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Changing behavior: Can education clean up the city?

Awareness and behavior towards waste.

A case study in Semarang, Indonesia



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Summary

The growth of urban populations in Asia has resulted in a municipal solid waste problem (United Nations, 2006). This causes waste disposal problems in many cities in Asia, the same goes for Semarang, the capital city of the Central Java Province, Indonesia. To solve the municipal solid waste problem awareness of waste can be a helpful factor. When inhabitants have proper awareness about waste they can participate in the waste system by reducing, reusing and recycling their waste (Licy, Vivek, Saritha, Anies, & Josephina, 2013).

Education can play a role in raising awareness and changing behavior of students (Boyes & Stanisstreet, 2012, p. 1601) (Desa, Kadir, & Yusooff, 2011). Environmental and waste education could increase students' awareness by producing the knowledge and attitude of waste among students. Additionally, awareness of waste is closely linked to behavior towards waste (Guagnano, Stern, & Dietz, 1995). For some actions, such as recycling, environmental education can have an important role in changing behavior. In this research, behavior towards waste is defined as the inclination to protect the environment. Looking at the relations between environmental education on awareness of waste and of environmental education on behavior towards waste, this research relates that information to finding out how the behavior towards waste of students occurs.

This research gives an insight in the awareness of waste, in this research defined as knowledge and attitude, and provides next to awareness an insight in the behavior of waste of students in Semarang. The role of education is investigated for these concepts, because education is often seen as an important anchor for raising awareness and changing behavior (Desa, Kadir, & Yusooff, 2011). After that information is revealed, that implies further research about the behavior towards waste. That makes the objective of this research *to analyze the role of environmental education on the awareness of waste and on the behavior towards waste issues of students in Semarang and relate that information to explain how the behavior towards waste issues of students occurs.*

To reach the objective of this research a main question and three sub-questions are formulated. The main question is divided in two components. The first part of the question investigates the role of environmental education on awareness and on behavior towards waste. The results of the first part of the question imply further research about the behavior towards waste of students. Therefore, the second part of the question dives deeper into the behavior. Based on this the main research question with its three sub-questions are formulated:

To what extent does environmental education play a role in raising student's awareness of waste and their behavior towards waste issues in Semarang, and how can the behavior towards waste of students subsequently be explained?

- 1. What is the awareness of waste and behavior towards waste of students in Semarang?*
- 2. What is the role of environmental education on the awareness of waste and behavior towards waste of students in Semarang?*
- 3. How can the correlation between the awareness of waste and behavior towards waste help to explain the behavior towards waste of students in Semarang?*

To come to an answer for that question several theories are used as a theoretical background. The first theory used is the viewpoint of Anthony Giddens (1984) on the structure-agency debate. This is the starting point of this research, which explains the dynamic between awareness and behavior. Behavior is the structure and is the outcome of the agency awareness of waste of students. But structure does also influence agency, this cyclical relation describes the importance of changing structures. To dive deeper into the relationships of the core concepts of the research, the ABC theory by Guagnano, Stern, & Dietz (1995) is elaborated, to explain the relationships between attitude, behavior and context. The context, in this research environmental education, always has to be taken into account when looking at the relationship between attitude and behavior. The theory of different 'capitals' by Pierre Bourdieu (1986) is followed after that where there is especially focused on cultural capital, which is focused on education and knowledge. And finally, the theory of waste hierarchy by Ad Lansink (1979) focusses on a more specific viewpoint of waste management, that tries to prioritize dealing with waste environmentally friendly.

To gather the information needed to answer the research question the study uses mixed methods. The first part of the research question is conducted using a survey. This is the quantitative part of the research that provides answers about the awareness and behavior towards waste of students at Unika Soegijapranata. The survey does not provide significant relationships, but shows insight in the awareness and behavior of students at Unika and their opinion on the environmental and waste education they receive.

To dive deeper into the subject interviews are conducted to answer the second part of the research question in a more qualitative way. Four interviews with experts have taken place to provide underlying information about the behavior towards waste.

The data of the survey revealed that there is a discrepancy between awareness of waste and behavior towards waste issues. Students answered that their awareness of waste, the knowledge

and attitude, is proper. A lot of them are willing to participate in the waste system by carrying out practices, but a lot of the students that answered that, did not actually carry out the practices. That indicates there is a discrepancy between awareness and behavior, which is the main conclusion from the close-ended questions in the survey. And the open-ended question in the survey exposed three insights in the opinions on the environmental and waste education of the students. Firstly, the answers about the sufficiency of the environmental education students received were very contrasting, some answered they received detailed in-depth knowledge where others only explored the surface of environmental and waste issues. Secondly, education lacking practicality was a frequently occurring answer and finally, students have showed that they have feelings of affection towards environmental and waste issues.

The opinion of the students together with the interviews with experts concluded that the role of education on awareness of waste is proper. Students are positive about the environmental and waste education they receive and answered that it helped improve their knowledge and attitude on the issues. However, the role of education on behavior of waste is not significant. This difference in the role of environmental education is in line with the discrepancy between awareness of waste and behavior towards waste that was concluded after the survey.

To look at the correlation between awareness and behavior the disconnect can be explained, when that is done there can be explained why behavior towards waste occurs the way it does. That is done by interviews with experts, which exposed that there are two reasons for the discrepancy to occur.

Firstly, the current environmental and waste education works differently on awareness of waste than on behavior towards waste. The education is mostly focused on passing on knowledge, but less focused on how to put the knowledge into practice. This causes that students receive the knowledge through environmental education, but do not change behavior.

The second reason for the disconnect involves the context earlier discussed with regard of the ABC theory. The context, in this research environmental education, always has to be taken into account when looking at the relationship between attitude and behavior. The context turns out to be bigger than expected, which causes the context to override the relation between awareness and behavior. That is a reason the disconnect appears.

That large context consists, next to the assumed environmental education, of four other factors. The first factor is the working of the waste system. When people do not have trust that their actions will help the environment, because for example all the separated waste is mixed up eventually, people will not carry out the practices. Also the social environment of students influences if they transform their learned knowledge into changing behavior, for that to happen it should at least be

an open environment for change. Next to the social environment, another factor in the context is the Javanese culture. Typical for the Javanese culture is that people follow the behavior of others in order to avoid conflict. And the last factor that is part of the context is law enforcement. This can be a proper way to change people's behavior.

To conclude, there is a discrepancy between awareness of waste and behavior towards waste. In line with this, the role of education is also different for the two concepts. The role of environmental education on awareness of waste is proper, in contrast with the role of environmental education on behavior towards waste which is not significant. Further qualitative research explains why that disconnect appears. Firstly, education works differently for behavior towards waste than it does for awareness of waste, a reason for this can be that it lacks practicality. Secondly, the context is bigger than expected. All the four factors are together with environmental education the context of this research. In the ABC theory the context has influence on the relationship between attitude, in this case awareness, and behavior. The context turns out to be bigger than expected, which causes the context to override the influence of awareness on behavior. These two conclusions explain how the behavior towards waste of students in Semarang can occur.

Preface

For the last six months I have been working on writing my Bachelor Thesis about awareness and behavior towards waste of students in Semarang and the role of education on that, which is now lying in front of you. This thesis provides the finishing research for my bachelor Geography, Planning and Environment at the Radboud University.

The research was supposed to be a field study in Semarang in Indonesia. Unfortunately, due to the virus outbreak of Covid-19, travelling to Indonesia has been made impossible. This was a major setback for me mentally, but also for the progress of the research. All information about Semarang had to be gathered from the Netherlands. This is accomplished mostly through e-mail and Skype conversations.

For this to be made possible, I want to thank several people. First I want to thank all the people in Indonesia that were eager enough to help me even though we could not meet. I want to thank Oely Sidabalok from Unika Soegijapranata in Semarang for helping me find respondents and providing me a student assistant, namely Clara. Which is the second person I want to thank, for helping me find respondents for my survey and helping me with the Indonesian culture and language by translating. I also want to thank all my expert respondents that were most helpful to provide me from information on the research. Finally, I want to thank my supervisors Martin van der Velde and Ainul Fajri. I want to thank them for their time and effort to discuss with me, coach me and give feedback. But also for helping me back on track when I felt lost.

Overall, the process was really insightful for me. It felt like every subject I have learned in the past couple of years came together in this thesis. I experienced ups and downs during the process, but I am happy to present my final version. I hope you will enjoy reading the thesis.

Dirkje Smulders,

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1: Introduction

The increase of urban populations and economies in Asia has resulted in a growth of waste (United Nations, 2006). Many governments and municipalities in Asia have difficulty disposing their growing waste. Also, the city of Semarang, the capital city of the Central Java Province, Indonesia, has been struggling to overcome its municipal solid waste problem. The current waste disposal system covers only about 60% of the total waste generated (Supriyadi, Kriwoken & Birley, 2000).

For the working of a better waste system awareness about waste can be an important anchor (Licy, Vivek, Saritha, Anies, & Josephina, 2013). People must have proper awareness about waste disposal problems to play an effective role in the waste system (Licy, Vivek, Saritha, Anies, & Josephina, 2013). Behavior towards waste is closely linked to awareness of waste, therefore, this research focusses next to the concept awareness of waste on the concept behavior towards waste (Guagnano, Stern, & Dietz, 1995). This behavior towards waste will regard the inclination of people to protect the environment. Education of students can play a role in creating the awareness of waste and changing behavior (Desa, Kadir, & Yusooff, 2011) (Boyes & Stanisstreet, 2012, p. 1601). Waste education gives students the opportunity to gain knowledge about problems related to waste, but also how their behavior can be improved by for example learning how to recycle waste. Environmental education can be a helpful tool to create awareness and change behavior and this research investigates what that role is. After that, there is focused on explaining the behavior of waste of students in Semarang. This research is focused on both the relations between environmental education on awareness of waste and of environmental education on behavior of waste, and also relating that into explaining the behavior towards waste of students.

This research is structured by firstly introducing the subject, with also formulating the research objective and questions in chapter 1. After that, chapter 2 will discuss relevant theories. Chapter 3 deals with the methodology used for this research. Next, chapter 4 describes the context in order to position the empirical results in the right context. Subsequently, chapter 5 presents the empirical results from the survey followed by chapter 6 which elaborates the empirical results from the interviews with experts. Finally, the main research question is answered by presenting the conclusions in chapter 7 and also the reflections and recommendations are given.

1.1 Project framework

The increasing of the world's population has put bigger pressure on our earth. Temperatures are rising and our ecosystems are degrading, that is why the United Nations have come up with Sustainable Development Goals (SDG's). Which are goals set for 2030 to end poverty, protect the planet and ensure that all people enjoy peace and prosperity (United Nations, n.d.). For example,

SDG 11: sustainable cities and communities. This goal sets that by 2030 cities have less environmental impact and this is done by paying attention to, in particular, air quality and waste management (United Nations, n.d.). But also, SDG 13 has compliance with the issue of this research. Goal 13 focusses on improving education and awareness-raising on climate change issues (United Nations, n.d.).

The United Nations has given attention to the municipal solid waste problem by integrating it in two SDG's, namely 'sustainable cities and communities' and 'climate change'. This is not without a reason. That is because the increasing amount of population in developing countries, comes along with an increasing amount of municipal solid waste. According to The World Bank eight years ago it was estimated that there were 3 billion residents that generate 1.2 kg waste per person per day. It is estimated that this amount grows up to the number of 4.3 billion urban residents generating 1.42 kg per person per day in 2025 (Hoornweg & Bhada-Tata, 2012). These are ever growing numbers, which require a well-organized waste management for municipalities to tackle the negative impacts of solid waste. The environmental impacts are river water and groundwater contamination caused by open dumping places, but also lots of methane gas generation that on their turn contributes to global warming (Sekito et al., 2013). Also different health issues strike up like bad hygiene and spreading of diseases through open dumping. Solid waste also leads to financial impacts, because the improvement and maintenance of a solid waste system covers big parts of the annual budget of the city (Sekito et al., 2013).

