

ASSESSING HIGH SCHOOL STUDENTS' PERCEPTIONS OF ENVIRONMENTAL SUSTAINABILITY: A CASE STUDY AT ADIWIYATA SCHOOLS IN DISASTER-PRONE AREA, INDONESIA

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ABSTRACT

This study aims to determine students' perceptions of environmental sustainability at the High School level. This research takes a case study at Adiwiyata School in a disaster-prone area of Banda Aceh City, Indonesia, that applied the concept of sustainability in the learning curriculum. The data was collected by using *Middle School Environmental Literacy Survey* (MSELS) instruments. These instruments are related to knowledge, concern, and attitude domains for analyzing high school students' perceptions. Data was collected by giving questionnaires to gather information about how students define sustainability. Data analysis was performed with a statistical percentage of questionnaire answers and open-ended questions about the knowledge of students' environmental issues and sustainability from a global perspective. The results showed that the most known environmental issues by students were environmental issues related to the effects of greenhouse gases and the effects of climate change. Based on the results of the study found that as many as 73% of students said they had heard the issue and could not explain it. The level of environmental concern of students within environmental issues is quite good. Students choose the form of environmental sustainability in terms of saving energy, recycling, and developing renewable energy sources.

Keywords: *High school, student perception, environmental sustainability, adiwiyata school*

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INTRODUCTION

The influence of human interaction and the environment have caused enormous environmental damage (Camino et al., 2007; Grimm et al., 2008). Some environmental problems began to be globally felt such as the phenomenon of

climate change due to global warming, depletion of the ozone layer, an increase in solid waste from industrial activity in large numbers, reduced green areas, the extinction of several types of animals and plants (Arslan, 2012). These effects cause conditions of environmental problems which is very worrying for all regions in the world including in Banda Aceh City, Indonesia.

Banda Aceh City is known as a disaster-prone area, a rapidly developing city at the present. After the earthquake and tsunami in 2004, Banda Aceh has revived in reorganizing all aspects of life (Kamil et al., 2020). This is marked by the infrastructure development such as roads, transportation, communication, and energy development. Besides, the increasing wave of urbanization has become a demographic phenomenon in Banda Aceh City area. The high population density has affected the environment such as air pollution, river pollution due to industrial waste and energy transportation that produce air pollution (Newman & Jennings, 2008; Wals, 1992). Thus, contributing to environmental damage. Environmental problems are wide direct result of pollution behavior carried out by individuals or community. Cultural norms play a very important role in shaping people's behavior (Kollmuss & Agyeman, 2002). Environmental problems have not been seen as problems of human nature or as problems of culture. For example, the solutions to the problem of pollution in changing our own "pollution behavior" were stop littering and help "clean" polluted areas (Wals, 1992). Therefore, there is an urgent need for the development of sustainable environmental awareness in Indonesia (Bravo, 2010; Parker, 2018).

Banda Aceh City has made efforts to build sustainable environmental awareness through education. Education was chosen in the implementation of sustainable development because it is a powerful instrument that is effective for communication, providing information, awareness, learning and can mobilize the community, and move the nation towards a future life that develops more sustainably (Desfandi, 2015; Eames & Birdsall, 2019; Kinash & Hoffman, 2009; Ngabekti et al., 2012). Education is seen as the key to overcoming environmental problems. This study was conducted to concretely determine the perceptions of high school students in Banda Aceh City area. It is interesting to study because students directly interact with the surrounding environment. They face environmental problems that occur in Banda Aceh City area, an area that wishes to develop sustainably. The vision of the green Banda Aceh City can only be achieved by using a comprehensive and integrated approach (Petrou, 2017; Sakurai et al., 2018). The city has applied the principle of Green City in several fields. However, this still needs improvement and development. Seeing the phenomenon, a solution to provide education to young people is needed to care for the environment.

One of the improvements was made through education. To enhance the role of the government in solving environmental problems through education, the Ministry of National Education and the Ministry of the Environment has developed environmental education at the secondary level through Adiwiyata schools. Adiwiyata Schools is a form of school with environmental culture (Dasrita et al.,

2015; Desfandi et al., 2017; Haris et al., 2018). The Adiwiyata Schools is a choice and a strategic effort to succeed in a sustainable development program (Kamil, Putri, et al., 2020; Sumarmi, 2008). Adiwiyata Schools is expected to be the right and ideal media to educate and introduce a positive and strategic culture to change the mindset of the community in protecting and managing the environment.

