One day in Semarang generated about 8,000 tons of rubbish generation.

Schools are the initial place for students to learn about society, and the form the basic values of character education such as character of pious (religious), responsible, discipline, honest, tolerance, hard work, creative, independent, curiosity, the spirit of nationalism, respect, friendship, social care, peace, democratic, caring, reading and loving the country (Fadillah, 2014).

According to Handayani (2013) the school is the foremost educational institution in developing character education. To handle the problems of garbage in schools can be done one of them through the establishment of waste management activities that can be used as school extracurricular activities for students.

SMAN 13 Semarang has developed waste management activities as an extracurricular school. SMAN 13 Semarang is located on Jl. Rowosemanding, Mijen, Semarang City. The existence of waste management activities is expected to form the character of environmental care to students, which can also be applied to the student residence environment. SMAN 13 Semarang has pioneered waste management activities as an additional activity for students since 2013. In every corner of the class there are several garbage bags used to accommodate more manageable waste, such as used bottles and papers. However, from the narrative of the school, the activity is still limited to small activities due to lack of assistance from the school. Currently, the teacher involved this activity is only one person, so the teacher is sometimes overwhelmed to guide students to do activities.

The waste management activity starts from the sorting of organic and inorganic waste in the classroom until sold to the collectors. Papers and plastics collected by students can be utilized to serve as a product of selling value, thus indirectly reducing environmental problems at school. In addition, waste management activities also provide an important role to form students of SMAN 13 Semarang have an awareness of maintaining the environment in daily activities. Through the activities of processing waste into handicrafts also raises students' creativity. This is in line with the details of the character's value by Hasan (2010) that creative characters are formed when students can think and do something to produce something new.

Based on preliminary observations, currently SMAN 13 Semarang had not been able to develop waste management activities optimally. According to Fitria *et.al.* (2015) because it was mostly managed by students, there is a possibility that the management was not optimal. Based on the results of interviews with the teacher of extracurricular activities of waste management, the number of students who followed extracurricular activities of waste management was \pm 15 of 250 total students. Students who follow extracurricular activities of waste management are expected to have a high awareness to contribute to reducing environmental damage by participating in managing waste.

This research is essential to know how environmental care characteristic could be formed in students through extracurricular activities of waste management. The environmental caring character is very important for students so that they are able to contribute directly in preserving the surrounding environment through waste management activities. A similar study that encourages researchers to conducted this research is the Fitria (2015) study which states that waste bank activities can have an impact on the school environment, which reduces the number of school waste piles and raises students' awareness to take part in protecting the environment. Ulfah *et.al.* (2016)

also mentions that waste banks are effective in managing waste in some schools, thereby reducing the amount of waste in schools.

This study would examine how the value of environmental caring character formed in students who followed extracurricular activities of waste management. Researchers assessed the environmental cares by referring to the four indicators of knowledge, curiosity, investigation and evaluation, and verbal commitment. These four indicators indicate how big the environmental cares are in the students who followed the waste management activities. The researcher's explored students' self-care character by using student observation sheets, questionnaires, and interviews with students. This research is expected to provide awareness to educational institutions that schools' activities is a container to develop students' character, especially the character of environmental care. Environmental cares affect the environmental sustainability in which people live in it, so that environmental activities need to be developed in various levels of education, not only in SMAN 13 Semarang.

RESEARCH METHOD

This research was conducted at SMA N 13 Semarang located on Jl. Rowosemanding, Mijen, Kota Semarang, Jawa Tengah. The study was conducted on the even semester of the 2016/2017 started from January to February 2017. This study was done in qualitative approach with a case study. The main informants were students who joined the waste management activities. This study also involved supporting informants consisting of principals, teachers, and food vendors in the school's canteen.

Data of the influence of extracurricular activities of waste management on student's environmental caring character of SMAN 13 Semarang were explored by observation, questionnaire, interview, and documentation. Data were analysed by flow model developed by Milles & Huberman in Handayani (2013) that is data reduction, data presentation, and conclusion / verification.