These problems also occur in Semarang, the capital city of Central Java Province. To improve the municipal solid waste system the city of Semarang has joined many programs and plans to enhance the waste system. Several 'Five-year development plans' have been set up and the city joins the Adipura program for years now and has won several awards for that (Supriyadi, Kriwoken & Birley, 2000). In Semarang, the recycle activities do still have a relatively low share with only a percentage of 7.5% compared to the aim to recycle 30% of waste by 2025. That means that the waste recycling activities must increase to 22.5% within 5 years (Bintari, 2019).

This is closely linked to the public waste facilities available in the city. In Semarang households bring their waste to a temporary disposal site (TPS). After that, the government transports the waste from there to the final disposal site (TPA) ten kilometers outside the city (Bintari, 2019). From now on, the terms TPS and TPA will be used in the research. This option is available for everyone in the city. Another option for households is to bring their waste to a waste bank, from where waste is sold to the recycle market as much as possible (Bintari, 2019). This option is common in Semarang, but the target to provide every community in the entire city with a waste bank is not reached yet.

Waste banks are institutions that stand apart from the TPS, so these are two separate options (Bintari, 2019). Waste banks can be initiated by the government, private companies or NGO's like Bintari. Bintari is an organization that calls themselves 'The Indonesian association of sustainable development' (Bintari, n.d.). They deal with management to support sustainable development. For example helping the solid waste management system in Semarang improve.

The number of waste facilities in a city create or do not create the conditions that support the population to act responsible with their waste. In chapter 4 there will be returned to this subject where it will come up when explicating the context.

So, to solve the waste disposal problem, it is also partly the responsibility of the individuals themselves to enhance municipal waste problems. It is important that individuals develop attitudes that guide them towards environmentally friendly behavior (Desa, Kadir & Yussoof, 2012). This is where awareness of waste makes its appearance. When people are aware of waste issues they can participate in the waste system and help it become more effective (Licy, Vivek, Saritha, Anies, & Josephina, 2013). Behavior towards waste is closely linked to awareness of waste and therefore behavior is also involved as a separate dimension (Guagnano, Stern, & Dietz, 1995). Because of the importance of awareness and behavior, there must become more understanding about it. These are often-discussed topics in the scientific world. General research has been done on the awareness and behavior of waste (Desa, Kadir, & Yussooff, 2011) (Otoma, Hoang, Hong, Miyazaki, & Diaz, 2013, pp. 1–3). To make a more complete view this research will focus on the connection between awareness and behavior of waste and the role of environmental education of students in the specific region of Semarang, Indonesia. Sometimes it is assumed that education would result in better awareness and behavior on environmental and waste issues waste (Desa, Kadir, & Yussooff, 2011), that is why this research will focus on that connection. After that there is focused on explaining the behavior of waste of students. The research in particular is about the role environmental education plays in creating awareness and changing behavior and also relating that to explaining why the behavior occurs.

1.2 Research area

This research takes place in Semarang, Indonesia. Semarang is the capital of the Central Java Province and is located 540 kilometers east of Jakarta on the North coast of the island (Supriyadi, Kriwoken & Birley, 2000) (Hillmann & Zieglmayer, 2015). The population of Semarang, distributed amongst its 16 kecamatans (districts), is 1.5 million people (United Nations Statistics Division, 2019). Semarang is the fourth biggest urban center in Java and has a high population density of 10.000 people per square kilometer. This density and large number of inhabitants leads to difficulty for managing waste disposal systems.

As discussed earlier, education can be a tool to improve waste disposal problems (Desa, Kadir, & Yusooff, 2011). Looking at education in Indonesia, it appears to be significantly less developed than other countries in Southeast Asia. An example is that 55% of Indonesians are nearly illiterate after finishing school (Roach, 2019). For the last years there is a trend in Indonesia where the government is investing in improving education, this also applies for Semarang. Each year a larger amount of the annual budget of the municipality of Semarang is cleared for improving the educational system (Roach, 2019).

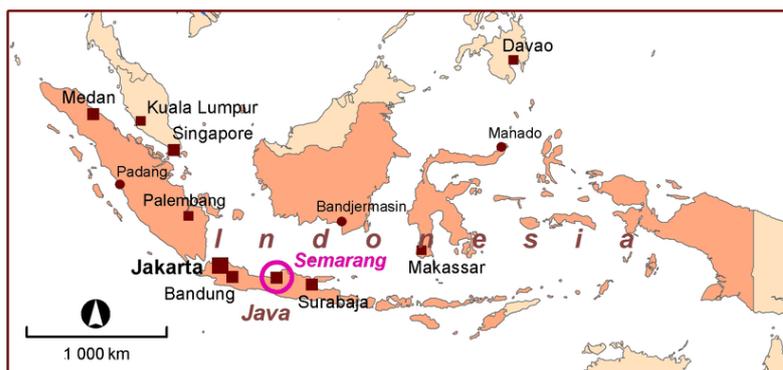


Figure 1: Map with location of Semarang (Hillmann & Ziegelmayer, 2015)

1.3 Relevance

1.3.1 Societal relevance

With the knowledge gained from this research an insight in the role of environmental education on the awareness of waste and behavior towards waste is provided. This has societal relevance, because this research can give the local government a more complete understanding about awareness and behavior of waste. Next, there will be a clearer view on what is missing and what is covered about the awareness of waste of students and their behavior. And when the role of environmental education on awareness of waste and behavior is investigated, there can subsequently be looked how environmental education can respond to those limitations and advancements in their programs and curricula.

Not only will the meaning of the role of environmental education be explained, but also the underlying thoughts and bigger picture behind it. This way educational programs and school curricula have more understanding about the points that need more attention. And policy implementations have insight about the bigger picture and influencing factors next to education. All these insights can change educational programs, school curricula and policy implementations for the better. This can be beneficial for society because this way the environmental and health impacts that occur in the city of Semarang due to solid waste problems can be decreased.

Not to forget, young people are the future generation who are the ones that will make decisions about environmental issues. They are the ones that can affect the sustainability of our earth in the future (Desa, Kadir & Yussoof, 2012).

1.3.2 Scientific relevance

The increase of urban populations comes with an increase of solid waste (United Nations, 2006). This is the case for Semarang as well. One of the ways to tackle municipal solid waste problems is to increase the raising of awareness of waste and change people's behavior (Desa, Kadir, & Yussooff, 2011). Awareness of waste is an often-discussed topic in the scientific world (Otoma, Hoang, Hong, Miyazaki, & Diaz, 2013, pp. 1–3).

Research is done on how awareness influences a certain factor. For example research about how awareness influences waste management (Sekito et al., 2013) (Hasan, 2004). This research takes a slightly different entry point. It investigates if environmental education, influences awareness of waste and also involves behavior of waste. This research analyzes the role of environmental education on awareness and behavior of waste.

A lot of research has been done on solid waste and the influence of education (Desa, Kadir, & Yussooff, 2012) (Licy et al., 2013) (Festus & Ogoegbunam, 2012).

But the fact that none of the researches have taken place in the specific region of Semarang gives it relevance. According to Desa, Kadir & Yussooff (2011) the local environmental conditions and specific environmental problems are important aspects in environmental awareness. Which makes this research more relevant, since none of the similar researches have looked at the specific region of Semarang. This research takes location specific aspects into account by analyzing the awareness and behavior towards waste of students in the city of Semarang. Next to locational aspects in the city, the research is aimed at the behavior of students in their household.

Even though a former Bachelor Geography, Planning and Environment student conducted research in Semarang where a little of this topic came to the surface, Schravendeel (2015) focused on the level of sustainability, where environmental awareness and behavior was not operationalized. This research therefore fills the gap in scientific knowledge by adding information to the research started by Schravendeel (2015) and advances earlier research on this topic by specifying it to Semarang.

1.4 Research objective

Based on the project framework a research objective is formulated:

The aim of this research is to analyze the role of environmental education on the awareness of waste and on the behavior towards waste issues of students in Semarang and relate that information to explain how the behavior towards waste issues of students occurs.

This study provides an understanding of the awareness and behavior towards waste of students and the role of environmental education in the presence or absence of it. As explained in the former chapters it is of importance that the solid waste disposal problem is solved by involving individual awareness of waste and their behavior. Around eighty percent of urban solid waste is generated in residential areas (Supriyadi, Kriwoken & Birley, 2000). That means that most waste comes from individuals and households themselves. Of course, the number of public waste facilities like TPS and waste banks have to be taken into account, but it can be said that there also lies a responsibility with individuals and households to reduce and manage their waste. Environmental education can play a role in raising awareness and changing behavior, and this research investigates that role. Education is something that can be adjusted through educational programs and school curricula. Not only adjusting school's curricula can be made possible, but this research can provide useful information for sustainable management of waste (Li, Yang, Song, & Lu, 2012). Awareness of waste and behavior towards waste are closely linked, which will be explicated in chapter 2. By looking at the awareness and behavior of students, it becomes clear if environmental education plays a role in the process. But also what the bottlenecks are in the process of raising awareness and changing behavior. After analyzing the role of environmental education, an additional qualitative research takes place. The reason behind the students' behavior is examined, but also their opinions and other influences around behavior towards waste issues. These findings can be used for adjusting school's curricula and waste awareness programs of the municipality of Semarang.

1.5 Research question

On basis of the former formulated research objective the following research question has been constructed:

To what extend does environmental education play a role in raising student's awareness of waste and their behavior towards waste issues in Semarang, and how can the behavior towards waste of students subsequently be explained?

Based on this the following sub-questions are formulated to answer the main question:

1. *What is the awareness of waste and behavior towards waste of students in Semarang?*

By conducting a survey on students, the results will be given. Awareness and behavior towards waste must be operationalized since these are relative concepts. When that is clearly defined, the survey can look at what has to be known to investigate this. The next step is to look at the differences of the results of the surveys. If this is established a well-thought answer to the research question can be given.

2. *What is the role of environmental education on the awareness of waste and behavior towards waste of students in Semarang?*

After the awareness and behavior is clear, the role of environmental education in this process will be investigated. In the survey two open questions are asked on the opinion of the environmental and waste education students receive. This will unravel insights on the environmental and waste education students in Semarang get and together with additional interviews with experts there is investigated if education does play a role in raising awareness and changing behavior.

3. *How can the correlation between the awareness of waste and behavior towards waste help to explain the behavior towards waste of students in Semarang?*

The results of the first two sub-questions imply further research about the behavior towards waste of students, therefore the third question focusses on how that can be explained. Looking at the correlation between awareness of waste and behavior towards waste can help to explain the behavior. To answer this question, the information is gathered by interviews with experts. By knowing this the second element of the research question can be answered. With this knowledge a better view of behavior towards waste of students is created, that connects with the gathered information in the first two sub-questions. Now the underlying and surrounding flaws have surfaced.

2: Exploring relevant theories

This chapter will focus on exploring the theoretical background. At first, a theoretical framework is created that is needed to apply to the research. These insights can be seen as the basis for the thesis. Several theories are explained that apply to the research and the core concepts in the research are elaborated. After that, a conceptual model is created to show the relationships between the core concepts of this research.

2.1 Theoretical framework

To research the role of environmental education on the awareness and behavior towards waste, several theories will be used. Firstly, Anthony Giddens' (1984) viewpoint on the structure-agency debate will be discussed. This is the starting point of this research, which shows the importance of practices that can change structures. To dive deeper into the relationships of the core concepts of the research, the ABC theory by Guagnano, Stern, & Dietz (1995) is elaborated, which explains the relationships between attitude, behavior and context. The theory by Pierre Bourdieu (1986) of different 'capitals' is followed after that where there is especially focused on cultural capital, which concentrates on knowledge and education. And finally, there is focused on the core concept awareness of waste, where the importance of this concept is supported by the theory of waste hierarchy by Ad Lansink (1979). It focusses on a more specific viewpoint of waste management which aims to prioritize environmentally friendly waste processing depicted in a structured way.

2.1.1 Structuration theory

The structuration theory is developed by Anthony Giddens in his book 'The Constitution of Society' (1984). He talks about agency and structure and the debate between the two, where on the one hand actions are explained by external structures and on the other hand explained by individual actors. But Giddens is looking for a third way between the two explanations, where he shows the interaction between agency and structure and poses them as mutually dependent. This is what Giddens describes as the process of structuration in which he discusses social structures are constituted by human action, but also determine human action. He uses the concept 'duality of structure' to explain this: "Structure is both a medium and outcome of the reproduction of practices (Giddens, p.25, 1984)". Meaning that structures are dependent on our actions and at the same time are structures the outcome of the practices of the past. For him that means structures are constantly structuring, where structures are not fixed and universal but a process. That way structural changes can take place.

