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Eating Practice and Food Waste Performances in the UK Primary and Secondary Schools:

Behaviour and Practice

By

Michaela Dhas

A thesis submitted to the University of Huddersfield
in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

October 2021

Dedication

This thesis is dedicated to my beloved mother, the first person who taught me the value of food. Thanks to her, I believe that humanity can live in harmony with nature. Mum, everything that I am today, I owe to you.

Miss you!

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To the future, I hope I will be able to continue my journey in school food and make the world a better place to live for all.

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List of Acronyms

DfE	Department for Education
DoH	Department of Health
DS	Dewsbury School
EA	Environmental Awareness
EAT	Environmental Awareness Test
FFL	Food for Life – as a social enterprise
FFLCM	Food for Life Catering Mark
FfLP	Food for Life Partnership
FfLP	Food for Life Partnership –as Eco-programme in schools
FSA	Food Standard Agency
FSM	Free School Meal
FW	Food Waste
HS	Huddersfield School
HSM	Hot School Meal
HSP	Healthy Schools Programme
LEA	Local Educational Authority
MP	Meal Pictures
PT	Practice Theory
RtR	Ready to Rumbe
SA	Soil Association
SD	Sustainable Development
SDGs	Sustainable Development Goals
SFT	School Food Trust
SM	School Meal
SMRP	School Meal Review Panel
SNAG	School Nutrition Action Group
SS	Satisfaction Surveys
WA	Washingborough Academy
WRAP	Waste and Resource Action Programme

Abstract

The volume of food waste produced by primary and secondary schools during school lunches raises significant concerns among politicians, scientists and school practitioners. Economic losses are the main factor driving schools to transform behaviour and practice in canteens. This thesis focuses on factors influencing the volume of food waste produced in two primary and one secondary school in England. The study's main aim is to explore how a range of factors such as meal satisfaction and general level of environmental awareness among pupils and staff influences the overall volume of food waste produced during school lunches.

This thesis draws on Warde's (2013) work on the *"Practice of Eating"* to explore how dispersed, and integrative practices create the foundations for compound eating practice performances to bring about sustainable change in school meal provision. While schools often understand food waste production through ABC individual behaviour models based on the lens of food choice (Shove, 2010), I argue that what pupils consume and how much they waste depends on school routines and the nature of dispersed and integrative practices performed during the school day. These issues were explored in schools with very different levels and understanding *of*, and engagement *with*, sustainability and school food programmes. The thesis thus explores how each school's approach to school lunch provision and healthy eating consumption varies and why eating practice performances in public schools bring about significantly different outcomes.

More than 3000 satisfaction surveys and 300 pairs of meal pictures were collected during the lunch break in all three schools. Additionally, pupils were provided with an environmental awareness test focusing on their knowledge and attitudes towards food waste while exploring the practices that lead to food waste. A series of interviews were also conducted with the staff members at the schools to better understand the development of the

school's eating practice performances and their attitude towards sustainability. Food waste and mixed waste volumes were also measured each day after the lunch break in all three schools. This extensive collection of qualitative and quantitative data creates a solid foundation for a holistic exploration of the food waste phenomenon in schools.

Surprisingly, this study shows that the school with the most extensive pro-environmental practices in place wastes on average 20% more food per pupil per day than the other schools. Moreover, the study found that attempts to understand and reform school food systems solely through behavioural interventions are inadequate to address the volume of food waste produced in schools. Therefore, it concludes that establishing effective routines within schools in general, and school canteens in particular, is an important way of encouraging a transition towards sustainability in school meal provision.

Chapter 1: Introduction

The impact of the global food system on the volume of food waste (FW) worsened significantly during the last decades. Scientists, politicians, and the public noticed the negative impact of industrialisation on the overproduction of food on the farm level and issues connected to overconsumption and consumerism on the customer level of the food supply chain. Too many choices, a seemingly unlimited volume of food products on the supermarket shelves and the impact of marketing and advertising made people forget about food as a finite resource depleting fast with a growing population. Instead, food is often considered a resource without value when more than 1/3 of all food is wasted globally (Scialabba, 2015). This thesis shows some research papers exploring the impact of supermarkets' strict requirements regarding the shape, size or colour of the food when farmers are forced to overproduce to satisfy these quality conditions (Feedback, 2018). However, while supermarkets keep complaining about the consumer preferences for '*perfect'* food, Lang (2020) points out that consumers are not educated enough about the differences between the quality and aesthetics of food. This and other issues connected to best before dates, lack of planning, changing lifestyles with working days, and a growing reliance on fast-food chains are the most significant factors contributing to household FW production (Evans, 2014).

Decades of transformation of households' eating habits do not only negatively affect all three pillars of sustainability, but they also transform children's perceptions about food. The issues with children's unhealthy eating habits and low quality of food served in the school canteen have been addressed through the introduction of food orientated eco-programmes, school nutritional standards, School Food Trust (SFT) and other government and private initiatives. However, the increasing volume of FW produced by schools is often overshadowed by seemingly more important issues connected to children's unhealthy eating habits, rising

obesity rates as well pupils' undernourishment. Nevertheless, government and local authorities often fail to understand the connection between pupils' unhealthy eating and FW production in schools. Latest studies show that about 50% of FW in the schools consist of fruits and vegetables. And while food eco-programmes try to tackle pupils' unhealthy eating habits through food education, gardening, tasting sessions and more, their impact on FW production stays under-researched and detached from the issues of healthy eating. This thesis explores the connection between FW production and healthy eating in two primaries and one secondary school in the UK.

1.1 Positioning Research: Research Questions

While multiple studies have been conducted exploring FW issues in schools internationally (Hanks et al., 2014; Biltoft – Jensen et al., 2017; Boschini et al., 2018; Eriksson et al., 2018; Costello et al., 2015; Eriksson et al., 2017), the issue of FW in UK schools is being underestimated for decades. In the UK, there are only a few studies quantifying FW production in school canteens. The most recent large-scale study by WRAP (2011) investigating the FW phenomenon in schools estimates that an average English pupil waste only around 26g of food per day which appears to be a grossly erroneous estimate compared to other European studies as well as results of this thesis (see e.g., Boschini et al., 2018; Eriksson et al., 2018; chapters 5,6,7). Nonetheless, the research claims that on average every primary school in the UK waste at least 80000 tons of food each academic year (WRAP, 2011). This highlights the need for further research into schools' FW phenomenon, which might aid political leaders to take the necessary steps to address this problem.

The primary goal of this study is to investigate the most influential elements identified in the literature as having a significant impact on the volume of FW created in schools during the school lunch. These include environmental awareness, meal satisfaction, school's views of the food systems, schools'

environmental position or employees' approach. While most of these factors have been studied separately in the past, by using a holistic approach this study aims to bring all of these elements together to develop an understanding of why and how FW is produced during the school lunch. Theoretically, this research aims to understand how Practice Theory (PT) can be used in the studies of waste in schools and how it can contribute to the understanding of FW in schools in comparison to its behavioural counterparts. Therefore, this study aims to answer two main research questions:

- What are the most influential factors affecting the volume of food waste produced in schools during school lunch?
- How can focusing on eating practices in the canteen rather than individual behaviour help school practitioners to reduce the volume of FW production during the school lunch?

1.2 The Structure of the Thesis

The first chapter of this thesis introduces the current literature in the field, starting with the development of agricultural food systems and the impact of industrialisation on producers and consumers' wasting practices. Later, the chapter discusses the history of school meal (SM) provision since the beginning of the 19th century when more attention is paid to the impact of various political strategies on the school food system. And finally, food orientated eco-programmes are introduced as a way of responding to children's worsening health conditions and reduced food quality in school canteens.

Before investigating pupils' eating practices in schools, chapter two develops a theoretical understanding of how theories of practice differ from their behavioural counterparts. In a similar way to Shove's (2010) ABC framework, Ham et al. (2015) argue that the behaviour of individuals

results directly from attitudes and choices. On the other hand, theories of practice focus on how routinized types of behaviour (Reckwitz, 2002) impact social structures and how the food system is formed and understood (Ortner, 1984). In this way, understanding the performance of practices in different environments is key to comprehending and addressing the issue of FW.

Chapter three builds on the mix of multiple contextual frameworks from the literature while introducing the main aims of this study alongside research questions and objectives. It focuses on the methods used for the collection of both qualitative and quantitative data to evaluate the factors influencing FW volume production in schools. This chapter explores why and how data have been collected while examining the processes of data analysis.

Chapters four, five and six investigate current eating practices in two primary and one secondary school in Northern England. These schools have been recruited based on their different environmental positions. While Washingborough Academy (WA) participate in multiple national and international food eco-programmes, the schools in Huddersfield and Dewsbury represent average schools with no or very limited eco-involvement. Therefore, the impact of eco-activities among the recruited schools on pupils' FW volume production is explored.

This thesis concludes with chapter seven, which summarises the most significant findings and positions them within the current literature. This chapter answers the research questions outlined in chapter three while evaluating the theoretical framework based on compound eating practices and the ABC model of behavioural theories within the context of SD. The end of this thesis explores the possible implication of this research on the current school food system and proposes solutions needed to be implemented to change the current school FW situation.

1.3 Research Aims

The main aim of this PhD thesis is to explore how and why FW emerges in schools in the UK. In this way, school canteens are ideal places to study how food is consumed and wasted. They have gained considerable interest from scientific and public audiences (Derqui et al., 2016; Balzaretti et al., 2020). Exploring current pupils' eating habits and ways of adjusting them could help to build more sustainable consumption practices while educating children about the importance of consuming healthy food could improve the consumption models of future generations (Derqui & Fermandez, 2017). This thesis explores the principles on which the school food system is currently based in connection to FW production and how various factors connected to the environmental position of schools influence pupils eating practices and, in turn, lead to increased or decreased rates of FW.

Chapter 2: Literature Review

It is estimated that about 1/3 of all global food produced worldwide is wasted from farm to fork (Scialabba, 2015), representing about 2.3 trillion euros lost each year (FAO, 2014). Food waste (FW) is a global issue with significant environmental impacts. It is connected to the depletion of resources, including water and soil, and accounts for over 3.3 billion tonnes of greenhouse gas emissions released into the atmosphere annually (HM Government, 2018). Although, the publication of the national waste reduction strategy: Our Waste, Our Resources: A Strategy for England in 2018 shows that reducing waste is a priority for the UK government (HM Government, 2018), the misconception of sustainability is often evident in UK policies.

While the challenge of reducing FW and its environmental impacts is becoming more significant, the term – Sustainability – relates to more than just an environment. From a business perspective, Elkington's Tripple Bottom Line Paradigm presents a necessary balance between so-called 3Ps: People, Planet and Profit urging companies to add social (people) and environmental (planet) aspects to their overall evaluation of success. In the same way, the concept of Sustainable Development (SD) was introduced to help understand the balance between environmental, economic and social pillars of sustainability. In this thesis, the concept of Sustainability and SD became an overreaching theme and the bottom line of this research.

However, while targets have been set through the Sustainable Development Goals (SDGs), it is clear that a broader approach to tackle the issue of waste prevention and the overproduction and consumption of food is needed (Lang 2020). With a growing population and an intensifying environmental crisis, the cost associated with FW cannot be ignored and needs to be addressed now more than ever. The goal of food security for

all can only be achieved by transforming current food systems based on the principles of sustainability (Patterson et al., 2017; Conijin et al., 2018; Lever et al., 2019).

This chapter reviews the current literature focusing on FW production in schools and its connection to the global overproduction and consumption of food. Firstly, the history of the global transformation of agriculture systems since the industrial revolution is briefly described to establish why food systems operate in the way they do. The concepts of overproduction and consumerism are connected to the ways in which the global food system currently operates while investigating how this connection influences the current volume of FW. Secondly, this chapter looks closely at the development of current SM guidelines while exploring the links between schools and sustainability through schools' participation in eco-programmes.

2.1 The Agricultural Food System

The food system can be defined as a complex network of activities related to food production, distribution, and consumption. Zhang et al. (2018, p.19) define the agricultural food systems as:

> *"Diverse agricultural production systems grow our crops and livestock and employ more people than any other economic sector. They are underpinned by complex biological and climatic systems at local, regional and global levels. These natural systems are overlaid by social and economic systems, which transform agricultural production into food and finally deliver it to people based on market infrastructure, economic forces, government policies, corporate strategies and consumer and societal preferences."*

The efficiency of the global food system significantly increased within the last centuries as part of industrialisation and intensive farming techniques, currently feeding more than 7 billion people worldwide (Oliver et al., 2018). However, this brought multiple challenges, including increased FW production (1/3 of all food produced is wasted), the unequal distribution of food (800 million adults and 115 million children undernourished), negative environmental impacts (greenhouse gas emissions, water and soil degradation) as well as cultural erosion (lost farming skills, food knowledge, broken connection between generations and food) (FAO, 2017; IPES-Food, 2016; Dangour et al., 2017).

The so-called 'Green Revolution' or the 'third Agricultural Revolution' was a set of research and development projects carried out from the 1940s until the 1970s, which significantly increased food production globally. Various technologies such as synthetic nitrogen, pesticides, and mechanization significantly increased crop yields, leading to the production of low-cost livestock. However, Tilman et al. (2002) argue that while modern agriculture increased the yield of food products worldwide and helped feed a growing population, intensive agricultural techniques brought challenges to all three pillars of sustainability, the economy and the environment, and society.

For example, the increased use of pesticides and fertilizers disrupted the balance of nutrients in watersheds leading to health issues, rising water purification costs, creating negative influences on fisheries and permanently decreasing water quality for recreational use. Intensive agricultural practices also have a negative impact on soil degradation and contribute to eutrophication, and disrupt natural biodiversity, leading to a reduction in the ability of eco-systems to provide certain goods and services (Loreau et al., 2001).

2.1.1 Global Food System - Overproduction

Scholars are still trying to fully understand the complexity of the global food systems and trying to find a way to make them more sustainable. This transition is driven by social justice and climate change goals (Marsden, 2013; Oliver et al., 2018). Although there is a consensus that agriculture can meet the food needs of up to 10 billion people, there is also a lack of consensus about how this can be done. In this context, sustainability in food systems refers to maintaining high yields while protecting the environment, suggesting that even in the face of significant shocks, sustainable agricultural practices need to be maintained (Conway, 1997). Today, the significant impacts of agriculture on the environment are converting natural habitats into agricultural land and the pollution that this process creates. These include nutrients that enter streams and lakes and the residue from animal feed that affects both human health and the health of ecosystems. However, these impacts suggest that it may be difficult for the current agricultural system to prosper in line with sustainability principles (Hinrichs, 2014).

A report by the campaign group Feedback (2017) points out that increasing demand for food due to a growing population is responsible for around 80% of worldwide deforestation, approximately 70% of freshwater consumption, and more than 30% of greenhouse gas emissions annually. However, current agricultural practices can be directly connected to global market forces that lead to overproduction and FW (Lang 2020). Feedback (2017), for example, highlights the volume of food wasted due to overproduction practices on farms. Farmers are forced to overproduce as part of the contracts with international supermarket chains and their radically stringent cosmetic specifications for food products. As a participant in their research stated:

> *"From my experience when I used to supply the supermarkets you generally grew about a third more than you thought you would sell, just to make sure that supermarket buyer didn't have a tantrum if you run short, and so routinely you have more than you can sell"* (Feedback, 2018, p.6).

Cosmetic specifications are currently used to determine the quality of the food product based on the external appearance. If the product does not meet strict rules defining the item's shape, colour, or weight, this often means that the product cannot be sold in supermarkets. These strict rules leave farmers to either sell produce on local markets or to wholesale providers for a quarter of the price to cover their losses. However, farmers argue that the volume of products supermarkets refuse to take creates a typical low demand-high supply situation meaning that there are decreases in the price that farmers can charge for their products. Therefore, farmers often decide to bury the foods rather than re-sell as it is often less risky and more economical than investing in selling more of the produce.

> *"That's not just a few sacksful of parsnips, it's not a skip-load. Its' a colossal mountain of them – enough to fill nearly 300 shopping trolleys. And, more importantly perhaps, to feed 100 000 people"* (Feedback, 2018, p.4).

Supermarkets defend their cosmetic standards as being consumer-driven. However, if '*high-quality'* food products are less available, supermarkets use imperfect foods and buy them off farmers for the agreed price (Feedback, 2017). This clearly shows that the main drive of cosmetic standards is not consumers but rather the preferences of supermarkets. Moreover, Feedback (2017, p.10) reports that "*the cosmetic specification is being used to restrict market access when demand is lower than supply",* leading to unfair trade in countries where penalties against unfair practices are limited. In this way, the report shows that current retail practices lead

to overproduction and FW while negatively influencing farmers' economic power, resulting in even greater moral, agricultural and economic depressions in certain countries (Lang 2020).

2.1.2 Food System and Communities - Consumerism

The global food supply system currently faces significant pressure to feed a growing population while its complexity has increased significantly with the age of industrialisation and globalisation. Today, the global food system is characterised by over-nutrition and obesity in some parts of the world and chronic under-nutrition in others (Lang & Heasman 2015). This paradox of having too much and too little food at the same time and place has been contextualised by Sen (1981, p.154), who pointed out that: *"…starvation is the characteristic of some people not having enough food to eat and not the characteristic of there not being enough food to eat"*

Sen adds that food products exported from famine areas are a natural characteristic of the market. This shows how markets do not meet people's social needs and highlights the importance of establishing a foundational economy within a capitalist system (Morgan, 2020). The foundational economy is based on the principles of moral economy, which criticises gaining wealth through financialization while exploring the impact of financial activities on people, the planet and the food system (Clapp & Isakson 2018). Foundational economists argue that all people have a right to be educated and have a standard length of life and the right to become members of social communities (Sayer, 2019).

Morgan (2020) argues that the principles of true sustainability need to be based on the foundations of the moral economy, especially in the development of food policies and the running of global food systems. He argues that the strength of the country's economy should be based on the quality of public sector procurement and the availability of food for all

citizens, especially for the most vulnerable, such as patients, children or prisoners (Morgan, 2020). Nevertheless, there is still a worrying number of people and children in the UK who do not have a healthy diet and suffer from hunger or undernourishment. This is especially true for those from disadvantaged communities (WHO, 2008; Moretti et al., 2021). On the other hand, the latest UNEP (2021) (United Nations Environment Programme) report estimates that about 931 million tons of food are wasted at the consumer level globally every year, while the UK contributes to this number with about 10 million tons of FW annually (GOV, 2017).

The Waste and Resource Action Programme (WRAP) reports that about half of the food thrown away or otherwise wasted in the UK is edible. In 2012, researchers found that UK households throw away about £12 billion worth of food products, representing about 17% of the annual turnover of the food industry in the UK (WRAP, 2013). In his book *"Food Waste: Home Consumption, Material Culture and Everyday Life"*, Evans (2014) points out that while people feel anxious about throwing food that they paid for away, the realities of everyday life, such as long working days, mean that people have less time for cooking. This leads, as he demonstrates, to preferences for fast-food restaurants, poor shopping habits and the serving of oversized portions, which drives families to select less environmentally friendly solutions when choosing what or where to eat. On the other hand, Evans adds that the way food systems currently operate (cheap food, full shelves, overproduction) does not motivate families to stop wasting but instead encourages them to buy more than necessary and then waste what they cannot consume.

As described above, the rivalry among supermarkets to provide cheap food for consumers to gain a more significant market share comes at the expense of the environment, while absurd food quality requirements (such as shape or size) drive farmers to overproduce and hence waste. Although it is important to point out that the main aim of the food system is to feed

a growing population and provide food for all, the transformation of the global food system and consumer practices has a negative implication for social, economic, and environmental sustainability. So far, this section has explored the development of the global food system, the link between overproduction and consumerism and has also introduced some of the issues in the food system leading to FW. The following section explores the impact of FW on the environment, society and economy and further positions it in the current literature.

2.2 Food Waste as a Global Issue

It is estimated that about 1/3 of all food produced globally is wasted each year (Scialabba, 2015). However, FW is not simply an ethical issue, as it also creates other social, economic and environmental impacts on each part of the global food supply chain. Previously, I have discussed FW on the farmer and consumer levels, but this section focuses on the environmental impact of wasted food. Scientists and governments warn that FW should not only be considered in connection to resource (water, soil) depletion or economic losses but also in relation to the environmental impact of burying waste in landfills and its impact on communities (HM Government, 2018; Lever, 2021).

A widely accepted definition of FW has been developed by FUSIONS (2014, p.6) (Food Use for Social Innovation by Optimising Waste Prevention Strategies) which defines FW as:

> *"…any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed of including - composted, crops ploughed in/not harvested, anaerobic digestion, bioenergy production, cogeneration, incineration, disposal to sewer, landfill or discarded to the sea."*

Nationally, the UK government shows that FW reduction is a priority by developing national strategies such as Our Waste, Our Resources: A Strategy for England in 2018 (HM Government, 2018). Internationally, FW has been addressed as part of multiple plans and agreements among countries, of which the most popular framework is Sustainable Development (SD). The concept of SD is based on a fifteen-year plan to combat the most pressing worldwide environmental, economic and social issues. Seventeen Sustainable Development Goals (SDGs) and 167 targets have been introduced for 193 countries that have agreed to adopt new policies and requirements toward these targets to achieve global sustainability. While Johan Rockstrom and Pavan Sukhdev (2016) argue that in fact, all SDGs are connected to eating healthy and sustainable food, this thesis focuses on goal 12 (*"Ensure sustainable consumption and production patterns"*) directly connected to FW reduction (UN 2015, p.22):

> *"By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses."*

It is estimated that Agriculture, Forestry and Other Land Use (AFOLU) annually contribute to creating 20-27% of global greenhouse gas emissions (Smith et al., 2013). As summarised in the IPCC (The Intergovernmental Panel on Climate Change) report exploring the impact of land on the atmosphere, it is clear that agriculture contributes significantly more to the production of global emissions than to forestry or other forms of land use (Jia et al., 2019). This points to the significant impact of food production practices on the environment and their potential to influence climate change. It is calculated that gasses released during the decomposition of FW represent between 8-10% of global gas emissions (Bloom, 2010). This shows that reducing FW by adjusting current food production and consumption practices could theoretically lead to a significant reduction in

the global greenhouse gas emissions created by the world agricultural sector.

It is essential to add that although current food production practices are one of the main factors negatively affecting the production of greenhouse gas emissions, the impact of food losses on climate change is also often underestimated. According to Adhiraki et al. (2006), landfill FW generates 125m^3 of greenhouse gasses, consisting of methane (60-65%) and carbon dioxide (30 – 40%), where methane is more immediately harmful due to its ability to contain heat 21 to 25 times more effectively over 100 years. The US EPA (2019) estimates that about 15% of methane emissions come from landfills. Another issue with storing waste in landfills is connected to the leakage of toxic leachate from decomposing hazardous waste together with biomaterials such as food into the soil and underground water supplies (Ozkaya, 2005). Ozkaya (2005) argues that mainly older landfills fail to have the necessary systems in place to deal with the by-products of landfills and therefore represent a serious health risk to the population in the area. Bloom (2010) adds that by continuing with current waste management practices, it is only a matter of time until landfills around the world permanently degrade the quality of both soil and drinkable water.

Although techniques such as feeding pigs, anaerobic digestion or incineration are based on the diversion of FW from landfills, Stuart (2009) argues that governments need to invest more into prevention techniques (reduction of overproduction and consumption) rather than continue to reduce the consequences of waste. Investments in food disposal through incineration or anaerobic digestion to produce bioenergy have a negative impact on prevention practices. He adds that these techniques do not motivate people to change their food-wasting habits, but it encourages them to do the opposite, as it allows FW to be viewed as a bio-product with a positive environmental impact. Stuart (2009) argues that encouraging people to keep wasting food with good intentions, feed the animals, or

create energy will allow the rate of overproduction to be maintained alongside consumerism, leading to further deprivation of natural resources and, consequently, global hunger.

2.2.1 The Concept of Consumption and Waste

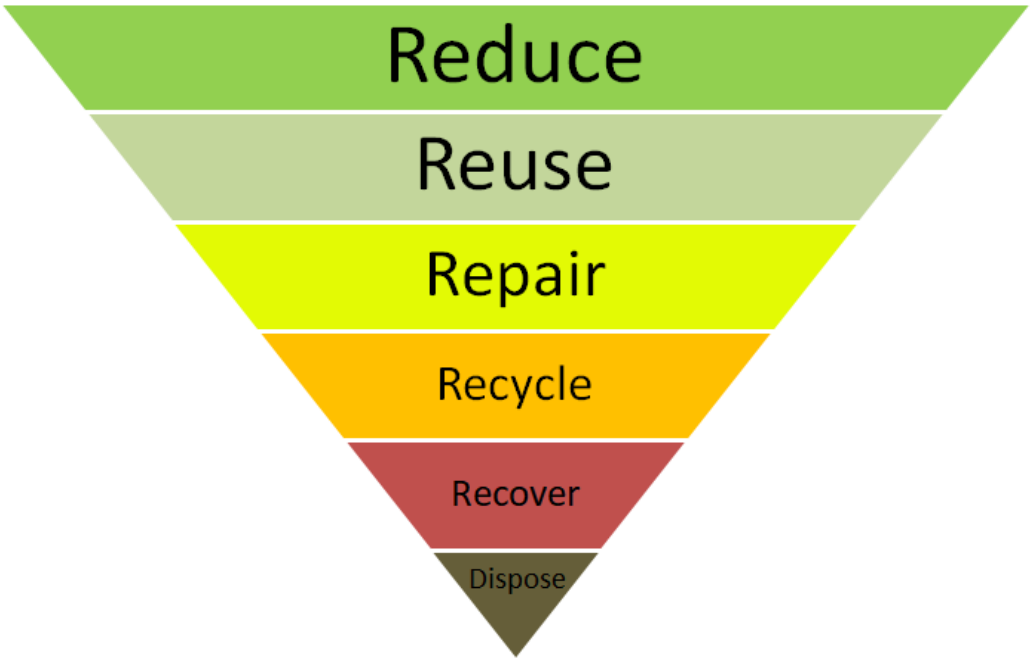
Before investigating the issue of FW and its emergence in schools, it is crucial to explore the idea of consumption to understand why and how FW has become an issue for society. Social scientists often connect the idea of responsibility for consumption and overconsumption to individual and societal well-being (Shor, 2010) or environmental concepts of sustainability (Jackson, 2009). The studies of consumption started to emerge after the second world war during the time of abundance, often referred to as the Long Boom (Marsden and Sonino, 2012). The attention has moved from ameliorating poverty and critiques of luxury to research on overconsumption and the impact of mass production on society and the economy. This era is also known for the development of cultural phenomena such as taste, uniqueness or aesthetics, and the growing impact of advertising on consumers purchasing decisions (Warde, 2014).

In the early 70s, social scientists started to leave behind theorisations of society with a holistic system approach, preferring instead to put the individual at the centre of sociological discussions. This happened as part of changing economic systems, in which the economy started to grow based on individual consumer spending power and the willingness to spend and borrow money. In this way, individual needs and desires started to become more aligned with the development of advertising agencies, with the individual positioned at the centre of the economy. Therefore, consumption was understood through individual expressions of identity, manifested in purchases and other symbolic representations of taste or lifestyles rather than material rewards (Warde, 2014).

However, the beginning of the 21st century brought wide criticism of individual centred models and a new alternative was established – Practice Theory (PT). In the next chapter, I will discuss PT and its position in the current literature, but it is essential to understand how PT emerged in connection to concepts such as consumption or consumerism. Lizardo (2009), Warde (2014), Evans et al. (2012) and more claim that PT represents the best alternative to replace the holistic system approach and individualism. This is because PT does not try to bring a brand-new understanding of the world but rather represents a bridge between systems and individuals, coherently expressed through an understanding of practices at the centre of the social world (Kaljonen et al., 2019). Therefore, instead of system analysis (holism) or individual evaluations (individualism), people's practices are observed within social systems and individual positions in the social world. In this way, PT helps scientists understand why and how people's consumption practices emerge and how they can be adjusted to reach a common goal: sustainability.

It is crucial to establish the connection between wasting practices, overproduction and consumption. Naturally, reducing overconsumption is the first step towards reducing waste. Based on the so-called Waste Hierarchy (see Figure 1) developed by the European Union's Waste Framework Directive in 1975, tackling waste starts with waste reduction (Williams, 2015). This can be translated to the context of consumption by reducing consumerism (Lever et al., 2019). This thesis is built on the argument that the most effective way to reduce the volume of FW produced in schools is to implement practices with a positive impact on reducing FW. Instead of developing new ways to manage FW, we need to focus on the most influential factors which affect the volume of FW produced in schools. In this way, I am to build a foundation for future research exploring the establishment of new routines and practices in the school environment that can contribute to the common aim of FW reduction.

Figure 1: Waste Hierarchy



2.3 History of the School Food System

This section explores the history of school food to examine why and how practices leading to FW in schools have emerged. The following paragraphs look at the history of the establishment of nutritional regulation in schools in the UK alongside the transformation of the school food system since the 19th century. This section ends by establishing the link between SM standards and eco-programmes, explaining how and why eco-programmes focus on food should be at the centre of school curriculums.

With the introduction of compulsory education in the UK in 1870, the concern for pupils suffering from hunger became more common (Evans & Harpet, 2009). The number of philanthropic organisations with the stated aim of feeding children grew significantly at the end of the 19th century, and in London alone, more than twenty thousand meal portions were

served every week during this time (Finch, 2019). The issue of undernourished children was prominent and led to concern about young men's poor physical condition and the inability to recruit lower-class men into military services. Therefore, Local Education Authorities (LEAs) were required to investigate the medical condition of school children around issues connected to malnutrition (School Meals Review Panel - SMRP, 2005). This demonstrated to government officials the necessity of implementing new reforms to the provision of SMs.

The beginning of the 20th century brought more philanthropic organisations into schools helping to tackle children's malnutrition, which resulted in the expansion of SMs so that more than one million children were eating SMs by 1920 (Evans & Harpet, 2009). In 1944, nutritional standards for SM providers were introduced, laying down levels of fat and calories to be consumed during school dinners (Parliament UK, 1944). This set an obligation for schools to provide SMs for pupils that wanted them while the net cost of the meal provision was to be covered by the government. The year 1955 brought another significant change when school providers were required to account for the possibility of pupil nutritional deficiencies caused by aspects of their home lives (Ministry of Education Northern Ireland, 1955). In 1966, new nutritional standards were introduced by the Department of Education and Science (1966), which stated that each SM had to contain at least 29g of protein and 880 kcal. These nutritional recommendations were set for 12 years old pupils and then reduced or increased with the age of each pupil attending school. The schools were required to cover the standard charge for the SMs until 1967 when LEAs were required to accept full financial responsibility for SM provision (SMRP, 2005).

However, the introduction of The Education Act (1980) and what Simon (1991, p.511) calls *"deep systematic damage to the whole public system in Britain"* during the era of Thatcherism brought significant change to the

school food system (Beauvallet, 2015). The 1980 Education Act removed the obligation for LEAs to provide SMs to cut public expenditure. Thus, SM provision became an unessential service. At the same time, more private meal providers were introduced to the school food system by introducing food convenience and the principle of *"lowest bid wins"*, which put profit over quality (Evans & Halpert, 2009). At the same time, fixed prices for school dinners as well as nutritional standards were also abolished. This resulted in many school kitchen facilities being demolished in the 1990s, affecting underfunded schools that struggle to install new kitchen facilities today (SMRP, 2005). Although the Black Report published in 1980 warned Thatcher about the importance of nutritional intake on pupils' health, the situation did not improve (Evans & Halpert, 2009).

These issues worsened even more in 1986 when the Social Security Act prevented children whose parents received supplementary state benefits from being part of the free school meal (FSM) scheme (Evans & Halpert, 2009). In 1992, due to increasing public concerns regarding food provision in schools, the Caroline Walker Trust (CWT) introduced science-based guidelines for children's nutritional intake. Although these have not been accepted as official requirements for the meal providers, they have been considered a gold standard in presenting schools with food recommendations. In 1998, the Fair Funding provisions were introduced, delegating SM funding to all primary and secondary schools. This has led to a financial incentive for schools to provide nutritious meals, but it also meant that schools were forced to take a more financially driven approach (SMPR, 2005).

Due to public concerns regarding SM provision, in April 2001, the Minimum Nutritional Standards for School Food were reintroduced. New FSM eligibility criteria were introduced under the Education Act 2002, leading to more children receiving FSMs (SMRP, 2005). Between 2000 and 2002, each of the UK's regions (England, Wales, Scotland, Northern Ireland) has

independently developed its own SM standards (Evans & Halpert, 2009). Today, these standards remain devolved in UK territories. The following section explores the development of nutritional standards in England as all schools recruited to participate in this study are located in this part of the UK.

2.3.1 The development of School Meal Standards in England

As mentioned above, the minimum nutritional standards for SMs were reintroduced in 2001 for schools whose LEAs regained their position as SM providers. Foods were divided into food groups such as meat, fish, bread, fruits or vegetable, of which at least four had to be served daily to pupils receiving meals in the school (Food Standard Agency - FSA), 2007). In 2001 the Food in Schools Programme was launched by the Department of Health (DoH) and the Department of Education (DfE), aiming to help schools to improve the school food system and to create a culture of healthy eating (FSA, 2007). This was followed by the reintroduction of eligibility criteria for FSM for pupils, which led to a higher number of pupils eligible to participate in the FSM scheme (SMRP, 2005). Since 2004, the government undertook multiple initiatives to improve SM provision, such as revising meal standards in both primary and secondary settings (Department for Education and Skills - DfES, 2004), introducing a school food guide website[1] and developing a new 'Food in Schools Toolkit' as an extension of the Food in Schools Programme. These resources became freely available for schools to introduce new practices into the school food systems, leading to an improvement of SM standards (SMRP, 2005).

This was shortly followed by White Report: "*Choosing Health: Making healthy choices easier"*, which initiated plans for improving food and health

[1] (www.foodinschools.org)

in schools (DoH, 2005). These initiatives inspired government bodies to create a vision for all schools in England to achieve healthy school status by 2009, while the Office for Standards in Education (Ofsted) started to consider food and food education as part of the school reviewing processes (Evans & Halpert, 2009). In 2005, the establishment of the SFT brought a new view to the SM provision to fully transform school food and improve the quality of food served in schools. In October 2005, the report "*Turning the Tables: transforming school food*" by SMRP proposed major changes to how SMs are prepared, including restrictions on the amount of fat, salt, and sugar that can be served in schools. Between 2006 to 2009, the recommendations proposed by SMRP and SFT have become compulsory food standards for all schools using private councils or self-food provision services (Evans & Halpert, 2009).

In 2012, the founders of Leon restaurants Henry Dimbleby and John Vincent were asked to re-evaluate the quality of current SM provision services. In 2013 they published the School Food Plan to increase the quality of SMs and introduce new measures to improve nutrition (Dimbleby & Vincent, 2013). The report proposed new food standards that became mandatory for all schools from January 1st, 2015 (DfE, 2014). The schools were advised to visit the School Food Plan website providing a more straightforward explanation of new food regulations and were also advised to follow an official guide of current government SM standards[2] (DfE, 2021). Some of the requirements for meal providers include the daily provision of fruits and vegetables, regular servings of meat or poultry at least three times a week, the availability of healthier drinks, as well a reduction of the amount of salt, fat and sugar in meals.

[2] This guide was updated in 2021 as a response to a global COVID-19 pandemic, however, without major changes in school food provision. Department for Education announced that instead of updating school food standards it is more necessary to ensure that current school food standards are followed in all schools (Long et al., 2021).

Under the 2014 Children and Families Act, new regulations regarding the FSM provision for younger pupils in England were announced (GOV.UK, 2014). The act stated that the government would provide FSM for every child attending Reception, Year 1 and Year 2. The scheme aims to improve the academic attainment of children in low-income families. Moreover, since 2015, the government has also introduced multiple initiatives to support current SM provision for children in England, such as an automatic FSM registration system with an online eligibility checking system and the Digital Economy Bill that allows councils to share their benefits data with schools so that students could be automatically enrolled into SM schemes. Additionally, Holiday Club Programmes were introduced in 2018 (DfE, 2020), followed by additional funding of £9 million for FSM and activities provided for children during holidays and breakfast clubs in disadvantaged areas (DfE, 2020; GOV.UK, 2020). Around the same time, other charity and private organisations, including the Soil Association (SA), received significant funding to support the government's attempt to establish healthier schools (FFL, 2021).

The latest data show that about 1.74 million pupils are eligible to receive FSMs, representing around 20.8% of pupils attending state-funded schools. The number of pupils eligible to apply has been steadily increasing in the last couple of years, from 15.4% in 2019 to 17.3% in 2020 (Long et al., 2021). Pupils' eligibility for FSM increased significantly during the COVID-19 pandemic[3] when more than 427 000 pupils became eligible to apply for FSM after the national lockdown in March 2020. Although the rise in the number of pupils claiming FSM is most likely caused by the pandemic, other

[3] Although the school food system has been significantly influenced by the COVID-19 pandemic, this research took place before the pandemic. In this way, this study represents a unique opportunity for future research to explore the changes in the production of FW in schools before and after the pandemic, which could lead to a better understanding of the impact of COVID-19 on school food systems.

factors such as the transitional period for Universal Credit may also have affected the figures (Long et al., 2021). However, Truninger et al., (2015) still compare children's healthy food consumption to a *"tour de force"* rather than a smooth eating habits transformation.

2.3.2 School Food System and Food Eco-Programmes

So far, this section has explored the history of SM provision while describing the development of SM standards and how they impact pupils' health. However, it is also essential to investigate the role that food eco-programmes play in changing school food systems and how they can impact pupils' eating habits. As mentioned before, SM standards have been developed based on research from multiple organisations such as SFT, SA, as well as the WHO, and based on public concerns about pupils worsening health situations connected to pupils' unhealthy eating habits (SMRP, 2005).

According to recent studies, pupils consume significantly more sugar than recommended by school food standards (Murhy et al., 2020). This leads to increased obesity rates among young adolescents and a higher incidence of heart diseases (Johnson et al., 2009) and dental problems (Holmes et al., 2015). Although studies show that hot school meals (HSMs) improve pupil nutritional intake, on average, at least 40% of pupils still prefer home-packed lunches (Jones et al., 2016), which contributes to the increased consumption of sugar, fat, salt and oil (Stevens & Nelson, 2011). This suggests that while the quality of food served in school canteens has increased during recent decades, parents and pupils are either not fully satisfied with school food or do not trust the current school food system.

Improving pupils' eating habits and renewing the trust among pupils, parents, and the school food system has become one of the main priorities of food eco-programmes (Orme et al., 2011). In this way, eco-programmes

with the primary orientation on food play a key role in reconnecting pupils and food while creating a new bond between schools and families. Therefore, the development of new eating habits rather than the establishment of new nutritional recommendations is a more efficient tool for change. Although the establishment of food standards is a good tool that can be used to evaluate food served in the canteens, the standards themselves do not represent an efficient instrument to increase the nutritional intake of pupils and therefore, it seems to need to be accompanied by other activities. Pupils need to be taught why and how it is important to consume nutritious food and get into a routine of eating healthy food (Jones et al., 2016; Orme et al., 2013; Jones et al., 2012). Thus, this thesis explores the impact of food orientated eco-programmes on the transition of pupils eating habits and their impact on FW volume production in school canteens.

2.4 The link between Sustainability, the School Food System and Food Initiatives

As in the rest of Europe, in the UK there is a growing recognition that food quality in schools is an issue of moral responsibility when children's health is endangered by poor diet, irregular mealtimes and meal etiquette (Truninger et al., 2013). Following the reintroduction of the National Nutritional Standards in 2001 and the Jamie Oliver School Dinners television campaign, political interest in school food and the fears about declining physical activity rose and kick-started the so-called "School Food Revolution" (Morgan & Sonino, 2008). Studies show that the introduction of food standards for SMs has had a positive impact on school food provision by reducing fat and sugar intake and increasing fruit and vegetable consumption (Evans & Harper, 2009). Despite the beneficial relationship between healthy foods and pupils' improved attention, academic success or positive public health influences, other aspects of the public plate are still determined by the need to provide low-cost foods. This often leads to

less healthy meals based on mass-catering services in high demand spaces such as prisons, hospitals and schools (Morgan & Sonino, 2008).

From an economic perspective, studies indicate that poor diets and obesity are detrimental to individuals and the economy. Analyses indicate that if the UK population followed the five a day guideline for fruit & vegetable consumption, thousands of deaths could be avoided (Lehnert et al., 2013; Park et al., 2012). Studies have been conducted to estimate the effects of childhood health promotion on lifespan. These studies have provided predictions related to weight-related poor health (Pil et al., 2014; Tran et al., 2014). A study conducted in 2016 (Sonntag et al., 2016) estimated that being overweight or obese during childhood resulted in an average lifetime cost of over 3300 euros per person. A review of interventions designed to promote fruit and vegetable consumption found that these are highly cost-effective, reducing the negative impact of poor health on the economy. The same applies to community-based programs that aim to improve the availability of healthy food and environmental changes (Lehnert et al., 2013).

So far, this section has explored the principles of healthy eating in schools while pointing to the importance of providing healthy meals in school canteens. The next part of this chapter will focus on private and public school food initiatives (programmes) and will also outline how eco-programme founders currently understand FW issues.

2.4.1 School Food Initiatives

As described in the previous section, the importance of children's health and diets has been acknowledged by the public health and education authorities over the last two centuries in the UK. There is also evidence that eating well can help to improve educational achievements (Jones et al., 2016; Orme et al., 2011; Tran et al., 2014). The need for coordinated

policy-making and the development of programmes to improve school children's health and educational attainment has been highlighted by various initiatives. In England, the government has highlighted the link between children's health and academic success. It stated that investing in pupils' physical development could help to lower the risks of mental illness and improve their chances of living a healthy lifestyle which would, in the long term, automatically reduce pressure on healthcare budgets (DoH, 2010).