There are still only a few high schools in Banda Aceh City that received Adiwiyata awards. From 2006 to 2011, nationally, the number of schools participating in the Adiwiyata program has only reached 1,351 schools from 251,415 schools in various levels (Haris et al., 2018). Thus, it needs efforts to continuously improve schools cultivated in the environment. This is important because knowledge about environmental sustainability in students is formed through interaction with the environment, students are not only part of the family, but they are also part of the community and build knowledge through social environments (Fidan & Ay, 2016; Kresnawati, 2013; Rogoff, 2003). Therefore, with the Adiwiyata School, it will influence their perception of environmental sustainability (Haris et al., 2018; Parker, 2018; Tanu & Parker, 2018). Besides, this study also explores the implementation of the Adiwiyata Program in High Schools in Banda Aceh City to find perceptions, attitudes, and actions as a form of internalizing the values of environmental education that is sustainable. Sustainable for Development Education (SDE) has been carried out in several high schools in Banda Aceh City but is not yet fully compatible with the concept of global SDE. However, Adiwiyata Schools implementation contains the basic components consisting of: (1) environmentally sound policies, such as including environmental protection and management efforts in the school curriculum; (2) implementing an environment-based curriculum and building competencies in developing environmental learning activities; (3) participatory environment-based activities; and (4) management of environmentally friendly facilities in schools (Daryanto & Suprihatin, 2013; Haris et al., 2018).

The results of several studies found that environmental education can be taught through geography subjects by using an integrated learning approach (Kamil, Putri, et al., 2020). Through geography, lesson contained in the learning curriculum at Adiwiyata Schools can accommodate students in increasing knowledge and understanding of basic environmental issues. However, the main challenge is to achieve the implementation of environmental education to the action of preserving the environment (Mwendwa, 2017; Spiteri, 2018). The results revealed that individual interest towards the development of green classes and decision-making initiatives to analyze scientific evidence on sustainability issues is still quite low at the high school level (Behm, 2011; Siegel, 2006).

The effectiveness of environmental education in Adiwiyata schools is evaluated to measure student's environmental sustainability literacy level. Its measured based on the criteria of environmental literacy components, namely: knowledge, cognitive skills, attitude and responsible behavior towards the environment. Measurements were made using the *Middle School Environmental Literacy Instrument Survey*

(MSELS) (McBeth & Volk, 2009; Petrou, 2017). The instrument consists of environmental literacy test questions in the form of questionnaire. The questionnaire consisted of three parts which is included student knowledge of environmental issues, environmental awareness of students, and students' perceptions about the concept of environmental sustainability. By knowing the level of environmental sustainability, it's important to be done as a benchmark for the success of environmental education programs in Indonesia.

Several other studies have also been carried out to explore the perceptions of urban society towards environmental concerns in developed countries. The results of the study show that younger, politically-liberal and more educated individuals show relatively stronger environmental concerns (Dunlap et al., 2000; Hunter et al., 2010). Therefore, this article examines the perceptions of teenagers in developing countries in Indonesia, especially in Banda Aceh City area, at the high school level regarding their perceptions of the concept of environmental sustainability. This study investigates students' views on environmental issues by understanding how students perceive human actions, as having an impact on the environment based on geographic scales at the local, regional and global scales (Ansell et al., 2016; Benninghaus et al., 2017; Kamil, Utaya, et al., 2020; Sumarmi, 2008). It examines students' perceptions of interpreting, organizing and giving meaning to stimuli from an environment after their learning experience.

Based on the explanation above, the perception of high school students about environmental sustainability is an important concept in the field of education for sustainable development. By exploring the extent to which high school students can make a connection between environmental sustainability and human actions that occur in the environment (Carmi et al., 2015; Weeks, 2010). However, there are not many empirical studies that provide information about this research in Indonesia, especially in Banda Aceh City. Therefore, a case study was carried out in Banda Aceh City area at Adiwiyata Schools to find out the understanding of individuals of the information obtained through the Adiwiyata program at the high school level about environmental sustainability in the school context.

RESEARCH METHOD

Research Design

This study uses a qualitative approach intended to find out students' perceptions of understanding environmental sustainability. Qualitative research was used to study or interpret phenomena meaningfully (Hsieh & Shannon, 2005). Therefore, a qualitative approach can be effective in generating information about students' knowledge, perceptions, attitudes, and views about environmental sustainability. This study interprets and explains the concept of environmental sustainability and how this perception affects student actions. This research was conducted during one semester, the stages are: (1) the preparation stage namely, make initial observations on school research objectives, (2) the implementation phase which is included coordinate with the teachers to provide MSELS instruments

for students and measure the level of environmental literacy ability, (3) analysis of data obtained from students' answers to the MSELS instrument questions, (4) taking conclusions from data that has been analyzed.