In this research the general behavior towards waste issues of students can be seen as the structure. Structures are changing and the same goes for the structure behavior towards waste issues. This structure is determined by the agency, which are students in Semarang that treat the waste with

all their existing, or non-existing, awareness of waste. If the awareness can be changed by raising more awareness, then that will at their time determine the structure. This way a structure can change by changing the reproduction of practices. That is the starting point of this research.

And when the structure subsequently changes that will at their turn influence the agency. If students have very positive behavior towards waste, that is a medium for the agency to be more aware of waste. This is in line with the ABC theory that dives deeper into the relationships between these factors.

2.1.2 ABC Theory

The ABC Theory is a theory in social sciences that explains the correlation between attitude, behavior and context (Guagnano, Stern, & Dietz, 1995). In social sciences often the distinction is made between two different approaches in studying behavior. There are people that state that behavior depends on processes internal to the individual. And the approach where behavior is influenced by external factors. This theory integrates those two approaches by combining the two variables both in the model of behavioral change (Guagnano, Stern, & Dietz, 1995).

The theory explains how attitude is or is not transmitted into behavior (Zepeda & Deal, 2009). That is done according to this theory by involving context. It states that the strength of the relationship between attitude and behavior is depending on the influence of the context (Guagnano, Stern, & Dietz, 1995).

In this research this theory investigates, instead of attitude and behavior, the connection between awareness and behavior. That is because the concept attitude is one of the indicators of awareness, which will be further elaborated in section 2.1.4.

The theory states that by studying the influence of attitude on behavior, the context must always be taken into account (Guagnano, Stern, & Dietz, 1995). It even states that the context can override the influence of attitudes on behavior (Zepeda & Deal, 2009). In this research that will translate itself in the context of the environmental educational system in Semarang. The context can be negative or positive. Positive context manifests itself as a context that is pleasant or supportive for the particular behavior. A negative context is unpleasant or creates barriers against the behavior (Guagnano, Stern, & Dietz, 1995).

This theory clarifies the relationships between the core concepts used in this research and will therefore also be applied in the conceptual model in section 2.2.

2.1.3 Cultural capital

The ABC theory explains the context is crucial, which brings us to the context of this research which is environmental education. Environmental education can be defined as “education aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its

associated problems, aware of how to help solve these problems, and motivated to work towards their solution” (Festus & Ogoegbunam, 2010, p. 255).

The importance of environmental education can be explained by the theory of different capitals by Pierre Bourdieu (1986). He talks about different concepts that explain people’s position in society. For this research the concept of cultural capital is most important, therefore the other concepts will only be explained briefly. In his essay ‘The forms of capital’ Bourdieu (1986) discusses that every agent, individual, is positioned in a social context which is dependent on the amount of capital. In his approach of different forms of capital, he states that your position in the field can be adjusted by your amount of capital. Bourdieu distinguishes three forms of capital: economic, social and cultural capital. Economic capital can be described as the financial assets and valuable possessions an agent has. Social capital is determined by the number of networks and relationships an agent has. And cultural capital is expressed in knowledge, education and skill. For the independent variable to be environmental education, this form of capital can be elaborated and applied further. Cultural capital can be divided into three categories: the embodied state, the institutionalized state and the objectified state (Bourdieu, 1986). The embodied state refers to cultural capital that is embodied and is for that reason passed through to the next generation. This could be the values and beliefs concerning waste that is passed on from generation to generation. The institutionalized state refers to capital passed through by institutions and law enforcements, such as environmental education or regulations in the case of this research. The objectified state refers to possessions that can be transmitted to economic capital, which can be related to valuable waste. These definitions of cultural capital will be a starting point of view for the independent variable environmental education. The bottom line is that these forms of cultural capital are necessary to change the current situation, which can be translated to the role of environmental education in the current awareness of waste and behavior towards waste.

Environmental education incites that people become more aware of problems, know how the problems can be solved and are willing to cooperate. Or at least that is the purpose of environmental education. UNESCO created the line that environmental education is ‘education from, about and for the environment’ (Festus & Ogoegbunam, 2010, p. 255). So, it is education about our environment in order to solve problems of that particular environment.

Environmental education can be expressed in educational programs, campaigns or school curricula. Some studies claim that these activities result in better environmental awareness and behavior (Grodzińska-Jurczak, 2003) (Boyes & Stanisstreet, 2012, p. 16010. Education is an example for children and students, it is a direct form of spreading knowledge on the individual level. Because it is from individual to individual it is important that the educational programs and curricula are well-

suitable for the level of education. There has to be made sure that the appropriate information is understood and if it is possible to be implemented on a daily basis (Grodzińska-Jurczak, 2003).

2.1.4 Awareness of waste and behavior towards waste

To dive deeper into the concepts just discussed in the ABC theory, there will be, next to environmental education, taken a deeper look at the core concepts awareness of waste and behavior towards waste. Several researches claim that awareness is a big factor of the working of a sustainable waste system (Han et al., 2018) (Hasan, 2011). There has to be certain awareness of waste and additional disposal behavior, to avoid the consequences of wrong waste disposal and the environmental and social impacts coming with that (Desa, Kadir, & Yusooff, 2011). That is a reason why people are trying to implement environmental education, because this might increase awareness amongst residents on the long-term and might change behavior (Chaerul, Tanaka, & V. Shekdar, 2006, pp. 1–3) (Boyes & Stanisstreet, 2012, p. 1601).

The reason why awareness and behavior towards waste issues can be beneficial on the long-term can be explained by the theory of waste hierarchy. The theory of waste hierarchy is once opted by the Dutch politician Ad Lansink (1979) where he tried to reduce the amount of waste, this idea is further developed by creating the model showed in figure 2 by the European Commission (2015). The idea is that the top of the pyramid most preferably takes up the largest part of the waste. And the bottom takes up the smallest part because disposal is the least preferred. The top of the pyramid is 'prevention' and by that is meant that the production of waste is avoided in the first place. 'Reuse' is giving waste a different purpose. 'Recycling' goes further than reusing because waste is transformed to something else. 'Recovery' means that waste can be used for other purposes, like burning it for fuel. And the last step is disposal, where waste does not get another purpose (European Commission, 2015).

This theory shows that raising awareness and changing behavior is important, because when people possess more information regarding waste and are willing to act conform with that information, they are more able to climb up the steps of the pyramid (European Commission, 2015). This way people are encouraged not to throw their waste in nature, but climb up the ladder and try to recover, recycle or reuse the waste. Or they might even take it a step further and avoid using plastics bags and other unnecessary waste at all, which therefore should not have to be made in the first place. That contributes to prevention of waste production, which is most preferred. This theory explains both the motive and importance to have a better look at awareness of waste and behavior towards waste.

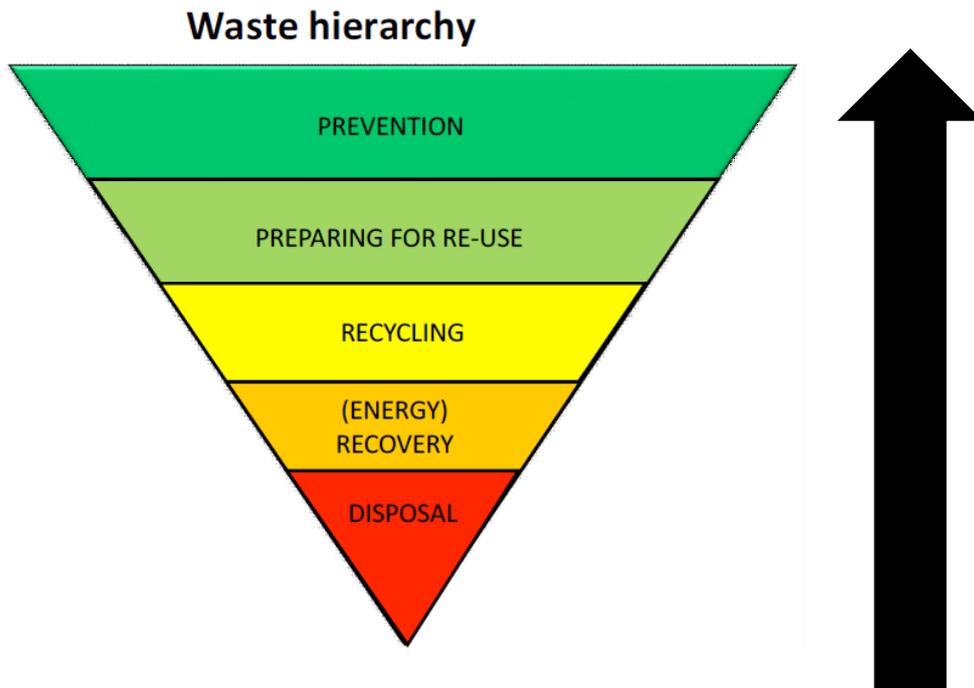


Figure 2: Scheme of waste hierarchy (European Commission, 2015)

First there will be taken a closer look at awareness of waste, which is a very broad concept in which a lot of different aspects play a role. The article of Han et al., 2018 is limited to environment in general, whereas in this research their view will be applied to awareness of waste. Han et al. (2018) consider environmental awareness as the knowledge people have about environmental issues, their concerns about environmental issues, and their willingness to act in favor of the environment. According to Desa, Kadir & Yusooff (2011) awareness of waste can be classified into perception and behavior. That means the perception of environmental problems and the behavioral inclination to protect the environment. Regarding perception it is important to take into account the locational aspects. This can be the conditions of the local environment and specific environmental problems. The article of Otoma, Hoang, Hong, Miyazaki, & Diaz (2013) distinguishes knowledge and attitude. These terms can be linked back to perception and behavioral inclination discussed by Desa, Kadir & Yusooff (2011).

Because there are a lot of different approaches to awareness of waste, the concept is operationalized. This research divides awareness of waste into two categories, namely: 'knowledge of environmental and waste issues' and 'attitude towards waste issues'. Some of the approaches of the different articles just listed, also include the term behavior into their perception of awareness of waste. However, this research considers behavior towards waste as a separate, but linked, dimension.

The first aspect which will be looked at in the concept awareness of waste, is 'knowledge of environmental and waste issues'. This is more about the 'knowing' of the issues of waste in general. Both on the global level to investigate how people look at environmental problems and the perception on issues related to waste. This also contains the understanding of the local waste system, considering locational aspects are very important when investigating awareness of waste (Desa, Kadir & Yusooff, 2011).

Secondly, a more practical view will be investigated with 'attitude towards waste issues'. People might have heard information about waste problems. But it is important to also have an attitude towards waste to be willing to participate in the waste system. Attitudes can range from very positive to very negative positions. Positive positions relate to people that would do practices unless they are coerced otherwise and negative positions relate to people that do practices only under coercion to do it (Guagnano, Stern, & Dietz, 1995).

Raising awareness is requiring individuals to develop those attitudes which will guide them to environmentally supportive behavior (Guagnano, Stern, & Dietz, 1995). Next to this, also the ABC theory states that there is a correlation between awareness and behavior. That is the reason that behavior towards waste is closely linked to awareness of waste. However, in this research it is considered as a separate dimension, which is linked to awareness of waste. Behavior in this research can be considered as the inclined behavior (Desa, Kadir & Yusooff, 2011). This contains that it does not so much focus on the practices carried out by people, but the intentions of people to carry out the practices. Behavior towards waste issues in this research can be considered as the behavioral inclination to protect the environment (Desa, Kadir & Yusooff, 2011).

A lot of factors can be an influence on the level of awareness. Factors such as gender, age, education, income, employment status, home ownership, location, and government policies have come up in researches (Han et al., 2018). This research will focus on environmental education, because that is what gives people knowledge about the environment and problems related to it. This makes the ABC theory relevant, with its focus on the correlation between attitude and behavior with regard to the context.