There is growing interest in how food affects pupils' academic achievements but also their mood, willingness to learn, and overall educational attainments. Studies show that improvements in SMs can be associated with positive effects on learning and concentration (Orem et al., 2012; Jones et al., 2016; 2017; Weitkamp et al., 2013). However, a vast of children do not eat the recommended amount of fruits and vegetables per day. A national survey revealed that only 18% of children between the age of 5-15 years old consume five or more portions of fruits or vegetables a day in England (NS, 2020).

Studies show that practical food education can help promote healthy eating among children (Jones et al., 2012) while helping to develop healthier habits that will be maintained in adulthood (Li &Wang, 2008). Walter and Stacey (2009) found that the promotion and development of cooking skills encourage children to experiment with new foods. Studies also suggest that children who are involved in growing food for their consumption either through the school-farm link (Joshi et al., 2008) or through school and home gardens (Morgan et al., 2010) are likely to eat more fruits and vegetables. It has been found that HSMs improve children's physical and mental health when represent a significantly healthier alternative than packed lunches (Evans et al., 2010; Jones et al., 2016). Efforts targeting the school food system have the potential to reach large, diverse

populations. This has been identified as an area to develop effective public health strategies (Jones et al., 2017).

Several eco-programmes and other government initiatives were established to respond to increasing concerns about the health of school children and the rise in pupils' obesity rates (National Statistics - NS, 2013; Government Office for Science, 2007). A study revealed that children consume too much sugar, salt and saturated fat while also failing to eat enough fresh fruits and vegetables (DoH & FSA, 2010). This is the case when a healthier diet high in fruits and vegetables would help lower the risk of many chronic diseases such as high blood pressure and heart disease (Fung et al., 2008; WCRF & AIfCR, 2007). Defra (2013, p.22) argues that:

> *"Sustainable food procurement isn't just about better nutrition. It is also about where the food comes from, how it is produced and transported, and where it ends up. Food procurement is also concerned with about food quality, safety and choice. Most of all, it is about defining the best value in its broadest sense".*

Schools are increasingly adopting approaches that combine environmental and social issues. National and international incentives such as Eco-Schools in the UK and the USA, Green Schools in most EU countries or the Australian Sustainable Food Initiative have been developed to reconnect young people to the natural environment (Weitkamp et al., 2013). These programmes help develop children's capacity to make informed decisions and contribute to the world's SD (UNESCO, 2012). However, only a few of these initiatives have been developed based on a whole school or multi-component approach that attempts to impact the multiple challenges connected to sustainability and SD in schools. One of these programmes is the Food for Life Partnership (FfLP).

2.4.2 Food for Life Partnership

The Food for Life Partnership (FfLP) is a project of the Soil Association (SA) and other partners such as the Focus on Food Campaign, Garden Organic and Health Education Trust, aiming to improve the quality of school food provision in England by removing the barriers to healthy eating. The initiative aims to address the issue of climate change and the impact of food production on communities and individuals. It was developed to help people reclaim control over how food production practices impact their lives (FfL, 2018). Food for Life (FFL) is a social enterprise that aims to promote a healthy and sustainable food culture. It has evolved into a range of activities that can be carried out in various settings, such as schools, hospitals, and care homes (Jones et al., 2016).

Since 2007, the FFL scheme became a leading movement in England for promoting greater access to nutritious and more sustainable food for young people and adolescents. Due to the increasing popularity of the FfLP and its positive influence on the food culture in schools, programme leaders developed various branches of FFL through collaboration with local authorities. This resulted in further collaboration with multiple private and state caterers, children's centres, hospitals, universities, nursing homes, workplaces and more (FFL, 2021). However, in this study, I will be focusing predominantly on the changes in schools influenced by the partnership and their impact on food provision, eating practices and most importantly, FW.

The mission of FfLP is to give communities access to healthy and organic food by equipping young people with the skills to cook and grow their own food (FfLP, 2020). The FfLP aims to improve the quality of school food by supporting schools and their local food networks. It also encourages pupils to become more sustainable cooks. The concept of the FfLP emerged from growing public concern that society is becoming detached from the process of producing and eating food. The programme, therefore, encourages

communities to get involved and make food a priority in their lives. Morgan (2020, p.229) describes FfLP as:

> *"…one of the boldest and most ambitious food system reform programmes in Europe, a programme that began as a school food reform scheme that was predicated on concerted action on the part of municipalities, civil society intermediaries and local communities".*

Between 2007-2010, the first 180 Flagship schools with high enthusiasm to improve their school food cultures and impact their wider communities were selected to participate in the programme. Participating schools agreed to commit to transforming their current food system through the introduction of fresh, organic and local products, finding ways to reconnect pupils with their food, and impacting broader communities and families (Orme et al., 2011). The flagship schools received funding (about £1500) to help them to transform school food culture while planning trips, events or buying equipment (Jones et al., 2012).

Over the years, the FfLP has developed a network of partnerships with schools, communities and food producers working together to transform food culture and create a better food environment for young people. Due to the high popularity of the programme and its positive impact on pupils, teachers and communities, more than 3600 primary, secondary and special schools were participating in the programme by 2012 (Jones et al., 2012). However, due to limited funding, participation in the programme is no longer free for the schools, which has led to a decrease in participation, with only 1321 primary and secondary schools in the UK today (FFL, 2021).

Before further evaluation of the impacts of FFLP on the schools in the UK, it is important to describe the differences between primary schools,

academies and secondary schools[4] and present them in the UK context. The children between 5 and 16-years old living in the UK are entitled to a free place at state school. In general, this period is divided into four key stages:

- Key Stage 1: 5-7 years old (primary education)
- Key Stage 2: 7-11 years old (primary education)
- Key Stage 3: 11-14 years old (secondary education)
- Key Stage 4: 14-16 years old (secondary education)

From the educational perspective, primary schools and academies are identical. They cover key stages 1 and 2 and both require pupils to complete national tests in English (reading and grammar), Maths and Science (GOV.UK., 2022). However, the main difference between primary schools and academies is that academies receive funding directly from the government while primary schools are funded by the local authority (GOV.UK., 2022). In that way, academies have in general more freedom in how they spend their funding or how they follow the national educational plan. Some primary schools are forced to become academies because of inadequate results from Ofsted evaluations (GOV.UK, 2022).

The secondary schools cover key stages 3 and 4. Although some schools might be called High Schools, there is no difference in funding[5], curriculum or final examinations.

[4] These are the types of recruited schools

[5] All schools providing secondary education are governed by local school districts, in this study Kirklees Council

2.4.2.1 Whole School approach

FfLP adopts a whole-school approach which has been developed in connection with the National Healthy Schools programme scheme. The whole-school approach is based on the development of measurable outcomes, including changes in school education, leadership and management, and the impact of the changes on wider communities, local and national policy development, and the parent-school partnership (Orme et al., 2011). This approach is a vital component of the programme, which aims to develop an environment that supports learning and promotes healthy living. Research shows that the programmes are more effective when the subjects are actively involved in the process of change. A whole-school approach is a way to improve the preparation and procurement of SMs. It also includes an emphasis on experiential food education (Orme et al., 2013). Although it is too complex to evaluate the value of participant involvement, evidence indicates that multicomponent programmes focusing on nutritional health have a more significant impact on changes in food habits than self-reported food diaries with recommendations (de Sa & Lock, 2008; van Cauwenberghe et al., 2010; Jones et al., 2016; Orme et al., 2012).

A whole-school approach aims to develop and implement relevant actions for the school and the local community. It is envisioned that schools will play a vital role in helping young people develop lifelong eating habits (Orme et al., 2011). To track the impact of the whole school approach, FfLP is based on a three-level award scheme (Gold, Silver, Bronze) which helps to track schools' changes on multiple levels, including *"1) food leadership, 2) food quality & provenance, 3) food education 4) food culture & community involvement"* (Orme at al., 2011, p.27). These provide a checklist for schools to achieve environmental status while motivating pupils and school leaders to achieve prestigious awards. Moreover, SA has developed a range of schemes, of which the most popular is Food for Life

Catering Mark (FFLCM) designed to help school caterers make the most of the fresh, local and organic ingredients used during HSMs.

2.4.2.2 School Transitions towards Sustainability

The schools involved in FfLP work closely with a School Food Policy and FFL leader to explore possible changes that the school can start implementing into its school food practices while exploring what the school already does around food. This involves carrying out fact-finding exercises and consultations with key staff members and pupils to collect data about the school's food culture. Integrating new practices into pupil school routines starts with the implementation of a School Nutrition Action Group (SNAG). A SNAG is a school-based alliance working towards the improvement of the SMs service. It coordinates the work of pupils, school staff, local education professionals and the community to improve the SM service. The content of SNAG meetings is not directed by the FFL officer but instead based on the school's particular needs. However, FFL officers later join these meetings to ensure the school reaches its full potential in transforming food culture not only in the school but also in pupils' homes and the wider community. The main aim of the SNAG is to enable pupils to have a voice in the decisions around school food policy and involve them in various activities such as gardening, cooking, tasting and more. The meetings provide tools to help break down the barriers between school food service personnel, pupils, and the school management. They can also help to improve food education and nutritional intake (Orme et al., 2013). Studies found that the food practices pupils agreed to complete provided them with transferable skills in terms of planning and decision making. This included the development of effective communication and research skills (Lyons and Freedman, 2002).

The increasing interest in sustainable food procurement in public institutions has raised awareness of the various impacts of food purchasing policies. This is also evidenced by the growing number of schools exploring how food sourcing can be used to promote positive aspects of food. Therefore, the second stage of the school's adaptation to the principles of the FfLP starts with changes in food provision. The programme's goal is to promote the sourcing of sustainable, fresh, and local food through the FFLCM. FFLCM is based on independent caterers' audits providing schools and other catering organisations with accreditation. The FFLCM works on the principle of recurring standards inspections to keep the mark apprised of what is happening in the schools. Therefore, caterers are required not only to achieve bronze, silver or gold catering awards (more below) but also must stay prepared for random recurring inspections to keep the award appraised (Jones et al., 2016). This helps to sustain the quality of meal provision in participating institutions while keeping caterers motivated to maintain requirements and keep improving food quality. It is the responsibility of the caterer to meet the various requirements at each award level regarding food quality (Soil Association (SA), 2017):

Criteria for Bronze award:

- 75% of meals must be freshly prepared from unprocessed ingredients
- Using seasonal menus
- Meat must be supplied from farms satisfying UK animal welfare standards
- Eggs must be supplied by farms applying a cage-free hens policy
- Fish are served from the list approved by the Marine Conservation Society
- No GMOs or artificial trans fats are served
- Free drinking water available around the school premises
- Information about food provenance is available on display
- Menus should meet all dietary and cultural needs

- Demonstrable support of catering team during the healthy food transition

Criteria for Silver award:

- Meet all criteria for the Bronze award
- Use a minimum of 5% organic ingredients in menus
- Sourcing environmentally friendly, ethical food
- Creating school's own techniques to make healthy eating easier

Criteria for Gold award:

- Meet all criteria for the Silver award
- Use a minimum of 15% organic and 5% free-range ingredients in menus
- Preference of local food producers for food sourcing

The third element of school transition requires understanding the importance of healthy food by catering staff while focusing on their crucial role in the SM provision system. The rise in interest in SMs has been greatly influenced by the launch of the FfLP in 2003 and Jamie Oliver's Feed Me Better campaign. This combination of initiatives has resulted in dramatic changes to Government school food policy, including establishing the SFT and adjusting the school's nutritional standards discussed before (Orme et al., 2011). In addition, The Focus on Food Campaign was established to address declining cooking skills in the population. The Focus on Food Campaign aims to raise awareness about the importance of food education and securing food status in schools while improving the cooking skills of people already experiencing food-related health problems.

Based on this work, FFL leaders needed to ensure positive long-term effects and focus not only on improving catering services and food provision but also on building an understanding of healthy food among cooks. To achieve this, the school catering teams were engaged in various training activities

to develop their confidence and cooking skills while cooking sessions were established for pupils. The aim of this part of the FfLP is:

- To build knowledge of healthy meals and food nutrition
- To improve caterers cooking skills while working with new ingredients
- To teach pupils how to prepare their own meal while understanding 'farm to fork' food processes
- To improve understanding of the difference between local and organic vs global, non-organic food procurement methods
- To support caterers to feel included in school decision-making processes
- To help pupils and caterers become more engaged in the programme
- To create a network among cooks leading to mutual support, horizontal information flows and exchanging ideas.

The other parts of school transformations in changing their current food culture are connected to multiple areas based on the whole-school approach the FfLP adopts, including gardening, establishing school-farm connections, parent engagement, and more. These interventions aim to enhance pupils' connection to the food and food production system. Jones et al. (2012), in their review of how school garden establishments and growing activities influence pupils, conclude that the FfLP significantly contributed to increasing schools' ability to undertake food-growing activities either through school-farm connection or schools' private garden establishments. Staff reported that involvement in the programme helped to build an ethos of sustainability in participating schools, while the integration of garden and farm-based activities into the curriculum helped to promote a more inclusive and diverse school community Weitkamp et al., (2013).

2.4.2.3 The Impact of Food for Life Partnership in Schools

The FfLP has identified a set of core values that can be combined and used to create a strategic approach driving systemic change. Through a variety of routes, the programme aims to deliver change based on its unique advantages. There is also a growing body of evidence that the FfLP can have long-term impacts in schools when schools decide to perform the practices implemented by the programme leaders. The results of the programme are described in the paragraphs below.

FfLP has expanded in two main phases. Between 2007 – 2011, the FfLP focused mainly on schools while ensuring more sustainable food provision for pupils and re-creating their relationship to food. In phase 2, the school stayed at the centre of the FfLP framework. However, programme leaders started to operate with other organisations such as care homes, nurseries or hospitals to remodel food provision in English councils and extend the whole setting approach of change to a broader population.

In total, 5208 schools were enrolled in FfLP by 2016, of which 1087 achieved either Bronze, Silver or Gold awards (Jones et al., 2016). Today, 335 schools hold a Bronze award, 81 Silver, while only 29 still hold Gold Food for Life School awards (FFL, 2021). The numbers of schools actively participating in the FfLP have dramatically decreased since 2016, which could be connected to the limited funding allocated compared to previous years. However, this thesis shows that the programme results among participating schools achieved in the past and nowadays are identical (see chapter Lincoln School). Therefore, the studies conducted during the period of the programme's high funding allocation remain relevant today.

One of the biggest successes observed in most schools participating in FfLP is that HSM take up increased significantly in schools enrolled in the FFL scheme. The schools enrolled in FfLP recorded higher HSM take-ups

contributing to pupils' high fruits and vegetable consumption. When adjusting these results for pupils' gender, their eligibility to FSM and differences between local councils, the study shows that pupils are 40% more likely to enjoy meals in schools enrolled in FfLP while having a more positive attitude to SM provision in general (Jones et al., 2016). This shows that serving better quality food in alignment with FFLCM not only increases pupils' fruits and vegetable consumption but improves their attitudes towards school food provision as well. Studies also found that FfLP stays relevant to schools that decide to follow the programme's framework, while the principles of food education have become fully embedded in students' lives and the principles of the schools. The case studies also highlight that schools that have fully embraced the principles of the programme are no longer looking for continuous support from FFL. This is not to suggest that schools are not still facing challenges in terms of school food provision but rather that they know how to overcome them now because of the previous help from the programme leaders (Jones et al., 2016; Orme et al., 2012).

A report by Jones et al. (2016) shows that pupils in schools participating in FfLP consume on average 30% more fruits and vegetables while the probability of consuming five or more portions of fruits/vegetables a day increased by 60% in comparison to schools not enrolled in the programme. However, the differences in pupils' fruits and vegetable intake across the different award levels (bronze, silver gold) were significant even within the enrolled schools. On average, pupils in golf award schools were two times less likely to consume five or more portions of fruits and vegetables per day than their bronze counterparts.

Data from parents indicate that a high level of food awareness was maintained in their homes where the children have been involved in FfLP activities. Research shows that school participation in FfLP resulted in further discussions about food between children and parents. Family discussions about food had a significant impact on many families, leading

to various changes in pupils' eating habits. For example, some children wanted to improve their cooking and grocery-shopping skills with other family members (Salmon et al., 2013). Indeed, this shows that the FfLP improved relationships to food in home settings by providing families with opportunities to discuss food and its connection to health. However, some parents were worried about how the programme would affect their financial situation. This highlights the need for programmes that can be flexible and adaptable to meet the needs of different families. Although research shows that parents did believe that the well-being of their children and achievement of educational goals was linked to food-based activities (Salmon et al., 2013), it also warns that schools should improve their communication strategies to develop a two-way dialogue and reinforce positive messages with a focus on both parents and their children (Story et al., 2000).

Both parents and teachers have observed changes in pupils' behaviour. While parents mentioned the positive impact of FfLP through pupil connections with healthy foods, teachers noticed an increased readiness to learn and improvements in pupils' well-being. Aside from teachers and school personnel, other interviewees included staff members from food producers and suppliers and those working in the voluntary sector. Most of them talked about the positive effects of the FfLP in helping pupils and themselves to understand the bigger picture for the school food system while understanding the positive impact of sustainable food procurement in schools on the economy, society and environment (Jones et al., 2016).

2.4.2.4 Social Return of Food for Life Investments

Jones et al. (2016) conducted a study investigating the return of the investments into FFL in 83 primary schools enrolled in the programme in Kirklees and Calderdale Councils. The FfLP impacted 60 000 children, 2500

teaching staff and at least 1000 catering staff in this area between 2012 and 2016. The study explored the impact of the programme for the three years from both social and economic perspectives. Below are some of the benefits that participation in the FfLP brought to schools and local communities:

- The stability of large contracts with local caterers allowed local suppliers to retain and gain new sales. This benefit has a positive effect on local job creation and sales of goods to the public.
- The FFLCM provided school catering services with increased business security, better staff performance, and the capacity to develop and implement sustainable food procurement.
- FFL's support for the working practices of school and catering staff was acknowledged as an essential factor in maintaining a healthy and productive learning environment. This was demonstrated by the variety of ways in which it supported these individuals and their employers.
- Improved dietary health has been associated with lower healthcare use leading to cutting NHS expenses. In Kirklees and Calderdale, evidence has shown that children involved in the FfLP are more likely to eat a large portion of fruit and vegetables.
- Through FFL, schools can connect with their communities and provide children with the knowledge and skills to succeed academically and develop healthy habits. The programme also helps parents and carers develop healthy relationships with their children.

Total financial investment into the schools in both councils was £395 697 while the total return value of the investment was calculated to be £1 743 046 representing the total return of £4.41 for every £1 of investment (Jones et al., 2016). Similar results were recorded by Lancaster and Durie (2008) that examined the impact of FfLP on 43 primary schools in 26 authorities in Scotland. The results show that for every 1£ invested, the FfLP scheme

provided £6 worth of economic, environmental and social benefits. Most of these benefits were linked to contracts with local food suppliers or the reduction in the need for food transportation. The study also accounted for the positive impact of long-term dietary changes that could affect the participants' health. However, Morgan (2020, p.241) argues that: *"the key to low cost in providing a school meals service is not to reduce the food costs but to increase sales and thus spread staff and other overheads further*". In this way, increased HSM intakes in schools do not have only a positive impact on pupils' health (Evans & Harper, 2009) but improve economic stability for meal providers as well.

FfLP is considered one of the most inspiring experiments transforming communities through the way it addresses environmental, economic and social challenges through sustainable food (Morgan, 2015). Like other civil society initiatives, programmes that seek to improve the lives of ordinary people are relatively niche. They have mainly focussed on achieving change in select locations or organisations rather than enforcing systematic national change like FfLP (Marsden & Morley, 2014). The latest expansion and diversification of FFL's operations can be seen as attempts to scale up and out. This is achieved by replicating the programme in new contexts and adapting it to the conditions in each location to increase its impact and achieve an aggregated national shift towards sustainability (Jones et al., 2016).

It is important to add here that the FfLP is viewed in this thesis as a key school eco-programme mainly because of its whole-school approach. Hence, it influences multiple areas in school systems on which other programmes focus individually (see Table 1). For example, while FfLP improves the canteen atmosphere generally, the School Health UK programme focuses primarily on enhancing pupils' experiences during lunchtime. Another example includes programmes that focus on healthy eating, inclusion, food systems, climate change, or communities such as

Healthy Schools, Green Schools, Eco-Schools, which use broadly the same principles as included in FfLP. Therefore, instead of investigating the impact of multiple eco-programmes on school food practices individually, I have selected FfLP, which share common themes. Moreover, the impact of FfLP on pupils' eating practices has already been widely investigated, which will help with a more in-depth evaluation of the impact the programme has on food waste (FW).

Table 1:Themes of the Eco-Programmes Influence

	FFLP	Eco-School	Green Schools	Healthy Schools	School Health UK
Climate change	✓	✓	✓	✓	
Recycling (Zero-carbon) / Waste reduction	✓	✓	✓		
Healthy food consumption	✓			✓	✓
Food Education	✓				
Supporting biodiversity	✓	✓			
Green Energy	✓	✓			
Community involvement	✓	✓	✓		
Improving School Environment	✓	✓	✓	✓	
Reducing water consumption	✓	✓		✓	
Improved Lunchtime	✓				✓

2.5 Food Waste in School Canteens

So far, this chapter has explored the global issue of FW production, the impact of political agendas on SM provision, the need to serve healthier food to children, and the necessity to reconnect pupils with food as part of the current school food systems. Although it is clear now why FW production needs to be reduced, this section explores why reducing the volume of FW in school canteens is essential and how the founders of eco-programmes have overlooked the FW issue in school canteens in the past. In short, this part of the chapter connects all the previous sections to introduce the main aim of this study and position it within the current literature.

Many studies have been conducted in the areas of waste reduction and food quality in public canteens to examine various measurement methods and their effectiveness and precision (Hanks et al., 2014; Biltoft – Jensen et al., 2017). While some studies focus on establishing new methods for measuring FW and exploring how and why the FW is produced within the public food procurement system (Boschini et al., 2018; Boschini et al., 2020; Eriksson et al., 2018;) others explore what wasted food is made up of and the health risks implied by the loss of nutritional benefits inherent to wasting (Costello et al., 2015; Eriksson et al., 2017; WRAP, 2011). Garcia-Herrero et al. (2019) examine the economic and environmental impact of the FW produced in school canteens. They found that an average pupil in primary school in Italy wastes about 136g of food per day during lunch, representing about 20-29% of the food served to him. The results are similar for pupils living in China, where the average plate waste per pupil per meal is 130g (Wang, 2002) and slightly lower for Swedish pupils (79g) connected to smaller portion sizes served to pupils in Sweden (Eriksson et al., 2017).

There is only a limited number of studies in the UK that quantitatively measure FW production in school canteens. The last national measurement by WRAP, conducted in 2011, was based on 30 primaries and 9 secondary schools, and it found that the average primary school pupil wastes about 72g of food per day. The authors estimate that about 36% of the daily waste from pupils comes from the canteen during the meals, which means that according to WRAP, an average English pupil only wastes approximately 26g of food at lunchtime. This seems to be a highly inaccurate estimation compared to other European countries and the results found in this thesis. However, the report still suggests that UK primary schools dispose of at least 80 000 tons of food each academic year (WRAP, 2011). This demonstrates the need for more quantitative FW measurement studies in UK schools that could help national and local leaders understand the current situation regarding FW production in UK schools and take action to tackle this issue.

2.5.1 Eco-Programmes and Food Waste

The evaluation of FfLP as one of the most researched and well-funded eco-programmes with the food at its foundations showed that the priority of current eco-programme founders is healthy food while the FW production in schools is underestimated. However, the literature shows that as well as healthy eating, the reduction of FW in schools can contribute to improving pupils' health in the long term by reducing greenhouse gasses emissions, slowing climate change while saving financial resources to provide better quality food for pupils at the same time (Garcia-Herrero, 2019).

Only a limited number of studies explore the effect of the eco- programmes on environmental factors such as food wastage or transportation in quantitative terms. Research often focuses on the economic value of programmes connected to biodiversity and their benefits for agricultural methods like organic farming (Jones et al., 2016). Several research articles

and programme evaluation reports exploring the impact of FFL fail to address changes in FW production among the participating schools (see Weithkamp et al., 2013; Jones et al., 2017; Orme et al., 2012 and more). The only mention of schools' FW evaluation can be found in Orme et al. (2011) report. The report describes the results of a short survey conducted in 62 kitchens, of which 30 had previously implemented some FW measurements. Table 2 represents the central themes cooks mentioned at the review stage.

Table 2: FW emerging from interviews with schools participating in FFL

Not Much Waste Observed	25%
Compost / Animal Feed	21%
Use Band system (or equivalent	9%
Altered Portion Sizes	8%
Encourage Pupils to Finish	6%

Orme et al., 2011 add that given the other elements of the FfLP and its impact on the development of a food ethos in different schools, the programme appears to have a significantly positive impact on reducing FW. However, this statement is not supported by quantifiable data but rather is based on staff observations that were found not to be an effective measurement instrument in this and other studies (see, e.g. Derqui et al., 2018). The FfLP indeed helps schools reduce their environmental footprint by establishing farm links (animal feed) and implementing composting practices (Jones et al., 2016). However, it is essential to add that these practices do not necessarily reduce the volume of FW produced in schools but rather reduce the environmental impact of FW, which is not the same. Jones et al. (2017, p.12) therefore state that:

> *"It would have been desirable to undertake further dietary assessment through, for example, school mealtime observations and analysis of food plate waste however, this would have involved a considerably more intensive programme of research that was beyond the resources available to the team."*

This study aims to fill this gap by exploring the issue of FW production in schools that are actively engaged in programmes based on a whole school setting approach such as FfLP. This will help clarify the quantifiable impact of the eco-programmes on reducing the FW volume produced in schools. Although the impact of these programmes on the production of FW is essentially the main aim of this study, I have decided to use a holistic approach and explore other significant factors found in the literature, including staff involvement in the food system (Derqui & Fermandez, 2017), pupils' meal satisfaction rate (Orme et al., 2011) and environmental awareness (Jones et al., 2016). To do this, schools with different levels of environmental involvement have been recruited to compare differences between their school food systems while evaluating the quality of food served, eating practices in the canteen and the volume of FW produced.

2.6 Summary

This chapter has briefly explored the position of FW in the current literature and its connection to global food systems. The development of industrial food systems since the beginning of the 19th century and the impact of the technological revolution on the food production practices was examined in connection to FW practices in production (farmers) and consumption (consumer) levels. This chapter intended to re-associate the concepts of overproduction and consumerism with ineffective food system practices leading to global issues with FW. The issue of overproduction as part of current supermarket practices towards farmers contributes significantly to FW production globally (Feedback, 2017, 2018). Meanwhile, excessive

consumption in first world countries has become the norm, leading to FW worth billions of pounds every year (WRAP, 2013) as well as the significant environmental damage that is closely associated with climate change (Bloom, 2010).

This chapter points to social, economic, and environmental changes through the impact of industrialisation, intensive farming techniques, and globalisation while connecting them to the issue of overproduction and consumerism. It is shown here how profit takes precedence over responsible use of finite natural resources resulting in environmental disasters. In this way, the ideas of overproduction and consumerism and waste are closely linked through the current food system.

The second part of this chapter explored the issues connected to FW in schools through the history of school food standards and governmental influence on SM provision. This paper discusses the negative influence of Thatcherism on the quality of meals served in school canteens (Simons, 1991) through the public realisation of the importance of healthy meal provision for pupils and the latest spikes in the obesity rate (Evans & Halpert, 2009). Although conditions to provide healthy meals for children in the UK have dramatically improved since the introduction of government initiatives (SMRP, 2005) and eco-programmes such as FfLP (Jones et al., 2016), the issue of school FW has not been addressed. This chapter shows that pupils attending schools involved in food orientated eco-programmes have improved their eating habits in schools and increased their vegetable and fruit intakes. However, how these practices influence the production of FW has not been investigated in the literature yet.

Chapter 3: Theoretical and Conceptual Framework

In this chapter, a conceptual framework is proposed based on an understanding of existing theories from sociology (Ortner, 1984), psychology (Thomson & Barton, 1994) and sustainability (Tisdell, 1999). In this thesis, the phenomena of Food Waste (FW) is explored through a detailed understanding of factors influencing both pupils' habits and the school system. However, one single theory is not capable of capturing the complexity of this topic in its entirety. The data collected in this study is analysed and evaluated using Practice Theory (PT), the concepts of Sustainable Development (SD) and Environmental Awareness (EA) based on Shove's (2010) definition of behavioural ABC (Attitude, Behaviour, Change) framework.

These concepts are used to expand upon the limited understanding of FW in schools in the UK. PT is introduced to establish a basic understanding of society and individuals while exploring the connection between FW and eating practices. The concept of EA is used to explore the impact of levels of EA among pupils and staff on the volume of FW produced during the school lunch. The use of the SD model relates to school engagement with various pro-environmental activities since they will impact school practices to achieve Sustainable Development Goals (SDGs). Combining the theoretical insights that emerge from these concepts creates a suitable framework for investigating and understanding the complex factors affecting school waste production.

3.1 Practice Theory

During the last few decades, theories of practice have been of interest to social theorists, especially after Ortner (1984, p. 158) highlighted the importance of understanding the social world through 'how society and

culture themselves are produced and reproduced through human intention and action'. She names this process practice, action or praxis. Scholars who contributed considerably to the development of PTs belong to one of two central bodies (Postill, 2010). There are first-generation theorists (e.g. Pierre Bordieu; Anthony Giddens, Michael Foucault and Marshall Shalins) who developed the foundations of PT. Second-generation theorists (e.g. Theodore Schatzki, Alan Warde or Andreas Reckwitz) focus on evaluating and examining the foundations of practices and expanding on the foundations provided by the first generation (Postill, 2010). In this chapter, both the foundations and extension of the theoretical development of PT will be examined and established as the theoretical background for understanding the current situation of FW in schools.

Warde (2014) argues that the emergence of PT was influenced by the unsatisfactory response to the fundamental contradiction between society investigated as a system and through structures (holism) or approaches to a society based on individual perceptions about the world and society (individualism). PT addresses individual behaviour without systematic categorization of individual actions into societal wholes. At the same time, practice theories are not based on systematic structural approaches with the system at the centre of understanding the social world (Warde, 2013). Shove et al. (2012) position PT between holism and individualism, which gives scientists infinite chances to apply this approach to various fields. Southerton and Yates (2014) add that PT is well suited to explore the phenomenon of FW because it provides a bridge between structure and agency by positioning practices at the centre of the social world. This centring of practices allows for the direct examination of how routinized practices change.

However, no consistent definition of PT has been established; therefore, the theory is loosely defined, utilized and interpreted by scientists adopting a 'practice approach' (Postill, 2010). Schatzki (2001) describes practices as

the foundations of social order, the social world and society itself. According to Reckwitz (2002, p.249), practices are defined as:

> *"a routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activity, forms of mental activity, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational learning."*

Moreover, Warde (2014, p.286) adds that PT brought a new perspective considering the model of the *"sovereign consumer".* He argues that:

> *"Practice Theory emphasises routine over actions, flow and sequence over discrete acts, dispositions over decisions, and practical consciousness over deliberation while cultural emphasis is placed upon doing over thinking, the material over the symbolic, and embodied practical competence over-expressive virtuosity in the fashioned presentation of self."*

Warde (2005) argues that it is necessary to understand practices in the environment in which they take place. He suggests that practices are comprised of various competencies and capabilities and therefore affect each individual differently. Understanding the individual within each practice's institutional context is necessary to understand how practices affect both individuals and systems fully. Therefore, while Evans (2014) credits the individual with limited autonomy for the successful performance of the practice, Reckwitz (2002) recognises practices as both entities and performances, providing an opportunity to examine the position of 'individual' within PT.

As an entity, practices emerge from individual tendencies to repeat certain practices or aspects of these practices in the same way. These repeated practices later become observable habits or routines. In this study, institutional tendencies have been observed, and many of these have been the same in each of the recruited schools. Some canteen examples include specific timing for lunch start, pupils receiving desert after finishing the main meal, meal providers following government nutritional recommendations, pupils wasting certain types of food more than the others (for example vegetable is wasted more than pasta or pizza), pupils are being served vegetables without consideration for the volume of vegetable wasted and more.

However, Warde (2005) argues that this habitual and routinised nature of practice entities is often disturbed in dynamic environments when individuals like to experiment or improvise and unconsciously create a new configuration of the practice elements. In doing so, practices become performances, "*dynamic by virtue of their own internal logic' that can be reproduced, modified or otherwise changed by practitioners*" (Evans, 2014, p. 18). The way pupils' routines (entities) are being changed and become performances in each of the recruited schools has been influenced by multiple factors. Therefore, school practices differ based on the factors affecting practitioners like seating management, queue management or music in the background. The schools represent a system of practices influencing pupils and changing their eating practices (entities), resulting in pupils eating less or more vegetables, wasting less or more food, or acknowledging or ignoring principles of sustainability.

From a philosophical perspective, Schatzki (2016, p.27,28) positions practices at the centre of the social world both ontologically and epistemologically. Ontologically, he argues that practices are fundamental in nature when viewed as '*lexical commodity[ies]*' "*carried out by indefinite*

number[s] of people" and in this way should be positioned at the centre of social institutions.

3.1.1 Understanding Eating Practice

PT has been used in previous studies of consumption to provide a comprehensive understanding of individual practices in various social contexts (Jones et al., 2016; Evans 2014; Shove 2012). Warde (2013) points out that 'eating' needs to be considered a practice because although it is mainly connected to biological processes (e.g. ingestion), it would be absurd to fully detach it from the social arrangements such as why, how and where the practice is performed. Warde (2013) distinguished between practices that need to be understood within different social contexts. He developed a new theoretical concept of '*compound practice'* built on Schatzki's (1996) categorization of practices.

Schatzki (1996) distinguishes between two main types of practices: *'dispersed practices'* and *'integrative practices'*. While dispersed practices consist of one single practice, integrative practices are described as more complex practices made up of more dispersed practices. To define eating as dispersed practice, eating would have to be understood as a simple digestion process without any connection to cooking, taste preferences or other social influences. A typical example of dispersed practices is, for example, ordering, describing or imagining and although these practices require a certain level of understanding on the part of the agent (how to perform an activity or how to respond to and comprehend information), they do not require a complex understanding of the process while performing the activity. However, eating cannot be fully exploited without reference to the internal and external social conditions influencing eating, including meal occasions, food preparation, or food supply (Shove, 2012). Warde (2013) argues that eating is, therefore, a compound of many simple

dispersed practices such as following rules or understanding the food concepts necessary to perform every eating practice satisfactorily.

Although eating practice has been considered an integrative practice for a long time (Schatzki, 1996), the complexity of eating practices has never been fully captured within their limited definition (Warde, 2013). Typical examples of integrative practices are motoring, cooking or food manufacturing. Although integrative practices are defined as more complex activities built on multiple dispersed practices (following receipts to create a meal), the differences between eating and other integrative practices are hard to dismiss. To consider eating an integrative practice, eating would have to be formalized *'in terms of rules, procedures and standards'* (Southerton and Yates, 2014, p. 134) similarly to motoring, in the sense that drivers must follow street rules and control motor based on road standards and formal regulations. Warde (2013) argues that while it is possible to recognise a good driver, no one knows what it means to eat well. For some, eating well might mean having fresh ingredients or healthier meals, while for others, it is based on price, convenience, or tradition (Shove et al., 2012). As Schatzki's (1996, p.105) primary definition of integrative practices is connected to an individual's *'ability to judge the correctness and acceptability of the practices'*, using codifications exclusively to the setting of the practice to evaluate eating practices would lead to a limited understanding of eating practices.

Warde (2013) developed a new theoretical concept to account for dynamic and interconnected practices that he called *'compound practices'*. Compared with dispersed and integrative practices, compound practices are more complex and should be understood as practices with multiple organisational underpinnings. He explains that it is impossible to talk about compound practices without including other integrative and dispersed practices. Typical examples of compound practices other than eating are working or travelling. Southerton and Yates (2014) add that the key

advantage of considering eating as a compound practice is its capability to connect eating to wasting through the interconnection of practices compounding eating. These practices may be understood as a system as well as individual constitutive elements. They argue that this understanding provides:

> *"an approach which emphasizes the emergent properties of contemporary eating practices and how those properties relate to each other while offering the opportunity to analyse and indicate which integrative practice (or practices) are more or less significant for explaining food waste"* (Southerton & Yates, 2014, p. 143).

Therefore, eating should be understood as an intersection of multiple at least four practices: food supply, cooking, meal occasions and aesthetic judgments (Halkier & Jansen, 2011). Throughout this theses differentiation between dispersed and integrative practices performed in recruited schools is based on the connection to compound eating practice. This means, that dispersed practices are simple practices often connected to food education and learning while integrative practices are more complex activities requiring a basic understanding of specific activity such as queue management[6], canteen storage practices[7], serving food[8] or FW disposal[9].

Shove et al. (2012) create a similar scheme with three main aspects of the compound practices: material, know-how and cultural meaning. Material functions of the daily practices in the school context need to be understood in the form of food supply aligned with the government regulations and

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[6] Pupils need to understand where and how to queue.

[7] Pupils need to understand where and how to store their belongings.

[8] Pupils need to understand what their menu selection is, what ingredients can they request to be taken off, or ask for more food.

[9] Pupils need to understand where and how to dispose of their food or how much food is acceptable to dispose of during lunch.

school budget to create affordable good quality results (meals). The active coordination of cooking activities may represent know-how during food preparation and the necessary skills and experience to prepare healthy and tasty meals for pupils. It may also involve the external activities of staff members involved in the school food system, coordinating the pupils in canteens to achieve FW reduction or FW increases (Engström & Carlsson-Kanyama, 2004). Cultural meaning in a school context may influence the food choices of pupils and, therefore, the selection of food that is served in canteens. Meal occasions do not change in canteens as they are pre-defined in the school setting as a school lunch. However, aesthetic judgments may influence pupil satisfaction, increasing or decreasing the FW volume produced during the daily school lunch (Just & Price, 2013).

In this way, understanding eating practice through compound practices allows me to consider the multiple factors influencing FW volume production in schools. These factors (material, know-how and cultural meaning) are often overlooked, and therefore studies of FW often fail to explore how FW practices emerge in specific social settings. Instead, they often focus on factors affecting FW production (see Boschini et al., 2020, Derqui et al., 2018; WRAP, 2011; Just & Price, 2013 and more). On the other hand, by using a holistic approach and a more complex theoretical understanding of eating practices, this study aims to explore how FW emerges in school canteens while pointing to the practices that need to be adjusted to improve schools' overall environmental footprint by reducing FW volume produced in the canteens. The next part of this chapter explores how the concept of EA and other behavioural theories might fit in the context of pupils' eating practice performances.

3.2 The concept of Environmental Awareness

Environmental Awareness (EA) has become an area of interest in multiple disciplines, including sociology, psychology, and environmental studies

(see Newhouse, 1990; Thomson & Barton, 1994; Kaiser et al., 1999). Attempts to increase the general EA of people have become a goal for both scientists and political campaigns (Ham et al., 2015). The importance of understanding people's behaviour that affects the environment has become a major issue for the investigation of individual actions (practices). The concept of EA has been fundamentally based on other behavioural theories such as Social Cognitive Theory (Locke, 1987), Theory of Planned Behaviour (Ajzen, 1991) and models like the COM-B model (Michie et al., 2011), The Social-Ecological Model (Bronfenbrenner, 1989) or The Health Belief Model (Rosenstock, 1974).

Based on these theories, Shove (2010) developed a framework called ABC, where A stands for Attitudes, B- behaviour and C-choice. Like many others, EA is based on a linear conceptualisation of behavioural influence in which an individual's knowledge and attitudes significantly impact the choice about how to behave (Michail et al., 2006). In this thesis, both EA and ABC frameworks are used interchangeably to refer to the same basic concepts. However, there is some divergence in how they are used. EA is mainly used to explore how the level of EA in schools affects the volume of FW produced, and the ABC framework is used to explore the overall environmental strategies adopted by schools and their views of the food system. The following paragraphs focus on the main principles of behavioural theories and subsequently explore the utility of behavioural principles for understanding pupils' food-wasting practices.

There have been many attempts to create a definition of the term EA in the literature, however, the complexity of the term seems to be difficult to capture fully, and therefore various terms are used to describe similar or related phenomena, e.g. environmental consciousness, environmental concern (Ham at al, 2015, p.160) or environmental literacy (Ozsoy et al., 2012). Culiberg and Rojsek (2008) explain the concept of EA in terms of individual attitudes. They defined EA as particular behavioural inclinations

towards environmental issues. This means that personal beliefs and attitudes have a significant influence on pro-environmental activities (Michail et al., 2006). This concept results in a linear model of environmental responsibility in which *"knowledge influences attitudes and attitudes influence behaviour"* (Ham et al., 2015, p.163). While some proclaim that environmental knowledge and attitudes play a significant role in generating environmental actions (Newhouse, 1990), others argue that the influence of environmental attitudes on pro-environmental behaviour is limited. Credit for these behaviours should be given to other factors like convenience or comfort (Bratt, 1999).