RESULTS AND DISCUSSION

The results of the students' environmental care in SMAN 13 Semarang included to 4 indicator aspects. The four indicator aspects are 1) the students 'basic knowledge about the environment, 2) the students' curiosity about the environmental issues and how to overcome them, 3) the students 'understanding of the causes of environmental damage and how to overcome it, and 4) the students' real actions in maintaining and reducing the environmental problems. From the research that had been done obtained the following points.

The students 'basic knowledge about the environment

The result of observation on students behavior of extracurricular waste management participants is shown by Table 1.

Table 1 Observation results of environmental caring attitude of students who actively follow the waste management extracurricular related to environmental knowledge

No	Aspect Observed	Observation Result
1.	Discuss with friends about the environment	Not observed
2.	Explain to others about the role humans have on the environment	Not observed

Based on observations, discussion between students and activities explaining about the role of human to the environment is not observed. This is because researchers never meet students who are in talks with environmental topics. In addition, researchers also can not observe the activities of students outside the school due to limited time and energy. Seen from the daily behavior of students who joined waste management extracurricular activities, it can be said that the students do not have full understanding about the environment and efforts to protect the environment. According to discussion, it is very important to develop students' knowledge about the environment. The opinion is also supported by Rusman (2014) which states that the discussion among students has the benefit to develop ideas that students have, deepen knowledge and insight, and assist in making decisions, especially regarding environmental issues.

The questionnaire results show that students who actively participate in waste management extracurricular already have an understanding of the environment including knowledge of waste bank activities. Environmental knowledge is provided by the school through the subject of Environmental Education, hereinafter referred to as PLH. Then they apply the knowledge they have to the extracurricular activities of waste management so that it is beneficial for the students' environment. This is appropriate with the opinion of Iswari & Suyud (2017) stating that environmental education is one effort to provide environmental knowledge among school lessons. It is aimed at the assumption that if environmental knowledge increases, environmental cares also increase and it will reduce future environmental damage.

SMAN 13 Semarang provides materials on the environment through additional subjects of Environmental Education. Through the subjects students are given knowledge about the environment. The subjects of PLH given to the students are in line with the 1st indicator of the students' basic knowledge on the environment because through these subjects students have been trained to instill a sense of concern for their environment early on. This is in accordance with the opinion of Nurani (2014) which states that one form of concern that can minimize the problem is promoting environmental education as well as conservation of natural resources from an early age. Seeing the learning of PLH in school shows that the character of environmental awareness that arises is the habit of maintaining the cleanliness of the environment and the preservation of the school environment.

Based on the the observation sheet, it was not found students discussing and giving information to other students about the environmental topic even after learning PLH in the first year. This reinforces the researcher's opinion that the students do not have enough knowledge about the environment. Students in everyday activities tend to have talks with light topics such as their personal and daily lives.

Students' interest in conducting discussions varies. Students tend to like light topics about their lives, not about the environment. This is supported by the opinion of Wijayanti (2012), that many people prefer business, politics, law, tax, and sports topics, while women choose social issues, books, food and drink, life, and lifestyle. It shows that students do not have enough knowledge about the environment but the school has made an effort to instill environmental caring character to the students through the PLH.

The questionnaires show that students who actively participate in extracurricular activities of waste management feel there is economic impact from waste management, because they already felt that waste management in SMA N 13 Semarang gives financial benefit besides the clean environment. The benefit that is meant by the students based on the interview is the money from the garbage sale collected by the students every day. Through interviews with extracurricular companion teacher of waste management (Personal Communications, 2017), he also mentioned that the money meant by students is money from the sale of garbage collected by students during the waste bank activities. Trash collected by students is sold to collectors every 3 months.

The results of the questionnaire indicate that students who follow waste management extracurricular have a deeper understanding of the benefits of following extracurricular activities. This is because students get direct experience that is not experienced by students who are not actively following waste management extracurricular. Direct experience gives a deeper impression on students than only through theoretical explanation by teachers in the subject of PLH. The statement is supported by a statement of Abdul *et. al* (2013) which mentions that students have a strong understanding because they can find their own concepts if doing the learning with direct experience.