This section explained how this research defines the concepts awareness of waste and behavior towards waste. In section 2.2 the concepts are put into context when the conceptual model is presented.

2.2 Conceptual model

This research investigates the role of environmental education on the awareness of waste and behavior towards waste, which is visualized in figure 3. Thus, the conceptual model gives a representation of the subjects that will be researched and how they are interlinked.

The independent variable is environmental education. The main question investigates the role of environmental education on the awareness and behavior towards waste issues, which is presented in the conceptual model. Environmental education can be seen as the context that influences attitude and behavior in the ABC theory (Guagnano, Stern, & Dietz, 1995). This research takes a slightly different path than the ABC theory, because this research concentrates on the correlation between awareness of waste and behavior towards waste. That is because in this research attitude is one of the indicators used for the concept awareness of waste. Therefore, the influence of this independent variable will be investigated on the dependent variables awareness of waste and behavior towards waste (figure 3).

In the conceptual model the first dependent variable is awareness of waste and is divided in the two categories that are just discussed in section 2.1.4. Many studies found a positive and often significant relationship between knowledge and attitude (Otoma, Hoang, Hong, Miyazaki, & Diaz, 2013) (Han et al., 2018). Therefore, these concepts, in the overarching concept awareness of waste, are interlinked where the knowledge influences the attitude of students.

The next dependent variable is behavior towards waste issues, and it is involved because in the ABC theory the context of this research, environmental education, is investigated on attitude and behavior. As explained earlier, in this research that will be awareness and behavior. Awareness of waste and behavior towards waste are closely linked, because awareness can be seen as a means to change behavior which is represented by the arrow between the two (figure 3). Raising awareness is requiring individuals to develop those attitudes which will guide them to environmentally supportive behavior (Guagnano, Stern, & Dietz, 1995).

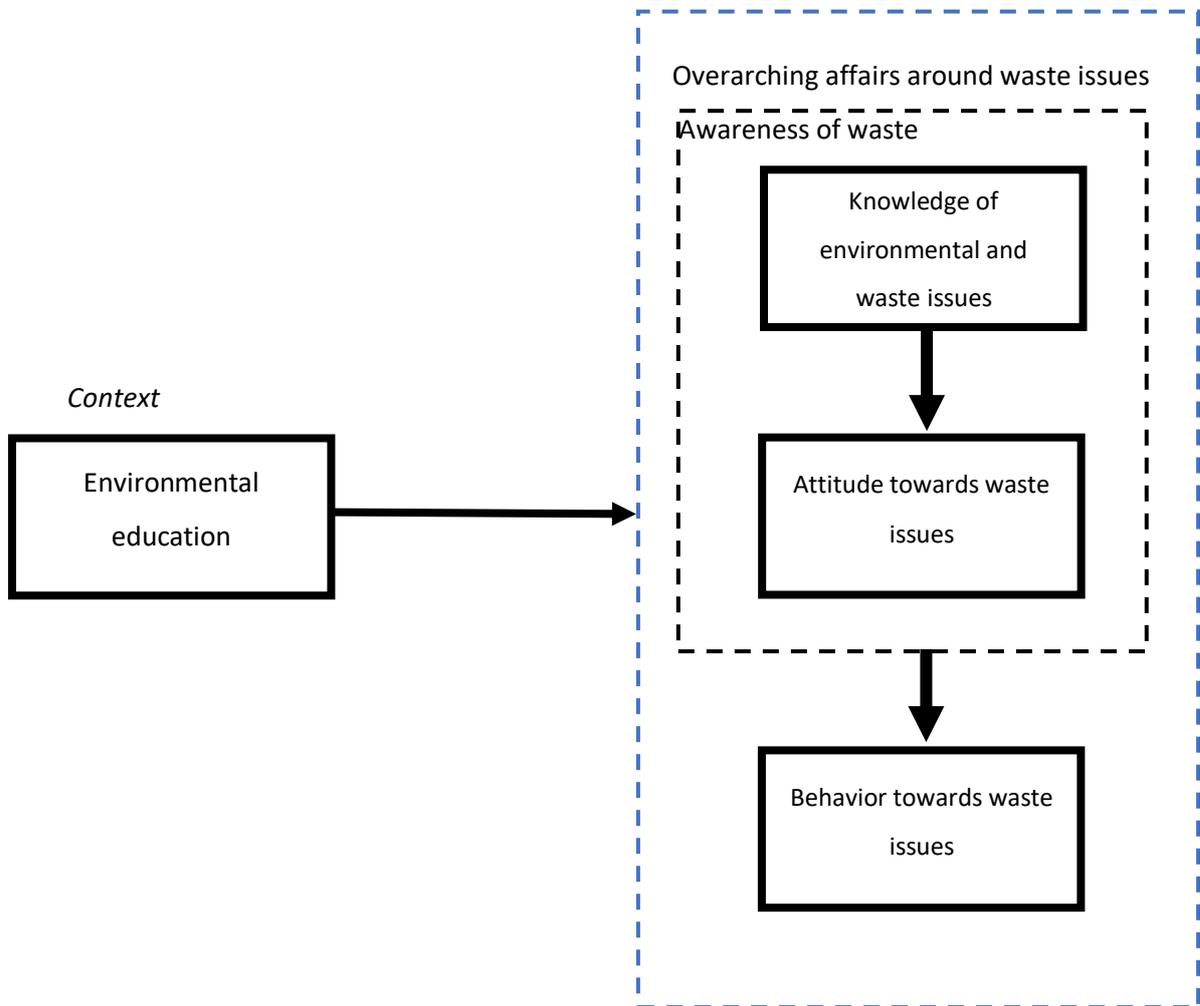


Figure 3: Conceptual model

3: Methodology

This chapter focusses on the way this research is conducted. A clear methodological approach is needed, in order to gain useful data to answer the research question. The first part addresses how it will be conducted, so what kind of research strategy is used. The second part focusses on the materials needed to follow the chosen research strategy.

3.1 Research strategy

3.1.1 Phenomenological approach

This research uses a phenomenological approach, which states this is “the study of structures of experience, or consciousness, experienced from the subjective or first-person point of view” (Smith, 2018). This definition states that experience and consciousness are central to phenomenology, which corresponds with the concepts in awareness and behavior towards waste (Vennix, 2016, p. 183).

This approach fits right in this research since it lies somewhere between qualitative and quantitative research (Creswell, 2013). The qualitative element of the research provides insights on the feelings, attitudes and peripheral matters that are in compliance with a phenomenological approach. By combining these forms of research together with a literature review there will be triangulation to strengthen the research. This way there will be a more complete view of all different perceptions and data.

3.1.2 Case study with mixed methods

The research lies somewhere between qualitative and quantitative research and therefore uses mixed methods with a case study. A quantitative survey provides rather ‘hard’ answers for the research question. Together with qualitative interviews, the more underlying and broader structures are shown and this part of the research contains the more phenomenological side. The research is a case study in Semarang and this is chosen as the case study because Semarang is currently dealing with increasing solid waste problems. The city is much concerned on improving this and has won several awards for being a clean city (Sidabalok, personal communication, June 8, 2020), so this is a suitable area to research awareness of waste and behavior towards waste.

Within the research area of Semarang, this research focusses on the research unit of students at Unika Soegijapranata in Semarang. Unika is a university that pays attention to environmental education. One of the main orientations at the university is ecology and environment, and there are several campaigns and environmental movements on campus (Setianto, personal communication, April 30, 2020). This makes the students of Unika a relevant research unit to look at.

This research can be qualified as a rather broad type of research. There will be looked into the broad concepts awareness of waste, behavior towards waste and environmental education and explains the roles and interrelations of the concepts. To conclude, the research method for this research is a case study with mixed methods and a phenomenological approach.

3.2 Research material

To answer the research question data must be collected. The research unit are students studying at Unika Soegijapranata in Semarang. The goal is to collect data from the students to analyze the role of environmental education on the awareness and behavior towards waste and relate that to explain the current behavior towards waste of students. The way this has taken place is explained in the following chapter.

What is the awareness of waste and behavior towards waste of students in Semarang?

To answer this question, a quantitative research is done in the form of a survey research. The survey is conducted with 55 respondents. All respondents are students in Semarang, to be specific students that go to Unika. The respondents in the population are chosen randomly, to increase the internal validity. Surveys are sent out to large amounts of students through e-mail and social media. The non-response is quite high in an online survey, but the entire population of students has access to the internet which makes it easy to be circulated.

The survey exists of both closed-ended and open-ended questions (Appendix 4). The questions are divided in three categories that are the parts of the dependent variables in the conceptual model, namely 'knowledge of environmental and waste issues', 'attitude towards waste issues' and 'behavior towards waste issues'. The questions are asked in the form of statements for which the respondent could answer using a Likert scale of five scaling options. The first part of the survey consists of statements about general environmental practices and their knowledge of those practices. Also the understanding of the waste system is included and both of this will represent the respondents' knowledge of environmental and waste issues. The second part of the survey focuses on the attitude towards waste. This is dealt with by statements of practices about the willingness to cooperate for a better waste system. These two parts together will cover for the awareness of waste of students. The third part treats those exact same statements of practices for a better waste system, but did leave out the 'willingness to' and only focused on if students would (hypothetically) carry out the practices. This way there is taken a look at the inclined behavior of students. With this set of questions all three categories of the dependent variables are covered.

With the amount of 55 respondents, significant statistic relationships will be difficult to achieve. This means that a statistical conclusion of a relationship is difficult to draw from 55 respondents. However, the respondents provide useful information on their awareness of waste and behavior towards waste.

For every of the three categories, each statement is looked at separately. The respondents answer on a Likert scale, which looks at the consent of respondents on statements on a scale from 1 to 5. These answers are interpreted by looking if the responses are on the positive or negative side of the scale, or in the middle which represents neutrality. Based on the position of the answer on the scale, the results will be determined. Looking at one statement, the amount of students that answered on the two answer options on one particular side of the scale (allegedly: answer option 1 and 2), are divided by the total amount of students that answered the question (answer option 1,2,3,4 and 5). This makes the form of the result a percentage. The different intentions of the statements are taken into account, so the results of opposite statements are reversed, so the percentages will all measure the same issue.

This is done with all statements individually and with these percentages, the differences inside each category and in between the three categories can be interpreted. This will provide an understanding of the awareness and behavior of students and the differences between the two.

What is the role of environmental education on the awareness of waste and behavior towards waste of students in Semarang?

To answer this question, a more qualitative approach is used. To achieve this there is chosen to also involve open questions in the survey and to do interviews with experts. The interviews with experts are done to look at the bigger picture. The open questions gain subjective data about the feelings and opinions of students which makes the research more phenomenologist of nature. There are only two open questions in the survey, where the opinion of the students is asked. The students are asked if they can explain how sufficient they think their environmental education is. The first question focuses on their opinion on their environmental education and the second one on their opinion of the waste education that they received. These questions are important, because it does not only show the thoughts of experts but also the opinions of the research unit itself.

How can the correlation between the awareness of waste and behavior towards waste help to explain the behavior towards waste of students in Semarang?

For this question, some deeper understanding will be collected by taking interviews. The interviews are semi-structured interviews, an interview guide is made but there are open spots for spontaneous turns (Appendix 2). Four interviews with experts have taken place (Appendix 1). Benny

Setianto and Oely Sidabalok are two professors of Unika Soegijapranata that gave information about the environmental and waste education at their university, but also on the improvements and bottlenecks they experience about the awareness of waste of students. Two staff members of the NGO Bintari, which is 'The Indonesian association of sustainable development', were interviewed. Ratna Budiarti and Yuliana Rachmawati took time to explain about the recent developments of the waste system in Semarang and how that is connected to the awareness and behavior towards waste. Another interview took place with Lars Tushuizen, he is deputy of the United Nations and works in developing countries on improving waste systems, this involves the process from raising awareness until waste processing. He was less location specific but did have a lot to inform on waste management and how to create awareness. These interviews from different disciplines give an understanding of how the correlation between awareness of waste and behavior towards waste can be explained. This information is used to describe how the behavior towards waste of students appears as it is right now.

These interviews are transcribed. After that, a close look is taken at the written texts and the main and side issues are separated. The correlating arguments are marked, so they can be used as quotes throughout the thesis.