Ham et al. (2015) differentiate between environmentally aware and environmentally responsible individuals as potentially distinct groups. They argue that environmental responsibility starts with the implementation of environmental principles into an individual's daily practices. Examples of such practices are recycling, growing your food or investing in more sustainable technologies. The concept of environmental responsibility represents a change within behavioural theories, including instances in which individual practices impact behaviour. On the other hand, environmentally aware individuals who do not engage in pro-environmental activities display their anthropocentric views where individual comfort is placed at the centre of their decision-making processes. It reinforces the importance of taking factors like convenience or comfort into account when promoting sustainability for these individuals (Thomson & Barton, 1994).

In this study, the term EA is used to describe a conceptualisation of individual understandings of sustainability principles and attitudes towards the environment. The study investigates if or how these understandings affect the implementation of pro-environmental activities in schools. The level of pupils' EA is explored through the deployment of Environmental Awareness Tests (EATs). Many EATs have been conducted in past studies to examine the impact of environmental knowledge and environmental

attitudes (Ham et al., 2015) on environmental behaviour (Thomson & Barton, 1994). However, in this study, EATs assess pupils' environmental knowledge and attitudes together with their environmental intentions towards the food consumption in the school canteen. In this way, EATs examine differences between how individuals think they behave and the reality of practices as performances in the school canteens.

Although the main aim of the ABC framework in the literature is to understand and predict the behavioural patterns of individuals (Kaiser et al., 1999), Ham et al. (2015) point to the theoretical limitations of behavioural approaches. Shove (2010, p 1280) argues that ABC fails to explain why people with high environmental knowledge and positive attitudes towards the environment often do not behave environmentally responsible. She argues that:

> *"ABC is not just a theory of social change; it is also a template for intervention which locates citizens as consumers and decision-makers and which positions governments and other institutions as enablers whose role is to induce people to make pro-environmental decisions for themselves and deter them from opting for other, less desired, courses of action"*

Evans et al. (2012) contribute to this criticism by noting how behavioural theories fail to account for changes in human behavioural patterns, making them unsuitable for understanding a dynamic social world. Shove (2010, p 1280) adds that by shifting responsibility for the environment to individuals that she calls *"CO2 addicts"* policy makers reduce the ability of institutions to implement change and, in this way, undermine the achievement of Sustainable Development Goals (SDGs).

However, it is important to add that Shove's (2010) criticism of behavioural theories does not consider other aspects of understanding behaviour that

these theories can contribute with. In general, behavioural theories consider material and social context, cognitive dissonance or value action gap and try to find ways to solve these problems. Whitmarsh et al. (2011, p.259) expressed their frustration with Shove's (2010) ABC model by pointing to her simplistic evaluation of behaviour theories. And while the theoretical structure of behavioural theories follows the linear model of knowledge and attitudes' significant impact on behaviour, behavioural scientists acknowledge the significance of contextual cues and their influence on individual behaviour. Moreover, Whitmarsh et al. (2011) add that individual cannot be fully detached from *"societal decision making and participation enacting change".* They add that often in the studies using mixed methods research design, using multiple theoretical views could provide a more comprehensive picture of the topic of investigation.

In this way, behavioural theories, as well as theories of practice, are relevant to this research as many contrasting results have been found concerning schools' environmental practices (see chapters 5,6,7). And while PT refers to these paradoxes as policy influenced practices when not trying to generalise or understand human behaviour as a system (Evans, 2014), understanding human actions exclusively through the framework of PT limits us in understanding why and how people's attitudes, knowledge and intentions evolved in a particular environment. Whitmarsh et al. (2011) describe an example of investigating the causes of obesity that can be better understood through individual behavioural and psychological orientation (choice and attitudes) rather than through investigation of obesogenic environments through practices. Therefore, it is important to be able to explore data from both practice and behavioural perspectives to understand all impacts on practice performances.

In this study, the ABC framework is not only used as a template to understand the views of the school on the school food system but also helps with conceptualising certain practices performed in the school environment.

Understanding practice and behavioural theories is crucial to comprehend why certain practices emerge and why certain school food policies are being developed. In this study, the EA is not used to investigate the general level of participants' environmental literacy, which is commonly found in the literature. Instead, it is utilised to investigate the impact of EA on one variable, food waste (FW), in the recruited institutions. In this case, the limitation posed by poor understandings and limited conceptualisations of EA does not apply to this study because of the narrow focus on the FW issue in schools adopted here.

3.2.1 Understanding the connection between EA and practices in Food Waste Studies

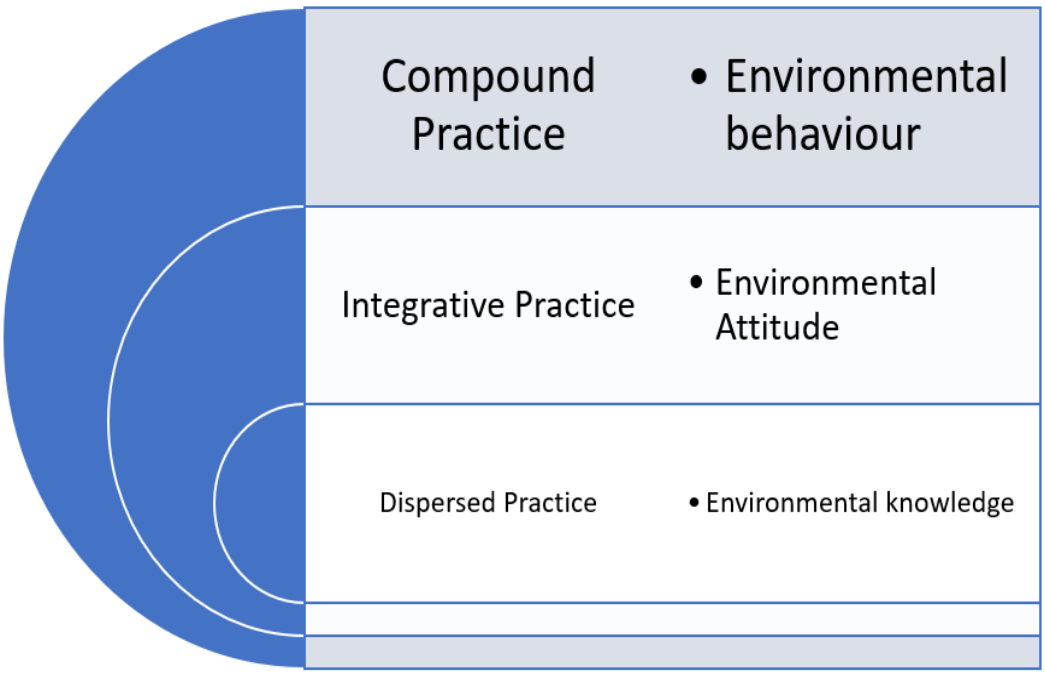
For the purpose of this study, eating practices in schools are explored and analysed as a compound of subsequent activities (Warde, 2013). This study aims to bring together both theoretical frameworks: compound practices and environmental behaviour (see Figure 2) while focusing on the overarching theme of the thesis – Sustainable Development (SD). The main aim of connecting these seemingly contrasting concepts is to create a framework practice scientists could use while contributing to heavily influenced behaviour-based policies (Darnton, 2004) that limit scientists using PT to provide significant insights for policy development (Shove, 2010)

Figure 2 shows the connection between the two contrasting frameworks - PT and EA - in their most simplistic form through their linear character. These frameworks are explored in this thesis both together and separately to examine some of the findings from the literature pointing to some level of connection between school/pupils' practices and EA. However, while PT positions practices at the centre of the social world, the individual is at the centre of behavioural investigations in EA. Therefore the connection between these contrasting theoretical perspectives will help to better

explain FW production in schools and evaluate how schools' focus on practices instead of individual pupil might contribute to FW reduction.

This new framework joins concepts of practice and behavioural theories through their unique linear character within social research. In this way, the connection among dispersed practice and environmental knowledge (Gifford & Sussman, 2012), integrative practices and formation of environmental attitude (Ham et al., 2015), as well as compound practice and environmental intentions/behaviour represent a unique and new understanding of how and why FW in schools emerges (see Figure 2). In this way, the theoretical findings from this study might be used to navigate how the FW phenomenon in schools should be understood and investigated. Theoretically, this study explores the best way of understanding the FW phenomenon in public institutions like schools.

Figure 2: Environmental Practices and Behavior



With this said, the main theoretical research question aims to look at changes in food-related activities based on various levels of schools' environmental engagement as well as different levels of EA among participants. This helps to explore the changes in practices and individuals' EA as part of institutional transitions towards sustainability. However, to perform this research in institutions with different environmental positions, Southerton and Yates (2014) argue that the FW analysis needs to be conducted at the particular location of eating patterns. Therefore, school canteens represent an ideal location for exploring the practices where food leftovers are generated.

As mentioned previously, eating practices are understood in this study through the theoretical framework of compound practices and are therefore considered an interconnection of dispersed and integrative practices. Warde (2013) points out that every compound practice consists of at least one dispersed and one integrative practice. The same principle will be used to explore the level of EA of pupils and staff in recruited schools. For example, in the same way, that recipes need to be followed to prepare tasty meals, pupils use their knowledge and understanding to develop attitudes towards the environment. In short, as the linear model of EA[10] is built on the principle of understanding environmental behaviour through individuals' knowledge and attitudes, so compound eating practice needs to be understood as a compound of multiple dispersed and integrative practices (Ham et al., 2015; Warde, 2013).

It is common in most schools to include information about the environment and the development of environmental understanding and environmental knowledge during school lessons and learning activities (Jones et al.,

[10] The linear model of EA explains how environmental knowledge influences environmental attitudes and how these entities effecting individuals' environmental behaviour in society (Ham et al., 2015)

2016). However, currently, schools in England are not required to include sustainability principles in their teaching curriculum, unlike in Scotland (Education in Science, 2018). In theory, the level of pupils' environmental knowledge and understanding of sustainability (dispersed practice development) should gradually increase during compulsory education, which this study tested in connection to the FW issue. Schatzki (1996) defines dispersed practices primarily as parts of more complex practices with basic 'know-how and 'understanding' during the performance of a particular activity. Therefore, learning may be considered a dispersed practice (see Figure 2) as an individual's theoretical knowledge would partly lead to pro-environmental behaviour based on the linear model of EA.

Gifford and Sussman (2012) argue that the development of environmental attitudes may be influenced by multiple factors, such as combinations of theoretical knowledge, current events, personal experience, age, religion and emotional attachment, among many others. Similarly, the development of environmental attitudes is built on at least one other factor impacting the formation of the attitude. Therefore, environmental attitudes are analysed in this study based on a theoretical understanding of integrative practices (see Figure 2). This facilitates understanding of pupils and staff's environmental attitudes not as a simple variable directly influencing their food practices but rather as a complex system of multiple related practices that need to be transformed to reduce FW production in schools.

School cultures reflect their overall environmental strategies, which may, in turn, influence pro-environmental involvement with significant impacts on pupils' knowledge, attitude and, therefore, environmental behaviour (Jones et al., 2016). Although the term environmental behaviour is often used in behavioural psychology with a direct connection to individuals, we can argue that to behave in a certain way is about performing practices the same way. Therefore, environmental behaviour may be translated from a

psychologically informed perspective on the individual to a sociologically informed approach to practices, and become environmental practice. Analysing pupils' eating behaviour through environmental compound practices allows me to investigate the phenomenon of FW in schools with a new perspective and helps develop a better understanding of the impact of institutional routines on pupils' food-wasting habits.

As part of the mixed-method approach, a high volume of quantitative and qualitative data has been collected from the schools, allowing me to test the new model (see Figure 2) and understand the connection between practices and behaviour. In this way, this study raises an important question: *If, how and to what extent does the concept of EA influence sustainable practices emerging in the schools.*

3.3 The concept of Sustainable Development

The concept of sustainability and Sustainable Development (SD) can be traced back to 1987 as a response to the rapid degradation of natural resources causing losses in human lives and decreased quality of breathable air and water supplies (UN, 1987). As no single definition of SD can be found in the official Brundtland Report: Our Common Future (UN, 1987), the definitions in various scientific fields are incredibly loose, as discussed below. On the other hand, commonly accepted definitions of SD are based on the precautionary principle: *to meet the needs of current generations without compromising the needs of future generations*.

Although the public, politicians and scientists have widely accepted this definition, the movement towards sustainability has been slow and often underestimated by both politicians and scientists (Morgan & Sonnino, 2008). Today, the concept of SD is well recognised and has moved towards the centre of political discussions. However, Kemp et al. (2005) and Fanzo (2019) argue that economic growth is still prioritised in political agendas

and that more attention needs to be paid to the connection between all three pillars of sustainability: economy, society and environment.

The definition of SD has evolved based on the focus on each pillar of sustainability, bringing definitional divisions among economists, environmentalists and sociologists. McKenzie (2004, p.11) points out that although the concept of sustainability is supposed to display a connection between all three sustainability pillars, most of the definitions could be described more as *"a useful disciplinary tool to promote the message of environmental or economic sustainability".*

Economists view SD as a tool to ensure that *"future generation income per capita won't be lower than the one of the current generation"* (Tisdell, 1999, p.24). Although this concept aligns with at least one of the SDGs (goal 8), ensuring economic prosperity for future generations in the long term needs to include restrictions of irresponsible usage of natural resources. However, economists often forget about the fragile balance between the environment and the economy. Therefore, defining SD from the economic viewpoint is considered a weak version of SD which allows non-renewable natural resources to become interchangeable with investment into human (e.g. education) or physical (e.g. infrastructure) capital. Andersen (2006), for example, highlights the problems that have been caused by the application of this weak definition of sustainability, especially where it has been incorporated into political agendas while often affected by corruption, unfair compensation system or irreparable environmental damage.

On the other hand, environmentalists emphasise the protection of natural resources and living in harmony with "*environmental limits"*, which should become the main priority in political decision-making processes (Jacobs, 1999). Environmental scientists use a strong version of SD based on theories like the circular economy (Braungart & McDonough, 2013), the ecological economy (Gowdy & Erickson, 2005), and other fundamental

theories that place ecological balance above economic growth. Nilsen (2010) argues that countries utilise both strong and weak SD in their policies on climate change, but they also note that they tend to apply these policies based on the weaker definition of sustainability, with having human utility and economic growth in a consistently higher priority. Kallio et al. (2006) further emphasize the importance of applying strong definitions of SD to state policies and regulations and recognising global environmental threats as the consequences of human actions on ecological systems.

Sociologists focus on SD through social sustainability generating *"enough wealth for society to reproduce itself to maintain its institutions and to provide a sense of cohesion and community for its members"* (Gibbon & Jacobson, 1999, p.107). However, this definition of social sustainability is widely criticised as it is essentially still based on economic sustainability. Dempsey et al. (2011, p.292) argue that social sustainability cannot be defined in the same terms as economic sustainability but should be examined as a dynamic concept that can incorporate changes in society. The factor essential to consider while examining the model of social sustainability is the influence of global *"economic, environmental and political crises"* on local communities and social equity. McKenzie (2004, p. 12) developed a definition of social sustainability focusing mainly on equality in communities: *"Social sustainability is a life-enhancing condition within communities and a process within communities that can achieve that condition."* She further developed indicators communicating an interpretation of social sustainability in community and neighbourhood terms, including equal access to services, local political participation, and a sense of social, economic and environmental responsibility in communities or the transfer of EA from generation to generation.

In this study, recruited schools will be evaluated against McKenzie's (2004) definition of social sustainability and their role in communicating the principle of sustainability to pupils. This definition of SD based on social

sustainability allows us to better understand the role of community in the school and its impact on school practices and the environment. Therefore, the community in which the school is located is a key element affecting both school practices and pupils' habits, which might be connected to the volume of FW produced during the daily school lunch. Moreover, the process of transformation of EA within the school as part of the community is explored through EATs and the measurement of the level of EA among pupils. This is later connected to the social principles of sustainability and their performance within a community.

3.3.1 The Concept of Sustainable Development in Schools

This section explores the link between Sustainable Development (SD) and schools' food systems. Although the history of school meal provision, including school food standards, government nutritional recommendations, and eco-programmes importance, has been discussed in the previous chapter, this chapter connects the concept of SD and the school food system as known today.

There have been numerous attempts to improve school meal (SM) provision since 1988, as many have noticed the negative impact that unregulated SMs have on children and society (WHO, 2000). Evans et al. (2012) refer to this era as a time when waste started to disappear from households while the value of food was continually decreasing, both in terms of price and quality. It was necessary to develop a concept that would protect the environment and stop unsustainable usage of natural resources that oblige countries to agree to sustainable economic growth. As outlined above, one such concept was introduced in 1987 in the Brundtland report: '*Our common future*'. One of the issues described in the report was the adverse situation in schools connected to the broken link between children and the environment that had become one of the biggest concerns of SD:

> *"Providing facilities is only the beginning. Education must be improved in quality and in relevance to local conditions. In many areas, it should be integrated with children's participation in farm work, a process requiring flexibility in the school system. It should impart knowledge relevant for the proper management of local resources. Rural schools must teach about local soils, water, and the conservation of both, about deforestation and how the community and the individual can reverse it. Teachers must be trained and the curriculum developed so that students learn about the agricultural balance sheet of an area."* (WCED, 1987, par, 66).

However, Evans and Harper (2009) point out that progress towards sustainable education was slow and inconsistent with the first signs of transformation seen only 15 years later. The government started to fund organisations created to support schools in an attempt to encourage sustainability. Programs like Ofsted (Office for Standards in Education) or SMRP (School Meal Review Panel) have been developed to evaluate catering services in schools and educational services. These attempts to improve pupils' eating habits in schools have also been connected to the responses to radical increases in childhood obesity rates, as reported by World Health Organisation (WHO, 2000).

Today, schools in the UK must provide SMs according to guidelines presented in a document called: Requirements for School Food Regulations (HM Government, 2014). This document specifies the minimum requirements for the SM provision, including daily intake of fruits and vegetables, minimum daily intakes of protein, and portions of dairy products, while avoiding fizzy drinks and snacks containing higher amounts of sugar. However, practical enforcing of these criteria in schools has become very challenging for school kitchens due to budget allocations or decreasing satisfaction rates of pupils and parents (Morgan & Sonnino,

2008). The government currently tries to support schools that take the initiative to become more sustainable through investment into various eco-programmes that help adapt to new conditions. Governmental bodies cooperate with multiple organisations across the country to reform school food provision (e.g. Soil Association) while developing new programs to share school food expenses (National School Lunch Program).

The introduction of the SDGs in 2015 brought more commitment to the governmental bodies involved in-school support. The goals are developed to improve sustainable growth in particular areas of either environment, society or economy. Goal number three: *"Ensure healthy lives and promote well-being for all at all ages"* (UN, 2015) directly applies to the necessity of school reform. This is later closely linked to the necessity to increase pupils' EA and promote food education in schools. As mentioned above, school food education and changes in food practices are critical elements for achieving sustainability and environmental balance. Therefore, the government is trying to encourage school governing boards to become interested in food education, growing their own food products, complying with school food standards, implementing more physical education, or even attending international school competitions (DfE, 2019).

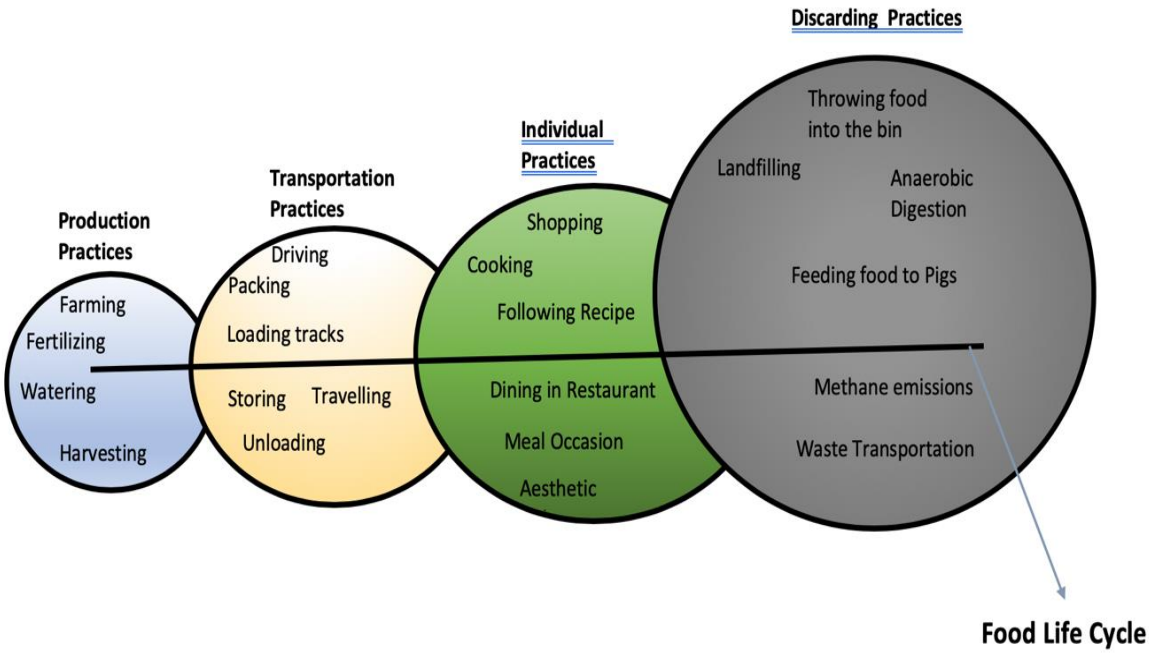
3.3.2 Sustainable Development Goals and Compound Eating Practice

To identify and measure the world's progress towards more sustainable practices and a more sustainable future, 17 SDGs, 169 targets, and 303 indicators were introduced by United Nations General Assembly in 2015 in New York (Hak et al., 2016). SDGs serve as a general set of standards and targets for countries agreeing to frame and assess their policies and regulations to improve various sustainability areas by 2030.

As explained previously, the main advantage of PT is that it helps researchers to explore the world through practices that are not conditioned by individuals or systems but create a bridge between these fundamental views in sociology (Shove et al., 2012). Warde (2013) argues that eating practices need to be understood as a compound of practice because of the multiple dispersed and integrative practices necessary to perform eating itself while positioning eating within the social context. Halkier and Jansen (2011) add that eating practices consist of at least four subsequent activities: food supply, cooking, meal occasion, and aesthetic judgments. It is important to understand that the individual is not at the centre of the practices ontologically, and therefore it can be argued that practices occur independently alongside individuals. This means that although an individual's first contact with food products (food supply) mostly starts in the place of shopping, this does not mean that the production and transportation of the given product might be excluded from an examination of the shopping practice itself. Therefore, as shopping, cooking or meal occasions are part of the practice of eating, the life cycle of the food product also needs to be understood.

One possible example of this could be an apple sold to a UK consumer in a supermarket produced and delivered from Spain. After the purchase, the apple cake is made from the apples and leftovers are thrown into the bin. Therefore, we can argue that a customer's eating practice starts in Spain with the production process, continuing through delivery, shopping, cooking and eating, ending with food disposal. Therefore, eating practices are compounded by countless practices occurring throughout the food supply chain, including production and delivery. This means that the life cycle of each food product used by individuals during eating is part of the eating practice, while the discarding of the food products leading to FW must be considered an end-stage of most of eating practices (see Figure 3).

Figure 3: Eating Practices



3.3.3 Achieving SDGs through the adjustment of Eating Practices

My argument is that FW needs to be analysed as part of the compound eating practices affecting the slow achievement of some SDGs. This means that FW is understood in connection to the countless daily performances of individuals, organisations and governments. Warde (2013) argues that eating needs to be understood in the social context and therefore cannot be viewed purely as a part of the biological process. However, in this study, eating practices are not viewed only in their social context but within the broader context of production, consumption and disposal of the food material and food products to understand the impact of this complex set of practices on our environment and, eventually, the achievement of SDGs.

Compound practices are well-suited as a theoretical framework to help us understand data and connect them to the global environmental problems expressed through the SDGs. Systematic analysis of multiple dispersed and

integrative practices that can explain eating as a compound practice may provide data helping to identify ways in which the SDGs can be achieved. Analysis of the first SDG (End poverty and its forms everywhere) may be used to understand the importance of the transformation of the eating practices in our institutions. A report by the United Nations Economic and Social Council (2019) points out that between 1998 and 2017, economic losses due to natural disasters had the highest impact on the increased number of people living below the poverty line. These losses were estimated at 3 trillion dollars. On the other hand, Gustavsson et al. (2011) report that around 1.3 billion tons of food are wasted in the pre and post-farm stage, which equals 1 trillion dollars every year. Therefore, theoretically, it is possible that the establishment of more effective management of food resources can end or dramatically reduce global poverty. However, to achieve this, a complete transformation of eating practice with all its compound elements starting from production and distribution to the habits of the final consumer would have to be changed. Figure 4 shows the connections between SDG achievements and the eating practice viewed in the broader context while pointing to the necessary change in eating practices.

Figure 4: SDGs and Eating Practices

3.4 Summary

In this chapter, the PT approach has been introduced as the main theoretical framework of this thesis, alongside the ABC and SD models, which help to explain the factors influencing the volume of FW produced in schools. This chapter has explained the theoretical foundations of PT within its historical context through the classification of *"dispersed"* and *"integrative"* practices established by Schatzki (1996) and later through the further development of 'compound practices' by Warde (2013). As a concept, compound practices bring new perspectives to investigators of waste-related issues within emerging practices while allowing for a broad understanding of the FW phenomenon in particular institutional settings (Southerton & Yates, 2014). Conceptualising practices that have a potentially significant effect on FW production as part of compound eating practices allows an understanding of the potential application of PT within the global context of FW to be developed. Therefore, eating practices are framed within the global context of food production, distribution, consumption and disposition, which is an original theoretical approach to the FW phenomena. This directly connects eating practices to the world effort to achieve SDGs and demonstrates how far these practices can be adjusted within current norms.

The concept of EA was linked to Shove's (2010) account of behavioural '*ABC theories'* to provide a way, as we shall see, of exploring how staff members involved in the school food system perceive the FW problem and how these perceptions and the levels of EA influence pupils' wasting practices. Although measurements of EA are widely used in psychology to investigate people's environmental behaviour, EATs are used in this study to show the impact of EA on FW production. Studies using a linear theorisation of behaviour show a relationship between the level of EA among individuals and environmental behaviours and practices (Ham et al.,

2015). However, the application of linear models of EA to the school environment has not been attempted thus far, and this thesis aims to explore how factors like environmental knowledge and attitudes or intentions towards waste impact the volume of FW produced during the daily school lunch.

In general, the main aim of this chapter is to explain school waste production through eating practices and how this understanding can contribute to the reduction of FW while helping to achieve SDGs. Therefore, this study will explore how a focus on practices can reduce FW in schools and contribute to the achievement of SDGs. Therefore, the main theoretical aim is to explore changes in these activities (practices) in relation to different levels of environmental engagement in schools.

Chapter 4: Research Aims, Strategy and Methodology

The main aim of this chapter is to describe the methodological framework and research strategy adopted in this thesis and explore the research objectives and research questions in connection with the theoretical foundations discussed in the previous chapter. The research aims and objectives are drawn from the literature as studies indicate that school eco-practices have a significant impact on the formation of Environmental Awareness (EA) among pupils and influence the production of food waste (FW). The literature review shows that the level of pupils' EA is often connected to the participation of schools in various eco-programmes (Jones et al., 2016; Orme et al., 2011). Holistic studies have been performed to investigate the impact of these programmes on the pupils' level of EA, but the impact of these programmes on FW production has been widely neglected (Jones et al., 2016; Orme et al., 2011). At the same time, studies investigating the impact of school practices on the volume of FW produced often fail to acknowledge the influence of school-level engagement in eco-programmes (Derqui et al., 2017). The literature review also shows that although several studies used comparative analysis to investigate the impact of specific eco-programmes on school waste management practices (Cincera & Krajhanzl, 2013), they fail to account for the complexity of the FW phenomenon and how eating habits in school canteens are formed. However, this thesis compares schools that are and are not involved in eco-projects, acknowledging the impact of EA even when pro-environmental activities are understood through foundations of Practice Theory (PT) rather than a purely behavioural approach.

The main aim of this study is to explore the differences among practices emerging in the schools with various environmental strategies and investigate the impact of these strategies on the production of FW during the school lunch. The sample of schools participating in this study has been

strategically selected based on a different level of environmental engagement to investigate the impact of internal and external pro-environmental involvement on daily FW production during the lunch break. While the schools recruited in Kirklees Council display limited or no external environmental involvement, the recruited school in Lincolnshire is considered one of the most sustainable primary schools in the UK with remarkably high involvement in various national and international eco-programmes (King, 2017). This sample selection allows me to add a comparative perspective to this study while investigating how schools' environmental involvement impacts FW produced by pupils.

Theoretically, this thesis should help reform the views held by schools about the FW issue by offering a way to position practices at the centre of the school policies instead of individuals' knowledge, attitudes, and behaviour. In this way, instead of pupil/individual, practices are positioned at the centre of this research, allowing us to explore why and how they emerge in the school environment. Based on the model of PT, the FW phenomenon needs to be understood within the complexity of practices and evaluated from multiple perspectives. To comprehend each school practice that might affect pupil eating habits, this study uses a case study approach to interpret holistic aspects of real-life events (Yin, 2009). A mixed-method research design is used to evaluate the multiple factors occurring in the school environment, including the possible impact on pupils' eating practices and, most importantly, the volume of FW production.

As mentioned before, this study focuses on highlighting the factors that significantly impact pupils' wasting practices while trying to understand the patterns emerging from these practices and what influences them. One of the assumptions emerging from previous studies on waste is that the active pro-environmental involvement should automatically reduce the volume of FW produced (Jones et al., 2016; Orme et al., 2011). This assumption is tested here by the placement of practices at the centre of social reality.

Finally, this study aims to connect the holistic approach devised by Jones et al. (2016), the focus on FW demonstrated by Derqui et al. (2018) and the comparative analysis using PT to explain the complexity of FW issues developed by Cincera & Krajhanzl's (2013). Building an approach that draws from these concepts helps to understand the impact of pro-environmental involvement on FW volume production in schools.

4.1 Research Questions

The main aim of this research is to explore four of the most influential factors raised from the literature that have been found to have an impact on the volume of FW produced in schools:

- The pro-environmental engagement of schools.
- The level of environmental awareness among pupils and staff members.
- Pupils' meal satisfaction.
- Staff viewpoints of the school food system.

As indicated in the previous chapter, most of these factors have been previously investigated in the studies separately but not together as a complex set of practices that influence the nature of FW production during the school lunch. Theoretically, this study explores the effectiveness of new theoretical frameworks based on an understanding of PT, Sustainable Development (SD) and ABC behavioural theories. This unusual theoretical connection should reveal the strengths and weaknesses of these concepts while making a significant contribution to the current sociological dilemma around the question of *practice or behaviour?* Therefore, this study will address two main research questions and discuss the most influential factors affecting FW volume production in schools found in the literature.

Research Question 1. What are the most influential factors affecting the volume of food waste produced in schools during school lunch?

This question is divided into four objections based on various studies exploring the factors influencing FW production in schools. Firstly, the impact of school engagement in pro-environmental programmes has been found to reduce FW production in studies investigating the impact of wwwwwwwwthe Food for Life Partnership (FfLP) (Orme et al., 2011; Jones et al., 2016). However, no quantitative analysis has been performed to confirm this assumption and therefore, schools actively involved and not involved in FfLP were recruited to compare the volume of FW production during school lunch.

Secondly, pupils' and staff members' knowledge about the waste has also been found to reduce the production of FW volumes in schools (Derqui et al., 2018). This is explored through Environmental Awareness Tests (EATs), where not only participants' knowledge about the waste is tested but their environmental attitudes and intentions as well. Thirdly, the impact of pupils' meal satisfaction on the volume of FW produced is based on insight from behavioural theories. Therefore, the level of pupils' meal satisfaction is measured during data collection. Finally, the impact of school employees on the volume of FW produced was found to significantly reduce the volume of FW produced in schools (Engström & Carlson, 2014). This led to the creation of the following sub-questions:

- <u>a) To what extent does a school's pro-environmental involvement influence the volume of FW during school lunch?</u>

To address this objective, three schools with various levels of environmental engagement were recruited. Washingborough Academy (WA) is an example of an institution that is actively involved in pro-environmental activities, while the schools in Dewsbury and Huddersfield

were recruited as examples of schools with no or limited environmental involvement. These schools were evaluated based on their history of participation in various eco-programmes and the marks received upon completion, with the results published on their website. The volume of FW produced per pupil has been calculated, enabling comparisons between the schools and their environmental activities.

- b) To what extent does a pupil's environmental awareness influence the volume of FW produced during daily school lunch?

To address this research objective, the study examined the influence of pupils' EA on the volumes of FW produced during the daily school lunch. EATs were conducted with pupils (see Appendix 1) to explore how knowledge and attitude influence their environmental practices and the volumes of FW they produce. The results of EATs were compared and connected to the school's general environmental involvement.

- c) To what extent does pupils' satisfaction with school meals influence the volume of plate waste during daily school lunch?

Satisfaction surveys (see Appendix 2) were provided for pupils after the school lunch to address this question. The survey results were then analysed and interpreted to understand how pupils' satisfaction with the meals served in the school canteens may influence FW production. According to behavioural theories, positive or negative perceptions about the taste of the meals should automatically result in corresponding decreases or increases in plate waste. However, to understand the full impact of pupils' satisfaction rate on the volume of FW in schools, it is necessary to analyse individual plate waste and connect it to satisfaction surveys to provide more comprehensive insight into this issue. Therefore, pictures of meals were taken before pupils started and after they finished eating, and these were connected to the satisfaction surveys.

- d) What is the impact of a school's employees involved in food processes on FW volume during daily school lunch?

In addressing this question, the study explored how the level of EA among staff influences the volume of FW in schools. Moreover, it is essential to investigate how staff members involved in food processes perceive the school food system as this may influence FW volumes. This issue was explored during interviews with staff members and through observations of routinised practices in the canteen.

Research question 2. How can focusing on eating practices in the canteen rather than individual behaviour help school practitioners reduce the volume of FW production during the school lunch?

This question represents the overarching theoretical aim of this study, which emerges from the new theoretical framework built on the foundations of PT in connection to SDGs. Hence, this study can investigate activities influencing the volume of FW through a lens that puts them in a global context offering a new and innovative way to understand the impact of schools on the environment. Therefore, FW in schools was analysed as a compound of multiple subsequent activities while the changes in these activities were explored in relation to the level of EA, the environmental engagement of the school and the concept of SD.

4.2 Philosophical Approach

The ontological and epistemological underpinnings of social science involve the boundaries of what we can know about the world and how to gain that knowledge (Gupa, 1990). While ontology helps us explore the certainty of collected data and the nature of reality, epistemology is related to collecting data and the relationships between different methods. Therefore, both

ontology and epistemology cannot be viewed separately, and their relationship needs to be understood in relation to the particular social phenomenon.

The main philosophical approaches used in the field of social science are positivism and interpretivism. Epistemologically, positivists emphasise the ability of the researcher to explain and understand collected data through the use of quantitative methods, including surveys, questionnaires or random sampling. This approach requires statistical analysis as the primary strategy to explain the social phenomenon through universal principles established by facts. The role of the researcher in positivist studies is independent, with little interaction with participants during the data collection process (Crowther & Lancaster, 2012). The quantitative part of this study was built on statistical analysis to explore and understand the level of EA, pupils' satisfaction with the lunch or FW measurements. However, in this research, a deeper understanding of the social world was gathered through qualitative methods to explain the interconnections between the quantitative data and the practices performed in the school environment. On its own, quantitative data could not provide enough insight into the complexity of the FW phenomenon in schools.

The perspective of an interpretivist emerges from the ability of the researcher to understand why and how certain phenomena work. Interpretivists try to comprehend social phenomena through attempts of being involved in the social context while collecting data. Qualitative methods like in-depth interviews, ethnographic studies or observations are the main instruments to understand human experiences in social systems (Shin, 2014). The main disadvantage of interpretivist studies is the high possibility that analysed data will not produce clear, objective findings but instead stay open to subjective interpretation (Ormston et al., 2014). The interpretivist approach is widely used throughout this study due to the holistic nature of this project and the necessity of applying qualitative

methods to understand the principles of the observed practices influencing FW volumes. However, this study avoids interpreting data in a subjective way but instead applies mixed methodological approaches that do not entirely fit into the interpretivist understanding of data analysis.

As mentioned before, Schatzki (2016) argues that to view the world through the lens of PT, practices need to be positioned at the centre of the social world ontologically to differentiate it from the other families of social ontology, such as those understood through reference to system, structure or individual. Schatzki (2016) develops a new philosophical approach showing how practices need to be understood both ontologically and epistemologically. He views practices as '*lexical commodity[ies]*' *"carried out by indefinite number[s] of people"* and in this way should be viewed at the centre of any social institutions including *"organisations, power, science education, transportation etc."* (Schatzki, 2016, p.27,28). Schatzki (2016, p. 29) adds that understanding practices as commodity positions them at the ontological foundations as they present ideas about the social world and its *"fundamental nature of something – thus ontological"*. This shows that practices can be conceptualised differently based on the social phenomena they explore in the social research in the same way, like theories that talk about the principles of action but may have different ideas about how those principles are conceptualized.

However, Buch and Elkjaer (2020) argue that Schatzki's philosophical conceptualisation of PT highly correlates to another philosophical tradition – American Pragmatism. Therefore, instead of using Shatzki's loosely defined philosophical tradition through positioning practices at the centre of epistemology and ontology, pragmatism represents a clear philosophical structure for practice scientists. In short, pragmatism is a philosophy that assesses theories or beliefs based on their ability to be put into practice (Menand 2002). The emergence of pragmatism was influenced by philosophers' ideas about how thoughts mirror reality and how they can be

portrayed in the social realities (Menand 2002; Misak, 2013). Pragmatists rejected the traditional approaches of rationalists and empiricists arguing that: *"Thought should be seen as a product of organism's interaction with the environment, essentially as action*" (Buch & Elkjaer, 2020, p.3). John Dewey, one of the most known American pragmatists of the 20th century, viewed routines and habits as dynamic in nature referencing to Schatzki's positioning of practices in the social world. Similarly to PT, pragmatism does not limit the researcher to methods of exploration of social phenomenon, as positivism and interpretivism do, but rather encourages the researcher to use any available method to understand how and why practices emerge while also encouraging exploration of the connections between them.

Pragmatism is used in this study to explore why and how pupils' wasting practices emerge and how the phenomenon of FW is understood by school practitioners, the government and other social institutions. This study compares different views of social reality when exploring the traditional connection of the individual to FW in schools to infinite possibilities of viewing and influencing the FW phenomenon through a practice-based approach with a pragmatist view of the social world.

4.3 Case Study Approach

Due to the focus of this study on practices performed in schools, this investigation took place in real-life institutions through the observation of real-life events (Yin, 2009), which in turn means that a case study approach was necessary. Yin (2009, p.4), adds that case studies help researchers understand certain phenomena holistically operating within institutional settings by exploring *"how or why some social phenomenon works".*

Case studies are characterized by their empirical value when seeking to explain the current circumstances of the social world through a holistic view of the social phenomenon. Moreover, they can explain the multiple parts of

a structure impacting one another, which is crucial for this study and could not be achieved by other approaches such as ethnography or narrative research (Denscombe, 1998). Therefore, case studies fit well with a theoretical position of PT explaining the social circumstances as part of the practices running independently from individuals while understanding connections between individuals and systems (Schatzki, 2001).

George and Bonnett (2005) add that scientists taking a case study approach are more likely to investigate the conditions under which specified social phenomena occurred instead of focusing on the frequency of the occurring circumstances. They suggest that a case study approach is mainly used to investigate the research issue from a qualitative perspective as it creates a perfect research design in which to apply qualitative methods. However, this study adopts a mixed-method research design to understand the investigated social phenomenon's depth and complexity; therefore, quantitative methods and statistical analysis are used to add another layer of knowledge to understanding the FW phenomenon in schools (Yin, 2009).

4.3.1 Case Study Selection

Yin (2009) points to the importance of careful sample selection in case study research. The selection should be deliberately chosen to help answer research questions. However, George and Bonnet (2005) warn about the high possibility of a biased sample. In this study, the sample consists of two primary schools and one secondary school located in England. The schools have been selected based on differences in their level of pro-environmental involvement and implementation of eco-programmes practices. Each of the recruited schools has a different level of environmental involvement: actively involved, non-actively involved and not involved in pro-environmental activities. Although the number of schools in the study is low for results generalisation, the types of recruited schools represent the majority of the schools' eco-involvement in the UK

which makes the results of this study replicable and transferable as well as generalisable to some extent.

As mentioned above, an essential factor in the evaluation of schools' pro-environmental engagement was their participation in eco-programmes and the promotion of internal eco-activities that could affect the volume of FW produced. According to Cincera and Krajhanzl (2013), not all schools involved in eco-programmes are actively engaging with the programme's activities. They argue that some schools involved in the eco-programmes have a limited understanding of the programme's requirements, and therefore their involvement in the programme has limited or no impact on pupils' eating practices. This suggests that eco-programmes with multi-level rewarding schemes can better differentiate between schools with active and passive forms of environmental involvement.

The reviews of school websites showed that the majority of the primary and secondary schools in England display limited or no involvement in eco-programmes or other pro-environmental activities. Therefore, my location in Kirklees guided the recruitment process of schools with low participation rather than focusing on a particular institution. As a result, more than 50% of the schools recruited are located in the Kirklees Council, specifically in Huddersfield and Dewsbury. These institutions want to remain anonymous in this study, and therefore pseudonym names based on their location are given to both: Huddersfield school (HS) and Dewsbury School (DS). After each school confirmed interest in the study, initial interviews with the school managers were conducted to evaluate the general environmental position of each school. The interviews confirmed that website analysis was, in fact, an effective method to explore schools' current environmental involvement as both schools showed no or limited environmental engagement.