Based on the description related to students' knowledge about the environment, it can be concluded that students in SMAN 13 Semarang already had sufficient knowledge about the environment but have not been able to raise environmental topics as a matter of daily discussion so that their knowledge is less developed. Students have acquired knowledge about the environment through the subject of PLH, so that they have sufficient knowledge but still need to be improved again so it continues to grow.

The students' curiosity about the environmental issues and how to overcome them

The results of observation indicate that students who actively follow waste management extracurricular observed reading the information in wall magazine at break time and school hours only about 3 to 5 people. This shows that students still have a low curiosity, whereas wall magazine is one of the means to increase students' knowledge as mentioned by Santoso (2007) that the wall magazine has a high enough role in the effort to form and build knowledge, skills, talents, interests and attitudes of students.

The results of interviews with students showed that the lack of interest of students to read wall magazine because in this modern era, students prefer to read the information by surfing through the internet because it is easier to do. Students can access articles online without a limited amount and time. This is reinforced by Agustina's (2016) statement, today's students prefer online media to access information and find things they love. The reasons are students can find that the content and pages in the online media easier to use and understand. Wall magazine began to be less desirable because the information or articles submitted limited, and the manufacture of wall magazines in one issue takes a long time, so the news is not up to date.

The result of the observation shows that the students are less showing the curious behavior about the environment, either related to the lesson or the student's daily environment. At the time of observation researchers are very rarely heard or questioned students matters relating to the environment. This shows that the character creates a class atmosphere that invites curiosity, especially about the environment does not yet exist. Whereas according to Kemendikbud (2010), curiosity can be raised by creating a classroom atmosphere that invites students' curiosity. The student's inquiring attitude relates to the intention or desire to perform certain behaviors, in this research is the behavior to preserve the environment. If students have a desire to behave in the environment then the character of keeping the environment around has grown.

The questionnaire results show that students have a high curiosity because students who actively participate in extracurricular activities of waste management have a desire to read articles about the environment they encounter. This indicates that the student has a character of exploring knowledge about the environment. If students are accustomed to reading information through articles then the longer the students will have their own interests even though no more coercion. This is supported by a description in the character education guide book by Kemendiknas (2010), which mentions that the characters inculcate the habit of good things so that students become good grades and commonly do it. So, the character is closely related to the habit that is continuously practiced or done. The habit also shows that students have a character accustomed to understanding good grades

and doing them. Curiosity is also shown from the percentage who have never seen an environment-related television show that shown in Table 2.

Table 2 Comparison of students who have seen an environment-related television show and who have never seen

Students who have never seen an environment-related television show	Students who have seen an environment-related television show
3 of 15 students are active in waste management (20%)	12 of 15 students are active in waste management (80%)

From that percentage it can be said that students have curiosity on the growing environmental issues. According to the researchers, students are more interested in knowing the issues about the environment through television because it is more easily understood and visualized than by reading the article. The researcher's opinion is supported by the article Wulan (1999) which states that the child has a penchant for watching TV to meet the curiosity. By watching television messages received by the child more efficiently get into the memory and are more easily understood by the children compared to the message through the reading. Besides television presents an interesting picture and sound so much easier to enjoy.

Based on the description of the students' curiosity on environmental issues and how to overcome it can be concluded that students do not have a high curiosity. Students have an interest in listening to environmental information on electronic media if shown to students, but have not been able to develop their own curiosity without teacher mentoring.

The students' understanding of the causes of environmental damage and how to overcome them

The observation of students' attitudes at school shows that there are still some students who do not throw garbage in their place. Based on the observations, according to the students, students have not understood that their daily behavior causes environmental problems. Reducing garbage issues should start with students first understanding the cause of the problem and then analyzing the problem so that steps can be taken to reduce future problems. This is also conveyed by Musadad (2017), which mentions that there are three main steps to solve environmental problems, that is first to realize the problem. Second, is the problem analysis to identify the root causes of the problem. Third, develop strategies to correct existing problems and prevent future occurrences.