The supportive main issues that are relevant for answering the question are assembled. After that, the arguments that match on themes are categorized. Per theme, there is looked at the different arguments from different interviews on how they can correlate and create an answer to the question. After each theme has created arguments, the assembled pieces can be interwoven in the thesis. That way a story can be written to answer the main research question.

4: Diving into the context of Semarang

For the research it is important to look at the gained data in the right context. In this chapter the context of the research in Semarang is explained, before the data collection and analysis take place. This is done by firstly elaborating a bit more on the waste system in Semarang and after that the educational system in Semarang is explained. With this information the data of the survey and interviews can be positioned in the right context.

The waste management system in Semarang is quite complicated, therefore a figure has been made to visualize the complexity (figure 4). Households have three options to deal with their waste within the waste system of Semarang. Dumping the waste, bringing it to the temporary disposal site (TPS) or bringing it to a waste bank (Budiarti, personal communication, May 29, 2020).

The most common waste management chain is from the household to the temporary disposal site, these are large open containers in the middle of the neighborhood (Supriyadi, Kriwoken & Birley, 2000). After the waste is brought from the household to the TPS, it is transported from the TPS to the final disposal site (TPA). The first step from the household to the TPS is the responsibility of the community and the second step from the TPS to the TPA is where the government interacts (Budiarti, personal communication, May 29, 2020). The government picks up the waste at the TPS and transports it in large trucks to the final disposal site 10 kilometers outside the city. In this step all the waste is mixed up, so no separation takes place. As there can be seen in figure 4 this chain does not involve a lot of recycle activities. This only happens at the household itself or through scavengers. Scavengers are waste pickers that sell the valuable waste they can find at disposal sites to the informal market. Even though it is mostly not intended, they contribute to a large share of the recycle activities in the waste system.

Another chain in the waste system involves waste banks. Instead of the households bringing their waste to the TPS, they bring their garbage to a waste bank. It works just like a regular bank. People bring their sorted garbage to the waste bank where it is collected. The collectors at the waste bank will determine what the value is of the waste. In return the people who brought in the garbage get an economic refund, which is a great incentive to help people recycle their waste (Hadiwidodo, Samadikun, & Arinasandi, 2019, p. 3). The collected waste at the waste bank is at their turn sold to plastic, paper and glass recyclers. This way people are incentivized to separate their waste, which is a preferred way of dealing with waste according to the theory of waste hierarchy (European Commission, 2015).

Therefore, the recyclable waste gets another purpose and only the residue of household waste is brought to the TPS. Waste banks are managed by different partners. It can be an initiative from the

government, or private companies like Unilever or NGO's like Bintari (Budiarti, personal communication, May 29, 2020). Bintari is a foundation that calls themselves 'The Indonesian association of sustainable development' (Bintari, n.d.). They concern environmental management to support sustainable development. One of the issues they tackle is the improvement of the solid waste management in Semarang. They want to achieve that by improving community's participation through reducing the production and utilizing the waste.

This wide variety of institutions that have ownership of waste banks and the fact that they operate next to TPS results in the waste system not having one clear structure.

Finally, households can dump or burn their garbage in the environment. Without any environmental and waste education this can be considered the easiest option for most households (Budiarti, personal communication, May 29, 2020). Of course, this contributes to a lot of environmental problems. When it rains the polluting materials from the dumped or burned waste infiltrate in rivers and in the soil with all attendant consequences like clogged up rivers due to plastic accumulation (Supriyadi, Kriwoken & Birley, 2000). But also societal disturbance like easy spread of diseases, by attracting disease vectors like flies (Supriyadi, Kriwoken & Birley, 2000). But unfortunately, this still happens in a lot of places in Semarang. That is why the issue of awareness and behavior towards waste deserves more attention.

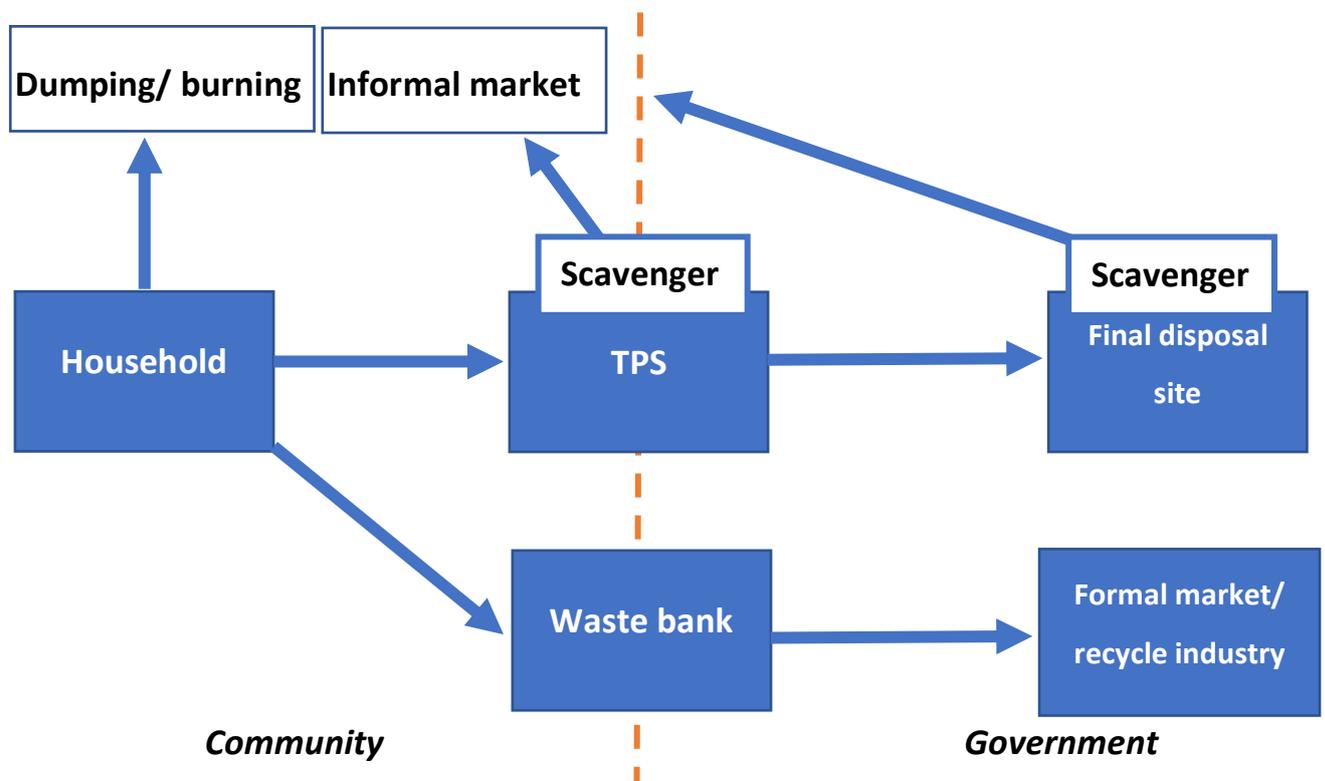


Figure 4: Schematic description of waste system of Semarang (Smulders, 2020).

One of the ways to create more awareness of waste is by implementing it through education. Education in Indonesia is significantly less developed than other Southeast Asian countries. The World Bank investigated that 55% of Indonesians are functionally illiterate after finishing school (Roach, 2019). Since the year 2000 Indonesia is very much investing in improving the educational system and quality of it. The educational system in Indonesia exists of multiple educational levels. To begin with, children go to elementary school. After that, they attend to junior high school (SMP) followed by senior high school (SMA/ SMK) (Roach, 2019). When students finish this, they can choose to attend higher education. This can be in the form of Diploma, which is higher professional education, or go to university which is more focused on scientific education. Remarkable is that in 2016 only 9% of students attained a degree in tertiary education like Diploma or university, presumably caused by high unemployment rates amongst this group of graduates (Roach, 2019).

Recently, education has become higher on the political agenda in Indonesia and is receiving a larger share of the national budget (Roach, 2019). This is also the case for education in Semarang. The municipality supports educational improvement, especially for environmental education. The environmental and waste education is starting at elementary school. This continues in high school and higher education, but in higher education it can sometimes even reach outside the classroom with environmental movements and campaigns. The interview with Benny Setianto, professor at Unika Soegijapranata Semarang, mentioned that a lot of attention is paid to environmental education on campus. For example Unika is banning Styrofoam from the canteen. But also through projects like 'arising the grateful minors' where being environmentally friendly is part of the competition in school. Another project is 'stuck in the middle', where students are encouraged to collect their plates at the canteen after using them (Setianto, personal communication, April 30, 2020).

In Java there is a policy concerning environmental education that every school from elementary school to high school, in central Java has to have a specific course project to enhance the awareness of students about the environment (Sidabalok, personal communication, June 8, 2020).

Even though this policy is a step in the right direction, the curricula students receive depends on the different schools and different areas. That means that every student in Semarang does not have the same chance to receive proper environmental education. This is because there is not one overarching policy of environmental education in Semarang.

This chapter handled the waste system and the educational system in Semarang. The waste system in Semarang provides three options for households to deal with their waste: bringing it to the TPS,

bringing it to a waste bank or dumping it in nature. The different options in the system are not working together but separately. The educational system in Semarang is increasingly giving attention to environmental education. With a policy that every elementary and high school in central Java must provide at least one program about environmental education, a step in the right direction is made. With this information the survey and interviews can be positioned in the right context.

5: Unravelling the survey: the awareness and behavior of students at Unika explored.

The survey deals with all three parts of the dependent variables in the conceptual model, namely: knowledge of environmental and waste issues, attitude towards waste issues and behavior towards waste issues. The survey combines closed-ended questions and open-ended questions. At first, the close-ended questions are explained. They are built up on statements on which the respondents answer using a Likert scale. After the close-ended questions are reported, the open questions of the survey are discussed. Those concern the opinion of the students on the environmental and waste education they receive.

5.1 Exposing the discrepancy

5.1.1 Environmental awareness

The first part of the survey is about environmental awareness and behavior. The first question consists of five practical statements (Appendix 4). The first question evaluates the knowledge of the students, whether they think a practice is good or harmful for the environment. This concerns practical statements on an individual level. For example, transport or how to deal with energy use in your household. The next question focusses on the behavior of the students towards these practices. These concern the same statements, this time it is not asked if the practice is good or harmful for the environment, but if the students generally carry out the practices.

In figure 5 the exact results are shown. The percentage in the column of knowledge in this figure means that that amount of the students think that the asked practices are 'good for the environment' or 'very good for the environment'.

For the statements about energy, plastic and motorcycle use the big majority of students think that the issue is good for the environment. And the statement about public transport scored more than half of the students that think that it is good for the environment. Only the statement about leaving the water tap open has a low percentage of students that think it is good for the environment.

In figure 5 the percentages are shown of the behavior towards waste of the students. This percentage means that students that filled in that they 'often' or 'always' carry out the practice in the statement. What stands out is that these percentages do not correspond with the knowledge students answered to have acquired on the same statements. In figure 5 the column for knowledge includes students that think the practice is good for the environment and the column for practices includes students that carry out that particular practice.

The last column in figure 5 shows the difference in percentages between knowledge and behavior. Looking at figure 5 it can be seen that for the statement on AC use, using a motorcycle and water use, students had relatively matching results on their knowledge and behavior. But for the other two statements, plastic use and public transport, that is not the case. For these statements the answers of the students on knowledge did not match the answers given on their behavior. That means that these students answered on the one side of the Likert scale for the statement about knowledge, and for that same statement about behavior on the other side. These results imply that there is a discrepancy between the knowledge and the behavior students have towards environmental issues. This leads to contradicting results. For two of the statements this percentage was rather significant with the outstanding numbers of 40% and 45% dissonance. But for all the statements, there is a difference in the percentage between knowledge and practice.

	Knowledge	Behavior	Difference
No AC use	91%	86%	5%
No plastic use	74%	34%	40%
Motorcycle use	63%	73%	10%
Use public transport	57%	12%	45%
Water use	26%	36%	10%

Figure 5: representation of the percentages of the results of respondents. It represents the percentage of respondents that had knowledge, the percentage of respondents that carried out the asked practices and the difference in percentage.