The recruitment of schools that are actively involved in pro-environmental activities has been more complicated due to a limited number of schools that would fit more stringent evaluation criteria. Therefore, schools across the country were contacted to participate. Although several primary schools showed an interest in the study, only one school in Washingborough (Lincoln) achieved a high enough level of environmental engagement to participate. Unfortunately, recruitment of a secondary school with a high level of environmental involvement was not successful, and therefore no secondary school with a high level of environmental involvement is part of the research sample. This is the main limitation of the secondary school analysis as it means that the recommendations for implementing new practices were not developed based on real-life observations. However, the strengths of this research and thesis lie in the usage of multiple methods and the high volume of data collected, which provides far-reaching insight cutting across several previous studies.

4.4 Mixed Methods Research Design

Applying both qualitative and quantitative methods has become a very popular way to understand complex research phenomena in many fields, including sociology. A mixed-method research design might be defined as a multi-research strategy allowing researchers to investigate various types of data, working within multiple paradigms or applying various strategies to explain the complexity of social phenomena (Brannen, 2008). A mixed-method strategy allows the researcher to generate a high volume of qualitative and quantitative data, which enables comparing and contrasting data during analysis, understanding and examining the data set in depth and increasing the overall validity of the findings (Denscombe, 1998). Triangulation is a technique for checking the validity of interpreted data through other sources, which is well established in studies using a multi-method strategy (Denscombe, 2010). Criticisms of triangulation relate to

poor interpretations of data, but this issue can be overcome by developing a clear rationale for the analytical techniques used (Fielding, 2012).

According to Shove et al. (2012), studies using PT as a theoretical framework are not limited to any application of specific data collection methods but opposite, because of flown nature of practices, researchers might choose between multi or mono-method research design freely. Similarly, Denscombe (1998) highlights that a case study approach lacks any prescriptions of methods and therefore allows the researcher to investigate a social phenomenon from multiple perspectives by applying both qualitative and quantitative methods. Some of the criticism of using mixed-method research design in case studies relates to the descriptive character of case studies, which focuses mainly on understanding qualitative data (Denscombe, 1998). Yin (2009) argues that although most of the methods commonly used in case studies explain social phenomena from a qualitative perspective, it does not limit the approach to using qualitative methods only. He adds that the opportunity of case studies lies in the ability to explain the social phenomenon in-depth and that this does not restrict case study research to mono-method designs. The complexity of FW in schools is understood from a broad perspective on eating practices requiring multiple research strategies to explore the many aspects of the FW in depth. Therefore, this study uses a mixed-method research design to investigate the holistic nature of the FW phenomenon in a particular institutional setting - primary and secondary schools.

4.5 Methods and Data Collection

As mentioned above, this study adopts a multi-strategy design. Qualitative and quantitative methods were used to investigate FW in schools, and each is now explored in depth. This study adopts six main methods of data collection discussed here:

1) Interviews,
2) Observations,
3) Environmental Awareness Test (EAT),
4) Satisfaction Surveys (SS),
5) Meal Pictures (MP)
6) FW volume measurements.

Secondary data from online resources are also used to explore school practices and understand schools' connections to community and government. In this way, this study adopts a holistic approach to viewing FW as a social phenomenon often used in case study research (Denscombe, 1998).

The qualitative methods (interviews and observations) explore the connections between the quantitative data and the impact of school routines and staff involvement on pupils' eating habits. On the other hand, quantitative methods (EAT, SS, MP and FW measurements) generate valuable data for comparisons between the recruited schools. Quantitative methods and an online investigation of school environmental involvement create a general environmental position (image) of the school connected to the volume of FW produced by pupils during school lunch.

Three schools have been recruited to participate in the study: one primary school, one academy and one high school. The high school and the primary schools are located in the country of Yorkshire (Kirklees), while an academy is situated in Lincolnshire County. Both schools located in Kirklees can be defined as institutions with little or no environmental involvement, while the academy in Lincolnshire is a school actively engaging in national and international pro-environmental initiatives. Although the official status of the school in Lincolnshire is an academy, academies belong to the group of primary schools receiving their funding directly from the central

government instead of a local council. Similarly, high schools belong to a group of secondary schools, and therefore for the simplicity of expression in this study, I will be discussing the recruited sample as a group of two primaries and one secondary school[11].

Before the start of the study, all recruited schools were examined based on the level of their environmental engagement evident through internal and external activities published on their official websites. However, the schools are also compared based on their cash flow balancing, educational results (OFSTED), relational involvement (parent's involvement), food-related activities (gardening, cooking, composting, eco-programs) and other activities (clubs). Moreover, daily canteen routines, menu development, nutritional requirements, number of pupils receiving FSMs and more will be discussed to understand daily schools practices from a broader perspective in the following chapters.

In this study, the secondary school is used as a pilot to establish the effectiveness and reliability of the selected methods for several reasons. Firstly, the number of secondary schools actively involved in pro-environmental activities is significantly lower in England when compared to primary schools and therefore recruiting a secondary school actively involved in eco-activities was not successful. In this way, the results collected from the school in Dewsbury could not be compared to other secondary institutions with higher environmental involvement. This resulted in insufficient data to draw generalisable conclusions from DS, but it did generate enough data to inform adjustments to the methodology deployed in primary school settings.

It is important to add that every method used in this study is part of a clear structure exploring the most influential factors on the volume of FW

[11] For further differences between primary and secondary schools in the UK settings see section 2.4.2 in this thesis.

produced by pupils during the school lunch outlined in the literature. Although every factor with an impact on FW volume has already been explored separately in other studies, e.g. (Derqui et al., 2018; Jones et al., 2016; Orme et al., 2011; Cincera & Krajhanzl, 2013), this study brings all of these elements together and analyses them as part of pupils' eating practices.

4.5.1.1 Interviews

According to Denscombe (1998), the meaning of any interview lies within the position of individuals and their perceptions about the social and natural world. In this study, interviews have been used to explore the perceptions of the school staff and their influence on the pupils' eating practices in the canteen. The interviews were used to discover the interconnection between pupils' eating habits and the influence of the general environmental position of schools on staff environmental engagement and their attitudes towards the environment and, in particular, food waste (FW).

The interviews were conducted with members of staff actively involved in the school food system. In each of the recruited schools, at least two cooks, one lunch supervisor and one member of staff or higher management have been interviewed. Together, fourteen official interviews have been conducted among all three recruited schools with a length of about 30 minutes each. However, some interviews with lunch supervisors could not be recorded due to busy schedules and the limited time they spend on school premises. The majority of lunch supervisors in schools are hired only for a lunch break (1-2 hours), resulting in insufficient time for separate interviews. Therefore, informal discussions with lunch supervisors during the lunch break were transcribed into the notes and analysed with the interview transcripts.

Semi-structured interviews have been developed for staff members involved in the school food system, such as cooks, lunch supervisors and school managers/headteachers. Although the interviews adapted the semi-structured design to address specific practices performed in the canteens, the questions were fluid in nature. This allowed me to address additional issues raised during the interview process, and therefore some questions had an open-ended character, which is more common for in-depth interviews (Denscombe, 1998). The mixture of both has been crucial for understanding how and why pupils waste in school canteens.

The structure of the interviews focused on three key dimensions to understand the research context: staff daily practices, school eco-activities, and FW. Firstly, participants were asked about their position in the schools and requested to describe their daily activities. Secondly, the school participation in eco-programmes and other internal eco-activities were discussed to explore staff knowledge about the eco-involvement of the school and how this influenced pupils' eating habits. Finally, the interviews explored staff perceptions regarding the FW produced by pupils. Although the FW produced by schools is the central theme of this study, the FW issue has been strategically discussed at the end of the interviews to display the relationship between staff activities, knowledge and attitudes, which influences the volume of FW produced during school lunch (see Appendix 3-5).

Before the start of the interview, each interviewee signed a declaration form to confirm that he/she understands the rights and duties involved in taking part in the study (see Appendix 6) as well as read the interview information sheet to get familiarized with the objectives of the study (see Appendix 7). The interviews have been recorded and typed up verbatim into a word document and later uploaded into the Nvivo program. Rather than participants' names, it is their position that is referred to during interview transcription to ensure the complete anonymity of interviewees.

In this study, the Nvivo program has been used to save and manipulate interview transcripts to recognise codes and themes raised from the interviews and observations notes. Due to the program's limited ability to display the relationship between the items in themes and the themes themselves (Welsh, 2002), a manual analytical approach was used to examine the collected data and create codes by dividing the texts analytically into thematic categories. This mixture of coding and inductive analytical methods was used to ascertain the depth of collected data fully. On the one hand, the coding methods helped with a better understanding of the transcribed text and displayed the relations between the research themes (Robson & McKartan, 2016), while on the other hand, the inductive approach allowed for specific situational evaluations of the qualitative data (Fereday & Cochrane, 2006). Although the Nvivo program needs more technological development to understand the depth of the transcribed text, it helps to visually view possible connections between developed themes and codes, increasing data analysis objectivity (Welsh, 2002).

4.5.1.2 Observations

Gathering qualitative data in the form of observations has multiple advantages. Firstly, observations are one of the most objective methods in qualitative research because they tend to detect actual doings rather than intended practices (Denscombe, 1998). In other words, observations consider *"what people do, rather than what they say they do"* (McWilliam, 2014, p. 73). Secondly, observations help researchers better understand both groups and individuals subjected to an investigation (Denscombe, 1998). And finally, observations are recorded independently, allowing an observer to take a neutral position and collect data as part of natural situational settings.

Two days of the study were dedicated to observations of the canteen routines before the start of quantitative data collection to analyse pupils' reactions to my presence in the canteen while evaluating the location of data collection instruments for the following research stage. Staff practices in the canteen have been observed and discussed, allowing for a better understanding of school food routines and possible implementation of additional questions during the interviews. Moreover, during my time in WA, I was asked to participate in one of the organised SNAG (School Nutrition Action Group) meetings discussing current and future food-related practices (Jones et al., 2016). According to Kawulich (2005), participant observation allows researchers to understand the environment of the research phenomena while gaining access to the community. In this way, I was able to better understand the school's environmental dynamics among the staff and pupils, which has proven to bring valuable insight to the research.

During the collection of quantitative data, observations became a natural part of the data collection process because I had to be in the canteen during the lunch break. Therefore, the observations were made while also collecting data by other means, including the SS, MP and FW measurements until the end of data collection. However, it is important to point out that an observer like myself was perceived differently in each of the schools where I was present as a researcher. While in the DS, barely any of the pupils noticed my presence in the canteen, which I accredit to the short time for the lunch break and the busy environment (discussed later); in HS, pupils automatically noticed my presence and wanted to engage with me. On the other hand, in WA, pupils are used to the presence of external observers due to schools' active participation in various eco-programmes, and therefore my presence was less disturbing for pupils.

During two days of preliminary observations, the notes were taken immediately after observing relevant practices on the iPad device in the

Nebo application. However, this was not always possible during the rest of the data collection, and therefore I had to retrospectively reflect on the pupils' practices based on the observed lunch patterns thematically, as shown in Table 3.

Table 3: Reflection - observations

Start of the lunch
Entering the canteen
Lunch Serving
Order in the canteen
Satisfaction
Collection of MP
FW volumes
Kitchen FW
Lunch Supervisors/ Staff Discussions
School Activities
Others

4.5.1.3 Environmental Awareness Tests

The main aim of the EA investigation is to understand how individual levels of EA might influence the volume of FW produced in schools. One of the methods used in the literature to test EA in schools is the Environmental Awareness Test (EAT) (Ham et al., 2016) - elsewhere called the '*Environmental Literacy Questionnaire'* (Ozsoy et al., 2012). Although there is no general definition of environmental literacy or EA, scientists associate each of these terms with people's level of environmental education. Roth (1996, p.2) describes environmental literacy as an individual's understanding of ecosystems and natural principles of the human-nature relationship. Therefore, the most critical mission of environmental education is to cultivate in people the skills to effectively deal with the *"man-environment relationship"* and understand the impact of technological innovation and social systems on the planet. And while environmental literacy is viewed more as a general skill or knowledge achieved through education, EA is a more complex phenomenon that can

be described through terms like *"environmental consciousness or environmental concern"* (Ham et al., 2015, p.160). In this study, the EATs are developed for two key groups: staff and pupils. EATs for pupils are the only instrument used in this study to measure EA among pupils. Therefore, it is connected directly to data about FW volume produced in the canteen during the lunch break. On the other hand, the level of staff EA is evaluated through interviews and EATs, and a triangulation technique was therefore used to analyse the tests and their impact on FW volumes.

A study by Grunert (1993) investigated the perceptions of green customers about the organic food market and organic food consumption. She attempted to characterise and define the EA through understanding EA components by developing a structure used to measure levels of EA, which involved testing their environmental knowledge, attitudes, and behaviour. The same structure was used in this study by developing EATs for pupils and staff members consisting of 12 questions divided into three sections measuring environmental knowledge, attitude and food-related intentions – behaviour (see Appendix 1,8). Although the test structure has followed a framework from the literature (Grunert, 1993; Ham et al., 2015), the questions have been developed independently. Moreover, questions exploring pupil and staff levels of environmental knowledge, attitudes and intentions are connected to the FW, instead of testing a general level of EA as shown in the literature.

The structure of certain questions in the EATs was adjusted after receiving questionnaires from the pilot school. Firstly, categorisation question two - school year- was adjusted to age due to confusion when the majority of the pupils circled the option D in DS (Year 5 and older), which would be correct only for pupils in years 10 and 11, so the tests from secondary school could not be connected to the age of the pupils. Therefore, EATs for pupils in primary schools focused on pupils' age instead of the school year. Another issue that emerged as part of the pilot study is connected to question two:

"What do you think the term Food Waste means?". More than 30% of secondary school pupils answered with the word waste or FW, e.g. *"it means wasting food"* or *"Waste Food"* or *"Waste of Food".* These answers cannot guarantee that pupils understand the term FW and therefore, the question has been altered for the primary school pupils to: "*What do you think the term Food Waste means? (Do not use the word 'waste' in the answer)"*. This technique has been successful as only 7.5% of pupils in primary schools used the word waste in their answers. The last altered question was number 12: *"Even if you are full, do you try to finish your school lunch?"* which more than 46% of pupils answered C (Sometimes). However, this answer did not display what is more likely to happen during pupils' daily school lunch routines, and therefore it was removed from the test. Understandably, pupils would probably not finish their lunch every time, as this would be affected by other factors, but their attitude to finishing served food might significantly impact their wasting routines.

Five questions (1, 2, 3, 4, 6) in the EAT (see Appendix 1) focus on testing pupils' environmental knowledge when asking about general information regarding FW. The test consists of four questions (5,7,11a,12) querying pupils' attitudes, opinions or concerns about the FW at home and in the school. And finally, the last six questions (1a, 8,9,10,11,12) are about daily food routines at home and school. Staff members were given the test directly after conducting interviews with six questions (1,2,3,5,10,11) focusing on environmental knowledge regarding FW issues in the world and their institution. Five questions (4,6,8,9,12) are used to examine staff attitudes and concerns about the environment and their perceptions of current environmental issues, while only two (7,8) were designed to address routinised staff eating practices. The linear model of EA used in this study suggests that environmental knowledge directly impacts the environmental attitudes influencing environmental practices. However, the main aim of this study is not to investigate staff's food practices but rather to understand staffs' impact on the pupils' eating practices.

In total, 715 EATs were collected from pupils across three schools, with an additional 14 tests filled by staff members after interviews. Data from the EATs were rewritten with numerical coding for easier processing of the data into the excel sheet and later uploaded into the SPSS program for a detailed evaluation of statistical significance within the test and among the schools. Each question was analysed from two perspectives firstly, as part of the individual test to determine participants' level of EA (see Appendix 21) and secondly, it was examined within the broader context of the schools' general environmental position. Answers to open-ended questions were thematically coded into categories and analysed accordingly.

EATs for pupils were printed before I arrived at recruited schools at the beginning of data collection. The tests were given to school teaching staff members that were required to give the tests to pupils at any lesson during two weeks of my presence in the school. Because some of the teachers decided to test pupils right away while others waited for particular lessons, the tests were collected gradually during the two weeks of data collection. Later, the answers from the tests were rewritten into an excel document and prepared for analysis. EATs for staff were given to staff members after interviews as part of an interview process. The necessary time to complete the test was given to all interviewed participants. The staff members have been observed from a walkable distance while filling the test to ensure no electronic devices have been used while answering questions.

4.5.1.4 Satisfaction Surveys

Surveys or questionnaires are among the most popular methodological tools in social research to understand participants' experiences with a certain phenomenon in the social world. Moreover, surveys can produce relevant key information about participants' preferences and opinions (May 2011), helping to improve outcomes such as practice advancement,

nutritional intake (Jones et al., 2016) or FW reduction. According to May (2011), surveys are one of the best tools used in social research to collect objective data using a representative sample to express the population's opinions. The main advantage of using surveys is their standardized character based on the pre-coded questions, helping to carry them out easily in any setting (Denscombe, 2010). On the other hand, the surveys might not be suitable for all objects in the studies (Bryman, 2016), such as pupils whose literacy skills are not fully developed and therefore cannot participate.

In this study, surveys were used to measure pupils' satisfaction with meals provided by the school and meals brought to school from their homes. The survey consists of five questions with pre-coded answers about gender, age, a meal option, satisfaction and leftovers (see Appendix 2). The meal options have been daily updated in the surveys based on the school menu available online or in the canteen. Pupils could express satisfaction with their meal option by circling four answers: *'Terrible, Good, Very Good or Excellent'*. However, this question was simplified after measuring pupils' satisfaction with meals in Dewsbury as pupils were confused when asked to add percentage satisfaction on a scale of 0 to 100 and when more advanced answers were provided (terrible, slightly satisfied, satisfied, very satisfied or excellent).

The last question in the survey: *'Did you have any leftovers?'* was designed to make pupils reflect on their eating practices. They could circle the words to answer *'yes'* or *'no'*. If pupils circled the answer *'no'*, they came to the end of the survey and were asked to place their sheet into the allocated box. In case pupils have leftovers, the survey continued with an additional question: *'If yes, can you stand a reason?'*. Pupils could choose one of the five options named in the literature as the most common factors for pupils' leftovers (taste, portion size, not hungry, bread, vegetable), or they could write their answers into the column '*others*'. These options could be

updated based on the menu; for example, if potatoes have been served, they were added to the option vegetable: *'Vegetable or Potatoes'* for better understanding.

The surveys have been collected after lunch during two weeks in both primary schools and six days in secondary school. The table with the *'Satisfaction Survey'* sign has been allocated in the selected location in the canteen for research purposes by the school management. The surveys have been printed and updated each day before the arrival at the school. The pens and the survey box used for filled surveys were provided for pupils on the allocated table. Pupils were encouraged by lunch supervisors to fill one of the surveys each day before leaving the canteen however understood that this task was not compulsory, which ensured that no pupil was forced to participate in the study against her will. The surveys were fully anonymous, ensuring honest answers from the pupils while rating their selected meal options or home-packed lunches. Lunch supervisors and I were helping younger pupils with limited literacy skills to fill out the surveys and help them understand the context of the survey.

During 26 days of the data collection in all recruited schools, 3023 satisfaction surveys had been collected, rewritten and coded into the excel sheet. Coded data were uploaded to the SPSS program to explore statistical links among the questions. The impact of gender and age on food preferences, satisfaction, and leftovers is explored through statistical tests.

4.5.1.5 Meal Pictures

Analysing the volume of plate waste or food intake using visual tools has become a valuable method to understand participants' viewpoints regarding food. Research shows that multiple methods such as food diaries, eating observations, questionnaires or individual plate waste

measurements are standard methods in plate waste estimations (Williamson et al., 2003). However, since the development of digital cameras, a new, more convenient method has become popular among researchers- digital photography. Although Wolper et al. (1995) argue that the most accurate method for weight estimation is a traditional measuring of plate waste before and after eating, according to Williamson et al. (2003), estimation of the waste by visual methods, including digital photography, highly correlates to the actual weight of the portions. This shows that using digital photography in the research is not only more convenient as the pictures might be analysed later in the non-disturbed environment, but the results represent relatively accurate weights of the items.

However, in this study, the digital photography method is not used to estimate the exact weights of the meal portions but rather helps analyse the type of items left on the plate while creating percentage estimates of the plate waste (Giampaoli & Khanna, 2000). After eating, the items left on the plate are analysed in connection to SS taken simultaneously connecting photography to SS sheet through card number (as an example see Appendix 9). In this way, the answers in the surveys correspond to a visual image allowing me to investigate pupils' understandings of the survey questions and their actual satisfaction with the meal. Although percentage estimations do not produce exact data concerning the weight of the portions, they are more suitable for this study. First, pupils in the schools have a chance to select from at least two main meal options with different sizes of portions based on the pupil's age. Second, pupils can ask cooks to serve more or less food depending on their meal preferences. Third, in all recruited schools, pupils could voluntarily choose among multiple side options such as bread, salad or vegetable. This would mean that each item on the menu would have to be measured separately before lunch every day and then connected to the pupil's portion individually. That would be time-

consuming and could result in less accurate weight estimation as the weight of each item served to pupils might differ.

While the SS could be filled by all pupils eating in the canteen, including pupils with packed lunches, only pupils receiving lunch HSM were asked to participate in the meal photography stage. This is due to the great variety of pre-packed lunches, which often included deserts that were excluded from the school meal pictures as pupils were not allowed to receive them together with the lunch but collected them after placing their leftovers in the bin. In addition, pupils having packed lunches were required to take their leftovers home for parental food check, and therefore, their plate waste was not added to the overall volume of FW measured in the canteen.

Pupils participating in MPs analysis were selected based on the table system. Each morning, the number of tables was pre-selected, and pupils with school lunch seating at these tables were asked to participate. Selected pupils accepted a paper card with a number and positioned their meal with the card number for a picture from 90 degrees angle using the iPad 8 MP camera. Pupils who agreed to participate were required to put their hands up after finishing eating to take a picture of their plate waste and collect the SS to ensure SS is connected to the MP taken.

It was a goal to recruit at least 30 pupils a day to participate to have a substantial sample for the analysis of MPs, but this was not always possible due to limited time and the busy canteen environment. The recruitment of the pupils in the primary schools was more successful compared to secondary school where only 13 pupils a day on average participated in the meal picture stage, mainly due to limited break time. In primary schools, on average, 27 pupils participated every day. In total, 1237 MPs were taken before and after pupils received their meal, but not all pictures have a pair. This is the result of multiple factors affecting the process of data collection in the canteen, such as limited understanding of the process among pupils

(e.g. they placed their waste into the bin before I was able to take the final picture), technical problems (e.g. there was a camera issue, and a blurry picture) or limited time (e.g. they have been rushed out of the canteen).

The pictures are analysed based on a percentage estimate of the plate waste conducted in a manner similar to Giampaoli & Khanna (2000), using a 10% scale. The results of the evaluations are recorded into a spreadsheet using either 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 or 100 percentage estimations of the amount of plate waste compared to the paired picture. The data are later analysed in connection to the meal option offered and the measured satisfaction rate of the participants. This might help better understand the correlation between the meal option, satisfaction, and meal leftovers.

4.5.1.6 Food Waste Volumes

Similarly to other studies investigating the FW phenomenon in institutional settings (Boschini et al., 2018; Boschini et al., 2020; Marlette et al., 2005; Derqui et al., 2018 and more), FW measurements are the most influential part of the investigation. In this study, FW volumes have been collected daily after the school lunch and measured using a Kamtron measuring scale connected to the mobile device, transferring and saving data automatically. The canteen practices in WA included daily measurements of the FW volumes by pupils using the school's hand measuring scale. Both the school and my measuring scales showed corresponding results with a maximum difference of 5g per measurement.

Schools in the UK are required to follow government guidelines regarding the nutritional intake of the pupils consuming school lunch (DfE, 2014). Therefore, the meals prepared in the school kitchens are the main source of protein, requiring a significant amount of time to make while

representing high economic value. In this way, *"waste carries a nutritional, economic and social cost"* (McWilliam, 2014, p.76). Consequently, this is the main reason why school lunch FW is treated as the most influential variable in this study, as it represents a significant loss for the school.

Pupils in both primary schools were required to separate their food scraps and other waste, allowing me to perform accurate daily FW measurements. On the other hand, the recruited secondary school did not have a system of separating food from other materials in place, and therefore it was not possible to measure FW volumes, but mixed waste from all bins in the canteen has been measured instead.

Kitchen waste has not been measured or analysed as pupils eating practices could not be influenced by the volume of FW produced during meal preparations. Although the main cooks prepared several unserved portions, the meals have been generally eaten by kitchen staff after the lunch (interviews, chef, Huddersfield, Dewsbury) or frozen and reused with the next round of food preparation (interviews, chef, Lincoln). Therefore, the unserved portions have not been added to the overall FW volume measurements.

The recorded FW volumes were analysed using descriptive statistics to summarise the features from the collected data. The data are compared between the recruited schools to understand how different practices influence FW volume produced in a particular institution. At the same time, regression analysis is used to understand the relation between the relevant variables and the overall volume of FW produced in the schools. Moreover, the results from both primary schools are compared to WRAP's study conducted in 2011 to estimate average changes in the amount of FW produced in primary schools over the last decade in the UK. In this way, this study shows if the findings of WRAP are still relevant in schools or if a new study needs to be conducted to collect more relevant data.

4.6 Analytical Approach

As mentioned above, the fact that multiple methods were used to identify relevant sources assists with understanding the complexity of FW in school settings. According to Yin (2009), case studies are characterised by collecting a wide spectrum of evidence while investigating specific social phenomena using triangulation techniques. Therefore, a great variety of primary data have been collected using multiple methods and analysed during three analytical stages. Firstly, raw data was transcribed into manageable forms (interview transcripts, excel sheets) and analysed using both qualitative and quantitative techniques. For qualitative data, codes and themes were developed to understand and characterise collected data, while for quantitative data, descriptive statistics were used to display the relations between data sets. The second analytical stage involved connecting data to underlying investigated issues (see Appendix 10). The data are compared within the sources in their thematic structures, referring to methodological triangulation. Finally, triangulation techniques between data sources showed differences between recruited institutions while auditing the reliability of the collected data using multiple methods. McWilliam (2014, p.80) argues that:

> *"understanding analysis within data sources before using triangulation between sources facilitates a fuller understanding of the meaning of key findings within sources […] and then allows the richness of the systematic approach to show itself by exploring relationships, connections and gaps between the sources."*

In the next section, the qualitative and quantitative analyses used in this study are discussed in detail with the connection to specific analytical software. The analysis within and between the sources is discussed in section triangulations.

4.6.1 Qualitative Analysis

Interviews, observations and other secondary documentation retrieved from government sources, an internet search or provided directly from the schools are analysed using qualitative content analysis. According to Bryman (2016), qualitative content analysis is characterized by searching for themes within qualitative data to develop a series of structural codes used to build a comprehensive understanding of the data set. Codes represent the outcomes of the qualitative analysis while introducing conditional explanation to the research question (hypothesis) (May 2011). In order to analyse a high volume of qualitative data, a clear structure of codes and themes needs to be used during the analysis to explore the in-depth meanings of data and find valid results. Denscombe (1998) points out that qualitative analysis allows researchers to search for relationships between different categories that emerge after revisiting information in texts.

Although other popular qualitative data analysis methods such as narrative analysis, discourse analysis or thematic analysis would have been useful here there are significant drawbacks that could have influenced the reproducibility and effectiveness of data analysis. For example, using narrative analysis could help us make more sense of participants' realities and inside perspectives through stories told, however, they would be hard to reproduce in subsequent research. On the other hand, discourse analysis could closely reveal the connections among participants and systems through the language used in the social context, but the research questions would need to be more specific to fully use the potential of this analysis (Bryman, 2016). While thematic analysis could possibly be a good choice to explore qualitative data collected in this study, thematic analyses are loosely defined and although they are flexible this can lead to *"inconsistencies and lack of coherence when developing themes derived*

from research data" mainly for novice researchers (Nowell et al., 2017, p.2).

According to George and Bennett (2005), semi-structured interviews are a useful tool allowing structural comparisons between and within recruited samples. However, in this study, the questions varied between the different positions of respondents; for example, interviews with the kitchen chefs were more technical with more details (see Appendix 3), while interviews with other cooks included more open-ended questions like '*What do you think?'* based on the chef's description of current kitchen practices (see Appendix 5). Although some of the questions were open-ended, allowing respondents to touch on various issues in the school food system, including their personal experiences, the majority of the themes emerging from the interviews were predetermined, which is another advantage of semi-structured interviews (Denscombe, 1998). Some themes repeatedly emerged from all interviews, such as canteen/kitchen practices, menu planning, food provision, meal quality, eco-activities, possible improvements and waste. However, more themes were raised from the interviews, including pupil and staff issues, school management, financial pressure, council and government impact, feedback and other schools' food practices.

As mentioned above, transcribed interviews, field notes and other documentary resources have been manually coded and saved in the Nvivo software. Later, the themes emerged as a set of coded words saved in the codebook. The themes and codes are connected through the mind mapping tool available in the Nvivo Software. According to Eppler (2006), mind mapping helps researchers centralise themes and understand them hierarchically through visual reasoning. However, in the study, mind maps were manually adjusted and used to identify and connect themes and topics while understanding other factors influencing school practices allowing for cross-referencing McWilliam (2014).

Similarly, observation notes (field notes) were manually coded and saved in the Nvivo software with emerging themes easily comparable between the samples. The themes related to observations arose from canteen practices during lunchtime. These include the roles of lunch supervisors, pupil habits, material positions and canteen reward systems. Again, the themes are analysed using a mind mapping tool and compared between the samples. In addition, the observations notes are used in the methodological and data triangulation techniques to revisit staff practices in the canteen to better understand their interview responses.

Although coding is one of the most used techniques in qualitative research, according to Bryman (2004), it has significant limitations because of the subjectivity involved in interpreting the data as a researcher. He highlights the necessity of interpreting the data correctly without losing the context or narrative. The relevance of the data is then shown through careful evaluation of data significance and codes relations in reflection to overall research objectives emerging from the literature. In this study, manual coding and mind maps represent a valuable tool to ensure an objective interpretation of the data by constantly revisiting the connections from the source. The relevance and significance of the findings from the qualitative data are connected to multiple sources through comparative analyses and re-revisited in the triangulation technique discussed later.

4.6.2 Quantitative Analysis

Statistical analysis is used to evaluate the quantitative numerical data emerging from this research, such as EA questionnaires, SS, waste measurements and MPs evaluations. Descriptive statistics and regression analyses are used to display the relations between the variables as commonly used in the small datasets that do not apply to the general population (McWilliam, 2014). According to Black (2002), descriptive statistics are an analytical technique that helps describe data sets while

explaining their characteristics with graphs and tables or charts to present findings. Although findings in small-scale research generally do not apply to whole populations, the meta-analysis might be used to understand how the findings correspond with the results from other studies. In this way, some of the inferential techniques involved in descriptive statistics, such as testing a statistical hypothesis, might be used during data analysis.

MPs are graded based on the estimation of percentages and analysed using descriptive statistics. SS connected to the meal pictures are used in methodological triangulation to confirm or reject pupils' understandings of the context of SS and their comprehension of food leftovers. SSs without connection to MPs are analysed within data sets, among the days connected to the menu and the schools to compare the samples. EATs are evaluated based on the 12 points scale, where pupils received points after expressing positive intentions or attitudes related to FW reduction or general FW awareness. The results are later analysed within the data set and between the schools.

All collected data have been transcribed into an electronic form, with quantitative data being transcribed and coded in the excel sheet in various ways such as percentage distributions, participant responses or numerical measurements. Data are analysed in the SPSS software, helping with calculating statistical correlations emerging from the data sets. The comparative analysis is a useful technique to display differences in responses between the schools and within the data sets (e.g., age, gender difference), creating a fundamental tool to understand their impact on practices among recruited schools.

It is important to add that more advanced quantitative methods such as mathematical modelling, structural equation modelling or more advanced regression analysis could have been used to analyse quantitative data. However, Zulkarnaen (2018) argues, that although using more advanced

statistical methods allows for further exploration of the data, the room for incorrect data interpretation significantly increases when these analyses are used by novice researchers without mathematical backgrounds like myself. Although structural equation modelling is more commonly used by social researchers today, the main limitation of using this method is connected to the small sample size of this study. MacCallum et al., (1999) argue that using structural equation modelling with a small sample size is often quite problematic, especially in social research. Therefore, I have decided to use simpler descriptive and inferential statistical analysis I am familiar with to ensure the correctness of the statistical results as well as the robustness of the performed analysis.

4.6.3 Data Source Analysis

After all data are coded, thematically organised and statistically analysed, the results are analysed with the use of triangulation techniques similarly to McWilliam (2014, p.86) in three stages: 1) *"analysis within the data source thematically"*; 2) *"analysis with the data source comparatively"*; and 3) *"triangulation between data sources"*. These analyses are vital elements in answering all parts of the first research.

Firstly, analysis within a data source help to understand the connections and patterns emerging from data in each recruited school. Arbnor and Bjerke (2009) point out that source analyses are a valuable tool for understanding the context of collected data from a broader perspective while patents and relations among multiple sources appear. On the other hand, May (2011) argues that the analysis within the source needs to be used with caution since data representativeness can be misused. Denscombe (1998) adds that while the primary source is usually evaluated within the underlying research objectives, secondary informational data are more likely to be less linked to particular social issues. More possible sources of analytical error during thematical analyses are explained by

George and Brunnett (2005), such as researcher bias, evidence choice, subjective interpretation, or poorly understood historical context. However, the limitations of thematic analysis are addressed in this study through the careful revisiting of collected data during the analysis and discussions with repeating re-evaluation of the findings from different perspectives in the research context. Moreover, the secondary documents retrieved from multiple online sources have a descriptive function to set the conditions of the information source rather than having a significant effect on the analysis themselves.

Secondly, comparative analysis or analysis between data sources plays the most crucial role to understand the conditions influencing FW occurring in the different schools. George and Bennett (2005) highlight the flexible uses of comparative analyses that can be used between multiple case studies or within a single one to create more comprehensive inferences between the findings. This study used comparative analyses to compare data emerging from multiple sources such as EATs from pupils and staff, SSs, FW volume measurements, staff interviews, and MPs.

Finally, the triangulation techniques between data sources helped create a more fundamental level of understanding between the elements and connections emerging from this research. According to Hammersley (2010), triangulation allows researchers to explore the social phenomenon from multiple perspectives while improving the accuracy of the interpretations. Triangulations are relevant tools in multidimensional studies using multiple data collection techniques to investigate the social phenomenon and explore patterns that could otherwise remain hidden. Triangulation techniques might be applied in multiple ways, including *"methodological triangulation"* between and within methods, but they also include *"data triangulation"* and *"theory triangulation"* (Denscombe, 2010, p. 346-348).

Methodological triangulation helps to explore multiple methods (most commonly qualitative vs quantitative) to investigate certain variables. In this way, methods can be validated and data explored from multiple perspectives. For example, methodological triangulation between the methods in this study is used to explore pupil satisfaction with the food through SSs, MPs and observations. On the other hand, methodological triangulation within methods helps to explore methods based on a similar principle. This study facilitated this by analysing the level of EA in schools through EATs developed for pupils and staff. Data triangulation is a tool used to validate data collected from various sources to understand the investigated variable. This study uses data triangulation to validate the FW measurements against numerical expressions of FW volumes from other studies investigating the same social phenomenon.

Finally, theory triangulation allows the use of multiple theoretical frameworks to explore data. For this study, a new theoretical framework has been developed to explain how new practice-based vs traditional, individual behaviour-focused approaches can explain FW phenomena in school canteens. While traditionally, schools understand the food system through the lens of behavioural theories, this study brings a different understanding showing how and why certain practices in the school canteen emerge. This approach allows the researcher to explore the same social issue, the production of FW, through the utilisation of multiple concepts to understand the social phenomenon from multiple perspectives.

However, Hammersley (2010) argues that the triangulations should not be used as a validation technique but more as a tool for enriching knowledge about the social phenomenon and making it more compelling. Denscombe (2010) adds that social reality is continuous in nature and that this should not be underestimated during triangulation analyses which are often misinterpreted in social research. He points out that triangulation should provide additional support and reduce error and improve confidence. Data

management was carefully designed based on the thematic principles and revisited many times to ensure the appropriate utilisation of triangulation techniques in this research. As a result, new questions emerged and themed data were re-analysed, revealing gaps in the research.

4.7 Ethics and Data Collection

It is common practice to apply for ethical approval for PhD projects through the university ethical board before the start of data collection. In this study, the ethical approval was received after careful consideration of research design and methods in line with the *"Guidelines for Research with Children and Young People"* (National Children Bureau, 2011) by the Business School ethical approval board at the University of Huddersfield. To obtain ethical approval, documentation describing project objectives, research design and research methods in detail were submitted to the research ethics committee for consideration. Submitted documentation included:

- Postgraduate Research Student Ethical Review Form (see Appendix 11)
- Risk management form (see Appendix 12)
- Flyer developer to recruit schools (see Appendix 13)
- Memorandum of Understanding (see Appendix 14) signed by all recruited schools with emails confirming their voluntary participation
- Parents information sheet: provided to parents by the school after request (see Appendix 15)
- Interview questions: for all intended roles participating in the school food system (see Appendix 3,4,5)
- Interview consent forms: interviewee consent form, interview information sheet (see Appendix 6,7)
- EATs for pupils and staff members (see Appendix 1,8)
- Satisfaction Surveys (see Appendix 2)

Business School Research Ethics principles were followed during the development of the research design, methodology and participants' involvement (University of Huddersfield, 2016, p.4) (see Table 4).

Table 4: Business School Research Ethics Principles

• The research design must respect statutory requirements, national and international codes and university guidelines referring to Anti-corruption and Fraud Policies. • Research must follow health and safety regulations to ensure the well-being of both participants and the researcher. • Researchers are required to be impartial, independent, transparent, trained, and considerate. • Participants must be respected with the option to withdraw from the study or refuse to take part with a full written and oral explanation about the implication for the study. • A researcher is required to maintain confidentiality, ensure anonymity and secure data appropriately with future disposal of all collected data.

Before the requirements of the Business School ethics committees could be fulfilled, confirmation from the schools ready to participate in the study needed to be obtained. The flyer was sent to more than 50 primary and secondary schools that met the study's criteria. The majority of schools located in Kirklees and Calderdale council met the criteria for a lower level of eco-engagement, but the recruitment of schools with a high level of eco-engagement had to continue beyond the Yorkshire region. After sending the flyer, some schools were contacted again to confirm receiving the email while being asked to reply with the decision to participate. Despite the effort, only three schools agreed to participate based on the voluntary

principle followed by the research ethics[12]. The interviews with the school managers were then conducted to explain the study's objectives and methodological principles. School managers were given one week to consider their participation in the study and sign the memorandum of understanding explaining the research design in detail. The memorandum of understanding consisted of a form that offered the option for schools to use their name freely in the study without a coded pseudonym, and although all staff information collected at each school would be anonymised, only one primary school chose to reveal its name.

After receiving the school's written confirmation of voluntary participation through a signed memorandum of understanding and approval of the study from the ethical board of Business School, fieldwork started. To follow ethical guidelines, all participants (school managers and pupils) became familiarised with the study's objectives and were given the option of withdrawal for any reason without penalisation. The participants could refuse to take part or ask to withdraw their data until a maximum of three months after the data collection in their particular institution. The three-month deadline for data withdrawal was to ensure that participants' data would not be analysed within the broader data set, making data withdrawal impossible. In this study, neither the school nor participants asked for a withdrawal, and therefore all collected data are analysed in line with the research design, aligned with the ethical principles.

In line with ethical approval, all data are safely stored in a safe location. All electronic data, including interviews recordings, observation notes, meal pictures and transcribed questionnaires and surveys, are stored on a private computer with password protection. The transcriptions and analysis of the data are performed on the same password-protected device to

[12] No organization or individual should not participate in any research study against ones will to do so.

ensure the protection of the stored material. Respondents' names and all personal information emerging from the data are stored in their original form on the computer, but the information was anonymised during the analysis. All physical documents (EATs, SS) are stored in a safe place. Participants have been given the option to request any publication emerging from the study, including the PhD thesis or journal publications. Moreover, the report of recommendations and suggested changes to school food practices have also been developed and sent to every recruited school with the option of further discussions regarding the results and the application of new practices in particular institutions (see Appendix 16,17,18).

4.8 Summary

The main aim of this chapter is to highlight research objectives and aims while exploring how data in this thesis are collected and evaluated as well as how they are used to answer outlined research questions. Firstly, research questions are developed to explore the factors influencing FW volume production in schools and how eating practices can help researchers to better understand wasting practices in schools. Secondly, from the philosophical perspective, American Pragmatism helps us to better understand social reality through PT while exploring how and why pupils' wasting practices emerge in the school environment. The case study approach was selected for this thesis mainly because case studies do not limit researchers while selecting the methods of investigations (Yin, 2009) as well as allowing for exploration of conditions under specific circumstances occurred. In this way, the case study approach allowed me to use mixed methods research design to explore the FW phenomenon in UK schools in depth.

As mentioned above both qualitative and quantitative methods are used to investigate FW issues in the schools. Qualitative content analysis is used to

examine interview transcripts and observations notes. Later these are uploaded into nVivo software and analysed through codes gradually emerging into predetermined themes as a result of using a semi-structured interview method. Quantitatively, Excel has been used to transfer the data from EATs, SSs, MPs and FW volume measurements to electronic format and prepare them for analysis. The data are analysed using SPSS software to perform statistical analysis as well as to compare the results among the schools. Both descriptive and inferential statistical methods are used for the completion of data analysis.