Participants

Participants in this study were Adiwiyata Schools students at the high school level. The selection was based on a survey at Adiwiyata Schools. The schools have implemented an environment-based learning curriculum. Thus, researchers can interpret students' understanding of abilities of knowledge, care, and perception of the concept of sustainability. The research subjects consisted of 66 high school students aged 16-17 years (Grade XI). The study was conducted in schools with the status of Adiwiyata, namely SMA Negeri 4 Banda Aceh and SMA Negeri 3 Banda Aceh. These schools are the Adiwiyata schools that applies the concept of sustainability. The researcher chose to focus on high school students in Grade 11 because the geography curriculum, especially, includes aspects of environmental interaction and there are some basic competencies related to environmental values and human interaction.

Data Collection and Analysis of data

There are two categories of high school in Banda Aceh, Indonesia namely Public High Schools and Private High Schools. The following Table 1 describes the category of high school in Banda Aceh City, spreading across nine districts (Oktari et al., 2015; Sakurai et al., 2018).

Table 1.
High School Category in Banda Aceh City, Indonesia

No	Region	Disaster Risk	High School Category		Number
			Public	Private	
1	Kuta Alam District	High	6	4	10
2	Baiturrahman District	Moderate	1	4	5
3	Banda Raya District	Low	2	1	3
4	Syiah Kuala District	High	1	2	3
5	Meuraxa District	High	2	1	3
6	Ulee Kareng District	Low	1	0	1
7	Lueng Bata District	Low	1	0	1
8	Jaya Baru District	Moderate	0	0	0
9	Kuta Raja District	High	2	0	2
Total			16	12	28

Data collection was performed by using a questionnaire instrument on environmental sustainability that was adapted from Middle School Environmental Literacy Survey (MSELS) instruments. (Horvath et al., 2013; I et al., 2017; McBeth & Volk, 2009). The questionnaire was divided into 2 parts. The first part was related to students' knowledge and concern for environmental issues. The second part consisted of statements related to the perception of Adiwiyata School students

about the concept of environmental sustainability. The research produced an explanation of students' perceptions of environmental sustainability. There were 66 students interviewed separately regarding their conceptions and feelings towards the environment, the meaning of the natural environment for students, and how they can protect it. Students were asked to name several environmental problems both locally and globally. The results of the study revealed the extent of students' knowledge and concern for environmental issues and can provide solutions. Data validation through triangulation using information sources, namely 2 geography teachers and the school principal.

Study Area

Banda Aceh City schools were chosen because the city received the Adipura award and is known as a city with Green City Vision. The selection of research samples is with purposive sampling. In Banda Aceh City, there are 30 high schools divided into two categories, namely private schools and public schools. The map below Figur 1 gives information about the distribution of high schools in the Banda Aceh Region.