5.1.2 Awareness of waste system

The following part of the survey consists of questions about the awareness and behavior towards waste (Appendix 4). The question of this part is about knowledge, for this part there is chosen to focus on the working of the waste system. When students understand the working of the waste system, they are able to participate in it. The practical issues that can be conducted when the knowledge of the waste system is sufficient, will be dealt with in a later question.

The results of this question reveal that students felt they have adequate knowledge on the waste system. In figure 6 the exact results of this question are showed. The percentage means that this number of students filled in 'I know something about this issue' or 'I know a lot about this issue'. For every single statement more than half of the students responded they thought they had good knowledge about the statement, irrespective of whether this was correct. But for the statement about their knowledge on when the waste is collected and about reduce, reuse and recycle, only half of the students claimed to have knowledge about it, which is evidently less than the other statements. Noticeable, the statement about pollution around the TPS has the highest percentage of 83%. Overall, it can be said that the respondents think they have proper knowledge about the working of the waste system.

	Knowledge
When waste collected	51%
Who collects waste	68%
Where waste taken	65%
Reduce, reuse and recycle	57%
Pollution TPS	83%
Waste pickers	75%

Figure 6: representation of the survey results by presenting the percentage of respondents that answered they had accurate knowledge of the asked statements on the waste system in Semarang.

The next two categories that will be dealt with are ‘attitude towards waste issues’ and ‘behavior towards waste issues’ (Appendix 4). The first question consists of five statements about the willingness to participate in the waste system. The statements focus on issues around reducing, reusing and recycling waste. These statements on the willingness to participate in the waste system are used to look at the attitude towards waste of students. The next question treats the exact same statements, but does leave out ‘the willingness to participate’ and asks directly if the practices are generally carried out by the students. This will give an insight in the inclination of students to carry out the practice, which provides information on the behavior of students towards waste.

In figure 7, the percentages of the attitude of the respondents is presented. This percentage shows the number of students that answered in the survey to ‘strongly agree’ or ‘agree’ with the statements on their willingness to participate in the waste system with the asked practices.

The column of behavior in figure 7 shows the percentage of students that answered that they ‘always’ or ‘often’ carry out these same practices. All percentages in this column are lower than the percentages in the column of the attitude of students, even though the statements consist of the same practices. The latter column shows the difference between the percentages.

This means that for every statement, some part of the students answered that they are willing to participate in the waste system, but do not generally carry out the practices to participate in the waste system. Here is where the discrepancy shows between attitude and behavior. Students say they have a positive attitude towards, but they have a less positive behavior towards waste. This discrepancy appears for every statement, but for the statement on separating waste this is most significant with a difference of 40%.

	Attitude	Behavior	Difference
Separating	69%	29%	40%
Reusing	83%	60%	23%
Garbage in bin	89%	77%	12%
Reducing	94%	77%	17%
No plastic use	91%	80%	11%
Recycling	60%	46%	14%

Figure 7: representation of survey results by presenting the percentages of respondents that had the attitude to participate in the waste system and the percentage that did have the behavior to participate in the waste system. The last percentages represents the difference.

The survey results of both the section about environmental awareness and awareness of waste have been reviewed. For both of the sections, there appeared a dissonance between the investigated concepts. According to the answers of the students there is a gap between their knowledge and behavior. And there is a gap between their attitude and behavior. For every single statement in the survey, there weren't matching results for the matching statements. Some differences in percentages are more significant than others. But it can be concluded that for these students there is a dissonance for all statements between the knowledge and attitude (in this researched defined as awareness), and the behavior.

In the survey there is chosen to include environmental awareness because that is the foundation for awareness of waste. To understand waste issues there has to be looked at the bigger picture. Waste can be a practical issue, therefore it can be important to tear it out of context by looking at the environmental problems in the world.

Comparing the results of both sections, it is remarkable that there is not much of a difference between the two sections. Speaking of knowledge; the mean percentage of the column environmental knowledge and the mean percentage of the column knowledge of waste are exactly the same namely 67%. But also for the results of the behavior the differences are not that big. The mean percentage of students that answered they carried out practices for the environment is 45% and the mean percentage of students that answered they carried out practices beneficial for waste issues is 62%. This difference might be explained because the practices for waste issues are mostly on a household level, which make them easy to change. But a lot of the practices of environmental issues are harder to change and more integral. For instance, not riding a motorcycle and using more public transport. Also issues like lack of financial assets and resources are involved in changing these practices.

To conclude, the results of the survey show an interesting insight. The results show a remarkable difference between the knowledge and attitude, in comparison with of the behavior of students. Students answered that they have knowledge and willingness towards environmental and waste issues, but they do not carry out these same practices. That means there is a gap between these concepts. These three concepts are the parts of the dependent variables in the conceptual model. In the conceptual model 'awareness of waste' consists of both the concepts of knowledge and attitude together. For both there appears a gap between them and the behavior of students. That means there is a gap between awareness of waste and behavior towards waste issues. When talking about raising awareness it is often talked about spreading knowledge and giving people education, so that people become aware and behave environmentally friendly. But as the results show, giving

knowledge and attitude to students is not strong enough to change behavior. But to have a positive effect on the environment it is necessary to change behavior. So, the question is how that discrepancy can be explained.

5.2 Education

The survey does not only contain close-ended questions. Next to this, information on students' education is asked by an open-ended question. The respondents are asked about their opinion on the environmental and waste education they receive and have received at previous school(s). By analyzing the answers to the question three findings stand out. The environmental and waste education students receive is very different from each other, a lot of respondents call out the lack of field practice and there is a prevalent feeling of affection towards the issue. These findings are substantiated below.

5.2.1 Diversity

Most students are rather positive on the knowledge they got from their environmental and waste education. The most used word in all answers is by far 'helpful'. However, standing out in the answers of the open question is the diversity of the answers. On the one hand a lot of respondents spoke out to have had very detailed education on environmental and waste issues. But on the other hand, some other respondents claimed their education was quite shallow and not detailed. These are contrasting results.

"Quite helpful education, I understand how the waste process can be recycled properly. I know about the impact that will result from arbitrary waste disposal."

"On my level, what my teacher taught me was that the garbage was taken to the TPA. Only limited to that."

"Enough, because the teacher / lecturer explains it very detailed."

"Less, actually because it is only explained at a glance and not shown concretely."

"Not entirely, because in the world of education in my opinion there is only given a general picture, but we can deepen it ourselves."

This is just an example of the contrasting opinions of students. It implies that the students do not receive the same environmental and waste education at the different schools they have attained, by different curricula and educational programs and different teachers. Some students receive only general information, while others dive into the subject and get detailed information.

5.2.2 Lack of practicality

Another issue that stands out in the answers is the feeling of lack of practicality. This is a returning point of view. A lot of respondents claimed they miss getting in the field and the practical view.

“Quite helpful, but in my opinion it is still lacking in practice directly in the field.”

“Helps a little. At school are only explained the basics. The rest is from reading a magazine or take a plunge into the field.”

“Not really, because there is more out of school education and hands-on practice also helps.”

Environmental and waste education is mostly provided by integrating it in existing courses. Or by setting up educational programs on the issue within the curriculum. This is mostly aimed at providing students of knowledge on the concerning issues. However, a lot of students want more than receiving knowledge according to the answers they gave. Seeing and practicing the learned theoretical knowledge in the field is something a lot of students mentioned that they miss in their current environmental and waste education.

5.2.3 Affection

According to the survey, the majority of the respondents think that their environmental and waste education is sufficient. As said before, the most-used word in the answers is ‘helpful’. This implies an overall feeling of satisfaction. To go even further than that, a lot of the students are very affectionate about the issue. Students answer that because they are aware about the issues in their environment, they have created a feeling of affection. This feeling was lacking before, because they did simply not know about the issues occurring in their environment.

This, in return, can be seen in the high percentages of students that answered they have a positive attitude towards waste. This is a very outstanding example of this show of affection:

“Quite helpful because in the past when I was in high school I only learned not to litter and when I studied here I got increasing knowledge about pollution that damages the environment, I got deeper and I became very sensitive. I am concerned with the environment around me, for example I no longer use plastic straws, I bring my own straws, I also have several straws made of bamboo, besides that I also use my own drinking bottles, food containers itself, and paper shopping bags that replace plastic shopping bags.”

To conclude, the close-ended question in the survey revealed a discrepancy between awareness and behavior towards waste issues. And the open question in the survey exposed three insights in the opinions on the environmental and waste education of the students. Firstly, there were very contrasting answers about the sufficiency of the education the students received. Secondly, the

argument that the education lacks practicality was frequently given. And finally, students have shown feelings of affection towards environmental and waste issues.

6: Analysis: portraying the bigger picture.

After the results of the survey have been elaborated, the findings are investigated by using the additional in-depth interviews. For the question how the discrepancy can be explained the research has to take on a more qualitative approach. The collected data indicates there are a few causes of the discrepancy. They will be discussed in this section.

6.1 Education

The first explanation for the discrepancy is environmental education. As explained in the former chapter, environmental education fulfills its purposes for creating knowledge on environmental and waste issues, but the way environmental education is right now is not fulfilling the purposes of changing behavior. Students have the knowledge, but do not have the inclination to carry out practices that are positive for the environment and the waste situation, which creates the discrepancy between awareness and behavior. Even though the current waste education passes on a lot of knowledge, there are a few points that could be a reason why this education can play a role in the discrepancy between awareness and behavior. These points about environmental education have just been reported in section 5.2, and are explicated further in this section by elaborating interviews.

At first, the open question in the survey revealed that students felt like the environmental education they receive and have received lacks practicality. They would like to focus not only on the theory they learn in school but also go into the field. This is a point made by students themselves, because the majority of the survey respondents indicate that that is something they miss in their current environmental education. But also experts acknowledge this problem. Oely Sidabalok (2020) teaches environmental law at Unika and is operating in several green initiatives with students at Unika. She recognizes this problem. According to her a common bottleneck is that students learn theoretical material, but it is hard to implement that into different environments (Sidabalok, personal communication, June 8, 2020). The knowledge students gain at school, is hard to bring along to the students' households where they can change their behavior.

The interviewed experts gave different ways to take on a more practical approach in the way of educating. For example, schools can give excursions to different elements of the waste system. This makes a connection between the theoretical parts and reality. This is helpful because a lot of people have difficulty to follow through when they come back to reality (Sidabalok, personal communication, June 8, 2020). They have not seen the learned things put into practice, which makes it hard for them to put it into practice themselves. Students will also gain more affection towards the issue when they have seen it with a close look.

Another option the experts have given is to involve the field into waste education by providing service learning for students. This can be seen as an equivalent of community service (Sidabalok, personal communication, June 8, 2020). Students get an assignment to deal with an environmental problem in a specific community. The students have to go to the field to see the problem for themselves. Together with the community they will have to come up with a plan to deal with the problem (Sidabalok, personal communication, June 8, 2020). What happens is that sometimes it is not easy to process the theoretical visions into the area (Sidabalok, personal communication, June 8, 2020). Therefore these assignments are very valuable for students. Service learning is beneficial for both the community and the students. It can be applied to different levels of education. The assignments can be made as easy or hard as is needed for that particular level of education. The municipality of Semarang supports this development, so that makes a step in the right direction (Sidabalok, personal communication, June 8, 2020).

And secondly, the results of the survey showed that the environmental and waste education students receive and have received is contrasting from each other. This thinking is confirmed by Oely Sidabalok (personal communication, June 8, 2020) as she states that the curricula students receive depends on the different schools and different areas. She states that education can be enhanced by creating a stricter policy to ensure all schools in Semarang provide the same environmental education. Issues that are just discussed like excursions and service learning can be implemented as a requirement in curricula for all school students in Semarang. Some policy like this already exists. All schools from elementary school to high school in central Java should have a specific course project to enhance the awareness of students about the environment (Sidabalok, personal communication, June 8, 2020). This is a beginning, but subsequent to the former argument it is of importance that this policy is adjusted to the kind of environmental and waste education students need.