Lastly, after completion of statistical and thematic analysis, the triangulation technique is used to help explore the connection between data sources thematically, comparatively and within data sources (McWilliam,2014). In this way, data are organised and analysed as part of a bigger structure resulting in a deeper understanding of connections between the results of data analysis. This chapter ends by examining the ethical consideration of thesis completion.

Chapter 5: Dewsbury School – a pilot study

This chapter is designed to explore practices performed in Dewsbury school (DS). DS was selected to examine the feasibility of the chosen methods in school canteens. There are two main reasons why the secondary school was selected as a pilot school. Firstly, the secondary school was the first school where data have been collected which allowed me to highlight flaws of the research design that had to be eliminated before progressing to primary school settings increasing the effectiveness of this research (Leon et al., 2012). Secondly, as mentioned before, recruiting secondary schools with a high level of pro-environmental involvement was unsuccessful and therefore data collected in DS could not be compared. Therefore, the study become more early education-orientated while the methods were developed to overcome age differences when exploring practice performances. In this way, this study is easily reproduced in all school settings when trying to understand practice performances in school canteens.

The environmental position of the school is investigated to understand the compound eating practices that take place there through a conceptualisation of dispersed and integrative practices based on the work of Warde (2013) on eating practice performances. In the same section, levels of environmental awareness (EA) among pupils and staff members are examined through the concept of EA (Ham et al., 2015) and its twin, ABC-type behavioural framework (Shove, 2009). Behavioural theories are often critiqued for their inadequacy in the real environment (Shove, 2009; Evans et al., 2012), but they continue to be the basis for assumptions about behavioural change in the educational system. Therefore, the application of these concepts is analysed theoretically and empirically while their theoretical counterpart, Practice Theory (PT), is used as a tool to provide a deeper understanding of how knowledge and attitudes influence pupils' practices. Finally, data from satisfaction surveys (SSs) and meal pictures

(MPs) are discussed to explore their relationship with the volume of FW produced. However, due to the school's food policy, such as short lunch breaks or failed queue management, both the quality and quantity of SSs and MPs were not adequate. Moreover, as pupils in the canteen do not separate their waste, FW only could not be measured, and therefore SSs and MPs could not be directly connected to the volumes of FW. Therefore, this chapter focuses mainly on evaluating the pupils' and staff members' level of EA, the school's involvement in food processes and pupils' practice performances in the canteen during school dinners.

5.1 About the School

The school belongs to a group of foundation schools providing secondary education for pupils in Dewsbury (West Yorkshire). DS is considered large with a capacity of 900 pupils due to amalgamation with another local secondary school in 2011 (Ofsted, 2012). The school employs 77 teaching staff, and as many pupils require help with their education, there are also 19 teaching assistants and 24 support staff. Almost 20% of pupils at the school were registered for Special Educational Needs (SEN) support during the academic year 2019/2020, almost double the national average (10.8%) for the same year group. The majority of pupils attending the school do not speak English as a first language and belong to local minority ethnic groups (GOV.UK, 2020). On average, around 50% of pupils are eligible for free school meals (FSM) (Kirklees Council, 2020). The school scored 5262 out of 32844 on the national deprivation index[13] in 2019, showing that the local area is highly deprived (GOV.UK., 2019). Cardoso et al. (2019) argue that schools play an essential role in providing meals for pupils living in highly deprived areas.

[13] The impact of the Deprivation index is discussed later

The school provides multiple clubs for pupils to improve their skills, develop a sense of teamwork and build a relationship with their peers. School clubs are scheduled every day, starting with the Breakfast Club that runs every morning and provides breakfast for all pupils through collaboration with Huddersfield Town Football Club: *"They provide fruit pots, cereals porridge, jam, butter, cheese, yoghurts and juices"* (Interviewee, Lunch Supervisor/Teacher, November 6, 2019). Moreover, pupils that do not require breakfast but arrive earlier have access to a selection of sports activities through the Multi-sports club (DS, 2020). During the lunch provided by Chartwells (a private meal provider), pupils might choose to participate in Basketball Club, Homework Club or KS3 Geography Club, MFL Intervention, Quiet Reading and more. After-school clubs include a selection of various sports activities (Rugby, Football, Badminton, Fitness, Netball and more) with an option of clubs for pupils interested in science (Science and Enrichment Club, Robotics, Math) or art (Music Club, KS3 Drama Club). Additionally, DS provides cooking classes where pupils can learn how to prepare various types of meals and learn about nutrition and healthy eating (DS, 2020). At the same time, the school engages in parent-school activities through programmes like MindED for Families or the Kirklees Local Offer (DS, 2020).

5.2 Environmental Awareness and Eating Practices

This section explores the school's general environmental position and its approach towards food provision during lunch while exploring participants' level of EA and its impact on pupils' eating practices and food waste (FW). While the observations and interviews provide a deeper understanding of the practices performed in the canteen, the Environmental Awareness Tests (EATs) should show why practices are performed in a certain way. In this way, this section is a key to comprehending where and how practices emerge and how they can be adjusted to improve the school's

environmental footprint. Firstly, various integrative practices performed before and during lunch are described in detail while being connected to the compound eating practices. Secondly, analysis of EATs is used to provide an understanding of specific practice performances observed in the canteen while demonstrating differences between human intentions and reality. Data extracted from the tests are later interpreted in the theoretical context of behavioural and PTs to explore how a particular theory can explain the volume of FW produced during lunchtime within the context of Sustainable Development (SD). Thirdly, observed practices are discussed during interviews with staff members to understand how and when they emerged. Finally, menu development and the practices of meal providers in managing the food selection and food servings are explored in relation to pupils' meal preferences and school food policies.

EATs were designed to explore pupils' knowledge, attitudes and intentions about food and FW. However, due to the different intellectual levels of pupils attending primary and secondary schools, the tests were more focused on evaluating pupils' attitudes and intentions towards food, while the knowledge concerning the FW concept was not explored in depth. In this way, tests prepared for primary and secondary schools could be the same and, therefore, analysed using the same analytical tools, allowing for direct comparison of the results. In the same way, tests developed for staff members focused more on participants' attitudes, as this was shown in the literature to have a significant impact on the volume of FW produced during lunch time (Derqui & Fermandez, 2018).

In total, 232 pupils and four staff members completed the EAT. Due to discrepancies in pupils' understanding of the school system, the categorical question *'school year'* was adjusted to *'your age'* in primary schools. In this way, the age of pupils in DS could not be evaluated in connection to other EAT questions. However, the analysis shows that neither age nor gender or

school lunch was an influential factor affecting EATs results in either of the schools.

5.2.1 Exploring Eating Practices in DS

In DS, lunch break starts at 13:15 and continues for 30 minutes until 13:45 when the classes resume. Pupils enter the canteen based on their current school year, starting with older pupils (year 10) and moving through successively younger year groups[14].

At the beginning of the lunch break, there is a long queue outside the canteen managed by lunch supervisors with more than 600 pupils trying to enter the canteen simultaneously. Lunch supervisors manage canteen space by allowing a limited number of pupils to stay in the canteen at any one time due to inadequate space. This should ensure that all pupils in the canteen have a space to sit down and eat their meal. However, observations show that at least 20% of students have no seat and are forced to eat while standing during lunch. The policy of a 30 minutes lunch break for all pupils attending the school creates an unsustainable situation in which many pupils are forced to perform eating practices that fail to produce healthy eating habits. Observations show that older pupils entering the canteen first prefer a hot meal of the day which requires a table. As a result of their Hot School Meal (HSM) preferences, it often takes longer to finish their meals than lunch supervisors expect. Observations showed that staff often rush older pupils to finish their meals and free up space for pupils still queuing outside, while the cooks complain that pupils do not order enough HSMs. Current practices performed in the canteen do not support healthy eating habits which is confirmed through the breakdown of meals

[14] The oldest pupils (Year 11) eat separately in a different part of the school. Therefore, the oldest pupils have not been included in data collection due to the separate lunch room allocation and the difficulty of collecting data from both canteens at the same time.

provided by cooks (see Table 12). This shows that most pupils often order less healthy options such as pizza, cookies or sandwiches, which take less time to eat, rather than HSM of the day.

During the lunch break, pupils have no obligation to separate their waste material after their meals, and as such, there are no dedicated FW receptacles. EATs showed that more than 50% of pupils understand this fact. However, it is concerning that most pupils (33%) answered that even if the school provided FW containers, they would not use them (see Table 5). This highlights negative attitudes towards waste separation practices among pupils, suggesting that they value convenience over sustainability.

Table 5: DS – Food only Container

	n	**%**
We have food only container and I am regularly using it	34	15
We have food only container, but I am not using it	10	4
We don't have food only container, but I would use it if we did	55	24
We don't have food only container and even if we did, I would not use it	**77**	**33**
I don't know	27	11
No answer	29	13
TOTAL	**232**	100

Due to failure to develop recycling practices in the canteen, staff members complain about pupils' littering habits outside the canteen:

> *"There is a lot of litter outside, and therefore we have a lot of birds around. So then it's a nightmare because we've got sea eagles everywhere that [are] trying to get it. So we're just trying to minimise that as well as the litter"* (Interviewee, Lunch/Behaviour Supervisor, November 5, 2019).

As a result of this problem, the school established a food policy which does not allow pupils to consume any food outside the canteen. However, at the same time, pupils who finished eating in the canteen are not required to dispose of their food and other waste, but instead, cooks do this for them. This is understandable as pupils already inside the canteen would have to queue in another line to dispose of their waste while pupils waiting to enter the canteen would not be able to consume their meal within the short lunch break time frame. However, what school policymakers fail to understand is that by allowing pupils to leave their waste on the tables after they finish eating in the canteen, they encourage the same practice to be repeated elsewhere:

> *"There is a lot of litter outside. I think in this school it is worse than food waste"* (Discussion, Lunch Supervisor/Teacher, November 6, 2019).

Consequently, pupils have never developed habits connected to sustainable waste disposal management inside the canteen. This leads to the application of the same unsustainable disposal routines outside the canteen, which is arguably caused by the short time allotted for the lunch break. Hence, this shows that shortening the lunch break or canteen only food consumption policies could never fully solve the problem of littering outside as pupils are not allowed to develop sustainable waste disposal habits inside. It is clear that as long as the school fails to create an environment in which sustainable practices can be reproduced, it will always face problems with unsustainable littering routines.

The lack of recycling habits among pupils can also be explored through pupils' limited understanding of the post-consumption stage of the food. While all staff participants understand that the FW produced by pupils ends up in the landfill, pupils did not share this understanding. Only 35% of pupils in DS assumed correctly that the food goes to landfills, while about

17% of pupils think that after they throw their waste into the bin, the waste gets recycled (see Table 6). This points to a misunderstanding of recycling practices as pupils fail to comprehend that recycling is built on the separation of waste material.

Table 6: DS – Understanding of Post-consumption Food Stage

	n	%
Landfill/ dump/hole/trash/garbage	**81**	**35%**
Compost / Recycling	39	17%
Sea/Ocean	11	5%
Poor/homeless	5	2%
Not related	1	0%
Others	38	16%
Bin/bigger bin/van	16	7%
No answer	41	18%
TOTAL	**232**	100%

Other questions in the EAT examine pupils' understandings of the FW concept. In DS, 98% of pupils understand the FW concept in theory, but unfortunately, they fail to perform practices showing the application of this knowledge. Education about food in DS is based on behavioural theories that put individuals in the centre (Shove, 2010), prioritising positive knowledge and attitudes towards the environment instead of sustainable habits. It is shown here that the impact of pupils' knowledge and attitudes is not a significant factor influencing FW volume production during the school lunch. Hence, this study questions the efficacy of the current school food educational system and its impact on long term pro-environmental change.

Although it is essential to develop knowledge about the concept of waste and sustainable practice performances, an environment where these practices can be effectively reproduced has been found to have the most

positive impact on both the environment and human well-being (Evans et al., 2012). In this way, it is clear that the school's problem in the establishment of sustainable eating practices in the canteen is not related to pupils' education (see Table 7) but rather to a failure in providing an environment for effective, sustainable practice reproduction that would lead to a waste reduction (Evans et al., 2012; Shove, 2009).

Table 7: DS – Food and Food Waste Education

		n	%
Food Waste Education	YES	105	45%
	NO	**121**	**52%**
	No Answer	6	3%
Food Education	YES	**171**	**74%**
	NO	0	0%
	No Answer	61	26%

5.2.2 Attitudes, Intentions and Food Waste

Table 8 shows that almost 90% of pupils participating in the EATs think wasting food is bad. Based on the linear model of EA, at least 90% of pupils should not waste food, but direct observations suggest otherwise. This study found that understanding pupils' behaviour through a linear model of EA (Ham et al., 2015) or a similar ABC model (Shove, 2010) is not the most effective tool for comprehending pupils' food habits in school canteens. Instead, PT creates a strong foundation for understanding pupils eating habits by focusing on current eating practices that are compounds of multiple smaller (integrative and dispersed) practices, which can be adjusted directly to create positive long-term change (Evans et al., 2012; Warde, 2013, Shove, 2010; Southerton & Yates, 2015).

Table 8: DS – Food Waste Attitudes

Do you think wasting food is bad?	n	%
YES	**206**	**89%**
NO	16	7%
No answer	10	4%

Question 11 and 12 looked at pupils' practices during the school lunch and the reasons for finishing or not finishing served food (see Table 9). While question 11 was designed to explore pupils' eating habits, question 12 examines if pupils are willing to endure the discomfort of being full to reduce FW production. Data shows that although about 90% of pupils think FW is bad, only 66% typically finish their lunch, while this number is significantly reduced when pupils do not feel hungry (30%). This highlights the instability of positive attitudes on FW reduction practices when circumstances change (i.e. not feeling hungry).

Table 9: DS – Intentions and Wasting

Q11: Do you normally finish your school lunch?		
YES	**141**	60%
NO	72	31%
No answer	17	7%
Q12: Even if you are full, do you try to finish your school lunch?		
YES	69	30%
NO	38	16%
No answer	18	8%
Sometimes	**107**	46%

On the one hand, cooks praise the meals they provide as one of the influential reasons keeping FW low, as they serve popular meals such as pizza, panini, sandwiches, burgers and cookies that pupils enjoy eating. However, the school's average meal satisfaction is the lowest among the three recruited schools, and the claim that the FW is low because of pupils' meal satisfaction should not be assumed. Instead, short lunch breaks, as well as limited spaces for seating, are just some of the factors influencing pupils eating habits and increased consumption of unhealthy foods such as pizzas or cookies. In fact, some staff members highlight the impact of the school on the development of unhealthy eating habits among pupils:

> *"Do you think healthy meals are served in the canteen? No, not really"…. "Half an hour is too quick, so it is that kind of rushed meal not actually sitting down and enjoying meal"* (Interviewees, Lunch Supervisor/Teacher, November 6, 2019).

> *"Some kids only get 10 minutes, so that is not a time to sit down and eat a proper meal. They just grab a cookie and things like that"* (Interviewee, Cook, November 5, 2019).

Others blame pupils and their unhealthy eating habits. One of the lunch supervisors connects exceeding orders of pizzas, paninis or cookies to pupils' behaviour, emphasising individuals' choice as the main issue driving unhealthy food consumption.

> *"I think they have enough options, but I think they choose to have the unhealthy staff… A lot of my students in my year group, the girls especially, just eat a cookie for their lunch, and that's all for the day because they are quite conscious about their body and they don't want to eat in front of their friends"* (Interviewee, Lunch/Behaviour Supervisor, November 5, 2019).

Although serving popular meals might reduce the volume of FW production in the school, this presents an ethical dilemma concerning the relative importance of reducing FW and ensuring pupils' well-being through healthy eating habits. The volume of FW was not measured in this school. However, observations did show that a low amount of FW was produced during the lunch, with the most common items ending up in the bin being pizza crusts. However, instead of removing pizza from the menu as a regular option, cooks continue to serve it as pupils are in turn forced to buy it due to short lunch breaks, while the meal provider focuses on the profit, undermining the goal of increasing the consumption of healthy meals. On the other hand, serving fast food items in the canteen such as cookies or pizza might contribute to the FW reduction as pupils are not able to waste as much food as their peers in the schools where more food, as well as more diverse food, is served.

This section shows the direct impact of the traditional, individual-oriented approach on pupils' behaviour and choice (Shove, 2010), suggesting that pupils should automatically make healthy eating choices because the school provides food education. However, pupils' choices are not necessarily influenced by the idea of individual responsibility for personal health. Instead, pupils' food choices are determined by practices implemented in the school's canteen. Thirty minutes lunch break for 600 pupils and the limited allocation of space in the canteen are the main factors driving unhealthy eating habits. Hence, the schools must understand pupils' eating habits based on the practice performances while taking responsibility for the development of healthy eating routines on school premises.

5.2.3 Environmental Awareness and Mixed Waste Measurements in DS

As mentioned above, pupils in DS do not separate their FW. Therefore, it was not possible to measure FW volumes after school lunches. Each type of meal served to the pupils comes with disposable materials placed in one of the five allocated bins. To measure the volume of FW produced by the pupils, I have suggested that the number of bins in the canteen should be reduced to two and that the FW and other waste material should be separated, but this was rejected by the chef who argued that: *"Most of the rubbish would end up on the floor as more than 600 pupils have only 30 minutes to finish the lunch"* (Discussion, Chef, November 5, 2019). This is understandable given the situation. Therefore, mixed waste volume measurements are used here.

During the study, 898 pupils were enrolled in the school, of which about 42.4% of students were eligible for an FSM (GOV.UK, 2020). I was able to collect a limited amount of data due to terse break times, the limited cooperation of the catering provider and the lack of pupils' interest in the study. The time for data collection in the DS was shortened to six days for methods adjustment. The average daily mixed waste produced in DS was 19.57kg which is approximately 32.6g[15] of waste produced per pupil per day. This is the lowest among the recruited schools.

Analysis of the EATs shows that pupils in DS achieved a score of 0.69 or 69%. Figure 6 suggests that most pupils scored between 70-83%, showing that pupils in DS are reasonably aware of environmental issues. Therefore, it is safe to suggest that pupils have a general understanding of the FW concept, but this is not demonstrated through their practices due to the

[15] The calculation was done based on the estimation of 600 pupils entering the canteen daily.

school's failure to provide an environment in which such sustainable practices can be reproduced (Evans et al., 2012). This is confirmed through linear regression results (see Table 10) conducted between the mixed waste measurements and the level of pupils' EA (see Figure 5).

Figure 5: Regression Model: EATs and Mixed Waste Volumes in DS

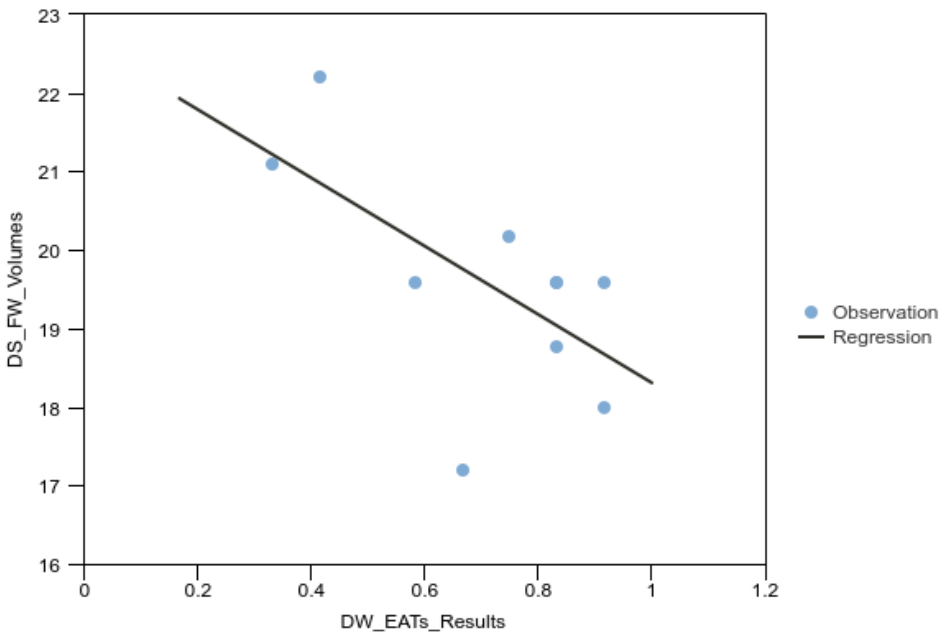
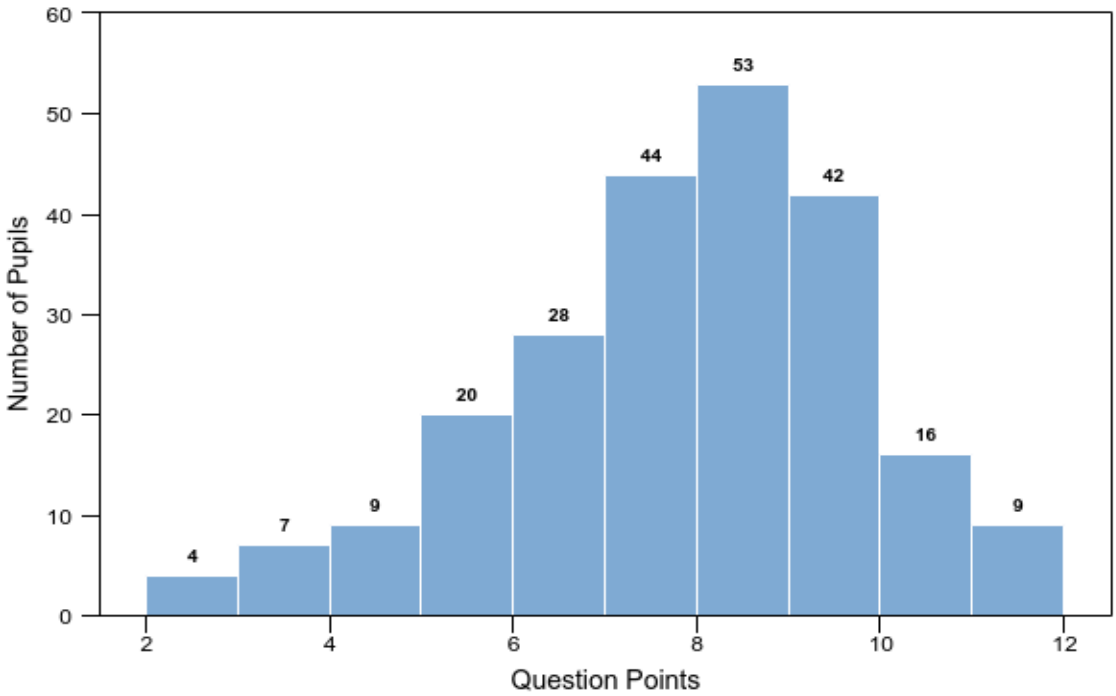


Table 10: Regression Formula: EATs and Mixed Waste Volumes in DS

Person Correlation (r) and Regression Line for EATs results in DS and Mixed Waste Volumes				
Category	n	r	Regression Line	p
Overall	10	-.62	Y=-4.35x + 22.65	.054

The results (p =.054) show no significant correlation between the level of pupils' EA and its impact on the mixed waste volumes produced during the lunch break. Therefore, this shows that increasing levels of pupils' EA would not influence FW production. It also suggests that the individual-oriented behavioural approach deployed in DS is failing the school and leads to implementing food policies damaging pupils' healthy eating habits.

Figure 6: Results of EATs in DS

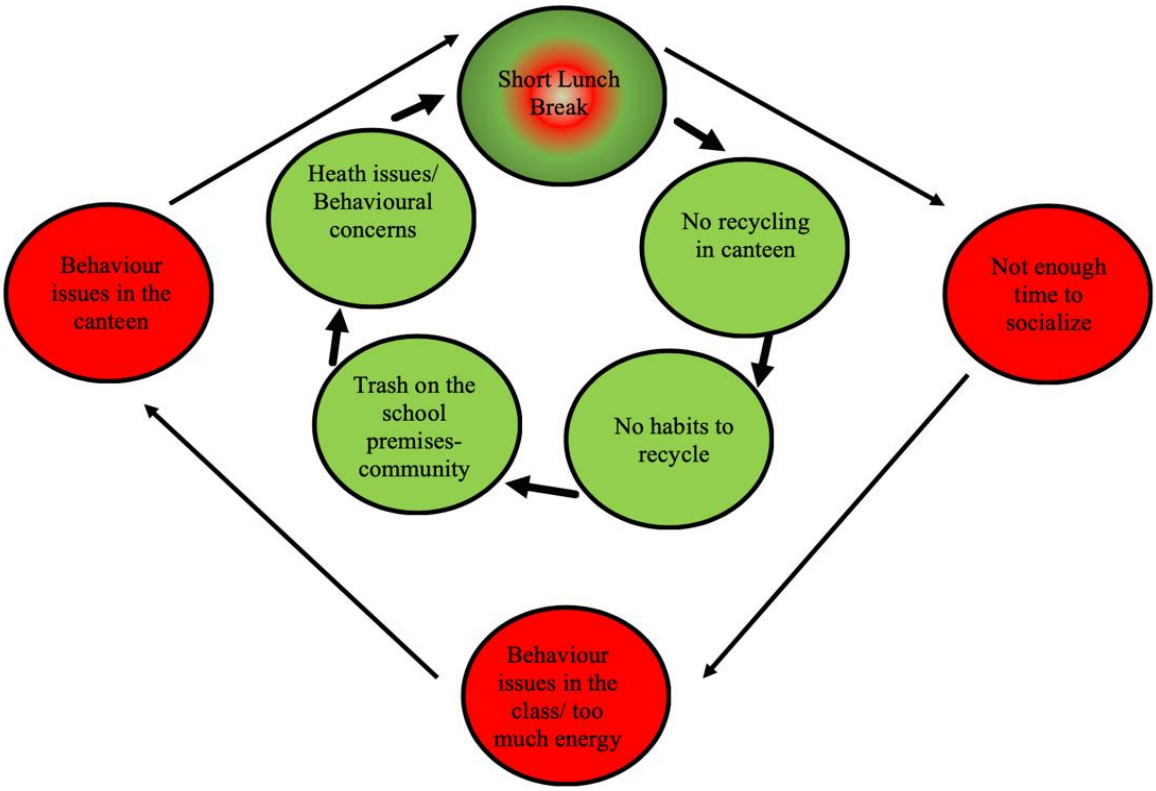


5.3 Mid-chapter Summary

So far, this chapter has explored the level of pupils and staff EA and its impact on wasting practices in the canteen. Relevant questions from the EATs are explored individually and in connection to eating practice performances. Findings show that positive pro-environmental attitudes do not significantly impact FW volume reduction in the canteen while pupils' eating practices are directly influenced by the school policy regarding the amount of time allocated for the lunch break.

Firstly, this study shows that the school compensates for its short lunch break by not requiring pupils to recycle their waste material. However, it has been found that as soon as pupils leave the canteen, they throw their waste on the floor, attracting birds and increasing the possibility of spreading diseases which leads to staff concerns connected to pupils' behaviour. This, in turn, results in more extensive support of a short lunch break (see Figure 7).

Figure 7: Waste Loophole in DS



Secondly, it is portrayed here how behavioural theories fail to adequately address pupils' eating habits and provide tools for their sustainable change. Behavioural theories are not an efficient tool to explain pupils' behaviour in the canteen as their knowledge, attitude and behaviour do not correspond. While pupils understand that recycling is necessary to achieve SD, they do not separate their waste in the canteen. While they understand the importance of having well nutritious meals, they do not consume healthy meals. However, PT moves the attention from the pupil and his choice to practices and their performances. Hence, PT suggests that it is rather the school's environment (no recycling bin, no place to sit) and food policies (short lunch break) than pupils' knowledge and attitudes influencing pupils' eating practices the most.

While most of the staff members realize how the situation in the school canteen might endanger pupil health because it encourages the development of unhealthy eating habits, the school refuses to change this

approach, arguing that pupils have healthy food available but prefer to consume unhealthy meals. In this study, DS represents a perfect example to demonstrate the ineffectiveness of behaviour-orientated theories for understanding social realities.

The individual behaviour oriented approach allows the school to argue that they are meeting policy objectives that require pupils to be educated about food nutrition and FW. The implication is that pupils should then behave sustainably, and it is not the school system that is at fault but instead the behaviour of pupils and their parents. A high level of EA among staff and pupils does not affect waste production or the consumption of healthy meals in the canteen simply because the policy of short lunch breaks strongly reinforces unsustainable behaviour. This shows that schools are still responsible for the long-term well-being of pupils while highlighting the necessity of schools understanding how practices are performed and how habits are created, as this would ensure that pupils could develop healthy eating routines with the long-term effects on their lives and environmental sustainability.

5.4 Food Waste, Catering and Menu in DS

The environmental position of the school's current meal provider - Chartwells, is explored when compared to the school's current sustainability practices. The section draws on interviews and observations to examine the impact of menu development, serving practices and school food policy on the volume of FW produced during the school lunch. As pupil meal options are connected to the practice performances in the canteen as well as the food policies of the meal providers, this section examines if and how pupil eating habits relate to food policy regulations and how these influence the volume of waste produced in the canteen during school dinners.

The school cooperates with external private meal provider Chartwells: Eat, Learn, Live (DS, 2020). Chartwells is part of the Compass Group, the largest meal provider in the UK and Ireland. Compass Group provides meals not only for primary and secondary schools but also for colleges, universities, hospitals, and businesses. The Chartwells division of the Compass Group works with primary and secondary schools around the UK and Ireland. The company promises to serve meals based on the pupils' preferences with a high nutritional intake while also focusing on healthy meals provision (Chartwells, 2016).

Menus are prepared by Chartwells nutritional department and can be altered based on the school's preferences and suggestions made by the cook. During the interview, the chef mentioned that the school is often delighted with meal selection, and therefore no significant menu alterations are made. The school operates on a three-week menu cycle with a selection of items continuously available. The example of items available for pupils each day is pizza, panini, sandwiches, packed salad, various sweet and salty snacks (Oreo, Cheetos or Hobnob's biscuits), juice, chocolate and strawberry milk, waffles and more. According to Cardoso et al. (2019), the provision of sweet snacks like these not only encouradge pupils to stop consuming healthy meals but also reduces hunger while providing limited nutritional intake. Chartwells provides a selection of daily meal deals for £2.40 (see Table 11). The observations showed that Meal Deal 3 (Pizza and cookie or sweet drink) was the most popular among pupils. Chef adds: *"We have to make sure that the kids are eating and that we have items on the menu the kids going to eat and they will enjoy"* (Interviewee, Chef, November 11, 2019).

Table 11: Meal Deal options in DS

Meal Deal 1	Meal Deal 2	Meal Deal 3	Meal Deal 4	Meal Deal 5
Main Meal of the day	Any Panini	Pizza	Pasta Pot	Any Sandwich
Home Bake (Cookie, Muffin, or other baked sweets) or Drink Cartoon	Home Bake (Cookie, Muffin, or other baked sweets) or Drink Cartoon	Home Bake (Cookie, Muffin, or other baked sweets) or Drink Cartoon	Home Bake (Cookie, Muffin, or other baked sweets) or Drink Cartoon	Home Bake (Cookie, Muffin, or other baked sweets) or Drink Cartoon

The daily menu (see Appendix 19) should be available through the school's website through the Nutrislice system maintained by Chartwells (Chartwells, 2018). However, I could not find any visible link on the school website to view the current menus (DS, 2020). If menus are not published online, parents lack knowledge about what type of food is available in the canteen. On the other hand, parents can identify what type of meals are sold to their children based on the fingerprint recognition system used in the canteen, recording pupils' food choices. The menus are currently displayed on the sidewall in the canteen above the visual range for pupils, making them practically invisible, making it hard for pupils to choose what type of main meal they would prefer before joining a queue. Moreover, some of the menu posters were not well attached to the wall and were hanging upside down. Pupils did not complain about this; in fact, I did not notice any pupils checking the daily menu before lining up in front of the counter.

Table 12 shows the observed estimation of pupils' meal preferences during three days of data collection. The chef provided these data; however, they do not include other snack products sold in the canteen like muffins, cookies, packaged snacks, or packed pasta, which are trendy items among the students. Moreover, the chef was able to provide details just for one of the counters, and therefore the number of portions does not correspond to an observed number of pupils eating in the canteen, around 600. Provided

data show alarm results when at least 60% of pupils choose pizza and panini every day instead of healthier alternatives. The data show that while around 20% of pupils are likely to order the main meal option when popular options are served, such as burger, lasagne or Mac&Cheese, the other mains such as chicken beggers and chicken drumsticks or chicken gyros are barely ordered (see Table 12). Chef admits that some days cooks make only two portions of certain main meals which the staff members take as pupils refuse to eat them.

Table 12: Sold Meal Portions in DS

	Monday (week 3)		**Tuesday (week 1)**		**Tuesday (week 3)**	
	Portion	Percentage	Portion	Percentage	Portion	Percentage
Burger	82	23.70%				
Penne Pasta	3	0.86%				
Chicken Beggers			9	2.88%		
Mac 'n' Cheese			37	11.86%		
Chicken Drumstick			5	1.60%		
Lasagne					49	15.36%
Chicken Gyros					14	4.39%
Chicken Drumstick					2	0.63%
Pizza	96	27.75%	102	32.69%	98	30.72%
Jacket Potato	20	5.78%	20	6.41%	20	6.27%
Panini	120	34.68%	119	38.14%	116	36.00%
Pastries	25	7.25%	20	6.41%	20	6.27%
TOTAL	**346**		**312**		**319**	

The origin of the food served to pupils, or the company's food suppliers are not clear from the website. While the official Chartwells website does not mention food suppliers for food used in the schools, Compass Group mentions that the company is part of SEDEX (Supplier Ethical Data Exchange) which enforces suppliers to present their data later evaluated in view of environmental standards and ethics. The company's sustainability

report (2019) shows that currently, more than 70% of fruits and vegetables are supplied locally, and the company puts an effort to educate cooks preparing meals in line with seasonal requirements. However, the origins of other food products used by the company, including meat, wheat or milk, are generally unknown, and because Compass Group has not received any standard mark from government or private companies (e.g. Soil Association), it is almost impossible to trace the origin of the food served in the schools. Unsurprisingly, the interviews revealed cooks' limited knowledge regarding food supply:

> *"We know that some of our tint products are sent from the address on the tin, but it might not be because tomato could be brought in from Spain. We do try to use a lot of local products where possible, but because of the size of the company, it doesn't always work that way"* (Interviewee, Chef, November 11, 2019).

5.4.1 Food Waste: Prevention Policies and Practice

The Compass Group sustainability report (2019) analysis points to the company's general policy regarding the SDGs' achievements, particularly: Good Health and Well-being, Responsible Consumption and Production, Climate Action or Marine Conservation. The company introduced three main stages focusing on the FW reduction that are explored in detail based on the observations in DS.

1. **Prevention:** by ensuring that little food goes uneaten through effective meal forecasting and purchasing.

The FW prevention approach in DS is based on the waste book as the main instrument to ensure a practical meal portions forecast. The waste book works as a recording system of sold meal portions each day, creating a forecast for cooks preparing the meals.

"The meals are based on three weeks cycle with multiple options for pupils to choose from, without pre-ordering, and therefore it is important to keep track of pupil's meal preferences" (Interviewee, Chef, November 11, 2019).

During the repeating weeks, the cooks refer to the waste book and adjust the number of portions based on the sold meals from three weeks ago. The chef was willing to share the numbers of the unsold portions from the waste book during the interviews showing minimal food surplus:

"So, my cooks know that that's what they are cooking so such as here for the dinner we add: cheeseburger we have done 60 and were sold out, Cheese pasta -sold out; English Chicken Strips we made two and two were left so on that day we had two meals wasted" (Interviewee, Chef, November 11, 2019).

2. **Food Recovery:** by cooperating with communities to recover surplus food. The company cooperates with multiple organisations like Toast Ale, Too Good To Go or Fare Share to recover its surplus food and redistribute the unused leftovers effectively.

Neither observations nor interviews revealed a school's cooperation with local communities regarding the food surplus in the area. However, the chef mentioned that the surplus meals are usually eaten by cooks or other staff members working in the canteen. The interviews show that Chartwells is encouraging its employees to minimalize FW as much as possible mainly because of the profit concerns:

"We are a private business; we have to control waste because waste is no good for the environment nor business" (Interviewee, Chef, November 11, 2019).

3. **Food Recycling:** by developing more sustainable FW management practices and changing the final destination of the food scraps from landfills and sewers to anaerobic digestion or biodiesel processing. Moreover, the company participates in the government scheme 'Step Up to the Plate Waste 'and agrees to develop FW reports from all sides of the company's operations.

The food recycling policy in the school is practically non-existent. Pupils are not separating their food scraps from other packaging material during the lunch break, and therefore neither food nor packaging can be recycled. However, staff members point out that previously the bins allocated in the canteen were used for waste recycling, but because of the busy atmosphere during the lunch now, pupils cannot recycle anymore:

> *"It does not matter how many recycle bins we put out there. Pupils don't have time to recycle during the half an hour, unfortunately"* (Interviewee, Chef, November 11, 2019).

Although staff members are concerned about the volume of FW produced by pupils:

> *"There is a lot of waste, so a lot of time we stand on the door which stops them from taking the food outside. And if they are stopped, a lot of them will just throw the food away rather than going backing in, sitting down and eating it. And it is very silly"* (Interviewee, Lunch/Behaviour Supervisor, November 5, 2019).

Cooks are more sceptical:

> *"It doesn't matter how well we look after our waste in the kitchen; the kids will always throw staff on their plate that they won't eat"* (Interviewee, Chef, November 11, 2019).

However, as mentioned above, the volume of food and mixed waste is the lowest among recruited schools. This study found that the responsibility for pupils' well-being is shifted between school, meal provider and pupils. During the interviews, the chef mentioned that cooks are trying to encourage pupils to select healthier meals; however, as she adds, it is not cooks responsibility for pupils to eat healthily but for pupils to eat:

> *"Kids won't even try new foods, we try to get them to try by encouraging them, but it is our job to make sure that the kids are fed and that they are eating"* (Interviewee, Chef, November 11, 2019).

However, an interview with one of the cooks shows that the meal provision situation, including shorter break and *'fast food'* serving practices, was implemented after Chartwells meal provider gained a school contract:

> *"When we were Kirklees, the meals were different, and we sold a lot more main meals. But now the kids only get half an hour for lunch; they don't get time to eat the main meals, so they just grab and go"* (Interviewee, Cook, November 5, 2019).

So far, this section has connected school policies and Chartwells meal provider to the development of pupils' eating habits. As mentioned above, the most popular meal option in the canteen is pizza and cookies, and although this selection is understood by both school and meal provider as an unhealthy choice, the chef argues that Chartwells was hired to produce meals that pupils would eat not focusing on healthy meal consumption. Although both chef and cooks expressed their concerns about pupils' unhealthy eating habits during the lunch break, Chartwells fails to raise this

issue with the school and therefore directly encourages the school's unsustainable food policy. On the other hand, one of the cooks remembers how more main meals were sold when the school cooperated with Kirklees Catering as the school allowed pupils to have a longer lunch break. This shows that meal providers can affect schools' food policies while serving healthy meals without loss of profit. Hence, this study reveals the need for the establishment of a national food policy that would include minimum required time for a lunch break which would force schools to provide pupils with enough time and space for healthy meal consumption while taking pressure off meal providers when choosing between serving healthy meals or profit.

Later, this section explores FW reduction policies of meal provider and their implementation in the school. Chartwells's FW policies are based on prevention, food recovery and food recycling. Cooks try to prevent FW through the so-called 'Waste book' where orders are recorded daily to ensure no surplus food is produced. Hence, food recovery is unnecessary as the chef mentions that all surplus food is consumed among the staff. However, food recycling, which should be, according to Chartwells (2019), based on the pupils' separation and environmentally friendly FW disposal practices, are non-existent in the school. While food prevention and food recovery are closely connected to cooking practices and therefore functional in the kitchen, food recycling policies are abandoned in the canteen when the chef shifts responsibility for recycling to school while blaming its short lunch break policy as a reason for non-recycling.

5.5 The Impact of Meal Satisfaction on Eating Practices in DS

This section explores the impact of pupils' meal satisfaction on their eating practices during lunchtime. The Satisfaction Surveys (SSs) are explored in

connection to interview evaluations, observations, and the results of EATs, as the volume of FW production was not measured in the school.

In DS, 377 SSs and 65 MPs[16] were taken during six days of data collection. Pupils in the DS have not been adequately engaged in the study, which is shown in the average daily collected number of SS (63) and MSs (10) that was considerably higher in both primary schools. Discussions with staff members and cooks suggest that low engagement in the study was not caused by incorrect methodological evaluations but rather school practices during the lunch break. One of the lunch supervisors expressed this situation when commenting on pupils' disengagement in the study: *"I don't think they would not want to participate, it's just that they barely get any time to eat"* (lunch supervisor, discussions). Interviews showed that many cooks consider allocated time for a lunch break inadequate when pointing to the fact that some pupils must perform all eating practices within 5-7 minutes. On the other hand, other staff members point to pupils' behavioural issues and therefore argue that pupils would not want to participate in the study under any circumstances.

In total, 236 boys, 103 girls and 23 gender fluids pupils filled the surveys during data collection, while 18 pupils did not specify their gender. Due to a high number of meal options served to pupils in DS (see Appendix 19), only satisfaction with the popular meal such as Pizza, Panini or Sandwiches (see table 12) is analysed. Table 13 displays both pupils' daily satisfaction with the most popular meal items on the menu and the overall meal satisfaction. Data shows that pupils are generally satisfied with all meals they are being served; however, because FW only measurements were not

[16] Due to a low number of meal pictures (MPs) collected during lunch, MPs are not analysed here.

able to be performed in the school, it is impossible to evaluate if pupils' satisfaction has a significant impact on the volume of FW production in DS.

