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Analysis of the Hydroponics Program in Instilling an Environmental Care Attitude for Elementary School Students

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Abstract

This study aimed to describe the planting of environmental care through hydroponic programs. This type of research is qualitative research with purposive sampling technique. The research subjects were students in grade V SDN Susukan 04 East Ungaran Semarang Regency. Data collection techniques through FGD, questionnaires, interviews, and documentation. The research instrument used was a draft FGD, questionnaire sheets, interview guides, and documentation archives. Technique validity of data through source triangulation and technique triangulation. Students carry out the hydroponic program with a floating raft system through the axis technique. The planting of an environmental care attitude is carried out through several stages of the hydroponic program, namely the stages of sowing, seedling, growth/enlarging and harvesting. The results showed that the most dominant environmental care attitude of students was nurturing plants, while the weakest environmental care attitude of students was developing a comfortable environment. The environmental care attitude that has been embedded in elementary school students is the interest in planting and caring for plants, conserving energy by using water as needed, throwing trash into the trash, and recycling used goods.

Keywords: hidroponics; environmental care

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INTRODUCTION

Elementary school is a path of education that have an important role in shaping a person's character. Students should be invited to preserve the environment from an early age according to Law no. 32 of 2009 concerning Environmental Protection and Management. However, students' awareness of the school environment is still low (Muslich, 2011). The students of SDN Susukan 04 also showed the same thing. The students' caring attitude was not visible yet (only 34% of students had an environmental care attitude in a good category). In fact, environmental care is one of the character values that must be developed in order to prevent damage or destruction to the surrounding environment and how to repair it.

Based on interviews with school principals and teachers, it was revealed that students still didn't care to the plants in the school because they relied on school

keepers who water and care for the plants in the school. In addition, students did not realize that the plants around them had comfort benefits for themselves because as many as 78.2% of SDN Susukan 04 students regarded farming activities difficult to do. The school also has not made any schedule for realizing the go green program that must be done by all school members. This causes the interest of students to plant plants both at school and at home nothing.

If students do not have an attitude of caring for the environment from an early age, they do not have the habit of caring for the environment, are indifferent to the environment, and do not try to preserve the surrounding environment. Azzet (2013) explains that the earth is getting old and human needs for nature are also getting bigger so that environmental issues are very important things to pay attention to. Yaumi (2014) also states that planting an environmental care attitude is very important because it can create harmony, harmony and balance between humans and the environment, realize the wise use of natural resources, and protect the Republic of Indonesia from impacts outside the country's territory that can cause pollution and destruction of living environment. Therefore, there needs to be an effort to embed an environmental care attitude for elementary students. The hydroponic program can be used as an alternative means of embedding an environmental care attitude.

Hydroponics is a planting activity without using soil but water as a planting medium (Roidah, 2014). Hydroponic planting can be used as a means of preserving the environment as contained in Law no. 32 of 2009 because the hydroponic planting stage always involves the environment, namely the sowing stage, the seedling stage, the growth/enlarging stage, and the harvest stage. The selection of this hydroponic program is based on the consideration that students can care for hydroponic plants independently and do not require large areas. The noble values resulting from the hydroponic program are environmental care, discipline, hard work, creative, independent, curiosity, social care, and responsibility (Hidayat, 2018).

The advantages of the hydroponic program are the success rate of plants to grow and produce more guaranteed and more practical treatment and more controlled pest disturbances (Istiqomah, 2006 & Sameto, 2003). Students can plant without hassle, meaning without watering the plants every morning and evening, but only periodically monitoring the adequacy of nutrients and the crop harvest time is faster than conventional farming. While the disadvantage of the hydroponic program is that the installation costs are expensive. To anticipate these weaknesses, the hydroponic system used is a floating raft system with the wick technique.

The choice of this system is caused by students are beginners in hydroponics so this system is the simplest compared to others. Alviani (2015) explains that this wick technique is similar to how a traditional stove works, where the axis functions as an absorbent for the solution in the media. This floating raft media does not require special maintenance, is easy to assemble, portable (movable), and is suitable in limited land (Herwibowo & Budiana, 2014). Students do not need a lot of land and can be placed anywhere because the floating raft media is minimalist in shape with a size of 20 cm x 5 cm.

Elementary school students are “children see children do” who have a tendency to imitate those around them so that this hydroponic program is done by all school members who are supported by the parents of the students. In line with the research of Ahmad (2018) and Maghfiroh, Lianah, and Hidayatullah (2018) that hydroponics

can embed a sense of love and concern for caring and maintaining the school environment in order to create a beautiful and comfortable environment. Both studies were conducted in MA and SMP, while research on hydroponic programs in elementary schools is still rare. Thus, this research needs to be done because previous studies only discuss environmental care attitudes and there is not much literature that discusses hydroponic programs that are applied to elementary students.