To conclude, environmental education is a factor that influences the discrepancy between awareness and behavior. That is because the environmental and waste education students receive works different for raising awareness than for changing behavior of students. The curricula lack practicality which causes difficulties for students to transform their learned knowledge into behavior. Another point is the lack of an overarching policy. That means that students do not have the same chance of receiving sufficient environmental education to raise awareness and behavior.

6.2 Working of the waste system

6.2.1 Lack of trust

The second explanation is the poor working of the waste system. That is one of the reasons that the discrepancy between awareness and behavior appears. Students do not carry out certain practices because of the working of the waste system. Benny Setianto (personal communication, April 30, 2020) agrees with this thought and has an explanation for this behavior. He gives the example that students will separate their waste into the right garbage bin on campus when there are three: plastic, paper and organic. But what he sees happening is that they do not know what happens to it after that. They know that a lot of different waste will eventually be mixed up on garbage piles. This does not give them the incentive to do these practices at home. When they see three different bins on campus, they are willing to cooperate.

“But the problem is they don't really care whether... once they throw it away in the bin where the cleanings of this will mix it, they don't really care.” – p.c., Benny Setianto, 2020

So for the knowledge that students have learned in school to become a practice, they have to have trust in the working of the waste system. Broadly speaking the waste system is divided in a community domain and a government domain as elaborated in the chapter 4. In the government domain all waste is mixed up. This results in people in Semarang commonly mixing their waste, because they know in the end the facilitators will eventually mix it (Setianto, personal communication, April 30, 2020). That means that the separation has to be taken care of in the community domain. That is where it can be solved. Both proper facilities and behavioral change will contribute for this separation to happen (Rachmawati, personal communication, May 29, 2020).

To look for those proper waste facilities in the community domain, the waste management system must be looked into. Currently, households have two options for where to bring their household waste. As elaborated in the contextual chapter, they can bring their waste to the TPS and to the waste bank (Budiarti, personal communication, May 29, 2020).

The group of people who bring their waste directly to the TPS bypass the selling and recycle market entirely (Budiarti, personal communication, May 29, 2020). People following this chain know that their waste is eventually mixed up and that results in people not having trust in the waste system and therefore not separating their waste. That is a reason why the discrepancy between awareness and behavior exists. Even though people have awareness of waste, they do not show matching behavior because they do not have trust in the waste system.

On the contrary of the TPS, waste banks provide recycle facilities. This way people are incentivized to separate their waste, which is a preferred way of dealing with waste according to the theory of

waste hierarchy (European Commission, 2015). The reason not every household brings their waste to the waste bank is because of the competition between the TPS and waste bank. If the TPS has a better location and is closer to your house, this is simply the easiest option (Budiarti, personal communication, May 29, 2020). That is what happens a lot, whereas a lot of people, some unintentionally, skip the selling and recycling part of the waste chain. That means that even though people have proper awareness of waste, the step to separate remains too big if the recycle facilities are not available anywhere close to the household.

That is why TPS and waste banks should be combined into one (Budiarti, personal communication, May 29, 2020) (Appendix 3). At this moment, both TPS and waste banks are public-private partnership. If these two institutions would work together, a big amount of waste that is not recycled right now would be recycled (Budiarti, personal communication, May 29, 2020). Every household brings their waste to the integrated TPS/ waste bank, these are all similar collection places in this scenario (Appendix 3). When the waste is collected there is looked which components of waste are valuable to sell to the market or recycle industry, and which components of waste are not valuable (Rachmawati, personal communication, May 29, 2020). This way people will have more trust in the waste system, because the separated waste will not be mixed up. In Appendix 3 a more in-depth explanation is provided about the integration of the TPS and waste banks in Semarang.

6.2.2 What is needed for change

To dive deeper into this solution the young generation can be involved in improving the waste system. As discussed earlier, the majority of the youth has knowledge and attitude about waste issues. This generation is provided by environmental education that learns them about environmental problems caused by poor waste disposal. They are the ones that are going to make the decisions in the future that can affect the sustainability of the earth.

Students already make a difference in the decisions of the municipality (Sidabalok, personal communication, June 8, 2020). This arises from the activities they do to protect the environment, this influences the policy but also the opinion of people.

This can express itself in a way to change policies, but also to play a role in the recycle market. Students can play a role in creating a market for recyclable waste (Tushuizen, personal communication, May 21, 2020). This will in their turn provide more jobs which is beneficial for the entire young generation.

All in all, the young generation is already making a difference by changing policies and can grow in making an impact.

This is one of the thoughts to enhance the working of the waste system in Semarang. The working of the waste system has a direct relation with the behavior towards waste as shown in figure 9.

When the waste management works well, people have confidence that their behavior will make a difference for the environment and are therefore more likely to carry out the practices. And when people carry out these practices, the waste system will work better in return. This is retrievable to Giddens structuration theory. Structures make practices possible, and are at the same time the outcome of those practices (Giddens, 1984). That reflects in this case on the structure of the waste system that makes practices possible. For example, recycle facilities make separating and recycling of waste possible. And at the same time those practices make the working of the waste system possible. So, because of practices like separation and recycling the waste system works better and is an outcome of those practices.

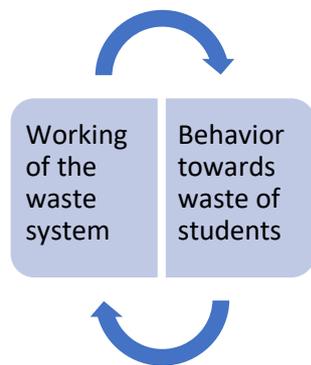


Figure 9: Mutual influence of the waste system and behavior towards waste (Smulders, 2020)

6.3 Social environment

The social environment of students plays an important role in the disconnect between awareness and behavior. Students' behavior is influenced by patterns they experience in their environment and the other way around (Sidabalok, personal communication, June 8, 2020).

This can take place at a household level when students learn about environmental and waste issues at school, they will bring that knowledge and attitude home (figure 10). They are the young agent and they can change the behavior of the household and even of the neighborhood (Budiarti, personal communication, May 29, 2020). Because it can also occur at the community level. Neighbors tell their knowledge from neighbor to neighbor and this can influence the behavior of a community (Budiarti, personal communication, May 29, 2020). If people have knowledge about the environmental impact of waste and about how to get economic benefit from valuable waste, they can become more willing to carry out waste practices. Of course, this depends on the conditions of their environment and the existing waste facilities.

But this process does also work the other way around (figure 10). Households and communities have an influence on the way students behave. Students are influenced by the patterns they experience in their environment. For example, if the community is eager to recycle and to collect their waste to waste banks, students will be influenced by the behavior they see (Sidabalok,

personal communication, June 8, 2020). When they learn about waste recycling at school, they are more open to it than other students that live in different communities where recycling is not that common. This cycle of mutual interaction is pictured in figure 10.

This figure shows that the awareness and behavior towards waste, that is generated from environmental education is far-reaching, but can also be withheld by social environment.

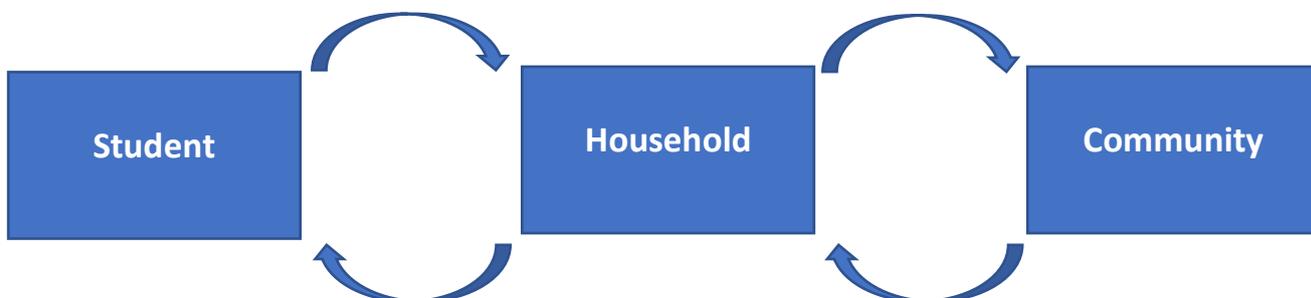


Figure 10: Schematic description of the influence of social environment (Smulders, 2020)

6.4 Javanese culture

In addition to the argument on the influence of people's social environment, the Javanese culture does also play a role in the appearance of the disconnect (Sidabalok, personal communication, June 8, 2020). Javanese people always try to respect people by avoiding conflict. This can be expressed by an attitude of discomfort to speak up to people about their opinions (Jenks, 2013). This culture in Java is called 'ewuh pekeuh'. The ethics of 'ewuh pekeuh' can happen at any relation, from superiors to friends and family.

Javanese people follow the older people or the people with power, this can work out in two ways. They follow the good initiatives, but also follow the harmful habits. They will follow that behavior, good or bad, because they have difficulty ignoring or refusing to someone (Sidabalok, personal communication, June 8, 2020).

This can also play a role in the waste system. For example, if some people in the neighborhood throw their waste next to the TPS in a non-environmentally friendly way, no one will speak up to them. People who live near the TPS and are exposed or impacted by the waste, will clean the place but never tell the culprits (Sidabalok, personal communication, June 8, 2020). In the ewuh pekeuh culture it is common to keep silent and avoid conflict.

This is an example of bad habits, but it works the same for good habits. People will copy the environmentally friendly behavior of their neighbors, relatives and superiors. Whatever their own opinion is on this topic, they will mostly avoid conflict and follow the good behavior.

The ewuh pekeuh culture on Java influences the behavior towards waste in two ways. On the one hand it can be beneficial when people do not have proper awareness, but follow the behavior of others which impacts the environment for the better. On the other hand, people might have the accurate knowledge but do not carry out the practices because they follow others' behavior and

keep their knowledge to themselves. This undermines the purposes of awareness of waste and behavior towards waste.

6.5 Law enforcement

Another influencing factor is weak law enforcement. In Indonesia there are strict law enforcements in environmental law. For example, regulations that littering will result in a fine of five million rupias, which is converted around 300 euros (Sidabalok, personal communication, June 8, 2020). That could be an effective incentive for people to abide by regulations and act environmentally friendly. However, the capacity of the law enforcement is too weak. The regulation and law enforcements do exist, but the regulation cannot be practiced. The capacity of the authority is too weak, there are not enough police officers to regulate (Sidabalok, personal communication, June 8, 2020).

So, law enforcements has a potential to be an effective incentive. However, without surveillance this is an empty effort. So right now, law enforcements do not have a big role in the behavior towards waste. But with a bigger capacity of the authority, it has a great influence on the practices of waste people conduct.

6.6 Resumé

This chapter treated the different factors that influence the disconnect between awareness of waste and behavior towards waste. In figure 11 these factors and the relations between them are shown in the adapted conceptual model. There are two explanations for the disconnect to appear. Firstly, the context, environmental education, works differently for changing behavior of students than it does for raising awareness. Environmental education does play a role in the awareness of waste, but the discrepancy appears because education does not work significantly for changing behavior of students. The lack of practicality in environmental and waste education creates a gap between awareness and behavior. This is presented in figure 11 by an arrow from environmental education to awareness of waste, which represents the influence between the two. And in contrast from that a dotted arrow from environmental education towards behavior towards waste, which represents that that influence is not very strong.

Next to this, there is another explanation for why the disconnect appears. The ABC theory states that when looking at the relation between awareness and behavior, the context, which is in this research environmental education, should always be taken into account (Guagnano, Stern, & Dietz, 1995). The influence of the context might be overriding the relation between awareness and behavior (Guagnano, Stern, & Dietz, 1995). In this research, the context does indeed override the relationship between awareness and behavior towards waste. The context consists of a lot more

factors than environmental education that have an influence on the relation between awareness of waste and behavior towards waste. These factors and relationships are shown in figure 11.

The working of the waste system influences the gap, because a lack of facilities results in people not translating their awareness of waste into behavior. Also, the social environment people are surrounded by can result in a reason why awareness cannot be put into practices. This is closely linked to the Javanese culture, that causes people to follow behavior of others. Finally, law enforcements can be an incentive to show certain behavior towards waste. These factors describe how the disconnect between awareness of waste and behavior towards waste can be explained.