Table 13: Meal Satisfaction in DS

Day	Pizza		Panini		Sandwich		Meal Option			Overall	
04/11/19	16	48%	19	58%	15	44%	Burger	27	56%	102	53%
05/11/19	11	70%	10	70%	6	65%	Mc &Ch	9	75%	65	69%
07/11/19	11	82%	11	55%	5	63%	Lasagne	17	60%	75	61%
08/11/19	5	75%	9	63%	4	91%	-	-	-	37	73%
11/11/19	9	53%	4	38%	7	63%	Burger	15	57%	59	60%
14/11/19	10	61%	5	44%	7	54%	Burger	9	50%	39	51%
TOTAL		**59%**		**60%**		**59%**					**60%**

The fifth question in SS was designed to explore if pupils had leftovers after lunch (see Appendix 2). Data show that while 182 times (48.40%) pupils admitted that they had food leftovers, 174 times (46.54%) pupils claimed to finish all food on the plates. EATs showed that 60% of pupils claimed to usually finish their lunch which is significantly higher compared to what SSs analysis suggests. Therefore, the discrepancies in pupils' answers could be explained either through a small sample size during lunchtime or the fact that pupils are not performing food-related practices in reality in the same way they would do in theory which is aligned with the theoretical findings regarding the implementation of behavioural theories in schools. This shows that focusing on influencing individuals' attitudes does not lead to improvements in one's eating behaviour. Hence, this section points to the gaps in how pupils' food choices are often understood in schools through behavioural theories when the intentions and attitudes are key in food choice formation.

This research points to a limitation in practical application and understanding of behavioural theories based on individuals' food choices in the canteens. It was found that neither pupils nor staff positive environmental attitudes and knowledge towards FW and healthy eating do not significantly impact pupils' food choice and eating behaviour. Therefore, this study shows that pupils' food choices are influenced by other factors such as short lunch breaks, limited space allocation in the canteen, unsustainable queue management, unhealthy meal serving and more. In this way, not pupils and their intentions but rather practices implemented through school food policy are the main factors influencing the development of their eating habits and food choice.

The second part of the fifth question in the SSs explores reasons for pupils' leftovers. As mentioned above, DS was a pilot school, and therefore only reasons found in the literature were included in the SSs. The literature review showed that as well as taste, portion size or feeling hungry, look of the food (Derqui et al., 2017) and inedible parts (Derqui & Fermandez, 2018) were common reasons for pupils' leftovers. However, in all three schools, cooks rarely served inedible parts to pupils (bones or egg shelves) while the look of the meal was rarely mentioned in the SSs and therefore both of these options were removed from the SSs in primary schools and were replaced by vegetable (often mentioned in 'others' options) and bread. In DS, most pupils with leftovers complained about the taste of the served food, while about 20% of pupils were being served too big a portion or not feeling hungry enough (see Table 14).

Table 14: Leftovers' Reasons in DS

Reasons	Number of Pupils	Percentage of Pupils
I did not like the taste	78	47.85%
Too big portion	21	12.88%
I am not hungry	11	6.75%
Look	11	6.75%
Inedible Parts	7	4.29%
Others	15	9.20%

These results show that although cooks argue that the menu is developed in line with pupils' taste preferences, this does not guarantee high meal satisfaction or empty plates. This study shows that focusing on the preparation of meals popular among pupils does not increase eaters' satisfaction as the average satisfaction rate (60%) in DS is the lowest compared to primary schools where more vegetable and less popular meals are served. Hence, this study shows that serving less healthy meal options in the school canteens does not increase pupils' satisfaction, significantly reduce FW or contribute to pupils' social well-being, and in this way is not aligned with SDGs achievement.

5.6 What have we learned in Dewsbury?

This section concludes the most influential findings emerging from data collected in DS in November 2019. Pupils' EATs showed urgency for re-evaluating the school's food educational processes and FW practices performed in the canteen during lunchtime. The most important issue emerging from the EATs is that the pupils do not separate their waste during lunch break. EATs show that most pupils would not separate their waste even if the school provided recycling bins in the canteen. In this way, pupils see surplus food as material without value (Evans et al., 2012). However, this research found that pupils' negative attitudes towards waste

recycling are not connected to pupils' unwillingness to recycle but rather to school's food policies directly affecting eating practices in the canteen.

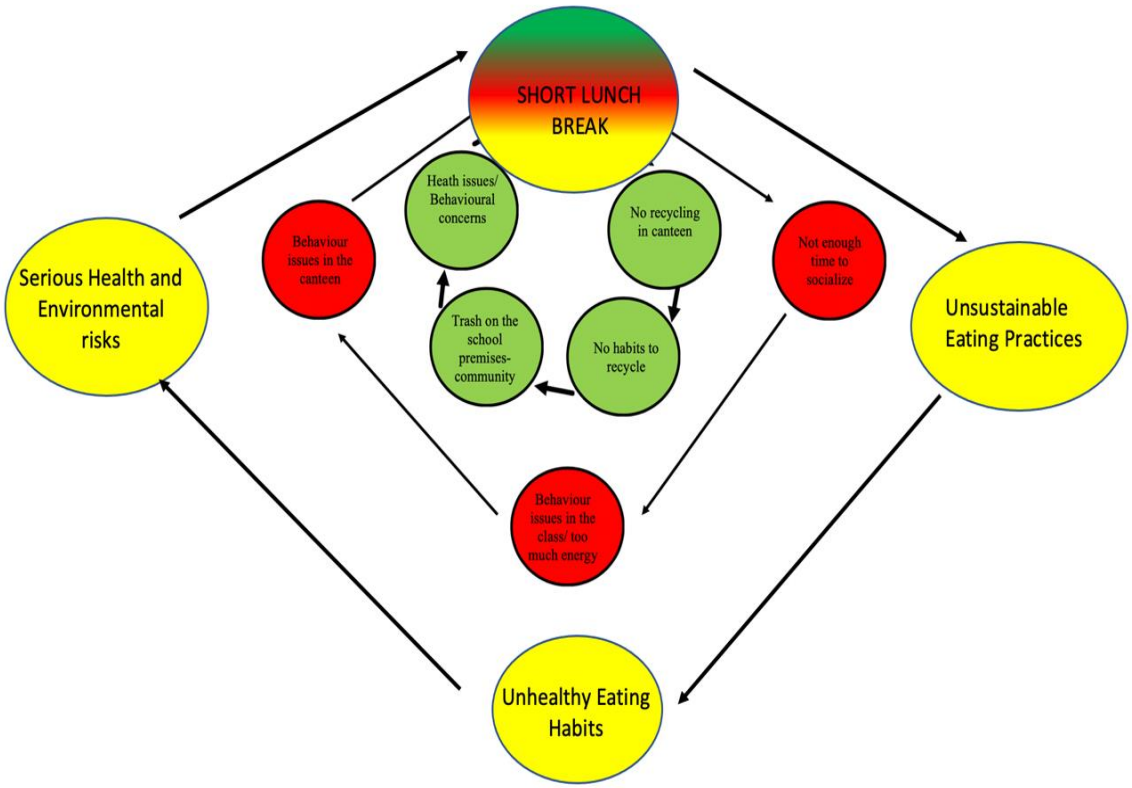
Firstly, 30 minutes lunch break provided for more than 600 pupils is not only environmentally unsustainable (no time for recycling) but also negatively influences pupils' eating habits. Pupils are often forced to choose quickly, which means choosing less healthy meals with lower nutritional intake. On the one hand, this has been proven to negatively impact pupils' well-being and health (Thomas et al., 2019). On the other hand, low volumes of FW produced by pupils in DS during lunchtime show that the practices forcing pupils to choose less healthy, small meals might be significant factors contributing to the reduction of FW production in DS.

Secondly, pupils are allowed to consume food and dispose of their waste only in the canteen. However, as they are not required to recycle, they do not have a chance to develop waste separation habits. This surprisingly does not only lead to negative attitudes towards recycling, but EATs show pupils' limited understanding of waste post-consumption processes. Pupils' misunderstanding of the recycling practices and their inability to recycle themselves points to the school's incapability to apply sustainable routines in the canteen. This study found that pupils' unsustainable recycling habits are connected to the school's short lunch break policy as well as non-recyclable bins allocation in the canteen. In this way, it is school food policies implementation rather than individual choice responsible for pupils' unsustainable eating practice performances during lunch break.

Unfortunately, this study shows that shortening school lunch breaks not only leads to deterioration of pupils' waste disposing practices and behavioural issues but also worsens pupils' health through the development of unhealthy eating habits. The short lunch thus lies at the centre of unsustainable practice performances in the canteen (see Figure 8). First, due to short lunch break, pupils fail to develop habits to recycle in the

canteen and therefore they do not use appropriate bins outside either, which might attract birds and create health risks. Second, a short lunch break was established as a measure to prevent pupils from being: *"rowdy and silly",* however, during data collection, multiple incidents of pupils being disciplined and parents attending disciplinary meetings with their children were observed, which suggests that short lunch breaks do not improve pupils' behavioural issues (Interviewee, Lunch/Behaviour Supervisor, November 5, 2019). Moreover, lunch supervisors often mentioned that pupils are: *"going crazy"* in the canteen during the lunch break (lunch supervisors, discussion). This indicates that the school uses the wrong tool to improve behavioural problems and that the situation seems to worsen with a short lunch break. Third, due to the short lunch break, pupils' eating habits worsened, representing a future risk to their health, while unsustainable waste disposing practices contribute to environmental problems connected to landfilling, pollution and climate change (Bloom, 2010).

Figure 8: Waste Loophole- Health, Environment and Practices



Theoretically, this chapter contributes to understanding practices and their impact on pupils' environmental attitudes and knowledge. Educational processes developed to influence pupils' environmental understanding in the schools are based on the traditional, individual-orientated concepts that Shove (2010) calls ABC and Ham et al., (2015) EA. These individual-focused frameworks are built on the linear model of behavioural influence when knowledge and attitudes directly impact behaviour and choice. However, this study shows that pupils that are required to perform unsustainable eating practices (eat within 10 minutes, not sitting down while eating or not separating waste material) because of school's requirements of practice performances (30 minutes lunch break, limited space allocation, no recycling bins) are developing negative attitudes towards the environment and sustainable practice performances. This is indicated by the fact that 33% of pupils would not separate their waste even if they had a chance, while more than 30% usually do not finish their

lunch. This shows why a linear model of behavioural influence does not work in schools.

While the individual-orientated model used in the school works on the principles of knowledge and attitudes influencing behaviour and choice, it is clear now that to change pupils' behaviour and influence their choice, practices must be implemented into the school environment. The analysis shows that the same pattern emerges from the evaluation of staff members' level of EA when all staff members are inclined to finish their lunch as part of their upbringing: "*I was brought up this way".* Hence, their past practices become their attitudes and reasons for their future practice performances. This points to the importance of sustainable practice implementation in pupils' homes and schools, representing their future practice performances. Therefore, if pupils are not used to recycling, eating healthy meals or eating while sitting down, these practices will translate into their future eating habits with possible adverse effects not only on the environment but also on their health. In this way, it is not focusing on behaviour and choice but rather the development of sustainable habits and routines that plays a key role in achieving sustainability and human well-being.

Chapter 6: Huddersfield School

In this chapter, the Huddersfield school (HS) is evaluated based on its environmental strategies and practices promoted within the school environment through the lens of Practice Theory (PT), Environmental Awareness (EA) and Sustainable Development (SD) models. The chapter explores the most influential factors affecting the volume of FW produced during daily school lunches, including school environmental involvement, level of EA among pupils and staff members, meal satisfaction and employees' environmental views. Results from Environmental Awareness Tests (EATs) are analysed in connection to the school's eco-programmes involvement and other eco-activities. Similarly, the impact of the school's environmental practices on the school curriculum is explored in connection to food waste (FW). In this way, this research investigates if and to what extent the school's environmental practices influence the volume of FW production during daily school lunches. However, to understand the impact of pupils' and staff members' levels of EA on the production of FW, EATs are analysed through PT and the concept of EA. In this way, the school's practices, level of pupil' EA and employee attitudes towards the environment are not investigated individually, but holistically as part of a complex system of eating as *'compound practice'*, helping to understand the impact of these factors on the volume of FW.

6.1 About the School

Huddersfield is located in West Yorkshire in the north of England, and the chosen school is considered an above-average size with a maximum capacity of 600 pupils. The school values tolerance, cooperation and courtesy to foster an encouraging educational environment where each pupil has an opportunity to develop a work ethic and achieve their full potential (HS, 2020). The school scored only 1926 out of 32844 on the national deprivation index in 2019, adding HS to a group of schools located

in the worst deprivation zones in the UK (GOV.UK, 2019). The possible impact of the deprivation index on school eating practice performances is discussed later in this chapter.

Ofsted reports (2003, 2005) show that most pupils attending the school come from disadvantaged ethnic groups. The school improved its overall Ofsted grade from satisfactory (requires improvements) in 2008 (Ofsted, 2008) to Good in 2014 (Ofsted, 2014) and stayed in this category with results in reading, writing and Maths corresponding to the national average (GOV.UK, 2020). HS provides free courses for parents to get involved in their child's education at home, which according to Desforges and Abouchaar (2003), is the main reason for pupils' educational improvements. Moreover, the school provides an opportunity for pupils to get involved in multiple outside classroom activities (clubs), starting with the breakfast club (8:00-8:45); breakfast is £1 per day per pupil. A Healthy Fruit Shop is available during the school day (from 10:15 am or 10:40 am), where pupils can buy a selection of fresh fruit or water for 25p per item. More clubs run during lunchtime (basketball, football, cheerleading, rugby or netball) and at the end of the school day from 3:05 pm – 4 pm (gardening club, guitar club, cricket, gymnastics and more) (HS, 2020).

At the time of the study, 549 pupils between the ages of 7 to 11 years old attended the school, with a mixed-gender ratio of 51% boys to 49% of girls (GOV.UK, 2020). Many pupils attending the school come from overseas families leading to a high level of persistent absenteeism due to overseas family visits (Ofsted, 2005). Around 80% of pupils speak English as a second language, which is considerably higher than the national average (21.2%) (GOV.UK, 2020). Only 0.5% of pupils are included in SEN (Special Education Needs) and Health Care Plans, but more than 15% need SEN support. The school employs 108 staff members.

6.2 School's pro-environmental involvement and recycling practices

In this section, the school's pro-environmental activities are explored through participation in eco-programs and the implementation of eco-activities. The school's website points to active involvement in the Healthy School Programme (HSP) through the achievement of the Golden Award and the implementation of other activities recommended via the programme guidelines. The programme provides support in multiple areas such as 'School Food Nutrition and Cooking, Citizenship, Participation and Sustainability, Spiritual, Moral and Cultural Development' and more (Healthy Schools, 2020, p.1). The programme assesses schools' based on Ofsted standards and the implementation of Ofsted's recommendations, which are balanced between health and well-being and the nutritional aspects of the school food system. Schools are allowed to self-validate the implementation of the programmes' recommended practices into their daily curriculum. Therefore, it is easier to achieve a Gold award compared to other programmes, where external validators assess schools based on the national school standards rather than the school's view of themselves (Orme et al., 2011).

Is it necessary to analyse one of the core parts of the HSP, the Healthy Eating initiative, as it is the most relevant to this study. The company provides detailed food plans for all the schools enrolled in the programme consisting of several recommendations and challenges aligned with government policies for schools. Some of the requirements are increasing pupils' Hot School Meal (HSM) intake, improving the quality of school meals (SMs), setting up a breakfast club, training teachers regarding nutritional recommendations, and improving practices in the kitchen. Schools are also encouraged to establish pupil ambassador meetings to discuss lunch menus with the main cook to improve meal planning and satisfaction (Dimbleby & Vincent, 2013). Although the school website describes regular school

council meetings involving student representatives (HS, 2020), during data collection, neither the manager, lunch supervisors, nor cooks acknowledged having any such meetings.

According to Shove (2010), most government policies established to tackle climate change directed to institutions are based on the ABC framework targeting individuals. The concept of EA is similar to the ABC framework where attitude (A) influences (B) behaviour through which the individual adopts a choice (C). In this way, the policies are designed to influence individual behavioural by encouraging positive behavioural patterns while the habits and routines are viewed only as an *"abstract factor bearing down upon the behaviours it directs"* (Shove, 2010, p.1276). In the same way, instead of implementing recommendations into daily school routines, the HSP is designed to influence pupils' behaviour through recommendations for the schools. Interestingly, interviewees were not aware of the school's participation in the programme or the achievement of the golden award from the HSP. This was confirmed by a school manager, who stated that:

> *"So we have not got any eco awards, but certain year groups and classes have often done eco-projects linked to the curriculum"* (Interviewee, School Manager, November 5, 2019).

The only FW prevention practice observed in the school was VIP Fridays, which aim to motivate pupils to finish their meals by eating with their favourite teacher during Friday lunch. Although VIP Fridays positively influence some pupils, others complained that pupils who did not finish their lunch every day during the week often get the VIP Friday seat, as the system is based on pupils' honesty rather than cooks' or lunch supervisors' evaluations. This is connected to the issues with the self-evaluation techniques that are popular but not effective instruments. Except for VIP Fridays, no other food-related environmental practices were observed in the school during lunch.

EATs were filled by students during teaching lessons, handed to their teacher and collected at the end of the data collection period from the school manager. The tests were evaluated based on the positive/negative connection towards the environment and FW (see Appendix 1). EATs explored to what extent dispersed (knowledge) and integrative (attitudes) practices influence pro-environmental intentions based on the linear model of EA and the extent to which this leads to the creation of compound practices resulting in the production/reduction of FW. EATs questions are analysed separately through correlations with eating practices and other EAT questions. As is common in questionnaires, not all questions were completed by every pupil. The response rate was 71%, while only 4.9% of pupils scored 100%. High participation in the EAT shows the school's active engagement in the study, providing reliable results for EA evaluation.

Observations showed that in each school at least 80% of all pupils attending the school enter the canteen during the lunch break of which at least 60-80% eat HSMs. A similar pattern was found through EATs in HS when 57% of pupils answered that they usually order HSM. This shows that the pupils have a habit of coming to the canteen to eat their lunch instead of staying in the class, going home or eating meals outside the school. This is a crucial fact, as it is vital to locate the place where the majority of the eating practices are performed to tackle pupils' eating habits through the implementation of suitable integrative and dispersed practices affecting the development of compound eating practice (Warde, 2013) and hence FW.

6.2.1 Separation and Recycling in HS

The first question from the EAT (see Appendix 1) determined how well pupils know canteen practices and if they understand the FW related activities in the canteen. During lunch, pupils must separate their FW scraps

and place them into the allocated bin while all other waste is disposed of separately. The results show that the majority of pupils (28%) claimed to regularly use food only containers in the canteen; however, considerably higher numbers of pupils (31%) were not aware of these containers. However, most of these pupils (21%) had a positive attitude towards FW separation, as they stated that they would have used an FW only container if provided (see Table 15). This might be connected to the fact that pupils with packed lunches are not required to separate their food scraps from other materials; instead, they are obliged to take their FW home. However, observations showed that many pupils with home-packed lunches are throwing their food scraps and packaging into the same bin, demonstrating a lack of understanding of school separation policies.

Table 15: HS: Food only Container

	HUD	
	n	%
We have food only container and I am regularly using it	**110**	**28**
We have food only container, but I am not using it	32	8
We don't have food only container, but I would use it if we did	80	21
We don't have food only container and even if we did, I would not use it	38	10
I don't know	79	20
No answer	43	12
TOTAL	**382**	100

This suggests that the school needs to implement stricter regulations for FW separation practices performed by pupils eating in the canteen. In this way, pupils could start understanding food leftovers, not as waste material thrown away together with plastic wrappers, but rather as a more valuable resource. However, while pupils need to understand the positive impact of canteen waste segregation, cooks point to the school's non-existing recycling policies:

> *"I don't understand why we are forcing pupils to separate the waste when everything eventually ends up in the same bin together."* (Interviewee, Cook, November 6, 2019).

During interviews, many cooks complained about non-recycling processes in the school, while the kitchen chef pointed to the high number of plastic bags thrown away daily. Another cook (working in multiple schools) expressed her disappointment with the council's and schools' recycling policies (Interviewee, Cook, November 7, 2019):

> *"They don't recycle their own things, and all the rubbish goes into the same place which isn't very good … you would think that because it's a school, they would do something, but they don't. And even in the other schools, they don't. But I think as the chef said yesterday that they have to pay extra to get the things recycled, so they don't want to spend the money on it which is quite sad because a lot of rubbish is going in the same bin".*

So far, this study shows that Kirklees Council's lack of interest in the school's recycling policies leads to environmentally damaging practices performed by dozens of schools in the Kirklees area. These practices have a significantly negative impact not only on the planet but also on employees' trust in government bodies and pupils' false perceptions about their impact on the environment. What is more, this research suggests that Kirklees schools are not aware, not willing to investigate, or do not care about their environmental footprint. Given these factors, it is not surprising that the school manager in the school shows a lack of awareness about school waste disposal practices:

> *"We have a paper recycling, and I believe the kitchen recycles some carbon boxes and packets and other things that can be recycled"* (Interviewee, School Manager, November 5, 2019).

On the other hand, EATs showed that staff members are aware of the final destination of FW while pointing to limited resources allocated to environmental FW processing. Even the school management complained about the council's lack of policies targeting FW management:

> *"I think there is a problem in Kirklees generally with food waste because homes can't recycle food waste. So the Kirklees refuse collection to collect food waste. So awareness isn't very high in the community not just our community here but generally because it's not something we do at home. Whereas in other authorities dividing your waste into food waste and paper is daily practice so it might impact morals in kind of organisations like schools or workplaces. There isn't a way in Kirklees for us to recycle food like that"* (Interviewee, School Manager, November 5, 2019).

Interestingly, results indicate that most pupils seem to know about the post-consumption stage of their food scraps, with 40% of pupils assuming that their lunch leftovers end up in landfills (see Table 16). However, 20% of pupils still assume that FW is composted or otherwise recycled, demonstrating a lack of knowledge about FW disposal practices.

Table 16: HS: Post-consumption food stage

	Huddersfield	
Landfill/ dump/hole/trash/garbage	**156**	**40%**
Compost / Recycling	79	20%
Sea/Ocean	37	10%
Poor/homeless	13	4%
Not related	0	0%
Others	40	11%
Bin/bigger bin/van	32	9%
No answer	25	7%
TOTAL	**382**	100%

6.2.2 Mid-chapter Summary

So far, this section has revealed several inconsistencies related to the school's environmental involvement and eco-programmes theoretical foundations. While the information found on the school website points to the school's active participation in the HSP and presents an excellent application of programme recommendations into the daily curriculum (HS, 2020), interviews with staff demonstrated the limited impact of the programme on the daily school practices. According to Evans et al. (2012), PT points to the importance of interconnection among the carriers of practice and practice attendants; however, in this case, it revealed detachment and lack of interest in pro-environmental activities among school practitioners. Although participation in the HSP could be considered a sign of the school's attempt to implement more pro-environmental practices to improve its environmental position, PT shows that the school, unfortunately, fails to apply and reproduce programme-recommended practices, which is the critical component of practice efficiency (Evans et al., 2012). Indeed, the investigation of multiple practices performed by pupils (such as gardening, VIP Fridays, or participation in the HSP), which were supposed to improve schools' environmental position, had little if any real impact on the pupils' food habits.

This study shows that the ABC approach (Shove, 2010) used by the HSP developers is not an effective tool in school environments. There are several reasons for this. Firstly, schools can use self-evaluation techniques that fail to produce a practice implementation in the school environment. Instead, the schools use these techniques to improve public opinion about the school's environmental position. Secondly, the programme's individual orientated approach is not well received by the pupils in the canteen. Pupils do not know how to apply their knowledge because the school fails to produce a supportive environment for new practice perforations. And finally, due to a failure in the reproduction of practices, staff members are

not aware of the change in pupils' eating habits and therefore cannot relate to the new sustainable approach the school is trying to implement. In this way, PT points to a significant gap in eco-programmes using self-evaluation techniques while directly showing the inefficiency of the programme's recommendations during their implementation in a school environment due to their individual orientated character.

A similar pattern is evident concerning recycling in the school. While school management assumes that recycling is Kirklees Council's responsibility, the cooks are aware that none of the waste produced by the school in partnership with the meal provider Kirklees Catering is being recycled. As canteen staff members are employed by the council, the lack of communication between the cooks and the school management is a key reason for the school's limited knowledge about recycling. As mentioned above, the disconnection between the practice attendants and 'carriers of practices' represents a significant gap in the efficiency of practice performances (Evans et al., 2012). However, to understand the school's role in achieving SD standards, the lack of pro-environmental activities in this study can be connected to McKenzie's (2004) definition of social sustainability, where social, environmental and economic sustainability starts in communities.

In the Kirklees area, the council is the primary agency driving sustainable practices as entities for its citizens to be reproduced within households and institutions to become a practice performance. In this way, the council may reach its local sustainability goal as stated on its website (Kirklees Council, 2021) website:

> *"We need to consider everything from reducing the amount of rubbish that we create, finding ways to reuse and recycle materials so that we use less energy refining raw materials, and reduce the amount of carbon produced in the disposal processes."*

However, by refusing to provide environmental services for the schools in the area, material separation practices performed by pupils lose their sustainable value; therefore, they cannot be part of compounded recycling practices as they fail to impact the environment positively. Moreover, Kirklees Council employees cannot reduce the volume of rubbish as stated on their website because they are not aware of quantities or types of waste produced by schools, with all school waste ending up in landfills, thus undermining sustainable efforts elsewhere.

6.3 Environmental Knowledge, Attitudes and Intentions

In this section, the school's level of EA is explored through pupils' and staff members' knowledge, attitudes and intention about FW and the environmentally related educational processes in HS. As a tool, EATs are used to explore the impact of participants' environmental knowledge on their environmental attitudes and intentions while exploring the impact on the FW volume reduction. In this way, participants' environmental knowledge and attitudes are understood as one of the key factors influencing environmental intentions, which should positively impact the pupils' eating practices leading to FW reduction.

The critical element in exploring participants' environmental knowledge was to identify their understanding of FW. Findings show that all staff members in this school, and about 88% of pupils, understand the concept well, while only 7% of pupils misunderstood FW as *"not eating the food"*, *"food not used"*, *or "recycling but only food"*. These results point to pupils' high awareness of the FW concept. The following questions from the EATs indicate that about 65% of pupils have been taught about FW in school, while 78% of pupils recall some type of food education implemented during lessons. This shows that although the impact of the HSM was not found to

significantly impact pupils' eating practices, HS implements some food education into pupils' curriculum, creating a sufficient knowledge platform for pupils to learn about the FW idea.

So far, this case confirms that almost all pupils and staff members in HS understand something about FW production and the negative environmental impacts of unsustainable FW disposal. However, it is essential to explore the extent to which participants' environmental knowledge influences their perception of the FW to understand how to motivate pupils to change their eating practices and establish sustainable school routines leading to FW reduction. Pupils' attitudes to FW were explored using a series of questions in the EATs, while staff members' environmental attitudes were analysed using interviews.

Firstly, pupils were asked if they think wasting food is bad; understandably, more than 90% of pupils think so. Most of the pupils believe that wasting food is wrong because they are concerned for poor people who do not have enough food while they are throwing it away. Although more than 90% of pupils think that wasting food is bad, when asked if they normally finish their school lunch, only 57% of pupils had a positive answer, while even fewer would finish their lunch when they are full (see Table 17). These results point to the limited impact of environmental attitudes on pupils' eating intentions. Therefore, they show that the linear model based on individual orientated social theories is not an effective instrument for explaining complex phenomena such as FW in schools.

Table 17: HS – Pupil's Food Waste Attitudes

Q7: Do you think wasting food is bad?	n	%
YES	355	92%
NO	16	4%
No answer	11	4%
7a) If YES why?		
Because of poor/hungry people	175	49%
Because of the waste of money	69	19%
Use it for something else (reusing)	3	1%
Because it destroys environment	17	5%
Because animals could have it	10	3%
No answer/Other	81	23%
Q11: Do you normally finish your school lunch?		
YES	220	57%
NO	145	38%
No answer	21	5%
If Yes, Why?		
Waste	41	11%
Energy/Health	7	2%
Hunger	59	15%
Taste	64	15%
Others	32	8%
If No, Why?		
Too much	50	13%
Taste	65	17%
No School lunch	2	0%
Others	19	5%
Packed Lunch	0	0%
No answer	47	14%
Q12: Even if you are full, do you try to finish your school lunch?		
YES	214	55%
NO	129	33%
No answer	43	11%
Sometimes	N/A	N/A

EA belongs to a group of individual-orientated behavioural theories (Ham et al., 2015), suggesting that the main reason for pupils' anti-environmental behaviour (B) regarding FW are so-called 'contextual factors (C)' and 'attitudinal variables(A)'. However, while contextual factors and attitudinal variables are, according to Stern (2000, p.415), described as barriers and/or motivators to achieve specific behavioural characteristics of the individual, Shove (2010) argues that it is hard to determine if they have a positive or negative influence on individual behaviour as they might have a contrasting impact on people and therefore the complexity of the

investigated issues cannot be fully understood within limited behavioural theories foundations. In this study, Shove's (2010) criticism of the theoretical foundation of behavioural theories becomes directly relevant. For example, a discussion with lunch supervisors revealed that the pupils in the second setting often waste less food as they take their time to finish the meal before going back to classes. On the other hand, pupils in the first set attend clubs directly after lunch, and therefore they are motivated to either finish quicker and leave or throw their lunch away to leave quicker. For each pupil, clubs during the lunch might be either motivational to finish the meal or discouraging – waste more food.

The same principle is valid for other most influential factors affecting FW production, such as portion size, vegetable preference or feeling hungry. Therefore, I suggest that these contextual factors that positively or negatively affect individual behaviour must be viewed from a broader perspective of the overall system. In this way, PT allows adjustment of certain practices leading to systematic changes resulting in FW reduction through, e.g. cancelling the clubs during the lunch, exploring the menu options during the classes or discussing pupil's taste preferences before changing the menu cycle.

Staff members' attitudes towards FW were explored through EATs as well. Five out of six staff members consider FW to be a significant environmental problem. The reasons for staff members' beliefs were mainly connected to the perceived economic impact of FW (cost of food production) rather than environmental consideration (the impact of FW on the planet) or ethical issues (some people do not have enough food), as seen with pupils. However, the EATs data point to inconsistencies in staff attitudes. On the one hand, all staff members think that individual behaviour is a key to preventing food environmental crisis, while on the other hand, no participant thought that individual actions are key to achieving FW reduction. This shows that staff members fail to connect the current FW

crisis to their own food practices. These findings point to the confusion carriers of practices experience while not knowing the impact of their habits on the environment. Therefore, this study suggests that pupils and school staff need to be re-educated about the effect of their eating practices on the environment, economy, and society, leading to adjustments of food-related practices in the school.

In conclusion, this section shows that pupils are fairly knowledgeable about the FW even without active participation in eco-programmes or implementation of effective eco-practices in the curriculum. This study shows that pupils are more food-educated than their teachers and cooks were at their age, pointing to a successful implementation of food education into schools' curricula as shown in Evans et al. (2012) ethnographic study exploring the history of the waste. However, at the same time, the majority of pupils admitted that their level of EA does not stop them from throwing their meals away, as only 57% of pupils regularly finish their meal during the lunch break.

Brian Wansink (2006) describes an experiment with similar implications. He presented his portion size findings to 40 highly educated researchers and showed how portion size increases peoples' food consumption. Later, these researchers were invited to an 'experiment party' where their food intake was measured. Although participants were informed about the impact of serving size, they ate 59% more food than students with smaller serving plates that were served the same food volume. The implications here relate to ineffective linear settings of educational policies that are based on the behavioural orientated theories where individuals' knowledge, attitude and behaviour take precedence over the establishment of sustainable routines and habits in schools that are oddly being considered as *"an abstract factor"* driving behaviour (Shove, 2010, p.1276). In this way, schools lose control over their environmental footprint, pupils leave schools without enhancing their pro-environmental understanding, and

governments fail to provide efficient pro-environmental recommendations. Therefore, this study suggests that a radical movement in schools' environmental policy development regarding the FW reduction needs to be established. Policies and legislation must help schools develop sustainable practices that are by multiple repetitions transformed into a routinised type of behaviour and habits (Evans et al., 2012) rather than using an ineffective individual-orientated approach leading to the wasting of schools' resources and pupils' future environmental potential.

Similarly, staff members are aware of the FW issues but, unfortunately, fail to see the connection between the economic, environmental and social impact of the FW. The same approach is unfortunately found in the schools where economic losses take precedence over the environmental or social impact of the FW, therefore leading to a deceptive loop. Schools try to improve their financial situation by serving cheaper, worse quality food, ignoring recycling, or increasing HSM prices. Although these arrangements can bring short term economic profit for schools and meal providers, they lead not only to environmental damage through increased FW production but what is worse, they influence the development of unhealthy food consumption patents and obesity of pupils when they move away from the HSM provision due to quality and or price. In this way, schools fail to establish practices that would lead to positive environmental and social change. If this continues, this unsustainable view of the food system that policy developers desperately hope to improve will lead to higher FW volume production, higher prices for the HSM and eventually more pupils leaving school hungry. However, Morgan (2020) argues that the way out of the low-cost school meal provision loophole is to increase the portions sold during the school lunch leading to a positive influence on pupils' health and keeping the profit for schools and meal providers.

6.4 Eating Practices during the Lunch Break in HS

In this section, dispersed and integrative practices (Shatzki, 1996) performed in the canteen by practice carriers (pupils and staff members) during the lunch are analysed to explore their impact on the performance of compound eating practice (Warde, 2013) and its impact on FW. Interviews provided valuable details about practice performances in the kitchen and canteen, which led to a better understanding of the food practices in the school. At the same time, the interviews demonstrated gaps in staff members' knowledge about food processes while pointing to significant communication issues among the school practitioners.

The lunch break in school lasts 90 minutes and is divided into two sittings. While the first set of pupils eats their lunch inside the canteen (Year 3 and 5) from 11:45 am until 12:40 am, their peers attend clubs. At 12:20 pm, pupils in the second sitting (Year 4 and 6) enter the canteen. There is a 45-minute limit to finish lunch and return to the class no later than 1:15 pm. Pupils in both sittings enter the canteen simultaneously, creating problems with queue management, which often confuses younger pupils. Pupils with HSM are required to queue in front of the serving counter, while pupils with home-packed lunches are free to choose any seat in the canteen. The queue to the HSM serving counter is often very long and blocks the entrance for pupils with packed lunches. This creates confusion and noise around the canteen and often accidental spillages of the food. At the same time, lunch supervisors try to allocate seating and clean up after pupils while helping pupils with special needs. One of the lunch supervisors pointed out that this situation is often overwhelming and confusing or stressful for pupils.

The school has an HSM ordering infrastructure for parents to pre-order lunch for their children before each school day begins. However, observations showed that every day between 30 to 40% of pupils still

consumes home-packed lunches. According to Evans et al. (2016), these parents' routines lead to unhealthy eating habits through which children consume more sugar and fewer vitamins and proteins compared to pupils with the HSM option. These findings are relevant in this school as observations indicated that although school regulations (HS, 2020) forbid parents to pack sweets, chocolate, kiwi fruit or food containing nuts, these policies are often ignored. Truninger et al. (2013) point out that parents understand their partial responsibility for their children's unhealthy eating habits; however, the child's satisfaction with the food often prevails over nutritious and healthy food serving: "*My son cries. He does cry! Sometimes I feel sorry for him, and if I don't give him the Merenda in the morning, I end up giving it to him in the afternoon*"[17]. Therefore, these unsustainable food practices might lead to pupils' health problems such as diabetes, obesity, and other food-related diseases. Therefore, this study shows the importance of sustainable food practices implementation in parents' and pupils' lives starting with the improvement of schools' meal provision and encouragement of children's guardians to rely on the HSM system to improve their children's health and food quality.

Going back to canteen routines, pupils whose parents pre-ordered HSM receive a coloured token based on the chosen meal option. These tokens are later given to cooks during the meal serving process. Pupils can voluntarily choose vegetables (e.g. corn or beans) and carbohydrates sides (e.g. bread or rice), but as the chef pointed out:

> *"I like to make sure they have got vegetables on their plate because I just feel that way, and they are more likely to try it if it's on their plate. If you won't put it on, they will never try it."* (Interviewee, Chef, November 5, 2019).

[17] Interview with mother, 43 years old from Truninger's et al., (2013) study

The school manager argues that the gardening club has helped pupils to establish a connection with fruit and vegetables and the food served in the canteen:

> *"We have a gardening club and what it's the time of year kind of products to be picked. So, for example, the tomatoes or the potatoes that were good enough would be given to the chef in the kitchen, and she'd make something with them and an assembly. But I suppose for the number of children we've got quite a small scale effort because the garden is quite small"* (Interviewee, School Manager, November 5, 2019).

However, the chef does not recall any occasion where she has received fresh ingredients from the school garden:

> *"I have seen them doing some baking and some stir-fries down in the DT room, but I wouldn't know. Because I don't have anything to do with the school itself but only the catering size because technically, we are like an outside company that's coming"* (Interviewee, Chef, November 5, 2019).

In a similar way to previous sections describing the school's recycling practices and eco-programme activities, this section points again to a lack of communication between the school management and the cooking staff members. Adequate communication infrastructure is not established in the school, leading to issues with the performance of food practices. While the school management blindly believes that the school has a pro-environmental strategy in place, the cooks are aware of the schools' lack of pro-environmental food practices performed by both students and staff members, respectively.

PT is helpful here. Evans et al. (2020) propose the establishment of food routines in schools' environments to effectively tackle communication problems. They suggest that practice reproduction ensures increased awareness of school practitioners without the necessity of relying on the functionality of communication channels among carriers of practice. On the other hand, the chef pointed out that pupils are getting better at eating fruits and vegetables in comparison to previous years, but she adds that:

> *"It's quite hard to pay attention to the individual child when there are normally more than 300 pupils eating school meals at the same time"* (Interviewee, Chef, November 5, 2019).

During interviews, multiple staff members mentioned that the cooks, compared to other schools, fail to encourage the pupils to try new things. One of the cooks in the school on the temporary rota stated that:

> *"I've noticed that they are not doing it in this school compared to other schools if there's something a child hasn't tried before.* [In other schools] *They let him taste a little bit on the plate. But they don't really do that here."* (Interviewee, Cook, November 7, 2019)

Lunch supervisors expressed a similar opinion, suggesting that one of the necessary improvements in the school should be *"more encouragement in trying"* (Interviewee, lunch supervisor, November 5, 2019).

These findings point to specific improvements in the school's meal provision when serving healthy food. However, failure to implement practices such as queue management and pupils' gradual entrance to the canteen was found to have a significant negative impact on pupils' healthy eating habits. Insufficient encouragement to try new things and eat healthier foods can also be a consequence of the ineffective pupil management practices in the canteen.

There are two main bins allocated in the canteen where pupils are required to separate FW from other materials. One member of staff helps pupils with segregation of the FW, and in the case of considerable food leftovers on the plate, pupils might be sent back to finish their meal. Pupils in both sittings are allowed to leave the canteen as soon as they have finished eating. They might go and play outside, join the clubs or go back to their classrooms. During one day of the study, I observed a teacher coming into the canteen and rushing pupils in the first sitting to finish their lunch because of the early club start. One of the lunch supervisors argued that while pupils in the second sitting take their time to enjoy the lunch, and therefore eat more and consequently waste less, pupils coming into the canteen first want to leave as soon as possible and use their lunch break to enjoy clubs or sports activities with their friends, which leads to an increased volume of FW. Observations confirmed that the pupils in the first sitting do waste more food.

6.4.1 Catering and Menu in HS

The school relies on Kirklees Council Catering Team to prepare meals. The price is £2.20 per meal for pupils not eligible for free school meals (FSMs). During the study, 36.1% of pupils were eligible for FSM (GOV.UK, 2020). However, the average number of pupils eligible for free lunch in the last six years was 40.3%, which is significantly higher than the national average (23%). Cooking staff and lunch supervisors were mostly satisfied with the quality of the ingredients provided by the food supplier, as one interviewee stated.

> *"The quality of the meal we provide is excellent. It has got a lot of nutrition and health benefits. Nothing is fried, everything is baked"* (Interviewee, Lunch Supervisor, November 7, 2019).

However, some of the cooking staff pointed to the limited volume of fresh vegetables served to pupils by the meal provider: *"I would probably just go for more fresh vegetables"* (Interviewee, Cook, November 6, 2019). Others automatically connected the quality of the ingredients to the meal provider without questioning the food quality:

> *"I think it'll be good quality because it's with Kirklees and they have to provide for the children. So it should be good quality"* (Interviewee, Cook, November 7, 2019).

National studies investigating the impact of the deprivation index in UK neighbourhoods on the quality of food consumption show that people in highly deprived areas generally consume fewer fruits and vegetables (Thomas et al., 2019). These findings might be partially relevant for HS, as observations indicated that pupils have access to limited types of fresh fruits and vegetables in the canteen. However, school management implemented a school fruit shop where pupils can purchase fruits and vegetables for a small price. In this way, pupils have good access to fruits and vegetables, but this does not necessarily mean they will consume more, as this is connected to the development of their eating habits and broader food routines. On the other hand, Cardoso et al. (2019, p.581) conclude that school staff play a major role in increasing pupils' healthy eating consumption in highly deprived areas while parents often understand the *"caring role"* of school practitioners.