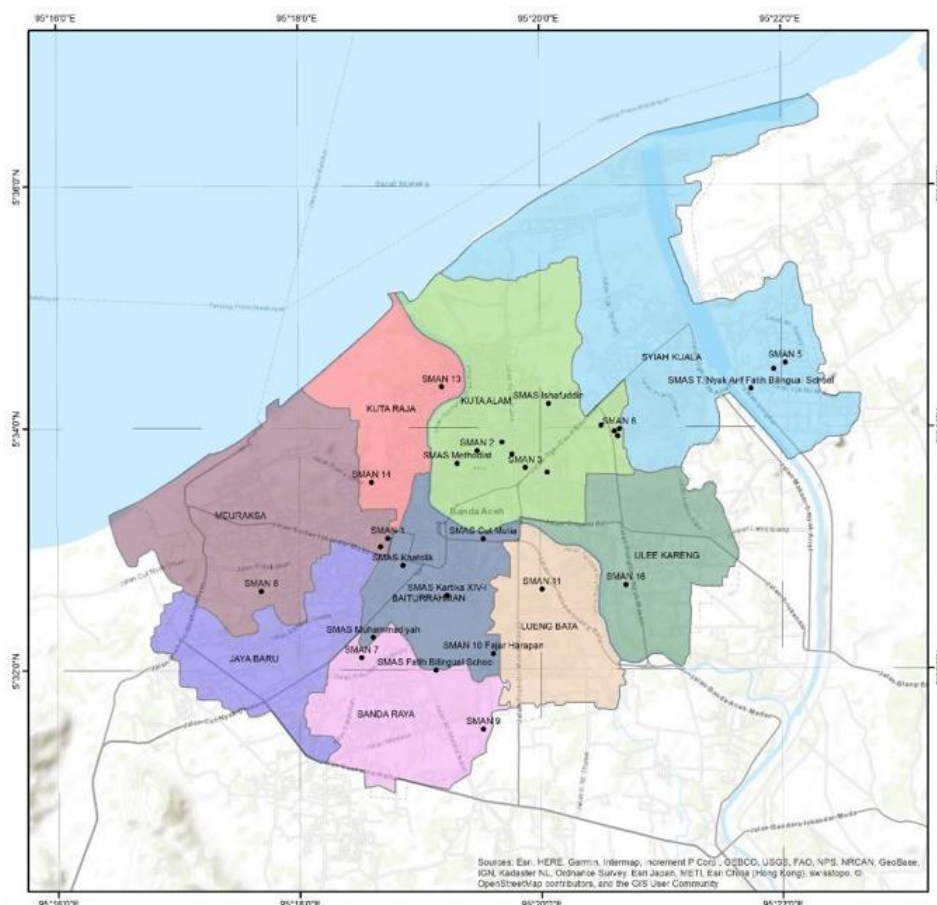


Figure 1.
Map of the distribution of high schools in Banda Aceh City

Figure 1 shows the distribution of high schools in Banda Aceh City. The schools spread over nine districts, namely: District Baiturrahman, Banda Raya, Jaya Baru, Kuta Alam, Kuta Raja, Lueng Bata, Meuraksa, Syiah Kuala and Ulee Kareng. The schools that implement Adiwiyata schools are SMAN 3 and SMAN 4 Banda Aceh in Kuta Alam sub-district.

RESULTS AND DISCUSSION

Adiwiyata Schools Student Knowledge of Environmental Issues

One of Indonesia's commitments in implementing sustainable development goals (*SDGs*) is to increase awareness of environmental issues and to make changes to policies, legal and social systems (Prabawa-Sear, 2018; Tanu & Parker, 2018). This priority area in environmental cooperation through environmental education and community participation is a commitment of ASEAN countries to promote sustainable development in the aspect of education. A survey of high school students in Banda Aceh City area was conducted to find out whether the Indonesian national curriculum was one of the dominant factors that could shape learning experiences and be able to address the need for increased student knowledge and concern for the environment. The following global environmental issues as a barometer of the proportion of information on environmental issues known by Adiwiyata high school students in Banda Aceh City.

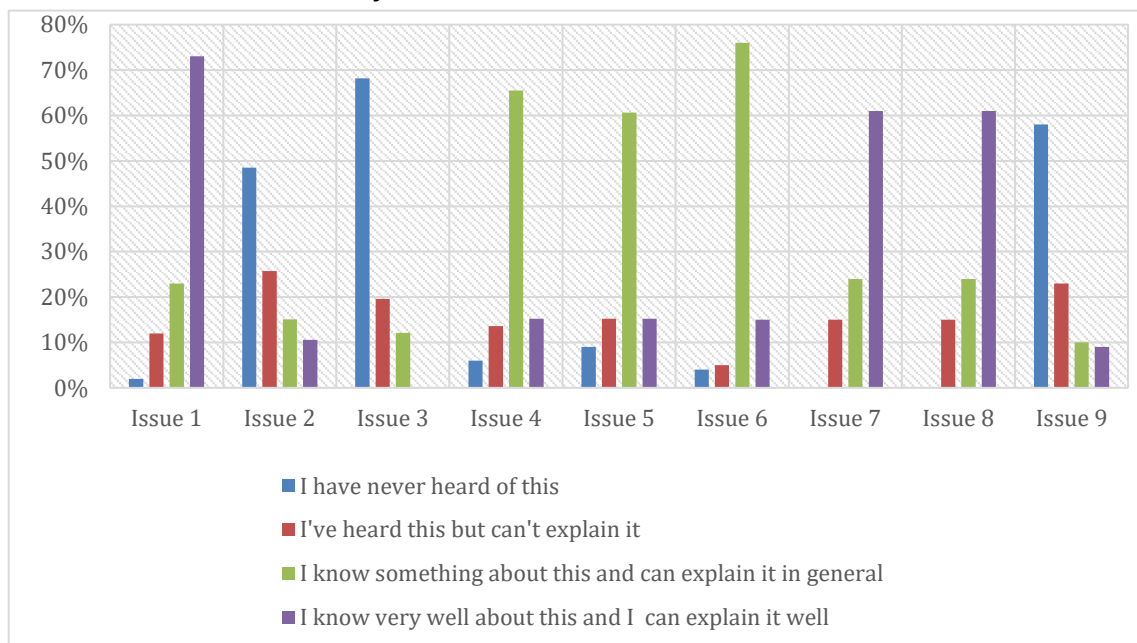


Figure 2.