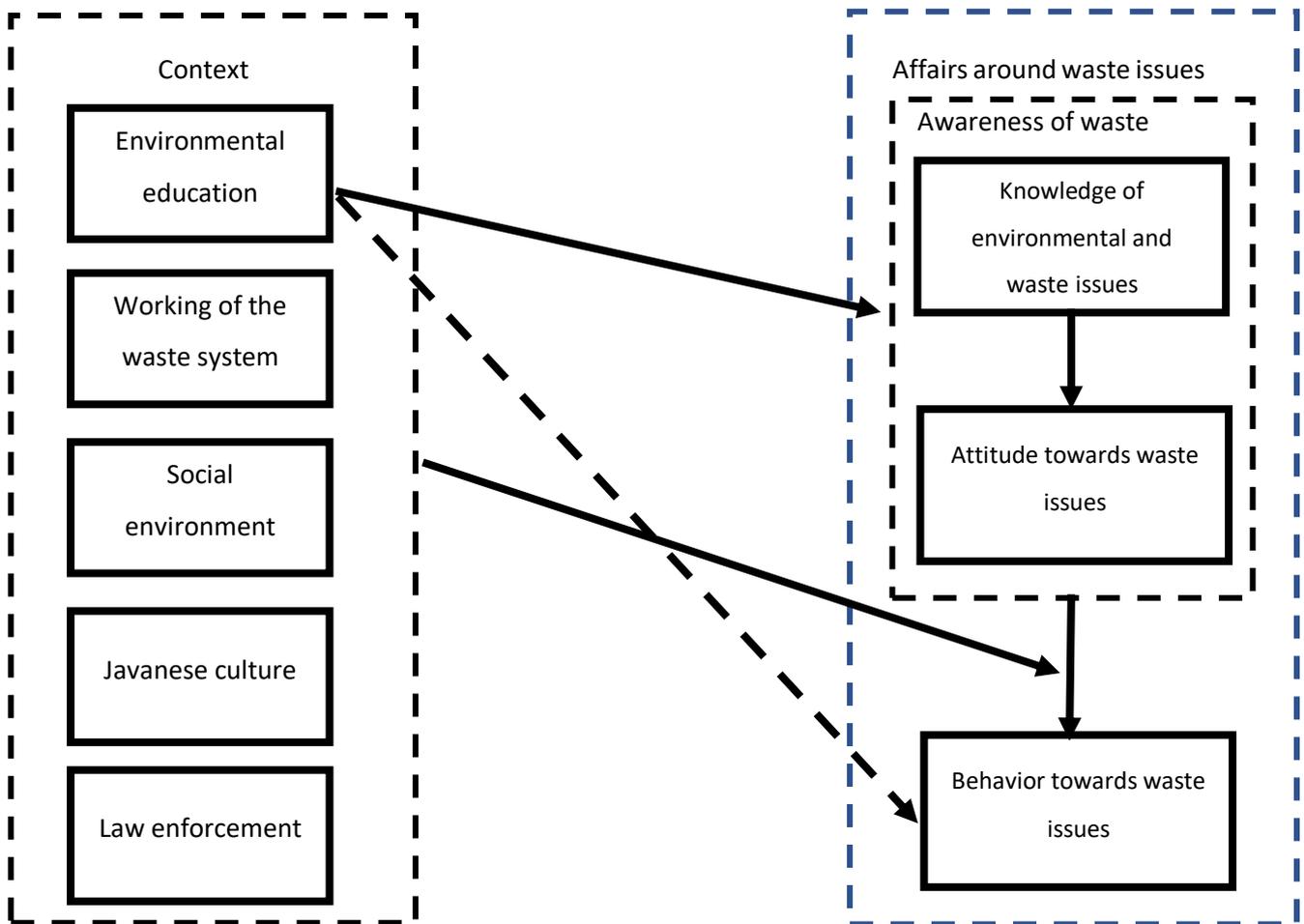


Figure 11: Adapted conceptual model

7: Conclusion and recommendations

The data of the survey and the interviews are elaborated and put into place. Putting all of that together has led to the conclusions of this research. All sub-questions will be answered individually. With this information gathered together the main question of the research can be answered. After the conclusion is given, a reflection and recommendation is explicated.

7.1 Conclusion

What is the awareness of waste and behavior towards waste of students in Semarang?

In the survey students answered that they thought they had knowledge about environmental and waste issues. They also answered to have a great willingness towards environmental and waste issues. These two concepts are the dimensions of awareness of waste in this research.

On the contrary to this, students answered differently at the part of the survey about behavior towards waste issues. Even though the majority of students is willing to cooperate for a better waste system, there was a large number of students that answered to be willing to cooperate but didn't carry out the practices for a better waste system. This creates a dissonance between awareness of waste and behavior towards waste.

What is the role of environmental education on the awareness of waste and behavior towards waste of students in Semarang?

The role of environmental education on the awareness of waste and behavior towards waste of students in Semarang is different than expected. The conceptual model shows that the role of environmental education on these three variables is investigated. This is depicted with one arrow because environmental education is seen as the context that influences the relationship between awareness and behavior in the ABC theory. But the role of education is more complex, because the role is different for awareness of waste and behavior towards waste.

Environmental education plays an important role in raising knowledge of waste problems and issues. It also plays a role in creating a better attitude of students, because they gain affection with the issue through education. However, environmental education does not play a significant role in changing the behavior of students. That happens because environmental and waste education lacks practicality and therefore does not reach students to the point of changing their behavior.

How can the correlation between the awareness of waste and behavior towards waste help to explain the behavior towards waste of students in Semarang?

The former questions have shown information about awareness of waste and behavior towards waste. That information incites that the correlation between awareness of waste and behavior towards waste can be marked as a disconnect. Looking further into the disconnect, the reasons behind it can explain why the behavior towards waste of the students occurs. To answer the question there is investigated why the disconnect appears.

Firstly, environmental education works differently for raising awareness than for changing behavior. Environmental and waste education needs a more practical and integral approach. Students have to go into the field to bring their theoretical learnings to reality. This can be done by excursions or service learning. This rationale has to be implemented in a broad policy about environmental education, so that every student in Semarang has the same chance to enrich themselves with awareness of waste and the corresponding behavior towards waste.

Secondly, the context does not only consist of environmental education, what is mentioned in the conceptual model. But the context exists of a lot of different factors. That is why there is a disconnect between awareness of waste and behavior towards waste. The ABC theory states that the context always has to be taken into account when looking at the relation between awareness and behavior (Guagnano, Stern, & Dietz, 1995). This context can override the relation between awareness and behavior, in this research that is the case. Because of the large context, the context has a strong influence on behavior which tones down the influence of awareness on behavior. That is the second reason that the disconnect appears. These relations and different factors are depicted in the adapted conceptual model in figure 11 in section 6.5.

The working of the waste system belongs to the context that influences students' behavior towards waste. When people have trust that their behavior towards waste will result in helping the environment, people are more willing to do it. But when people do not have faith in the waste system and do not trust that their practices will make a difference, people are mostly not carrying out the practices. For the waste system to work better it would be a solution if competition between TPS and waste banks would stop by integrating the two. In that case everyone that brings their waste to the waste collection location will sort and recycle their waste.

Also the social environment of students is part of the context. People copy the patterns they experience in their surroundings. But the other way around, students also influence their surroundings with their gained knowledge. This could be a reason that students have awareness of waste that they learned at school, but they do not have the behavior in their own environment.

Another factor in the context is the Javanese culture. That expresses itself in the fact that it is common in the Javanese culture to avoid conflict and follow the behavior of others.

Another factor in the context is law enforcements. Regulation is an effective incentive to change people's behavior. Unfortunately, the law enforcement in Semarang is not working optimal and can be enhanced. However, this factor does play a role in the behavior of people towards waste.

Main research question

To what extent does environmental education play a role in raising student's awareness of waste and their behavior towards waste issues in Semarang, and how can the behavior towards waste of students subsequently be explained?

The three sub-questions give an overview of the results. Combining the three of them creates an answer to the main research question. In figure 11 in section 6.5 an adapted conceptual model has been made, which describes the conclusion in a schematic way.

The three different parts of the dependent variables are investigated using a survey. That resulted in the fact that there appears a disconnect between awareness of waste and behavior towards waste. There is subsequently looked at the role of environmental education on the dependent variables. For awareness of waste it can be concluded that the role of environmental education is proper. But the role of environmental education on the behavior of students is not significant. This confirms the disconnect between the two concepts.

The frequently used theory for this research is the ABC theory, it states that the context, in this case environmental education, must always be taken into account when looking at the relation between awareness of waste and behavior towards waste. This information explains why the behavior towards waste of students in Semarang appears like it does right now. There are two explanations for the appearance.

The first one is environmental education, the context of this research. Environmental education fulfills the part of awareness sufficiently, namely the knowledge and attitude of students. However, environmental education is not able to play a significant role in students' behavior towards waste issues. An explanation is because the education that is given at this moment works differently for the two concepts. The theoretical approach provides students of knowledge and attitude, but does not influence their behavior towards waste. Environmental education gives students the stepping stone to be more aware of waste. But because they don't have the capability of doing the practices, they cannot change the structure of changing behavior.

Therefore the environmental education should need a more practical approach, which can be done by service learning or excursions. The policy for environmental education should also be more integral and overarching, so that every student has the same chance to receive sufficient environmental education.

Secondly, the discrepancy appears because the context that influences the relationship between awareness of waste and behavior towards waste exists of a lot of factors next to environmental education. Therefore the context can override the relation between awareness and behavior, which is the case in this research.

There are a lot of factors that are part of the context. The first one is the working of the waste system. For the structure of behavior to change, people must have the capability to do the practices. And for that to happen the waste system has to work better. If the waste system works better, people have more confidence that their practices will result in a better waste system. And when people carry out these practices, the waste system will in their place work better. 'Structure is both medium and outcome of the reproduction of practices (Giddens, 1984)'.

The social environment of students is also part of the context. Students' social environment must be open for changing behavior. Also the Javanese culture is part of the context. In the Javanese culture it is common to avoid conflict and follow others' behavior. Besides this the law enforcements have impact on the way people behave, because regulation is an effective incentive to change people's behavior.

To conclude, there is a disconnect between awareness of waste and behavior towards waste. There are two explanations for why that disconnect appears. Firstly, the role of environmental and waste education explains why there is a disconnect. That is because the lack of practicality results in the education not reaching students to the point where they change their behavior. Secondly, the context that influences the relationship between awareness of waste and behavior towards waste exists of a lot of factors next to environmental education. This context overrides the influence of awareness on behavior. These factors next to environmental are the working of the waste system, students' social environment, the Javanese culture and law enforcements. These two statements explain why the behavior towards waste of students occurs as it is.

7.2 Reflection and recommendations

The process of doing research has appeared to be an intensive, but interesting job. Finding an appropriate and interesting subject to do research about has been difficult. Once that was accomplished, the proposal of the research got of to a good start. Unfortunately, Covid-19 made its appearance which caused both mental and practical disappointments. Doing empirical research

about Semarang in Indonesia without being able to go to the place has been a struggle. This can be seen as one of the limitations of the research. For instance, because finding respondents for the survey has been hard without being able to contact students myself.

The applied research strategy does involve another limitation. The results of the research cannot be generalized for all schools, because the survey is conducted with 55 students. However, it provides insights on what a current group of university students know and feel about waste management and practices. This is valuable for curriculum development for primary, secondary and teacher education programs, because these are all schools they attained in the past. In the future, an extended study could be conducted to cover more schools in Semarang.

Another recommendation could be a more intensive research about the TPS and waste banks. This research has pointed out the factors that influence the awareness of waste and behavior towards waste. One of the factors is the functioning of the waste system. For future research it is interesting to look at the integration of the TPS and waste banks, that is discussed in section 6.2. It would be helpful to investigate how this integration could take place. What steps there have to be taken for all different actors, like the community, private sector, government and NGO's.

All in all, the goal of this research was *to analyze the role of environmental education on the awareness of waste and on the behavior towards waste issues of students in Semarang and relate that information to explain how the behavior towards waste issues occurs*, and this has been accomplished. Being able to answer the research question has made it possible to accomplish the research goal.

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