Yet neither the chef nor other cooking staff had any information about where the food is sourced from:

> *"To be honest, I can't tell you. I know that some of the veg, I think its Sheffield they come from. But obviously, they buy it in wherever they want. So I don't know I think its more globally rather than from the local farmers"* (Interviewee, Chef, November 5, 2019).

Although the origin of the ingredients was unknown to cooks in HS, Kirklees Catering has been awarded a Silver Catering Mark by the Soil Association (KBS, 2020). As discussed in chapter one, the Silver catering mark requires catering services to provide high-quality ingredients, e.g., 75% of the menu must be freshly prepared and not include processed ingredients. Meat must be supplied from UK farms satisfying UK animal welfare standards, and *"at least 5% of the ingredients used must be organic items"* (Soil Association, 2015, p.1).

The limited knowledge of school employees and cooks about the origin of ingredients (and hence of the meal quality) leads to parents' misinformation, which could explain why many parents whose children are not eligible for FSM choose home-packed lunches. Cardoso et al. (2019) add that parents are often more worried about the quality of the SMs than children, which leads to high consumption of home-paced lunches in the schools. This was admitted by the school manager who connects the high number of home-packed lunches to the school's failure to promote its menus and thus children's and parents' limited understanding of the served food:

> *"I think we probably could promote the menu on offer like a bit more with children and perhaps do kind of tasting sessions for children to give children small tastes of what new food might look like. Because I think sometimes what happens is that presented with that choice which for some of the younger children can be quite overwhelming… Maybe a bit of teaching if we think about the other quick and we can call it pre-learning. So, this is what's coming up on the menu. So what it looks like what it tastes like but that might help with that"* (Interviewee, School Manager, November 5, 2019).

These findings show that the school's individual orientated approach to promoting school dinners is not an effective instrument to increase pupils' HSM intake. Pupils have every day at least two menus and two dessert options they can choose from (see Appendix 20). The halal and vegetarian options are always available for pupils due to many pupils with Islamic religious requirements in the area (Lever et al., 2019). The menu works on a two-week cycle and is changed twice a year (summer and winter). The kitchen chef pointed out that Kirklees Catering introduced the same menus for each school only recently. She added that before, every school chef was responsible for creating a menu based on mutual agreement with the school and pupils' preferences. She argued that although the menu needs to be approved by the headteacher, generally, the changes proposed by school staff are minimal. Today, all schools using Kirklees Catering as a main meal provider have the same or very similar weekly menus, which helps reduce food supplies (buying in bulk) and easier transfers of substitute cooking staff necessary to work in multiple locations. When discussing collecting questionnaires from pupils to receive feedback on the quality of HSM, the chef noted that because menus can be adjusted only minimally due to the pressure from serving the same meals everywhere, pupils' food preferences are not the main priority while creating term menus.

Although this general approach in menu development facilitates financial savings for meal providers, this study shows that the environment and society pay the hidden costs of FW. Because of the Council's non-existent recycling processes, the volume of FW produced by schools in the region is unknown, and there is little motivation to implement practices and provide funding and recommendations for schools to reduce the volume of FW they produce. Instead, schools are kept in the dark about their impact on the environment, while their unsustainable food practices do not protect future generations, therefore directly counteracting the SD agreement.

6.4.2 Mid-chapter Summary – Menus and Catering

In conclusion, this section points to certain issues the school needs to adjust to reduce the volume of FW produced during the school lunch. Firstly, parents' routines of meal provision show how damaging repetitive performances of unsustainable practices can be. On the one hand, studies suggest (Evans et al., 2016) that children's eating habits are worsening with home-packed lunch provision, while on the other hand, the meal provision in schools in Kirklees is profit-orientated therefore barely provides the necessary nutrition. However, still, observations show that more than 30% of pupils in HS prefer home-packed lunches. The study investigates the connection between school meals and pupils' eating practices in the school canteens in high deprivation zones in Portugal concludes that pupils' high consumption of packed lunches is connected to the limited provision of FSM as well as pupil's low satisfaction with the SM's quality (Cardoso et al., 2019).

This study points to the unsustainable practices of Kirklees Council, the biggest meal provider in the region, when enforcing the same menu regulations for all schools or failing to recycle school waste, including food. In this way, the Kirklees Council shifts the responsibility of FW reduction to the schools without providing the necessary support to implement long term sustainable practices. Instead, schools are left with the choice-based, individual orientated approach, which fails to significantly change pupils' behavioural patterns (Shove, 2010). The approach to control the individual rather than understand pupils' behavioural patterns is installed in the schools in line with national Government food policies (Lang, 2020), failing to improve pupils eating practices or reduce FW.

Secondly, the non-functional communication infrastructure among cooks, school managers and the Kirklees Council creates a severe issue in school practice performances. School practitioners fail to realise the significant

impact of dispersed and integrative practices on the compound eating practice (Warde, 2004). They see them as instruments of influencing individual behaviour rather than systematic changes in pupils' eating routines and habits (Evans et al., 2012). Although gardening practices were implemented to increase pupils' meal consumption during lunch, it was unsuccessful due to disconnection between gardening practices and cooking activities. Hence, detachment between integrative practices such as gardening and cooking leads to the limited impact of the practice performance on the pupils' eating habits, thus FW volume reduction. In this way, pupils fail to understand the food processes from farm to fork, which undermines the development of connections to healthy foods such as fruits and vegetables (Jones et al., 2016).

Thirdly, pupils' choice preferences during the HSMs, which are directly connected to the school's ABC based menu policies (Shove, 2010), were found to cause issues with healthy eating habits and the production of FW. Both cooks and school management acknowledged that the choice-based system promotes neither healthier meal consumption nor FW volume reduction. Although the school considers implementing sustainable practices that would help tackle these problems, they are not supported in the needed transformation from an individual centred approach to a practice-based view (Evans et al., 2012).

6.5 Meal Satisfaction and Food Waste in HS

In this section, satisfaction surveys (SSs) and meal pictures (MPs) collected from pupils in HS are explored in connection to FW volume measurements, school food practices and other activities investigated in previous sections. SSs were developed to explore pupils' meal preferences and their overall satisfaction with the served food in the canteen. In total, 1353 SSs were collected during lunchtime at this school. The poster with the sign *'Satisfaction Surveys'* was placed at the entrance/exit door in the canteen

where pupils could voluntarily choose to fill SS before they decided to leave the canteen. Out of 1353 collected surveys, 267 were paired with MPs. In total, 455 boys and 870 girls filled the SSs, while only 28 pupils did not specify their gender. Data shows that most pupils participating in the SSs were between 9 and 10 years old (n= 685).

Pupils in HS could choose one of the two main meal options (see Appendix 20). The chef suggested that pupils preferred one meal option significantly more than the other: *"I generally split the portions 80 to 20 based on the experience from previous weeks."* (Interviewee, Chef, November 5, 2019). This was confirmed during observations and SSs. For example, on one particular day, 319 HSMs were ordered, 180 SSs were collected, of which 46 pupils had brought a home-packed lunch; 19 pupils did not answer; 106 pupils were served Roast of the Day (chicken); while only 11 pupils chose Vegetarian Sausage and Gravy (see more Table 18).

Table 18: Meal Options and SSs collection in HS

Day	Option 1	No.P	Option 2	No.P	HPL No.P	No. of Surveys	PO
20.11.19	Roast of the Day	106	Vegetarian Sausage	11	46	180	319
21.11.19	Vegetable Pizza	68	Spaghetti Bolognaise	18	32	130	305
22.11.19	Crumbed Fish	78	Balti Curry	17	26	121	304
25.11.19	Chicken Sausage	57	Mac & Cheese	27	35	129	317
26.11.19	Tikka Masala	87	Quorn Pie	12	38	137	310
27.11.19	Roast of the Day	51	Salmon Fillet	23	41	117	316
28.11.19	Chicken Burger	73	Margherita Swirl	43	30	136	316
29.11.19	Fish Fingers	85	Pasta Bake	23	35	145	312
02.12.19	Cottage Pie	14	Quorn dippers	100	23	140	312
03.12.19	Southern Chicken	81	Penne Pasta	22	25	128	310

* HPL - Home packed lunch
PO - Portions Ordered
No. P - Number of Pupils

Table 18 shows that pupils generally prefer meat to meat-free meal options. The reasons for pupils' leftovers are an essential part of this research. The most common reason for pupils' food leftovers was their dislike of vegetables (n= 219), as confirmed in previous studies (see, e.g. Boschini et al., 2018; Derqui et al., 2018; WRAP (2011); Engstrom & Carlson-Kanyama, 2004). Understandably, many pupils were complaining about the overall taste of the meal (n = 218), which might be connected to certain meal ingredients such as vegetables or the overall meal service experience (see Table 19). These results point to the importance of adjusting pupils eating practices and meal preferences, leading to FW production while showing the impact of habitual food routines without an effective control system in place (Evans et al., 2012).

Table 19: The reasons for pupils' leftovers in Huddersfield (overall)

Reasons	All Pupils	All Pupils %	HSM Pupils	HSM Pupils %
I did not like the taste	218	26.42 %	205	29.29 %
Too big portion	175	21.21 %	136	19.43 %
I am not hungry	159	19.27 %	123	17.57 %
Vegetable	219	26.55 %	207	29.57 %
Others	54	6.55 %	29	4.14 %

However, SSs show that more than 40% of pupils have not finished their meals because of 1) portion size or 2) because they did not feel hungry enough during lunchtime. The data shows that the results are alike even after the exclusion of pupils consuming home-packed lunches. These findings suggest that although the taste of the meal is still the most important factor influencing pupils' meal satisfaction, schools need to start focusing on the implementation of practices allowing cooks to serve the correct portion size while pupils' snack access before the lunch needs to be eliminated. Cardoso et al. (2019) study shows that pupils often avoid consuming HSMs they think they do not like by purchasing or bringing various snacks from home. This leads to their refusal to consume new foods due to not being hungry enough, leading to FW. Therefore, by establishing

practices with a reproductive character (Evans et al., 2012), pupils could stop complaining about not being hungry during the lunch break while getting served the correct portion size, leading to a reduction in the volume of FW.

In total, 507 (37.5%) responses indicated that pupils had no leftovers, while on 723 occasions (53.48%), pupils admitted that they had finished lunch with some leftover food. These results represent a significant difference between pupils' FW intention explored in the EATs evaluation (see table 16) and the results from SSs. EATs data suggested that 57% of pupils claimed that they usually finish their school lunch; however, SSs' analysis points to a much lower overall number of pupils who acted based on their intentions (37.5%). The EA and ABC choice orientated behavioural frameworks currently implemented in the school environment are based on the linear model suggesting that individuals are influenced by their environmental attitudes leading to pro-environmental behaviour and sustainable choices (Ham et al., 2015; Shove, 2010; Evans et al., 2012). However, this study shows that the school food system does not work with either choice orientated ABC approach or the EA behavioural theory. These results show that although pupils acquire positive intentions for FW reduction, their habitual food preferences and other organisational practices are more significant factors influencing their food wasting practices. Therefore, it is clear that to reduce the FW production in the schools and improve pupils' eating habits, school practitioners and policymakers need to stop relying on established patterns of understanding through individual behavioural perspectives. They must stop trying to recognise factors influencing individual behaviour and rather start to explore the context of the social world as part of practices, routines, and habitual activities surrounding the carries of practices that create existing realities (Shove, 2010; Evans et al., 2012).

Pupils' satisfaction rankings were coded and displayed through the percentual evaluation (0-100%). Data show that the differences between overall and average daily meal satisfaction are not significantly different. The minor differences in the daily overall HSM satisfaction could be explained as one of the following reasons. Either the chef is aware of the pupils' preferences without pupils' input in the menu development, or pupils gained a habit of consuming certain meals cooked in the kitchen and therefore cannot compare them to meals they would like more and would taste better. This analysis, therefore, raises a question returning to the theoretical discussion: *'behaviour or practice?'.* Although cooks' experiences with SM preparation might add to their awareness of pupils' meal preferences, the results of the FW volume production indicate otherwise. On average, pupils in this school waste around 20.98kg of food daily with a similar daily satisfaction rate (see Table 20).

Table 20: Daily FW measurements and overall HSM Satisfaction in HS

Day	Volume of FW	HSM Satisfaction	Overall Satisfaction
20.11.19	25.15 kg	77%	78%
21.11.19	19.55 kg	87%	86%
22.11.19	21.25 kg	69%	73%
25.11.19	27.65 kg	70%	72%
26.11.19	16.15 kg	76%	79%
27.11.19	23.35 kg	77%	78%
28.11.19	22.7 kg	79%	78%
29.11.19	17.5 kg	76%	80%
02.12.19	18.2 kg	71%	73%
03.12.19	16.45 kg	75%	76%
AVERAGE	**20.98 kg**	**75%**	**77%**

Table 19 explores correlations between the FW volume measurements and HSM satisfaction evaluations. Data points to limited changes in pupils' daily meal satisfaction while the volume of daily FW fluctuates significantly. This shows that there is no correlation between pupils' overall meal satisfaction and the volume of FW production. Therefore, these findings do not suggest

that cooks know better what types of meals pupils prefer. Instead, it seems that pupils have established habitual eating practices that are reproduced in the canteen in the same way and therefore naturally lead to similar satisfaction rates.

The evaluation of MPs helped specify what type of food pupils prefer to eat and what foods often end up in the waste bin. Similarly to other studies (see, e.g. Just & Price (2013); WRAP, (2011); Derqui & Fermandez (2017) and more), the analysis here confirmed that the most wasted items during the school lunches are various types of vegetables (see Table 21). Although no correlation has been found between overall results from SSs and daily FW volume production, the Spearman test points to a negative correlation (r_s = -0.37, p< .001) based on the 0.05 alpha value between pupils' satisfaction and the MPs' leftovers. This suggests that pupils' satisfaction with the meal influences the volume of plate waste they produce however not significantly enough to influence the correlation between overall satisfaction and the FW volume production.

Table 21: Meal Pictures Evaluation in HS

Day	Option 1			Option 2			Overall
		No.P	MPL		No.P	MPL	MPLs
20.11.19	Roast of the Day	17	48%	Vegetarian Sausage	3	25%	45%
21.11.19	Vegetable Pizza	21	47%	Spaghetti Bolognaise	7	23%	42%
22.11.19	Crumbed Fish	23	36%	Balti Curry	8	23%	33%
25.11.19	Chicken Sausage	21	48%	Mac & Cheese	6	12%	41%
26.11.19	Tikka Masala	22	15%	Quorn Pie	1	80%	18%
27.11.19	Roast of the Day	21	30%	Salmon Fillet	7	40%	32%
28.11.19	Chicken Burger	14	30%	Margherita Swirl	11	47%	37%
29.11.19	Fish Fingers	20	39%	Pasta Bake	6	16%	35%
02.12.19	Cottage Pie	24	34%	Quorn dippers	2	35%	34%
03.12.19	Southern Chicken	21	50%	Penne Pasta	6	38%	47%
	TOTAL AVG						36%

This section investigated the impact of pupils' overall satisfaction with their meals during the school lunch on FW volume. Although cooks argue that pupils now eat more vegetables than ever, pupils' taste preferences in connection to vegetable consumption were the most significant factor influencing the volume of FW production during the lunch break. Unsurprisingly, this points to the school's limited impact on the pupils' eating habits. It has been found that HS fails to implement practices affecting food routines in the canteen into the daily curriculum. Instead, the school educational system tries to influence pupils' individual attitudes through knowledge transfer that was proven ineffective in achieving sustainability (Shove, 2010). Therefore, to reduce the volume of FW production in the school and improve pupils' healthy eating habits, the implementation of repetitive food integrative practices is a necessary step for the school food system. Studies exploring the impact of the FfLP have already determined practices that need to be established in the schools to improve pupils' healthy eating habits (e.g. Jones et al., 2016; Orme et al., 2012), yet they fail to tackle FW effectively. Therefore, this study shows the importance of additional funding to find and install effective routinised practices in the school environment in connection to already established healthy eating habits to reduce FW volume production. Such routines need to evolve not only around the taste preferences and vegetable consumption but serving correct size portions and making pupils feel hungry before entering the canteen.

Later, this section investigates the relationship between the environmental intentions explored through EATs and pupils' routines in the canteen. Although EATs showed that more than 50% of pupils claim to finish their daily lunch (see table 16), the SSs show that only about 35% of pupils actually did so. This suggests that although the linear model of EA adapted in this study might be an effective instrument to influence environmental intentions, it does not significantly impact the pupils' overall behavioural change and choice to finish the meal and not waste. In this way, this study

clearly shows how ineffective are the so-called choice-orientated theories schools use to establish educational systems (Shove, 2010; Evans et al., 2012). Therefore, I argue that as long as schools fail to transfer from individual orientated food systems and choice orientated policies, the environmental problems in schools will remain entrenched.

6.6 What have we learned in Huddersfield?

In this section, the results from quantitative analysis and the issues raised during the interviews are discussed in connection to pupils eating practices and the school's attempts to reduce FW volume during the school lunch. The empirical analysis has revealed several issues connected to the school's unsuccessful attempts to reduce FW during the school lunches, including communication issues on multiple levels of management, pupils' lost connection to food, the school's individual orientated environmental approach and issues with pupils' meal satisfaction. These are connected to the philosophy and underlying policies that attempt to (almost desperately) influence pupils' food behaviour. Instead, this study offers a systematic approach based on the theoretical foundations of PT which was found to be a successful instrument of change in other schools (Jones et al., 2016). In this way, pupils' actions are not understood through their individual behaviour but rather as part of the system of practices directly influencing one another that deploy the potential to become routines and habits. In this way, this study suggests that by adjusting current and implementing new school practices based on the re-established policies, the school's environmental and social (well-being of pupils) problems will be addressed more effectively.

Firstly, interviews point to communication issues between the school management, the kitchen staff working on the premises, and the Kirklees Catering representatives. The findings suggest that school management

does not pay enough attention to pupils' food-related activities while shifting responsibility for the pupils' waste during the school lunch onto the meal provider- Kirklees Catering. On the one hand, this study points to the Kirklees Council's profit-orientated approach when forcing all schools to serve similar menus (to cut the cost of the food), affecting the lack of fresh vegetables available to pupils. On the other hand, Kirklees Catering is taking steps to improve the food quality served to pupils by cooperating with the Soil Association. However, this is not acknowledged by cooks or school management, which leads to parents' misinformation about meal quality and a lower number of pupils preferring the HSM option, proven to be a healthier meal alternative (Evans et al., 2016). This points to a disconnection between the school management and the meal provider, showing the importance of establishing communication channels within the institutions. PT suggests that by establishing the routinised type of practices in the schools, the meal provider and the school management would be encouraged to communicate and discuss the performances of eating practices. In this way, communication among practitioners would not depend on individual attitudes and motivation to address the environmental issues but become a part of the routines implemented in the school food system.

As mentioned above, a non-functional communication channel was found within the school's management itself. The School's participation and achievement of the Golden Award from the Healthy Schools Programme (HSP) are unknown to school managers or cooks. This shows that the practical implication of participation in HSP based on the schools' self-evaluation techniques is not an effective instrument and their impact on the school practices, pupils, or employees is environmentally and socially non-existent. This research found that self-evaluation techniques rely too much on the individual understanding of the environment instead of focusing on adjusting the current school food system policies. In this way, they cannot make a change in the schools but rather focus on what is

already well-established with a lack of real impact. Therefore, I suggest that the programmes such as HSP should be re-evaluated based on the PT foundations to help schools improve pupils' eating, waste disposal, and recycling practices.

It is worrying that Kirklees Catering runs primarily by Kirklees Council, does not include recycling into its waste disposal practices and therefore creates a negative environmental footprint while sending all schools' waste material, including food, to landfills. It is shown that although pupils are required to separate their food and other material in the canteen during their time in the schools, their seemingly pro-environmental habits with the potential to positively influence the planet have no real effect. Cooking staff play a significant role in the FW reduction in the school during the school lunch, but their complaints to the Council to solve the non-recycling situation in schools is ignored while the school management chooses to turn a black eye on the situation by assuming that recycling practices are taking place without further investigation. This again brings up the communication issues and the school's ignorance regarding the environmental processes. However, as argued previously, the development of policies based on the routinised type of behaviour with the theoretical foundation in PT can institute effective communication channels and eliminate the gaps in the schools' environmental position. Adopting such a position would stop both parties from shifting responsibility for the waste and other environmental issues while helping them to understand the consequences of the failure to achieve the SDGs.

Secondly, the investigation of the Huddersfield school marks the importance of caterers' re-connection to local farms to establish the circular processes in the school food sector. It was found that in this school, pupils on average discard 20.79kg of FW into landfills, while an additional 9.86kg of other waste materials ends up at the same spot every day. The school chef provided an exact number of portions prepared for pupils each day,

which were used to calculate FW volume per pupil per day. On average, cooks were required to prepare at least 313 portions each day (see Table 18). Analysis based on these numbers shows that, on average, the volume of FW produced per-pupil equals 66.54g per day during the school lunch (see Table 22). This number is significantly higher than a study conducted by WRAP in 2011, showing that the FW volume per pupil increased about 156% within a decade.

Table 22: HS - Descriptive Statistics of FW volumes measurements

Variable	Mean	SD*	Min	Max
FW Volume (kg)	20.79	3.89	16.15	27.65
FW per pupil (g)	66.54	11.76	52.10	87.22
School Meal (portions)	312.10	5.02	304	319
Free Meal (portions)	112.67	1.82	109.74	115.16
Other Waste (kg)	9.86	0.50	9.13	10.60

*SD – Standard Deviation

These alarming findings call for the establishment of sustainable practices in the school environment when both meal providers and school management need to take responsibility for the future of SDGs achievement. However, most of the interviewed staff members estimate daily FW volume production to be between 7 to 12kg, while the school manager and the main chef overestimate FW production to be between 30-40kg. These results point to the inefficiency of the current linear-orientated, individual-based policies leading to misinformation and a lack of sustainable practices within the school environment while prioritizing profit. Therefore, it is vital to move from the linear style of school food management to circular practice-orientated food systems, resulting in more sustainable and environmentally responsible current and future generations (UN, 2015). This might be done by establishing sustainable routines such as daily FW measurements available for both pupils and staff, healthy eating competitions, pupils eating initiatives and more.

Thirdly, in HS, food-related pro-environmental activities start and finish with VIP Fridays. Although the implementation of motivational Fridays might positively impact pupils' FW reduction practices, cooks are quite sceptical, and they argue that no visible changes in FW volume production or implementation of pro-environmental activities have been observed. These findings point to the importance of stability of practices during their reproduction and innovation, leading to positive social change (Southerton & Yates, 2015). Although the VIP Fridays are indeed implemented in this school, their reproduction is not based on the stable influence of the carriers of practice which is a reason for the practice inefficiency. This suggests that to achieve practice stability in the school environment, practices need to be designed to interfere with all pupils' eating habits instead of focusing on a small group of individuals. In this way, I argue that the efficiency of practice performances influencing compound practices such as eating (Warde, 2013) can be improved by considering the size of practitioners' performances.

The lack of pro-environmental related practices in HS is evident when only 57% claimed to finish their lunch regularly, with even fewer pupils doing so in reality. However, pupils' EATs showed that pupils have a high potential to adjust their eating practices to possibly reduce FW. An average level of pupils' EA reached 76% showing positive environmental knowledge, attitudes and intentions regarding FW reduction. However, the regression model showed that there is no significant correlation (p=301) (see Figure 9) between pupils' level of EA and the volume of food they waste during lunch break (see Table 23).

Figure 9: Regression Model: EATs and FW Volumes in HS

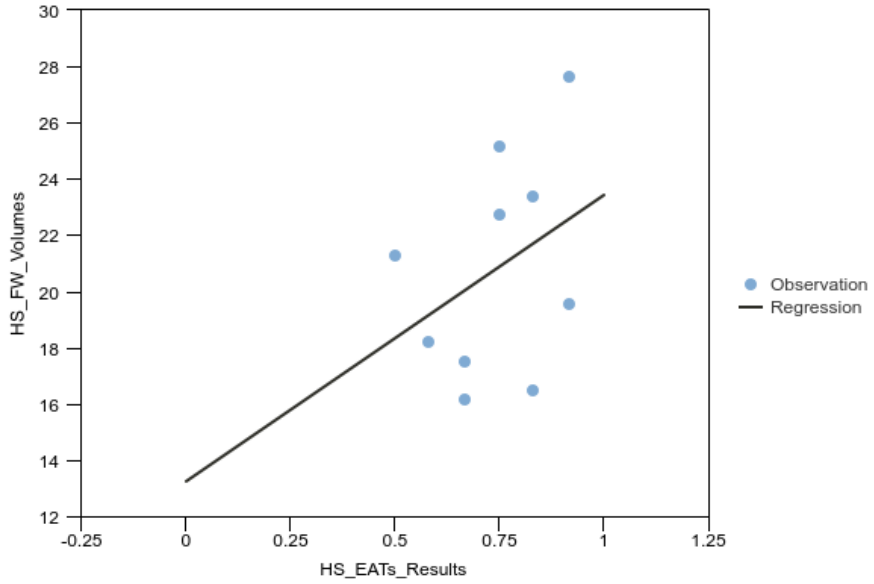
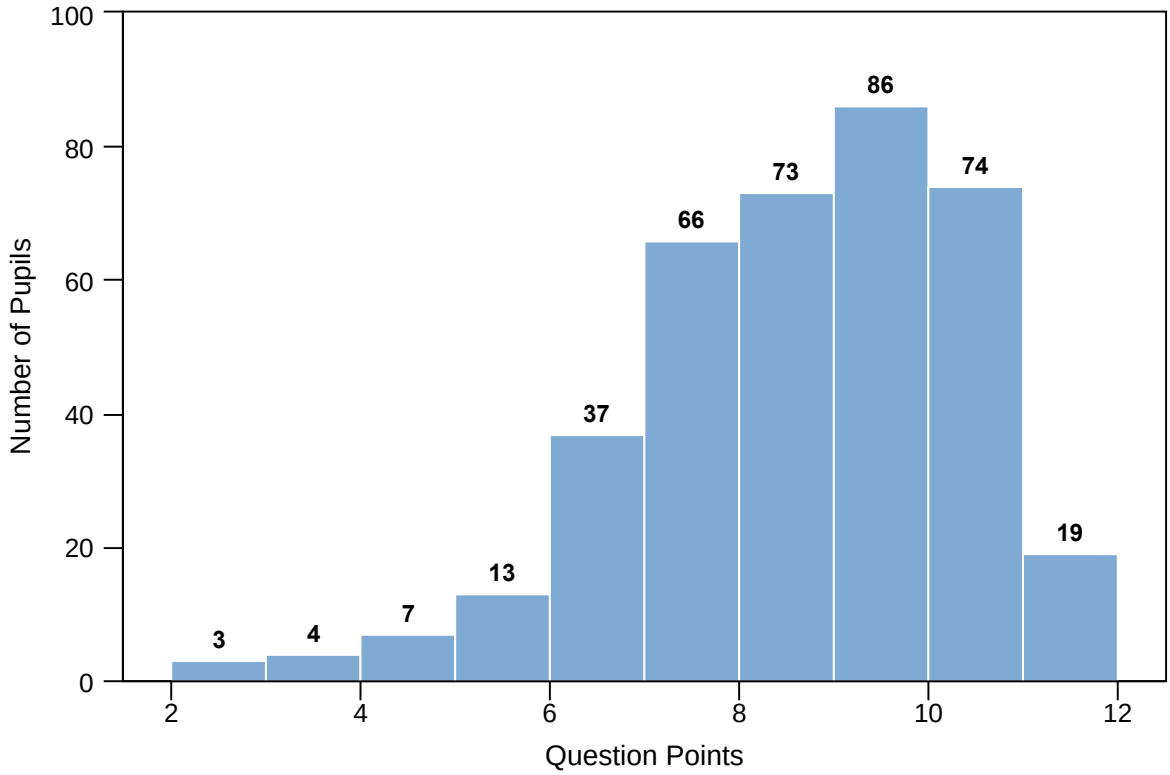


Table 23: Regression Formula: EATs Results and FW in HS

Person Correlation (r) and Regression Line for EATs results in DS and Mixed Waste Volumes				
Category	n	r	Regression Line	p
Overall	10	.36	Y=10.18x + 13.24	.301

Although most pupils scored 10 points (83.3%), 74 pupils scored 11 points (91.6%), and 73 pupils reached 9 points (75%) (see Figure 10) showing that most pupils understand FW issues and their role in protecting the environment, the school cannot engage with pupils' high level of EA because of its current routines, which are not developed to encourage pro-environmental behaviour. Therefore, it is necessary to develop effective food routines during the school lunch in schools.

Figure 10: HS – Results of Pupils EATs



And finally, this chapter explored the impact of pupils' overall satisfaction with the meal on the FW volume production. Analysis suggests that there is no significant correlation between pupils' daily FW volume production and their overall satisfaction with HSM. However, it is important to point out that the factors such as meal service, vegetable preference, taste, portion size and others are part of the pupils' overall meal satisfaction here. The findings demonstrate that taste in connection to vegetable consumption, portion size, and hunger are critical elements of FW production. Therefore, the establishment of integrative practices such as tasting sessions, food education, integrative gardening practices, queue management, and others might positively affect compound eating practice. This could result not only in an increase in healthy food consumption but also in FW volume reduction. The SSs in connection to EATs point to an ineffective individually orientated approach focusing on influencing pupils' attitudes and knowledge instead of their unsustainable habitual routines. This was found when 57% of pupils filling EATs claimed to finish their lunch without leftovers while a much

lower number (37.5%) performed this practice in the canteen. In this way, this study proved that the liner, individual-orientated model the school food system is built on is not an effective instrument to reach sustainability or achieve SDGs. Therefore, HS must start to develop practices affecting all pupils while ensuring their sound reproduction to change its environmental strategy.

Chapter 7: Washingborough Academy

This chapter is designed to investigate the factors influencing the volume of Food Waste (FW) produced at Washingborough Academy (WA). Several theoretical foundations underpin this investigation, such as Sustainable Development (SD), Environmental Awareness (EA) and Practice Theory (PT).

The factors contributing to FW production discussed here include the school's environmental involvement, the level of pupils and staff EA, meal satisfaction, and other observable practices. Investigating pupils' eating practices during the school lunch contributes to an understanding of the factors affecting FW production while also revealing the overall environmental strategy of the school, pupils' eating habits and the environmental attitudes of employees. This is relevant because these factors have been found in the literature to significantly influence the volume of FW produced in schools (Derqui et al., 2018).

This chapter introduces the school's educational and environmental strategy while drawing attention to pupils' eating practices at lunchtime. Following this, the level of pupils' EA is measured through Environmental awareness tests (EATs), an evaluation developed following the concept of EA (Ham et al., 2015) focusing on pupils' and staff members' knowledge, attitudes and intentions towards the reduction of FW. Finally, Satisfaction Surveys (SSs) are analysed in detail to explore pupils' satisfaction with meals consumed in school and its impact on FW volume. In general, this chapter is designed to investigate how school food practices influence pupils wasting routines and how these could be adjusted to result in FW reduction. Literature shows that although schools concentrate on promoting EA to tackle climate change challenges, they often focus on the individuals' behavioural patterns or choices, criticised as ineffective to achieve positive behavioural changes (Shove, 2010; Evans et al., 2012).

7.1 About the School

WA is situated in the small village of Washingborough, which is part of the city of Lincoln in the region of Lincolnshire. Since 2001, the school has available nursery classes and can provide education for 325 pupils (GOV.UK, 2020). WA is very popular in the local area mainly because of its views on sustainability which it demonstrates through participation in multiple national and international eco-programmes, government studies and sustainability projects. It also cooperates with various private organisations to improve school practices, with a particular focus on food (WA, 2016). Tomas et al. (2019) argue that schools' extensive cooperation with external organisations focusing on improving sustainable food practices is often connected to the organisational deprivation index[18]. WA scored 29 911 points out of 32 844 on the national deprivation index in 2019, suggesting that the school is in a neighbourhood with a generally low deprivation. School's index is calculated based on the citizen's income, employment opportunities, education, health, crime, housing, and environmental living (GOV.UK, 2019).

After the conversion of the primary school into an academy in 2012, the Ofsted report (2013) showed significant improvements in teaching methods and pupils' engagement during classes with an outstanding mark for pupils' behaviour, while at the same time the number of pupils attending the school started to increase. In 2017, WA scored again '*Good*' during the Ofsted inspection with improvement in personal development, behaviour, and welfare directly connected to serving healthy meals and growing fruits and vegetables on the school premises (Ofsted, 2017). Based on the final data from the previous academic year 2018/19, the school achieved results close to the national average in reading and writing but scored below the

18 Possible impact of deprivation index on the school's practices is discussed later in the final chapter when the comparative analysis reveals differences in current school practices.

national average in maths. The pupils attending the school are mixed gender, with 53% of boys and 47% girls. Of the total, 12.9% rely on Special Education Needs (SEN) support, and 1.1% of pupils depend on the Education and Health Care Plan. During the study, the school employed 36 staff members with the additional staff needed to run the in-house kitchen (GOV.UK, 2020).

Breakfast clubs and Afternoon clubs are both available for pupils as part of the extended school provision. The main aim of the clubs is to provide a safe and productive space for pupils to get involved in various activities like board games, computer games, team building, arts and crafts and more. The Breakfast Club starts every morning at 7:45 am and continues until 8:45 am when school classes resume. The price of the club is £4 per pupil per day. A healthy breakfast is available for pupils in line with the healthy eating ethos of the school. Children are encouraged to prepare their snacks from ingredients provided by the school and clean after themselves as part of the school food education. The Afternoon School Club starts at 3:20 pm and continues until 6 pm. The price for the afternoon club is £8 per session per pupil (WA, 2020). Moreover, pupils can get involved in multiple outside school activities through various projects like the Synergy Project, focusing on the improvement of sports skills, the Dance Fit Project, Cycling Lessons and more.

7.2 Pro-environmental Involvement

In 2017, WA announced new Food Policy regulations focusing on the promotion of healthy eating and improvements to the nutritional intake of pupils attending the school. The main aim of these policies was to enable pupils to make better food choices, and as such are based on an individual-orientated approach in line with Shove's (2010) ABC critique. In this critique, the individual's behaviour and choice are positioned at the centre of policy development. This section explores the school's participation in

multiple eco-projects and aims to assess the influence these projects have on both the individual and the food-related practices at the school.

The school builds its curriculum around pupils' understanding of the healthy eating principles and value of the food (WA, 2017). This approach aligns with the linear model of EA (Ham et al., 2015) and also with the ABC framework (Shove, 2010). In that, it assumes that pupils' behaviour is influenced by the attitudes they form as individuals in response to environmental concepts such as FW. On the other hand, the school also implemented various food-related practices into the curriculum, including cooking classes, gardening, food composting, empty plate rewards and more. Pupils leaving the academy have both practical and theoretical knowledge about food and food preparation techniques. The pupils should be able to prepare a couple of meals on their own while understanding their environmental footprint and the importance of waste reduction. In addition, special training has been provided for staff members involved in the school food system, such as teachers, lunch supervisors or cooks. Staff members are required to spend time with pupils during lunchtime, pay attention to pupils' nutritional intake and are encouraged to lead discussions about their chosen meal options. This shows that the school is attempting to move from a behavioural approach towards routinised practices and habit development.

To promote and support food policy regulations and implement food education, WA started to participate in multiple eco-programmes focusing on changing pupils' current food practices with a positive environmental impact. The Head teacher stated: *"Every school needs support to implement new changes at the beginning of the process to become eco-school otherwise it is too hard"* (Interviewee, Headteacher, February 13, 2020). This shows that the school understands the importance of practice implementation into pupils' daily activities, which become an influential part of the school's educational activities. The most critical eco-programme that

helped the school at the beginning of its transformation to become a food orientated institution was according to headteacher Jason O'Rourke, the Food Life Partnership (FfLP), in cooperation with Soil Association (SA).

7.2.1 Food for Life in Washingborough Academy

As discussed in the first chapter, the FfLP is a food-oriented educational programme aiming to implement pro-environmental practices into pupils' education. The programme was developed to change perceptions about food in schools, nurseries, hospitals and care homes across nine regions in the UK (SA, 2018). The main aim of the FfLP is to fight obesity and increase awareness of the impact of food processing on climate change (Orme et al., 2011). Multiple studies have confirmed that the implementation of practices suggested as part of the FfLP in the primary and secondary schools brought positive changes towards sustainability and the environment, such as increased Hot School Meal (HSM) intakes (Jones et al., 2012), improved levels of EA among pupils (Jones et al., 2012; Jones et al., 2016), better meal quality (Melikoglu et al., 2013; Orme et al., 2011) and increased pupils' fruit and vegetable intake (Salmon et al., 2013; Weitkamp et al., 2013). As part of the FfLP, the school implemented food education into its daily school practices and across the curriculum, as Jason O'Rourke noted:

> *"Food Education is in the heart of the learning Ethos in Washingborough; we see it as an important aspect of pupils' wellbeing"* (Interviewee, Headteacher, February 13, 2020).

The school has invested a significant amount of funds into the refurbishment of kitchen appliances for pupils, with the installation of cooking surfaces including induction desks, chopping boards, cooking desks, pots and pans that are all adjusted to the pupil height providing the opportunity to try various cooking gadgets like smoothie makers or

dehydrators. WA has also recently implemented an activity called 'Snack Shack', focusing on cooking practices and economic understanding of food value. Each week, groups of pupils are required to prepare healthy snacks under the supervision of an experienced staff member and then sell it during the breaks on Wednesdays. Pupils can pre-order healthy snacks prepared during the activity, such as sweet potato and chilli muffins or homemade crumpets prepared from products grown in the school garden. The price of each snack is 50p, with the revenue reinvested into the food ingredients or necessary cooking equipment and therefore not impacting the school's food budget (WA, 2020). According to Jones et al. (2016), the implementation of these practices in the school environment positively influences pupils' healthy eating habits while improving their understanding of environmental issues. However, the impact of these practices on the volume of FW has yet to be addressed.

Part of the FfLP practices is food growing activities that aim to help pupils understand food production processes and establish a connection to food. (Jones et al., 2016; Williamson, 2019). Pupils in each class have their own allocated garden beds to grow chosen fruits or vegetables during the term. These foods might be used as ingredients for HSM preparation or be sold during community events to locals, which teaches pupils' about the economic value of food. Moreover, the school's garden includes a variety of apple trees that are part of Lincolnshire's heritage. The newest addition to the garden was the development of the wood-fired pizza oven and three beehives for natural honey production while improving maturing of the food products grown in the garden (WA, 2020). From the practice theoretical standpoint, the adjustments of school integrative practices (e.g. gardening, composting, community lunch and more) are vital aspects of changes to the school (Schatzki, 1996). In addition, these integrative practices not only consist of but affect compound eating practices in WA (Warde, 2013). In this way, improvements in pupils ' healthy food choices in WA after participation in FfLP (Jones et al., 2016; Orme et al., 2011) might be

explained through the implementation of sustainable, integrative practices and their positive impact on the pupils' compound eating practices.

To further improve the food quality served in the school canteen, SA introduced a Food for Life Catering Mark (FFLCM) for the meal providers, focusing on improving food quality and ingredients served in the kitchens. The FFLCM is widely recognised by a range of government bodies, including the Department for Education and the Department of Health, while its foundations lie in the plan for Public Procurement developed by Department for Environment, Food and Rural Affairs (Bonfield, 2014). The institutions must start with the Bronze Award and build their way up through the Silver to Gold Catering Mark by further adjusting their practices[19]. Participating schools are then randomly examined throughout the year, allowing their current catering standard to stay updated (SA, 2019).

WA was awarded a golden catering mark in 2017 and defended its environmental food position during the three following years as the only school achieving this with an in-house meal provider (WA, 2020). The catering mark was designed to motivate schools to expand sustainability standards during meal preparation while slowly building on the previously adapted food supply routines. In this way, the schools were given time and motivation to transform their current food supply routines while improving the school's overall food-related practices. Hence, we can argue that the FFLCM is aligned with approaches to changing practices rather than the pupils' behaviour, making the programme superior in quality and achievements to its individual-orientated competitors.

[19] Complete conditions for award achievement is discussed in section: 1.4.2.2

7.2.1.1 SNAG Initiative

SNAG (School Nutrition Action Group) initiative is established in the schools as part of the FfL school partnership. Every couple of months, year group representatives, the headteacher, kitchen chef, two members of the teaching staff and the gardener arrange a meeting discussing the school food system and food education in the school. The meeting is part of the school food policy where pupils can express their opinions and concerns about the food system. As a participant in one of these meetings, I could express any concerns or ideas to improve or change current school food practices, similarly to all other attendees. Teaching staff started by discussing food education classes and asking pupils about their opinions while looking into their 'My Food Education Journal' (see Appendix 22), where pupils took notes or kept their learning material provided during the lessons such as recipes, recipe reviews or other food-related information.

The second part of the meeting focused on the pupils' allotments in the garden and what fruits and vegetables they will grow during the next term. After all types of foods had been allocated to each class (2 types of vegetables and one type of herb per class), the kitchen chef started to add recommendations for possible meals that could be prepared throughout the next term. Pupils started to express their opinions about planned meals and meals served during the term. Pupils were allowed to add ideas based on what their parents are preparing for them at home and what they prefer to eat at school. Their preferences led to more popular meals like pizza, hot dogs, or roast dinners, but it was reminded them how important it is to have a balanced diet. Pupils' preferences during this meeting suggest that the meals associated with healthy eating habits that are encouraged in the school environment might not be the first choice for the pupils' parents. Theoretically, this points to limitations in practice reproduction (Evans et al., 2012) discussed in more detail later.