Diagram of Knowledge Level of Environmental Information among High School Students in Banda Aceh City Region

Based on Figure 2, nine environmental issues are informed to students. These issues are global environmental issues, both in Indonesia and Banda Aceh City,

namely (1) environmental issues related to the increase in greenhouse gases in the atmosphere and the impact of climate change; (2) the use of genetically modified organisms (3) industrial waste; (4) ecosystem damage and loss of biodiversity; (5) transfer of land functions due to human population growth; (6) air pollution; (7) clean water crisis; (8) water pollution; and (9) carbon trading. Next is the percentage presentation of students' knowledge of environmental issues.

Environmental Issues Related to The Increase in Greenhouse Gases in The Atmosphere and The Impact of Global Climate Change

Based on a questionnaire given to high school students in Banda Aceh City, it is known students most widely knew the environmental issues related to the effects of greenhouse gases and the impact of climate change. The results found that 73% of students had heard the issue but could not explain it. Only 2% of students have information about the issue of the greenhouse gas effect and could explain it well. The 23% of students could generally identify and explain information on environmental issues about the effects of greenhouse gases and the effects of climate change. Furthermore, there were 2% of students who had never heard of the issue. In general, high school students in Banda Aceh City area have often heard about these environmental issues, but they cannot explain it well.

Use of Genetically Modified Organisms

Most students have never heard the issue of the use of genetically modified organisms. The results of the questionnaire showed 48.5% of students in Banda Aceh City stated that they had never heard of the issue of genetically modified organisms. Yet, after the teacher explained the form of genetic organisms that are often used in daily life, they could realize them. 10.6% of students were aware of the issue and could explain in general terms. Furthermore, the results of the study revealed that 25.7% of students had heard of issues related to the use of genetically modified organisms.

Industrial Waste

The issue related to industrial waste is one of the least issues heard by high school students in Banda Aceh City. It is very common for students and teachers in Banda Aceh City to be generally less familiar with the issue of GMO and industrial waste. This might be explained by the situation in the local context where Aceh is one of the provinces that has few industrial development activities and is not yet optimal in the organism's genetic engineering technology. Based on the research results, it is known that 68.2% did not know and had never heard of this issue. Whereas this nuclear waste harms biodiversity, an effect on human health [36]. Furthermore, there were 19.6% of students said they had heard about this before. But cannot explain in detail. There were 12.1% of students who answered that they already knew about this environmental issue.

Ecosystem Damage and Loss of Biodiversity

Aceh Province has a rich biodiversity. Therefore, students in Banda Aceh city area are quite familiar with this environmental issue. This is indicated by the results of research as many as 65, 2% of students already have very good information on the issue. This is because the issue is an environmental problem that is common in Indonesia and has been integrated into the national curriculum through subjects in schools. However, only 15.2% of the students were able to explain it well. Some students explained uncontrolled deforestation, mining activities, agricultural activities and infrastructure work. This is what causes damage to the ecosystem.

Land-use Change to Human Population Growth

Land-use change were also the most familiar environmental issues for students in Banda Aceh City. This is because these environmental issues were often displayed by teachers in learning specifically related to teaching material that is relevant to the theme of the environmental issue. Based on the results of survey research on students related to environmental issues with the theme of land-use change due to population growth, it is known that 60.6% of students knew about it and could describe it in general. As many as 15.2% were able to explain in detail and only 9% of students had never heard of this environmental issue.

Air Pollution

In Indonesia, air pollution is caused by motor vehicle emissions (Daryanto & Suprihatin, 2013). Motorized vehicles emit hazardous substances that can cause negative impacts, both on human health and the environment. From these conditions, students in Banda Aceh City were familiar to this issue. Diagram 1 shows that as many as 76% of students had good understanding of air pollution problems. It shows the highest percentage. Then, as many as 15% of students knew about the issue of air pollution but could only explain it in general. Air pollution by students' perceptions were caused by a lot of illegal logging, forests become bare causing less trees absorb carbon dioxide. Student responses show awareness of activities that can cause pollution in the atmosphere.