With the hydroponic program launched by the school, the purpose of this study is to describe the planting of an environmental care attitude through the hydroponic program. The process of embedding a caring attitude towards the environment is analyzed so that students can develop a comfortable environment, caring plants, and support the go green program.

METHOD

This type of research is qualitative research. This type of research uses research procedures that produce descriptive data in the form of written or spoken words from people and observable behavior (Moleong, 2012). The subjects in this study were students in class V to obtain data in order to explore the object of research, namely the cultivation of environmental care through hydroponic programs.

Researchers used purposive sampling technique to determine informants in data collection through interviews. This technique is done to study the subject category of students who care about the environment as very good, good, worse, and not good. In this discussion, the subject studied is a subject with a very high category of environmental care.

Data collection techniques were through FGD, questionnaires, interviews, and documentation. Meanwhile, data analysis in qualitative research was done when data collections take place and after data collection was complete (Sugiyono, 2015). The data analysis steps are shown in Figure 1.

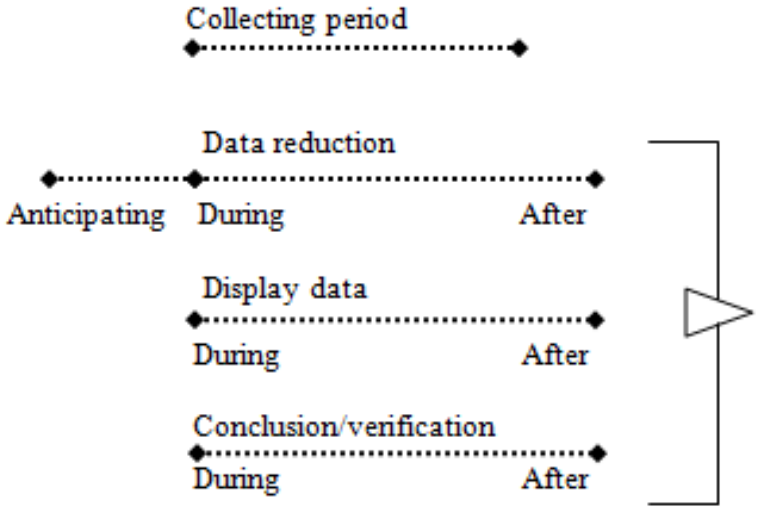

Figure 1. The steps of Data analysis (Sugiyono, 2015)

In addition, activities in qualitative data analysis were done interactively and occur continuously to completion so that the data was saturated. An interactive model in data analysis is shown in Figure 2.

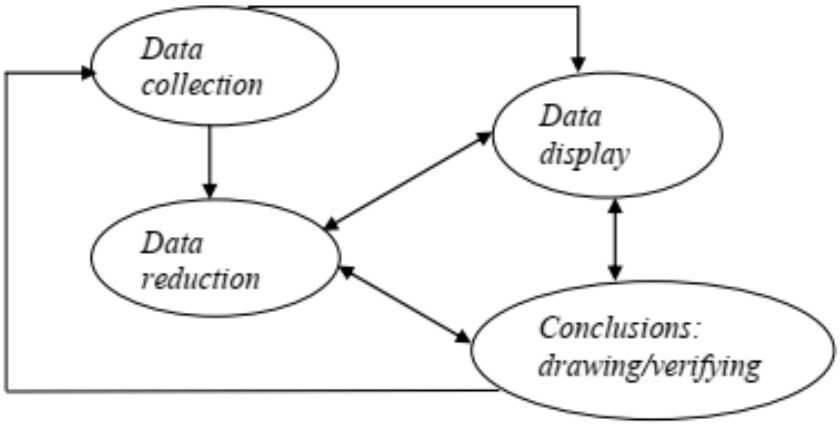

Figure 2. The Interactive Model of Miles Huberman (Sugiyono, 2015)

The technique of checking the validity of the data in this study used source triangulation and technique triangulation. Source triangulation was used by researchers to check data obtained from students, teachers, and school principals. While the triangulation technique is used by the researcher after getting the results of the interview and then it is checked with the results of the questionnaire and documentation. From these two techniques, it will produce conclusions related to planting an environmental care attitude through hydroponic programs.