The observations also show that some students still throw garbage without sorting it out first in accordance with the trash provided. Researchers checked into the garbage provided by the school, inside the garbage can still be found garbage mixed between organic waste with inorganic waste. This shows that students throw garbage without sorting it out first. Yet according to Susanto *et.al.* (2010) sorting out the trash should now be part of the lifestyle. Growing the habit of sorting waste can reduce some of the garbage problems.

The observations show that there is still plastic waste found scattered in the school environment. Plastic waste is also seen scattered in the school canteen although the school has given a policy to sell food using bowls and glass cups. It shows that some students who do not follow extracurricular waste management still have a low understanding of their daily activities that cause environmental damage. Character of students to get used to throw garbage in its place and sorting garbage according to its type not yet formed. The researcher's opinion is also supported by Riandes's research (2016) which says that lack of facilities, self-awareness, and sufficient knowledge about how to dispose of waste in its proper place is the trigger for littering someone.

The habits of littering students are probably caused by the fact that they have not been accustomed to throw garbage since they were young. Students will be difficult to change their

attitude because their care is not formed early. Aryani (2012) mentioned that the planting of environmentally care attitude in elementary school is an urgent thing in the effort to preserve the environment. This suggests that education gained in early childhood greatly affects child development at a later stage and increases work productivity in adulthood.

Schools have a good policy to ask students to reduce the use of plastic as much as possible even though they have not eliminated the full use of plastic. Excessive use of plastic will cause environmental problems as presented by Purwaningrum (2016) that excessive consumption of plastic will increase the amount of plastic waste that can pollute the soil, water, and disrupt the lives of other living things. Through the policy the character accustomed to maintain the cleanliness of the environment has been formed.

School policies to reduce waste are also supported by students' activities to utilize plastic waste to be handicraft products. Manufacture of handicraft products from plastic waste can reduce the amount of garbage that accumulates in schools as proposed by Lisdiana *et.al.* (2016) stating that the utilization of plastic waste can be done by making it a handicraft product (handicraft) so as to achieve the idea of zero waste or waste-free school as well as making practical learning suggestions for students.

Schools have made good efforts to reduce plastic waste by making rules in the school cafeteria. The contains of the rules are not to serve students who wrap their food in plastic, even though it is not one hundred percent done, but has been able to reduce the amount of plastic use. According to the researchers, the enactment of rules by this school is a firm way so that students have the discipline to reduce the use of plastics. The researcher's opinion is supported by the results of Arif (2015) which states that discipline can be enforced in several ways, one of which is by enforcement of the rules. If a student breaks the rules then it will get sanction and if following the rules well will get rewards.

Based on the description of students' understanding of the causes and how to overcome environmental problems, it can be concluded that students have understood the things that cause environmental damage, like littering, throwing garbage without sorting the type first, indifferent to the cleanliness of the school environment, and using plastic in excess. Students understand how it can be done to participate in reducing environmental problems is to reduce the behavior.

The students' real actions in maintaining and reducing the environmental problems

The results showed that students who participated in extracurricular activities did not litter and some inactive students were still littering. This shows that the character used to throw garbage in place has been formed on students who actively follow extracurricular waste management.

The attitude of littering is caused by some students still have low discipline and concern. This is also due to the location of the garbage can that is between the 2 classes rather than within each class so that when students eat snacks inside or on the classroom terrace, students feel lazy to throw out the garbage because it is not close to the classroom. The results of the interview also stated that students are lazy to throw garbage into the garbage can because it is far away and would rather keep the garbage in the desk drawer. Anggita (2014) mentioned that the effort in developing the attitude of students throwing the garbage in place is by placing a lot of garbage cans in student activity environment.