Water Pollution and Clean Water Crisis

In the Aceh community, water is used for basic consumption activities, includes drinking, cooking, bathing, washing, cleaning, and others. In Banda Aceh City area, especially during the dry season, a decreasing amount of rainfall causes many springs to dry up. Banda Aceh City has sufficient clean water, except for the dry season. In the rural area, households depend on river water for all their needs. The water was polluted by waste or mercury. As many as 61% know very well about this issue. Whereas, only 24% of students knew and could explain it in general, and the other 15% knew but could not explain in detail.

Carbon Trading

The results of the study notes that students in Banda Aceh City had never heard of issues related to carbon trading. Their knowledge was very limited when trying to explain what trading carbon was. 58% of Banda Aceh City school students has never heard of issues related to carbon trading. Only 23% of students knew environmental issues and only 9% of students knew and could explain it detailly.

Students' Environmental Concern

Attitudes of concern can be demonstrated by defining responsible behavior for the environment including (1) awareness and sensitivity to the environment and related problems (2) a basic understanding of the environment, (3) a feeling of caring about the environment and motivation for actively participating in environmental improvement and protection, (4) skills to identify and solve environmental problems (5) active involvement in solving environmental problems (Hsu, 2004; Hungerford & Volk, 1990). The following are some forms of questionnaire questions that have been answered and adapted from MSELs instruments (Horvath et al., 2013; I et al., 2017; McBeth & Volk, 2009).

Table 2.

Level of Concern Score for The Environmental Issue

No	Environmental Issues	Level of Concern							
		1 (Do not Care)		2 (Fairly Care)		3 (Care)		4 (Care deeply)	
		f	%	f	%	f	%	f	%
1	Global Climate Change	5	7,6	16	24,2	29	43,9	16	24,2
2	The Use of Genetically Modified Organisms	25	37,9	24	36,4	16	24,2	1	1,5
3	Industrial Waste	16	24,2	17	25,8	27	40,9	6	9,1
4	Ecosystem Damages and Loss of Biodiversity	0	0,0	14	21,2	31	47,0	21	31,8
5	Land-Use Transfer	1	1,5	16	24,2	34	51,5	15	22,7
6	Air Pollution	0	0,0	3	4,5	27	40,9	36	54,5
7	Clean Water Crisis	0	0,0	5	7,6	23	34,8	38	57,6
8	Water Pollution	0	0,0	4	6,1	23	34,8	39	59,1
9	Carbon Trading	21	31,8	17	25,8	17	25,8	11	16,7
Average		7,6	11,4	12,9	19,5	25,2	38,2	20,3	30,8

Table 2 shows that the level of environmental concern for Adiwiyata Schools students reaches a percentage of 38.2%. This shows that students have a level of environmental concern at a score of 3 means that generally, students care about environmental issues globally. The level of environmental awareness is influenced by factors aspects of the curriculum applied in schools. The following are students'

responses to the theme of sustainability in the curriculum that has been taught at school.

Table 3.
Identification of Sustainability-Theme Integrated Into the curriculum

Sustainability-Themed Courses Related with curriculum	Score (%)	N
0 Related Courses	9	6
1-2 Related Courses	53	35
3+ Related Courses	38	25
Total	100	66

Table 3 shows the results of the analysis curriculum content in subjects related to sustainability themes taken per respondent. This is used to assess responses to the theme of sustainability in the learning curriculum. The results of the acquisition score indicates the number of subjects focused on the theme of sustainability consists of 2 subjects integrated with learning environmental sustainability, namely geography and biology. Students surveyed knew about environmental sustainability from geography lessons, especially in Grade XI.

Students' Perception of Environmental Sustainability

Environmental sustainability is one of the pillars of sustainable development. This is considered a prerequisite for achieving general sustainability or is called environmental sustainability. Experts describe environmental sustainability as natural capital as a reserve of natural resources or environmental assets, such as oceans, forests or agricultural land, which produce benefits (Hunter et al., 2010; Spiteri, 2018). The results of students' perceptions of environmental sustainability are reduced to find out students' commitment to using the natural environment for human benefits and related to the impact of human activities on the environment. The following are students' responses to sustainability commitments (Ahi & Balci, 2017; Al-Nofli, 2017).