RESULTS AND DISCUSSION

Character education at the elementary level leads to the formation of a school culture. It means that the values implemented are in the form of values that underlie the behavior, traditions, habits, daily activities practiced by all school members and the surrounding community (Asmani, 2012). The formation of the school culture applied in this study is an attitude of caring for the environment. Students are given an environmental care attitude education through a hydroponic program with a floating raft system through the axis technique. The Ministry of National Education (2010) describes caring for the environment as an attitude and action that always seeks to prevent damage to the natural environment around it and develop efforts to reform natural damage that has occurred.

Table 1. Students Response to Embedding of Environmental Care Attitude

Aspect	Statement	Percentage	
Developing a Comfortable Environment	I try to develop a comfortable environment when:	Attempted	No
	a. sowing stage	83%	17%
	b. seedling stage	92%	8%
	c. growth stage	100%	0%
	d. harvest stage	75%	25%
	Average	**88%**	12%
Maintaining plants	I maintain plants well at the moment:	Maintaining	No
	a. sowing stage	100%	0%
	b. seedling stage	100%	0%
	c. growth stage	100%	0%
	d. harvest stage	75%	25%
	Average	**94%**	6%

Aspect	Statement	Percentage	
Supporting go green program	I try to realize go green program when :	Supporting	No
	a. sowing stage	92%	8%
	b. seedling stage	96%	4%
	c. growth stage	100%	0%
	d. harvest stage	67%	33%
	Average	**89%**	11%
Final Average		**90%**	**10%**

Based on Table 1 (questionnaire results) and strengthened by source triangulation involving the principal and teachers as well as technical triangulation by analyzing the results of questionnaires and interviews, the percentage of the three aspects of environmental care has a certain pattern, it is the percentage of environmental care attitudes increases at the time of sowing, seedling, and growth but it is decreased at the harvest stage. Students regard the harvest stage not to be a caring attitude for the environment because cutting plants causes the environment to not look green. Even though during the harvest process it still includes maintaining plants because students only cut the harvest and replace it with new seeds. One week before harvest, the seedlings have been planted so that the seedlings are in the form of seeds that are ready to be moved to the floating raft media at harvest time. This is done consistently by students in order to maintain hydroponic plants.

The strongest caring attitude formed was nurturing plants (94%) while the weakest was developing a comfortable environment (88%). Overall, the environmental care attitude has been formed in the very good category because the average positive response of students in each indicator is more than 85% and the character of the environmental care attitude formed is 90%. This character will become a culture of loving the environment, but it still takes a long time (Muslich, 2011) because building awareness of the environment is related to building the culture or character it self. The embedded environmental care attitude must be followed up with a hydroponic program which is done continuously and consistently.

Students are very enthusiastic during the hydroponic program from the beginning of the sowing to harvest. The environment around the house becomes comfortable, students can maintain hydroponic plants in the form of lettuce, and students begin to support the go green program launched by the school. If from the beginning the hydroponic program implementation was accompanied by a sense of interest in planting plants, the process of planting an environmental care attitude would be easier.

Based on the triangulation of sources and techniques in the form of FGD results, questionnaire analysis, interviews with teachers, students, and parents and documentation, the process of embedding a character of environmental care can be seen clearly when viewed from each stage of the hydroponic program as follows.

Sowing Stage

The sowing stage begins with students in groups making holes for the seed media (rockwool) using tweezers to put the seeds in it. Then the rockwool is poured with enough water and 1-2 lettuce seeds are put into the rokwool hole so that the seedling process is successful. Amalia et al (2019) explained that if too much water is put in the seed tray, the seeds will rot and there is a disease that causes the seedling

to fail. Therefore, students water the rockwool slowly so that water does not stagnate in the seed tray. The attitude of students has made water savings by using water as needed.

The seeds that have been sown are placed in a dark place until sprouts grow. Students begin to maintain adequate water and prevent the seeds sprout from rain because the stems are still weak. If the rockwool is dry, students will water slowly without water stagnating on the tray. This activity is done continuously during the seedling stage of lettuce so that it becomes a habit in making water use more efficient. The sprouted seeds are removed from dark conditions for a maximum of 3 days / hour in the sun so that seeding growth is more optimal (Suryani et al, 2020). The habit of using enough water and utilizing sunlight reflects the environmental care attitude of students. The Central Bureau of Statistics (2014), states that the use of sunlight is a form of environmental care.