The result of the observation indicates that the waste is still discarded without sifting so that it is mixed in the garbage can. Some students who did not follow waste management extracurricular acknowledged that they took out the garbage by not separating it first, but the questionnaire showed that they knew that the waste should be separated when disposed of. This shows that in the application of knowledge is still less discipline due to less supervision. Efforts that can be done is to ask students in charge of cleanliness classes to be more assertive in admonishing students who

dispose of garbage carelessly, but also the system of fines can be applied to this problem also so that students get a deterrent effect. According to Hadinata (2013) punishment is necessary to strengthen the behavior and infest a particular behavior with regard to the situation and condition of the students.

Class on duty system in SMAN 13 Semarang has been implemented and run well. This can be seen from the classrooms that look clean although some of the classroom terraces looks some scattered rubbish. Through the obligation given by doing this class picket will foster self-reliance and responsibility to preserve the environment as described by Anggita (2014) that the character of responsibility will arise when students have the behavior to carry out their duties and duties, which must be done to self, environment, country and God Almighty.

Schools also apply rules that prohibit students from using plastics so that students do not generate plastic waste that can cause many environmental problems. The rules are printed on A4 size paper which is then affixed to the school canteen wall. According to the researchers the enactment of regulations on the use of this plastic is very good to do because it helps students familiarize themselves to control the behavior of using the plastic in excess. This is in line with the statement of Irwansa & Maful (2014) that the implementation of discipline helps familiarize students in controlling and curbing the desired behavior. The rules or regulations aim to let students know the duties, rights and obligations.

Students of SMAN 13 Semarang have concern for their environment which is shown through their participation in waste processing activities. Extracurricular activities of waste management include the activities of sorting waste, weighing, selling, composting, and utilizing waste into handicrafts. These activities are only followed by active students so that inactive students can be said to be not fully concerned about their environment. This agrees with Heryanti *et.al.* (2016) that students can change an attitude by following the activities directly in the field. Students gain experience, trust, knowledge, and outlook through activities in the field and will form an attitude according to what is the object of their attitude, in this case is the attitude of concern for the environment.

The results of the questionnaire indicate that students have taken action to safeguard and reduce environmental problems. This can be seen from the answers of 15 students who actively follow extracurricular waste management entirely replied that if you see garbage scattered in the school yard will be picked up and thrown into the trash. They also feel that the responsibility of protecting the environment is a common property, not just the property of the individual. All students also have understood that the function of the garbage can in the school is to throw away the garbage, so students are obliged to dispose of the garbage properly. This is supported by the statement by Arifudin (2017) that the whole school community is responsible for realizing a clean school environment.

Teachers are encouraged to give a reprimand if the classroom is dirty and invites students to clean up dirty classes before the lesson begins. According to researchers the role of teachers in schools is very important to develop environmental awareness of students as submitted by Al-Anwari (2014) that the example of school or teacher is one strategy that can be used to shape the character of students. Teachers can provide invitations / motivations to students to maintain the environment and provide reprimand when there is behavior of students who have not reflected the concern for the environment. Character that is formed is the habit of maintaining cleanliness and environmental sustainability.

Based on the description of students' concrete actions to safeguard the environment it can be concluded that students who actively participate in extracurricular waste management activities have shown concrete actions to reduce environmental problems as a further step on their understanding of the causes of environmental problems. The real action done by students who actively follow

extracurricular waste management is that they throw garbage in the space provided, sort the garbage and throw it into the appropriate bins, reduce the use of plastic by bringing food from home or buy food in the school canteen with a bowl and glass cup.

CONCLUSION

Based on the results of research and discussion can be concluded that students still lack of knowledge because they were not able to explore it. Students only received knowledge about the environment from the subject of PLH. The students' understanding of the causes of environmental problems was good and the characters that were formed through concrete actions to reduce environmental problems are the characters used to maintaining the cleanliness of the environment, used to throw garbage in place, to maintain the classroom environment, the schools provide cleaning equipment, and responsible for maintaining the cleanliness of the environment.

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