Table 4.
Adiwiyata Schools Students' Perceptions of Environmental Sustainability

No.	Questions	Student	
		f	%
1	What is the importance of recycling?		
	a. Recycling reduces damage to ecosystems because of resource extraction	8	12 %
	b. Recycling can save energy in processing recycled materials rather than new materials	11	17%
	c. Recycling can reduce the amount of waste that goes to landfills.	46	70%
	d. All not true (recycling is not an efficient way to deal with waste problems)	1	1%

No.	Questions	Student	
		f	%
2	In your opinion, what are the main effects of global climate change? a. Destruction of habitats b. Erratic weather c. Extending desert regions d. Declining sea level	9 43 4 10	14% 65% 6% 15%
3	Coastal ecosystems are now affected by human activities. Which of the following causes of degradation of the coastal ecosystem? a. Use of pesticides b. Excessive fishing c. Beach use as a landfill d. Land transfer as a natural space for human needs (buildings, roads, livestock, etc.)	4 10 37 15	6% 15% 56% 23%
4	The driving factors that most affect the extinction of some animal species and plants and ecosystems around the world are... a. Overhunting/ Excessive Exploiting b. Conversion of natural space into agricultural/urban land c. Acid Rain d. Animal put in zoos	26 34 3 3	39% 51% 5% 5%
5	What factors influence population impacts on natural resources on earth? a. The large number of human populations b. Total consumption of fossil fuels used by humans c. The high use of technologies that are not environmentally friendly	28 22 16	43% 33% 24%
6	Which of the following is an example of environmental justice in carbon trading agreements? a. City residents win a law to bring toxic waste to rural areas. b. Governments create river dams to create hydropower as a source of energy for large city c. Indigenous people are involved in setting quotas for the amount of wood they can take from protected forests. d. Companies build factories in developing countries where environmental laws are not strict	9 8 41 8	14% 12% 62% 12%
7	Which of the following contributes most to sustainability? a. Recycling products b. Reusing products c. Buying new products d. Reducing product consumption	43 15 2 6	65% 23% 3% 9%

No.	Questions	Student	
		f	%
8	Using non-renewable resources such as fossil fuels can create economic growth, but future generations will be disadvantaged if the current generation overuse this resource. Which of the following principles can we follow if we do not want to harm the next generation?		
	a. Renewable resources such as fish, land, and water must be used no faster than the rate of regeneration	12	18%
	b. Non-renewable resources such as minerals and fossil fuels must be used no faster than renewable substitutes for these materials	35	53%
	c. Pollution and waste must be treated, and recycle so safe for the system natural environment	12	18%
	d. None. because humans will never run out of non-renewable resources	7	11%
9	The best way to support environmental sustainability in the school environment is ...		
	a. Saving water	2	3%
	b. Providing rubbish bins to separate organic rubbish and non-organic rubbish	46	70%
	c. Save electricity usage	13	20%
	d. Availability of bank waste in schools	5	7%
10	Which of the following statements is true about the crisis of water availability?		
	a. The number of people who have access to clean drinking water will increase over two decades next	22	33%
	b. Globally, freshwater reserves are used faster than the natural recycling process	23	35%
	c. Many people in the world do not have access to clean drinking water, so their only choice is to drink water that has been contaminated	19	29%
	d. Global warming is not a threat to reduce freshwater reserves	2	3%
11	Sort the list of activities below with the biggest environmental impact with the smallest environmental impact!		
	1. Charging a cellphone for 12 hours with a power jack		
	2. Disposing of factory waste directly into the river		
	3. Using styrofoam in buying or selling food/drinks		
	4. Using commercial airplane transportation in close range areas (Banda Aceh-Medan)		
	a. 1,3,2,4	12	18%
	b. 2,4, 3,1	33	50%
	c. 4,3,2,1	8	12%
	d. 4,2,3,1	13	20%

No.	Questions	Student	
		f	%
12	In your opinion, why does the environment need to be protected and sustainably conserved?		
	a. If the environment is not maintained, there will be a major disaster on the environment	41	62%
	b. To learn how nature works so that humans can control it.	14	21%
	c. If humans damage nature, bad things will happen.	11	17%
	d. Maintaining sustainability is easier to do than destroying the environment	0	0%
13	Which of the following statements do you feel and do at school!		
	a. My school is included in the Adiwiyata program so that it has a focus on environmental care.	25	38%
	b. I feel more comfortable with a class atmosphere that has artificial natural light generated from solar panels in the classroom.	16	24%
	c. I want to plant plants in the school garden.	16	24%
	d. I do waste recycling and make it a form of craft hands	9	14%

Table 4 shows the findings chosen by students related to students' sustainability knowledge. One of them is about the recycling process. Students realize that recycling is a form of solution in overcoming environmental problems. As many as 70% of students stated that the process can reduce the amount of waste produced by humans.