Seedling Stage (Sprouts into seedlings)

Students water the seeds periodically until the plants grow the true leaves which are indicated by the growth of the third leaf. This watering is done so that the rock wool is always moist. When the true leaves appear, the seeds are ready to be transplanted into the floating raft installation (Suryani et al, 2020). Moving of seedlings are done carefully by lifting the roots that are still attached to the Rockwool into the net pot of the floating raft installation. This proves that students are trying to take care of plants so they are not withered when they are transferred to other media.

The floating raft installation is filled with water as much as 75% so that the roots of the plants are touched by water. The goal is that the roots can absorb nutrients when giving AB mix at the growth stage so that the harvest can be optimal (Hidayat, 2018). The hydroponic stages are mutually sustainable, so the success of one stage determines the success of the next stage. Students also check the adequacy of seeds at each net pot. In the floating raft installation, the maximum of three lettuce seeds for each net pot is to grow well.

Growth/Enlarging Stage

Students painstakingly care for the seeds until the lettuce plants grow bigger until they are ready for harvest. The growth stage is done by giving nutrients in the form of AB mix. Solution A was poured into the floating raft media as much as 50 ml and solution B was poured as much as 50 ml with a ratio of 1: 1 (Swastika et al, 2017 & Suryani et al, 2020). Solution A and solution B are entered alternately into the floating raft installation slowly. Nutrition is given periodically by observing growing lettuce plants. Giving sufficient nutritional solution according to the dose requires accuracy or thoroughness and shows that students save in the use of nutrients.

Resh (2013) explains the factors that influence nutritional formulation, including plant types and varieties, plant growth stage, harvested plant parts (roots, stems, leaves, fruit), season and weather (temperature, light intensity, sunshine length). Students make observations on stems, roots and leaves. If the leaves look yellow and withered, then nutrition is added. Students have realized that if lettuce leaves are allowed to wither, the hydroponic plants will die. It shows that students can take good care of plants. Students like this can be said to have understood how to care for plants in the environment (Afriyeni, 2018). In line with Manurung (2011) that the

school program implemented by planting and caring for plants can develop the character of caring for the environment of school members.

The planting period of lettuce is 45-55 HST (Swastika et al, 2017), so the control of the floating raft installation is always done. Check the adequacy of water, nutrition, and water pH. Students once a week add sufficient water if the water in the floating rafts installation is running low or dirty. Awareness of providing water and nutrients into the installation is not only their obligation in caring for plants but has become a habit. Students have realized that plants which lack water will wither and die, thus forming moral actions in the form of habits (Lickona, 2014). This good habit needs to be maintained so that students care more about the environment without having a school program.

Lettuces that grow well make the environment look green and make it comfortable. The placement of floating media around the house with sufficient light intensity also makes a way of students to develop a comfortable environment in the area where they live.

Harvest Stage

When lettuce is harvested, students think that they no longer care for the plants which can be seen in the lowest percentage of aspects of maintaining plants at the harvest stage (see Table 1). The harvest stage is considered no longer developing a comfortable environment, even though at this stage students clean the hydroponic installation or tub from moss, scale, or other impurities. This activity is an effort to develop a comfortable environment so that the environment where hydroponics is done is not slum and becomes a nest for mosquitoes.

Students trim the wilted parts of the plant and throw them in the trash. The hydroponic lettuce harvest period is faster than conventional farming. Barbosa et al (2015) stated that hydroponic lettuce cultivation is more efficient in the use of water and soil than conventional farming so that harvest times are faster and save production costs. Students harvest hydroponic lettuce carefully and throw rotten crops in the trash. This shows that students are able to develop a comfortable environment by throwing trash into the trash.

CONCLUSION

Hydroponic program can be used as a means of planting an environmental care attitude for elementary students. The planting of an environmental care attitude is done in several stages according to the existing stages in the hydroponic program, they are the sowing stages, seedling stages, growth/enlarging and harvesting stages. The most dominant attitude of caring for the environment of the students was caring plants while the weakest environmental care attitude was developing a comfortable environment. The attitude of environmental care increases at the time of sowing, Seedling, and growth but decreases at the harvest stage. Through the hydroponic program, students start to enjoy planting and caring for plants, can save energy by using water as needed, throw rotting crops waste into the trash, and recycle from used mineral glasses to net pots. With the emergence of this interest in hydroponic planting, the process of planting an environmental care attitude can be easier to do.

RECOMMENDATION

The hydroponic program that is done by students at home due to the Covid-19 pandemic would be nice to become a school program done in schools. Students from

grades I-VI cultivate hydroponics in front of their classes so that the school supports the overall go green program. Thus, not only grade V students have an environmental care attitude, but grade I students have also been taught to care for the environment from an early age.

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