Furthermore, sustainability becomes a focus on the national curriculum, so schools develop and implement environmental education programs that are integrated into subjects. The results showed 53% of students stated that the subject of studying sustainability efforts, including the sustainability of student literacy, was through 2 subjects that were relevant to environmental material namely biology and geography (Ahi & Balci, 2017; Al-Nofli, 2017). It is possibly influenced by environmental sustainability taught in the classroom through discussions, relating the problems with a particular topic; programs carried out in schools; and each teacher's perception of environmental sustainability. The results of interviews with students are illustrated as follows.

"The environment is the place of our survival. Our parents earned their living from existing environmental resources. Therefore, we must work together to create a sustainable environment by managing waste efficiently, conserving forests, managing natural resources well, and collaborating with the government and stakeholders."

In supporting student perception data, researchers also analyzed data from teachers who teach in geography classes. The results of interviews with teachers stated that schools have an ongoing involvement in the implementation of the Green and Adiwiyata Schools Program and involve students in preserving the school environment (Sumarmi, 2008). In this regard, students are aware of and know about: (1) the recycling process; (2) developing a smart garden to utilize the school wall area with ornamental plants that are able to absorb pollution; (3) planting

plants in the front garden of the classroom, and planting *Jeumpa* trees as a school contribution to the protection of this species; (3) saving energy, (4) participation in "Aceh Go Green" activities in schools and class-related discussions about recycling. Planting by some students in the school playground and participation in continuing the maintenance of the garden and picking up trash; (5) selection of environment ambassadors, call "CUTBANG and CUTKAK Literacy".

These activities likely affect students' perceptions of contributing to environmental sustainability, especially in the data collected in this study. This is because in the context of this researched school, namely Adiwiyata schools. Through this Adiwiyata School model, it builds commitment, awareness, and responsibility among the school community to actively participate in protecting, maintaining and preserving the environment. One form of student participation in supporting a sustainable environment is the development of creativity and innovation in waste management in schools. This is the best idea and way to instill values, knowledge, attitudes, and care for the environment. This form of activity and innovation can be developed through recycling. Recycling is the process of garbage collection, sorting, cleaning and processing of materials used for the production process into objects with new functions (Haris et al., 2018). Some recycled materials are plastic, glass, and paper. The following pictures are the results of students' creations in the recycling process conducted at Adiwiyata High School.



Figure 3.
Student Creations in Waste Recycling

It is 35% of students made comments related to the issue of sustainability in natural resource management, the availability of water in the future where the number of people who have access to clean drinking water will decrease and globally reserves freshwater is used more quickly than its natural recycling process. These comments illustrate the effect of actions on environmental problems on students' thinking (Adams & Savahl, 2015; Edwards, 2002). Therefore, the participation of all components of the school community in environmental action activities is the basis for active participation in environmental preservation more broadly, integrated and sustainably.

CONCLUSION

The results of the study showed that the perception of Adiwiyata high school students in Banda Aceh City had a good knowledge and concern for the environment. It is known that the level of environmental concern in city school students reaches 38.2%. This shows that students have a level of environmental concern at a score of 3. It means that students generally care about environmental issues globally. The level of environmental concern is influenced by the existence of curriculum aspects that are applied in schools. This is supported by the Adiwiyata program which has basic components that have environmentally sound policies and management of environmentally friendly facilities and infrastructure in schools. The school also facilitates student participation activities in supporting a sustainable environment through the development of creativity and innovation in waste management in schools. This is the best idea and way to instill values, knowledge, attitudes, and care for the environment. So that these activities affect students' perceptions of environmental sustainability. Environmental Attitudes can be demonstrated by defining attitudes that are responsible for the environment that has: (1) awareness and sensitivity to the environment and related problems (2) a basic understanding of the environment, (3) a feeling of caring about the environment and motivation to participate actively in improving and environmental protection, (4) skills to identify and resolve environmental problems (5) active involvement in solving environmental problems. Therefore, this research can be used as a basis that environmental sustainability education is important to develop in schools as a system of education in Indonesia, especially in achieving the Profil Pelajar Pancasila in the National Curriculum.

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