During the interview, the chef pointed out that: *"Some meals like pizza, roast dinner are repeated in the menu cycle as pupils like it a lot, but it is very important for pupils to always trying something new."* (Interviewee, Chef, February 11, 2020). Practice Theory (PT) explains the origin of unhealthy meal preferences in the school with orientations to unhealthy food created through particular food routines in their homes. One of the reasons many programmes focus on the pupils' food adjustments in the schools is their incapability to spread their influence into pupils' homes, where most food habits are born. On the other hand, the FfLP attempts to involve parents in changing pupils' food habits, according to the parent-pupil food principle, which was found to help with improvements of food routines in pupil's homes (Jones et al., 2016). However, this research also shows that the parent-pupil food principle needs to be stretched out even more, and parent engagement in pupil school food activities should become a key component of school food programmes while expanding their influence to promote FW reduction practices.

7.2.2 Other eco-activities in WA

TastED

TastEd is a programme focusing on the improvement of the pupils' experience with healthy meals. The programme is built on the Sapere method of learning about food through the involvement of all human senses, such as touch or smell, rather than traditionally focusing on the pupils' taste and sight food preferences (TastEd, 2020; Larsen et al., 2010). This method has been implemented in many institutions around Europe and, through the active cooperation of headteacher Jason O'Rourke and Bee Wilson, finally reached the UK. WA was one of the first schools to implement sense education techniques into the daily curriculum, and the method received excellent feedback from both pupils and staff members. The method is not expensive to adapt to any school environment and helps increase pupils' intake of fruits and vegetables (TastEd, 2020). Although

the practical implementation of the Tasted programme was not observed during the data collection, the interview with the headteacher revealed significant improvements in pupils' willingness to try new foods. Therefore, the programme's impact on pupils' food preferences adds weight to the argument that changing food practices positively influence pupils' food habits.

School Health UK

Recently, the school started to participate in the School Health UK programme focusing on transforming lunchtime routines in the schools. The programme focuses on improving the lunchtime experience for pupils and staff, increasing the intake of HSMs while advising schools on how to create a smoother environment in the canteen during the school dinners. Schools can choose between bronze, silver or golden packages offering a different degree of school support (School Health UK, 2020). One of the routines the company influenced in the WA's canteen is announcing the meal options to pupils before serving food, pupils leaving the canteen together or having music in the background while eating. According to the programme coordinator, schools involved in the project recorded improvements in pupils' behaviour during lunchtime and a positive influence on pupils' eating habits (School Health UK, 2020). As the programme is based on the direct transformation of food routines, it seems to be aligned with the priorities of Practice Theory.

Eat Them to Defeat Them (ETTDT)

The programme ETTDT is designed to encourage children and parents to add more vegetables to pupils' meals and create healthier eating habits. The programme is built on the extensive cooperation of media, through TV advertisements and alliances between supermarkets like Tesco, Aldi, Sainsbury's, The Co-operative, Lidl or Morrisons to promote the importance of fruit and vegetable intake (ETTDT, 2019). The school campaign focuses on preparing and promoting a specific type of vegetable each week in the

school canteen. It is motivated by a financial award to the school (during data collection, it was £2000), and it aims to increase consumption of one particular type of vegetable each week, leading to an overall increase in vegetable intake. During lunchtime, each pupil who consumed the type of vegetable promoted that week (during data collection, it was carrot) could then colour the amount of eaten food on the ETTDT poster hung in the canteen. The initiative ETTDT was implemented during the second week of data collection, and therefore a quantitative comparison of the compost waste could be performed. Data shows that after the programme implementation, the volume of vegetables ending up in the compost bin reduced by 25%, from an average of 3.6kg to 2.7kg of compost waste a day.

Other Programmes

Furthermore, WA is involved in other national and international projects such as DEMETER (Developing Interdisciplinary Methodologies in Education Through Enhanced Relationships between Schools and Farms), focusing on creating practical guidelines and recommendations for all schools to enhance collaboration between schools and farms. Upon successful completion, researchers should lay out *"practical instructions, financial recommendations and quality indicators to evaluate the effectiveness and efficiency of activities"* (DEMETER, 2019, p.1). Moreover, through the cooperation with the SA, the school participated in the project EPESS (European Healthy Pupils and Skilled Educators via Integrated Schools Food Systems). The project's main aim is to create an international network of primary schools to share information, skills, and experience in achieving sustainability in schools (SA, 2020). Additionally, the academy is part of the Sustainable Food Trust, which helps organisations become more environmentally aware and offers solutions for developing more sustainable food production and consumption while understanding the balance between economic, environmental and social factors (Sustainable food Trust, 2020). Finally, the Jamie Oliver Foundation helps schools promote healthy eating

and sustainability through healthy recipes and adjustments to cooking practices (Jamie Oliver, 2020).

So far, this section has explored the environmental practices of a WA through their work on food routines. The practices implemented through the school's cooperation with the SA are explored through the FfLP and FFLCM. It was found that FfLP can be aligned with the assumptions of Practice Theory when the school's adjustments to pupils' food practices are located in the centre of the programme's vision. This approach was proven to have a significantly positive influence on the improvement of pupils' food habits (Orme et al., 2011; Jones et al., 2016). Furthermore, this study demonstrates the importance of involving not only pupils but meal providers and parents in the changes to food routines. However, although WA is an institution engaging in a wide range of pro-environmental activities around food, their impact on the FW reduction seems limited.

Nevertheless, schools' participation in the project ETTDT was proven to positively impact the reduction of the FW, even though the programme's main aim was not to reduce FW but improve pupils' healthy eating. Therefore, I suggest that although the importance of the food practices on healthy eating consumption needs to remain a key component of the school food programmes, the attention to FW production can no longer be ignored when attempting to build sustainable schools. The following sections explore pupils' practices further.

7.3 Food Practices during the Lunchtime in WA

In this section, the school's food-related practices are examined in line with the theoretical assumptions of Practice Theory (PT) to explore their impact on the volume of FW produced in the school. Firstly, to understand the creation of pupils' compound eating practices (Warde, 2013), canteen

activities before and during lunchtime are investigated in detail. Secondly, the establishment of the school's private kitchen is connected to the pro-environmental involvement of the school and the establishment of multiple integrative practices. Third, menu development and lunch routine management show the importance of the connections among the integrative practices influencing compound eating practices which lead to healthy meal consumption. Finally, the practices leading to FW volume production and waste separation are discussed at the end of this section.

Every morning at 11:45 am, lunch supervisors start to transform the gym area into a canteen by setting up the lunch tables. Recycling bins for packaging, cooked food and raw food are prepared for the pupils and placed in their allocated space. After the first week of the study, the headteacher decided to remove the canteen's packaging bin, which required pupils to take their rubbish from packed lunches home. The decision was made due to the council's inability to recycle the packaging material from the school, as it was often contaminated by food scraps (Discussion, Jason O'Rourke, 2020). Although this adjustment to pupils' disposal practices would not immediately improve the school or pupils' recycling rates, the headteacher revealed the plan to forbid all home-packed lunches from the next academic year. Hence, pupils would be unable to dispose of lunch packages in the school, which meant to motivate both pupils and parents to adjust to exclusive school food provision in the future. In theory, home-packed lunches restriction should improve pupils' eating habits and reduce the volume of waste from packaging materials.

The school lunch starts at noon when pupils who are part of the first sitting enter the canteen while several older pupils are on serving duty helping their younger peers with cutlery, serving ingredients from the salad bar, or carrying the meal to their seats. This not only helps lunch supervisors during a busy lunch period but also strengthens the relationship between

younger and older pupils. This practice was brought to the school through the FfLP participation to improve pupils' experience in the canteen.

At the beginning of the school year, each pupil is assigned a seat at a table called after common types of fruit and vegetable, e.g. peas, watermelon or onion, for easier orientation. Pupils are then required to sit at the same table every day during lunch. Moreover, pupils must leave their belongings like jackets, school bags and other items at the allocated hangers with the same name as their tables. In this way, pupils do not waste time looking for a space to sit down, giving them more time to eat and enjoy their meals. In WA, only 9.4% of pupils are eligible for FSM (GOV.UK, 2020), which is significantly lower than the national average in England (23%). This could be a result of Lincolnshire Council's limited availability to apply for an FSM. In Lincolnshire, only pupils in reception, year one and year two, can apply for the FSM scheme (Lincolnshire Council, 2020). In Kirklees, all children under 19 years old are eligible to apply (Kirklees Council, 2020). The price per meal for pupils not eligible for the FSM scheme is £2.30 per pupil. However, older pupils who cannot apply for FSM in WA have an option to purchase an easy lunch option called *'Ready to Rumble (RtR)'* for £9 a week. The headteacher said that RtR lunches aim to provide healthier alternatives to packed lunches while avoiding unnecessary packaging. This shows that although the school tries to promote school lunches while introducing various alternatives (removing packaging bins and packed lunches alternatives), the support from the local council is a crucial element in healthy meal consumption. If more pupils in WA were available to apply for an FSM, fewer pupils would rely on the home-packed lunch option and in this way, the elimination of the home-packed lunches would become an easier task to tackle on the way to improving pupils' healthy food consumption.

7.3.1 Catering Practices in WA

The school operates the kitchen privately and employs the chef and other kitchen staff directly. The headteacher points out that having a private chef gave the school more space for experimenting with various types of meals while giving the school an option to adjust menus based on pupil preferences. Interviewees described the process of installation of the kitchen and cooking appliances on the school premises. Before 2012 the school did not have a kitchen and relied heavily on parents' ability to provide packed lunches for pupils. The county council provided £450k in funding, in addition to the investment of £50k made by the school, which was used to build a brand-new kitchen. On completion, the county council shifted responsibility for the entire kitchen and its maintenance to the school. The school tried to hire an external company as a school meal provider in the traditional way. The company was carefully selected based on food quality provision with the FFLCM award from SA. The cooperation between the external meal provider and the school would have been successful if the company had not lost its Gold Catering Mark and lowered the quality of the meals in favour of higher profits:

> *"They stopped doing FfLP, around the same time when universal free school meals came in … the standard of the food went down incredibly, it was awful, none of it was cooked. It was all reheated package size, and I told them it was not good enough that it needs to change, they said they would do it, but they did not. So, I got rid of them, and we got our own chef in"* (Interviewee, Headteacher, February 15, 2020).

This shows the school's active initiative to establish pupils' healthy eating practices, leading to participation in eco-programmes, including FfLP. As part of FfLP, the school cooperates with farmers and businesses to supply the food exclusively locally.

"We are getting meat from Lincolnshire, eggs from Lincoln, veggies and flour from Boston-Lincoln. We have a pig farmer with organic mark" (Interviewee, Chef, February 13, 2020).

During the harvest seasons, the food is also acquired from the school garden, thus helping to reduce the food cost. However, according to the headteacher, prioritizing the environment and sustainability would not be possible without having a school-based kitchen:

"Because we have our own chef, we can have that influence if we would have an outside caterer I don't think we would have that much of an influence" (Interviewee, Headteacher, February 15, 2020).

Interviewed staff members and lunch supervisors showed high satisfaction with the school meals (SMs) quality while many of them mentioned locally sourced food and environmentally friendly waste disposal. However, the headteacher and the chef mentioned problems with running an indoor kitchen while keeping high standards and locally produced ingredients.

"But it also has some pitfalls in the fact that they are a member of staff. And if they go off, which we had in the past. We still have to cook meals for children as they still have to eat. It's a great thing when it's working, but it can be a nightmare if it doesn't work" (Interviewee, Headteacher, February 15, 2020).

"We had a situation with one of the teachers who wanted to do the cooking with strawberries, and it was out of the season, so we had to pay 5£ for about four strawberries… we do need to cut out whenever we can because we have to make sure that when they do this next check, (FfLP catering mark external validators)*, everything is local"* (Interviewee, Chef, February 13, 2020).

Although concerns regarding the running of the private kitchen were expressed during the interviews, the headteacher, staff members and lunch supervisors also observed that the private chef had brought higher food standards to the SM provision. The chef added that the food supply and meal planning while following the high standards of the catering mark can become expensive due to local food growing conditions, but pointed to the pupils' increased consumption of healthy meals. Hence, this section shows that although the school and kitchen are motivated to help the pupils develop healthy eating habits, the academy faces issues with food provision and higher prices. On the other hand, the school manages to keep the prices for the hot school meals (HMS) similar to schools without a healthy diet focus, therefore showing that it is possible to balance economic, environmental and social priorities in practice. In this way, this study shows schools' options in developing effective integrative practices to influence pupils eating practices leading to sustainable schools.

7.3.2 Menu Development in WA

In the middle of the term, during the SNAG meeting, the school chef receives feedback and further recommendations from pupil representatives and staff members regarding the current menus, leading to new ideas for next term menus. The suggestions are then adjusted, and the chef and headteacher announce a final menu decision. Moreover, every six months, children are surveyed about HSMs so that each child attending the academy can freely express their opinion, as the chef confirmed:

> *"I do a survey every six months, and children tell what they like, and I sort of keep that and put it on the menu. I sit down with Mr O'Rourke every time I do new menus and we go through it"* (Interviewee, Chef, February 13, 2020).

The menu (see Appendix 23) is adjusted every term based on a three-week cycle. Due to the school's organic, local food supply, the menu is based on the seasonal types of fruits and vegetables supplied from the school garden or local farms. Vegetarian options are always available, while the chef serves all non-meat meal options once a week. Pupils connect certain days of the week to a type of meal served in the canteen as part of the HSMs such as 'Vegetable Monday', 'Roast Thursday' or 'Fish Friday'. Salad Bar (except Thursday), Fresh Fruit, Yogurt, Freshly Baked Wholemeal Bread is available every day for the pupils with HSM and RtR. Pupils with the HSM can select as many items as they like from the salad bar, while pupils ordering RtR can choose any two available vegetable or fruit options.

7.3.3 Lunch Routines in WA

Pupils eat in two sittings with around 45 minutes for lunch in each group. Reception and pupils in years one and two enter the canteen shortly before noon and eat their lunch. Classical music is playing in the background during lunch which creates a relaxing atmosphere. The observations showed that lunch supervisors are busier during the first set as younger pupils often require help with simple eating practices such as cutting the meat, peeling vegetables, potatoes or pouring water. However, several older pupils are on duty to help lunch supervisors during the first sitting. The majority of children during the first sitting are served HSMs as a result of FSM eligibility. Pupils are receiving lunch in an orderly manner, starting with the youngest children. Observations showed that there are almost no queues in the WA as a maximum of 12 pupils (number of table seats) are allowed to go to the serving counter simultaneously.

Pupils in the second set are not allowed to enter the canteen before all pupils from the first sitting have finished their meal and left the canteen. Pupils with home-packed lunches can collect their lunch boxes from the trolley situated next to the entrance door; however, they are not allowed

to eat until the chef announces what is being served on the day. Pupils who ordered an HSM or RtR are allowed to go to the serving counter table by table. The observations showed that most pupils in the second setting prefer RtR to the traditional HSM option while some children still bring their home-packed lunches.

Older pupils are generally noisier than their younger peers, and therefore the music is usually off during the second set. Staff members use a rule of *'hand up'* to indicate when all pupils are required to stop talking. If one member of the teaching staff needs to announce something to all pupils, he/she will put a hand up and wait for all pupils to do the same, and as soon as pupils put their hands up, they stop talking.

During the lunch, pupils are awarded various stickers after completion of any of the school nominated challenges. For example, pupils are given a sticker if they have tried a new food ingredient *'I tried something new today!'* The staff members can reward pupils with the sticker *'I said Please and Thank you!'* or if pupils finish their meal they are awarded the sticker *'Clean Plate Award'*. As part of the competition through ETTDT, pupils painted consumed vegetables of the week on the poster next to the serving counter. The school has implemented FW volume measurements into daily food practices. Two pupils are staying in the canteen after lunch to measure the volume of cooked FW leftovers. Pupils do not measure packed lunch leftovers or raw food that is later turned into compost but focus on the HSM leftovers, which helps cooks judge pupils' satisfaction with the meals. However, daily FW volume measurements are not announced to pupils or published on the school website, and although this practice could be used as an effective motivator for pupils to reduce FW volume production, WA does not recognise it yet.

It is common for staff members to eat their lunch with the pupils while discussing meal ingredients, food preparation, taste, and more.

Observations show that pupils that eat their meal at the same table as the staff member waste less food. However, in general pupils in the canteen are not allowed to dispose of their food leftovers and receive dessert before one of the staff members or supervisors approves of it. If staff members think that pupils left too much food on the plate, they must continue eating. On the first day of data collection, some younger pupils have been selected to have lunch with the school headteacher to discuss their meal satisfaction or other food-related issues directly with the headteacher. Community lunch took place during the second week of data collection when elderly people from the Washingborough community were invited to spend time with the pupils in the canteen in the morning and afternoon. Before lunch started, pupils had shown the elders a school garden and other school properties and then ate lunch with them. The fee for the community lunch was £5 per person. It was observed that pupils enjoyed community lunch as it facilitated discussions about the type of the meals being served, while elders helped younger pupils cut meat or pealing vegetable skins reducing work for lunch supervisors.

7.3.4 Food Waste during the lunch break in WA

Insights from PT point to the significant influences of practices performed in the canteen on the compound eating practice impacting the volume of FW produced. According to Just and Price (2013), encouraging pupils during lunch combined with the food programme's initiatives has a positive impact on FW volume reduction. The observation showed that encouragement is one of the most popular ways in the WA to reduce the FW volume production. As a lunchtime supervisor stated:

> *"We try and encourage them to try a little bit even if say, oh, I don't like that. We just say try it. If you've never tried it before. So we do have stickers with I've tried something new on and stickers for clean*

plates, and I have tried something new today" (Interviewee, Lunch Supervisor, February 14, 2020).

However, lunch supervisors realise that using only food encouraging techniques is often not sufficient to prevent FW production in the school canteen:

> *"I think we could put the waste down more, I do you think there's quite a lot of waste some days, you know, I think it depends on what it is"* (Interviewee, Lunch Supervisor, February 14, 2020).

As mentioned above, the school is composting raw food material:

> *"We compost raw food… And what is made in the school by pupils when they have a cooking lesson they do* (compost), *the same again"* (Interviewee, Chef, February 13, 2020).

However, it is current practice for the schools in the UK to send all cooked food from the kitchens and other materials produced by pupils to landfills. It is important here to consider how pupils in WA perceive FW and composting. On the one hand, extensive environmental activities and programmes certainly contribute to healthier eating practices during the school lunch (Jones et al., 2012). On the other hand, large volumes of FW during lunchtime could be connected to pupils' FW misconceptions. Pupils might feel less motivated or even obligated not to finish all foods on their plate that could be composted as they might think they are helping the environment. Unfortunately, this study did not include interviews with pupils while pupils' wasting motivators were explored only through SSs. Nevertheless, eco-programme founders and school staff members need to stay aware of the possible negative impacts of extensive environmental activities on FW production.

7.3.5 Eating Practice Summary

This section has summarised the process of dispersed and integrative practice performances in facilitating compound eating practice (Warde, 2013) in the WA. The analysis highlights the connection between school practices and the school food system. Staff members are aware of kitchen performances and the school's active participation in various eco programmes. They are also aware of waste management and the origin of the ingredients used for the pupils. One of the reasons staff members know about food-related activities in the kitchen and have a chance to participate in menu development might be installing the in-house kitchen run by the school instead of a private meal provider. This ensures that the responsibility for the healthy food provision and environmentally friendly food disposal cannot be shifted between the school, meal provider and local council as observed in HS. Although this points to the significant positive impact of the in-house kitchen on the school's connection to food practices, pupils' healthy eating habits in WA are mostly connected to the school's active cooperation with the SA through FfLP and FFLCM.

In this way, this research suggests that to improve pupils' healthy eating habits, meal providers need to participate in programmes with healthy eating catering marks to motivate them to focus on the pupils' wellbeing rather than profit. However, although the catering marks positively influence the improvement of pupils' eating habits, they fail to implement practices to reduce the volume of FW. Hence, I argue that the FW volume reduction practices need to be developed in alignment with the pupils' healthy eating habits to form whole food sustainable systems in schools.

Similarly to the chef, the practices of pupils and lunch supervisors in the canteen are greatly influenced by the school's participation in eco-programmes. The table by table queue management, music in the background, colouring vegetables of the week, receiving stickers, food

waste measurements and the pupils on duty all play an essential role in developing sustainable food practices in the school canteen during lunchtime. Another crucial observation is that all pupils have an allocated seat in the canteen and cannot leave the canteen separately. In this way, no pupil feels rushed to leave the canteen early because their friends feel secure about their seats during lunchtime. Implementation of these integrative practices can, therefore, be connected to the attempt to reduce FW production in WA. The observations in HS showed that pupils' produced a higher volume of FW after feeling pressured by their peers who finished their lunch and were allowed to play outside or join clubs during the lunch break.

Both lunch supervisors and staff members who are required to eat with the pupils have a responsibility to challenge pupils to finish their lunch. However, what was found to have a significant impact on the development of school's sustainable food routines is the headteachers' proactive approach to pupils' well-being, environment and SD:

> *"We have a massive health crisis in this country to do with childhood obesity and the ongoing health risks that children have, and that's about what children eat. So, if you want to make a difference to children, it's not just about the academic stuff and how they could fill the government's coffers later on with the jobs they get. It's about their health and their wellbeing. And schools can make it a difference to that"* (Interviewee, Headteacher, February 15, 2020).

Although the school tries to reduce the environmental impact of FW through the implementation of composting practices, daily FW volume measurements, packaging reductions or future elimination of the home-packed lunches, both the headteacher and staff members understand that the school can do more to reduce the volume of FW produced during the school lunch. This study suggests that although some FW prevention

practices are implemented in the WA through the cooperation in multiple eco-programmes, they are mainly connected to the pupils' healthy eating routines rather than environmental protection and FW volume reduction. Additionally, a new assumption is raised in the previous section connecting the school's extensive pro-environmental activities to pupils' increased motivation to waste more food to help composting processes. In this way, the development of the schools' eco-programme practices must be equally adjusted to pupil well-being in addition to environmental protection; the two cannot be viewed separately.

7.4 The impact of Environmental Awareness on the Eating practice performances

The main objective of the Environmental Awareness Tests (EATs) was to explore pupils' and staff's environmental intentions and beliefs. According to ABC and EA framework, these are the most influential factors affecting individual choices and behaviour (Shove, 2010; Ham et al., 2015). In this section, the level of EA, particularly around FW, is explored through questions investigating pupils' knowledge, attitudes and intentions from EATs.

In WA, 97 EATs were collected from pupils, with 67 tests fully completed. Similarly to HS, all pupils who participated in the EA questionnaires were between 7 and 11 years old; however, no correlation was found between pupils' results, gender and age. Significantly lower participation in the EATs in WA impacted a headteacher's decision not to involve younger pupils (Year 1, 2) due to concern about their intellectual understanding of the test questions. However, this decision did not significantly improve the average level of EA in comparison to other recruited schools (DS: 69%; HS:76%; WA:82). Therefore, these results show that the EA scores of pupils did not significantly depend on the age of the pupils, which was one of the goals of developing the EATs.

The first part of the EAT's questions focuses on the FW disposal in connection to pupils' awareness of the canteen's food practices. The results show that more than 40% of pupils know about a separate food container in the canteen in WA. Many pupils (50%) are not aware or unsure if the school provides separate containers for the food leftovers during lunchtime. Although the school's environmental activities should positively influence the food awareness of pupils, it seems that many are confused by the current waste separation policies in the canteen. This shows that FW recycling processes need to be communicated more comprehensively to pupils in WA as they do not appear to understand school recycling policy. In WA, 15% of pupils think they do not have access to food only containers and that even if they did, they would not use them (see Table 24). This number is high for a school with such an extensive approach to food education. Additional dispersed and integrative practices such as additional explanations of FW separation practices in the canteen or changes in the allocation of the food separation bin (Schatzki, 1994) through adjustments to the canteen FW practices may be necessary to improve waste disposal awareness among pupils. These measures could help pupils become more aware of the food separation practices in the canteen, as their additional waste disposal involvement would become more influenced by the school food policy regulations.

Table 24: EATs – WA: Food only Container

	LIN	
	n	%
We have food only container and I am regularly using it	**29**	**30**
We have food only container, but I am not using it	12	12
We don't have food only container, but I would use it if we did	8	8
We don't have food only container and even if we did, I would not use it	15	15
I don't know	27	28
No answer	6	6

TOTAL	**97**	100

Intellectual understandings of FW were also explored among pupils. Similarly to Huddersfield, many pupils in Lincoln had similar misconceptions that their FW is received by other people for consumption and therefore responded to the question of what FW is as follows: *"throwing something away so other people can have it"*. Due to the school's active recycling policies, pupils understood FW through: *"putting peels into the normal bin",* which is another misconception that pupils think the food being composted in the school is not FW anymore. Some pupils did not fully understand the FW concept but tried to connect it to broader environmental concepts: *"saving the planet"* (see Table 25). This shows the gap in the environmental education provided by the school while pointing to the failure of eco-programmes to implement effective educational activities around waste and waste-related practices.

Table 25: EAT – WA: What is Food Waste?

	n	**%**
Food in the bin - any answer connected to the bin	6	6
Leftovers/uneaten food	11	11
Throwing food away	**44**	**45**
Word "Waste" in the answer	3	3
Wrong or Broad FW perspectives	10	10
Others	15	15
No answer	8	8
TOTAL	**97**	100

The next section of the EATs focused on the issue of school education in connection to FW awareness. This shows how the active implementation of food education into a daily curriculum in WA leads to an understanding of food practices among pupils. Table 26 shows that all pupils indicated that

they had been taught about the food and food waste in the school. This shows that implementing the food practices in the school environment has a positive impact on pupil food awareness in WA. On the other hand, analysis of EATs collected from staff members shows an only limited implementation of food education practices during their compulsory education, suggesting an improvement in food educational processes in schools.

Exploration of pupils' knowledge about the school's food recycling and separating practices indicated gaps in the food disposal awareness. Although pupils are aware of most of the food activities performed in schools, only 15% know about the school's food recycling practices, and 65% of pupils assume their food leftovers are sent directly to landfills (see Table 27).

Table 26: EAT – WA: Food Education

		n	**%**
Food Waste Education	YES	**94**	**97%**
	NO	0	0%
	No Answer	3	3%
Food Education	YES	**95**	**98%**
	NO	0	0%
	No Answer	2	2%

Although both of these answers are essentially correct, pupils considering school recycling as a leading waste disposal practice is low given the school's intense involvement with environmental programmes. This shows that both schools and eco-programmes need to pay more attention to FW practices and waste education.

Table 27: EAT – WA: Post-Consumption Food Waste

	n	%
Landfill/ dump/hole/trash/garbage	**63**	**65%**
Compost / Recycling	15	15%
Sea/Ocean	7	7%
Poor/homeless	0	0%
Not related	0	0%
Others	6	6%
Bin/bigger bin/van	2	2%
No answer	4	4%
TOTAL	**97**	100%

On the other hand, staff members were aware of the composting activities, as three out of four participants mentioned composting as the primary way of FW disposal in the school during the test. However, when staff members were asked about pupils' daily volume of the FW, their answers were surprisingly low. Staff members thought pupils in the WA waste between 1.3 to 3kg a day which is a significant underestimation of the reality in the canteen, which was 8.85kg a day (see Table 30).

This suggests that staff members' misconceptions about the impact of the school's pro-environmental involvement on pupils' FW practices might significantly negatively impact staff attitude towards pupils' FW production. In this way, the study corresponds with Derqui and Fermandez's (2018) findings that emphasise the importance of managers and lunch supervisors for reducing FW during lunchtime. Therefore, if staff members supervising school dinners in WA do not perceive FW production by pupils as a significantly negative issue, they may not influence pupils to reduce FW production, leading to high FW production volumes. This demonstrates the importance of effective integrative food practice implementation, with an evident influence on the FW volume reduction, while also highlighting the

development of misleading attitudes that can result in environmental damage by pro-environmentally involved schools.

Based on a linear model of EA, negative attitudes towards wasting among pupils should emerge from their positive attitude towards the environment, which is the first step for successful application of FW reduction activities in schools (Ham et al., 2015). However, this study indicates that pupil wasting practices are barely influenced by their positive attitudes towards FW. Table 28 shows that most pupils think wasting food is wrong because of their attitudes towards poor and hungry people. However, the data shows that in WA, pupils start considering environmental protection as the main reason not to waste compared to other schools. These findings indicate that the implementation of the eco practices may be transforming the pupils' attitudes. On the other hand, this research shows that despite the noble reasons of thinking of others or the environment, these justifications do not significantly impact pupil wasting practices at lunchtime. This suggests that pupils need to become more educated about the impact of waste on their daily lives through dispersed practices while paying attention to the impact of climate change on the performance of other elemental integrative and compound practices such as breathing, drinking or eating.

Table 28: EAT – WA: Food Waste Attitudes

Do you think wasting food is bad?	**n**	**%**
YES	**91**	**94%**
NO	6	6%
No answer	0	0%
7a) Why: YES answers		
Because of poor/hungry people	**26**	**29%**
Because of the waste of money	15	16%
Use it for something else (reusing)	3	3%

Because it destroys the environment	16	18%
Because animals could have it	5	5%
No answer/Other	26	29%
TOTAL	**91**	**100**

7.4.1 Environmental Intentions to reduce FW in WA

Questions 11 and 12 investigate pupils' eating habits and routines connecting to FW volume production while exploring pupils' practices during the school lunch and the reason for finishing or not finishing their school meal. Question 11 asked if pupils generally finish the lunch and continued with open-ended inquiry, with question 12 referring to a more specific situation (see Table 29): *"Even if you are full, do you try to finish your school lunch?"*

Table 29: EAT – WA: Finishing the School Meal in WA

Q11: Do you normally finish your school lunch?		
YES	55	57%
NO	42	43%
No answer	0	0%
Q12: Even if you are full, do you try to finish your school lunch?		
YES	50	52%
NO	44	45%
No answer	3	3%
Sometimes	N/A	N/A

A majority of pupils (57%) claim that they normally finish their school lunch. However, when asked if they finish despite being full, this decreases to a very small majority (52%). Although this reduction is not very significant, the proportion of pupils that developed a habit of not finishing

the food in the WA is, in both cases, over 40%. However, all staff members in WA that participated in the EATs developed routines to finish their food even if they were not hungry. This could be explained by differences in practices between pupils and staff members adopted in two different decades. Evans and Harper (2009) describe the disappearance of waste from homes leading to changes in household FW practices, a phenomenon in which FW stopped being a visible part of the household and became worthless. These changes in practices can be directly observed in the schools when two different generations eat together.

While staff members were not only taught (dispersed practice) not to waste food but this practice was regularly performed in their homes as well as schools (integrative practice), their current eating practices (compound practice) are still influenced by their past eating habits. On the other hand, the investigation of pupils' eating practices showed that while pupils are taught not to waste, they are not required to implement this practice into their daily lives and therefore, the food continues to be wasted during the school lunch. This leads to increased FW volume production alongside foods' continuous value reduction.

7.4.2 The impact of EA on the FW production in WA

This section continues investigating the pupils' level of EA and its impact on FW production. While the individual questions from EATs have been explored previously, the impact of pupils and staff level of EA will now be connected to the volume of FW produced. Hypothesis based on the EA and ABC behavioural concepts suggests that pupils with a high level of EA should waste less food. To explore this hypothesis, the following paragraphs describe the FW volume measurement process while connecting the level of EA among participants to pupils' eating practices during lunchtime.

This element of the research investigates the involvement of the school in multiple pro-environmental activities, which according to behavioural theories, should have a positive effect on the pupils' level of EA. Although this assumption seems correct when the EA evaluation shows that pupils in WA achieved the highest EA scores (82%), a t-test did not point to statistically significant differences between the average level of EA compared to other recruited schools. This suggests that the pro-environmental practices currently performed in WA do not significantly influence the level of EA among pupils about FW in particular. Therefore this finding points to the ineffectiveness of programmes based on behavioural theories aiming to influence pupils' food choices through their knowledge, attitudes and behaviour (Shove 2010; Evans et al., 2012; Ham et al., 2015). It is now clear that the school's current environmental practices do not significantly influence the level of EA about FW among pupils. However, the following section explores whether EA among pupils affects the volume of FW production.

Due to the separation practices used in the school canteen, the FW measurements were divided between compost FW, landfill FW and FW together: compost + landfill (see Table 30). On average, pupils in Lincoln produce about 8.85kg of FW during the school lunch each day, of which 5,96 kg ends up in landfill, and around 3.15 kg is separated and used to create compost for the school garden. On average, 113 pupils were daily signed up for the HSM, of which only about 11 were eligible to apply for the FSM. The analysis shows that, on average, the volume of FW produced per pupil is 78.81g per day, of which about 50g of waste per pupil is sent to landfills. Moreover, the school produces daily about 2.81kg[20] of other non-

[20] Due to the headteacher's decision to remove packaging waste bin collection from the school canteen during the second week of the study, the average volume of packaging material was calculated based on the measurements collected from the first week of data collection.

recyclable material. The headteacher's decision to remove the packaging waste collection bin from the school canteen is connected to the effort to eliminate home-packed lunches in the future to promote pro-environmental engagement among parents.

Table 30: WA – Descriptive Statistics: Food Waste Volume

Variable	Mean	SD	SE_M	Min	Max
FW Volume T (kg)	8.85	2.12	0.67	4.75	11.97
FW Volume C (kg)	3.15	0.88	0.28	1.96	4.96
FW Volume L (kg)	5.96	1.87	0.59	2.79	8.96
FW per-pupil T (g)	78.81	13.15	4.16	51.63	102.07
FW per-pupil L (g)	50.52	13.25	4.19	30.33	72.64
School Meal (portions)	112.5	22.69	7.18	86.00	137
Free Meal (portions)	10.57	2.13	0.67	8.08	12.88
Other Waste (kg)	1.41	1.50	0.47	0.00	3.21
Other Waste A (kg)	2.81	0.21	0.07	2.41	3.21

Legend: T- together; L- landfill; C- compost; A- averaged

Linear regression was conducted to examine if at least one of the FW collection measurements (landfill, compost or together) is influenced by the level of the pupils' EA (see Figure 11). In all three cases, the results of linear regressions were not significant with p values fluctuating between .235 and .729 (see Table 31).

Table 31: Regression Formula: EATs Results and FW in WA

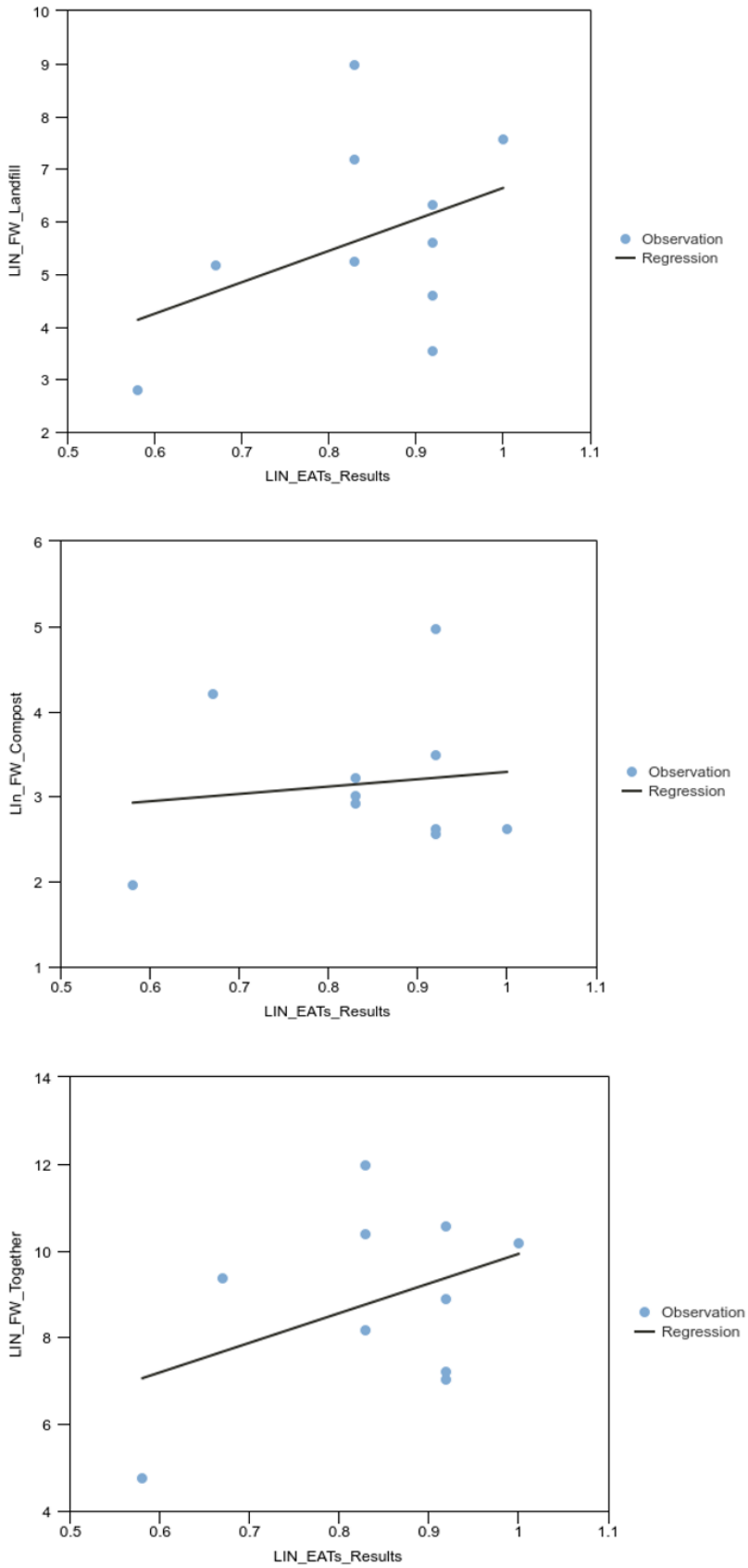
Person Correlation (r) and Regression Line for EATs results in WA and Food Waste Volumes				
Category	n	r	Regression Line	p
Landfill	10	.41	Y=5.97x + 0.67	.241
Compost	10	.13	Y= 0.86x + 2.43	.729
Together	10	.41	Y= 6.83 +3.10	.235

The results indicate that the pupil's level of EA influences neither landfill, compost nor the overall volume of FW measured. This suggests that the

linear model of the EA is not applicable in the school environment, and therefore knowledge and attitude are not the most significant factors influencing students' food-related environmental choices. This further contributes to the argument that the school's current approach, which is based on the idea that individuals' knowledge and attitudes influence behaviour and food choice, is not an effective instrument to fight FW volume production and climate change (Shove, 2010).

The EATs show that pupils' intention to finish their meal during lunch is low (see Table 29), considering the school's pro-environmental involvement and the general positive environmental intentions that pupils hold. As mentioned before, pupils' weak intention to finish their lunch might be connected to either external (meal satisfaction, feeling hungry, other peers) or internal factors based on misconceptions about the environment (not finishing a meal to help composting processes). Therefore, it is necessary to transfer schools and programmes' attention from pupils' knowledge and attitudes and focus it on the performances of practices and their effect on the environment. This study shows that although EA and positive attitudes towards FW have only a limited effect on pupils wasting routines, the performance of the sustainable practices has a higher chance to influence pupils' attitudes and increase their knowledge. The same principle can be applied in other fields such as construction. While an individual can learn how to build a house for years, the person working in the construction industry will know more through the practice performances because of the routinised behaviour he observed and acquired in the construction fields. The knowledge and positive attitude come then along with one's curiosity about the practice performances and work satisfaction, while at other times the knowledge or attitude might be missing, but the practice performances are independently reproduced through one's acquired habits, practices.

Figure 11: Regression Model: EATs and FW types in WA



In this way, the structures of school education systems and certain eco-programmes are not suitable when most resources are allocated to improving pupils' knowledge about climate change and developing positive attitudes towards those issues. However, this, unfortunately, does not significantly influence pupils' food choices or eating practices. Therefore, I suggest school systems and eco-programmes need to undertake a transformation not only in the way how waste is perceived but how it can be affected in schools as well. More effective, easy to reproduce practices should be implemented in schools and households to bring positive, observable changes to the environment (Evans et al., 2012).

Staff members in WA achieved the highest EA score (67.5%) in comparison to participants in other schools, but similar to the results from pupils; this was also not statistically significant. To examine if it is possible to predict the daily volume of FW produced during the school lunch based on the level of EA of staff members involved in food processes, linear regression was performed ($p=0.794$). According to Derqui and Fermandez (2018), the positive attitude of staff members involved in food processes is necessary to ensure FW reduction. Although staff limited awareness about the volume of FW produced during the lunch might be one of the significant factors influencing pupils' FW production, their understanding of the FW concept does not affect FW volume production.

So far, this section has explored an extensive statistical and theoretical analysis investigating the impact of the school's (pupils, staff members) level of EA on the FW volume production. Although overall results do not point to any significant correlation between the level of EA among staff and pupils on the FW volume production during lunchtime, the individual EAT question helps us understand participants' views on the FW issue. This highlights the ineffectiveness of the linear model of EA and the failure of behavioural theories that focus on the development of attitudes and knowledge to effect behavioural changes. This study demonstrates that

behavioural patterns and food choices are not influenced by individual knowledge and attitudes but rather that behavioural patterns and food choices affect individual knowledge and attitudes. According to the findings of this study, food choices are more likely to be influenced by the effectiveness of the practice performance, where environmental practices are performed the most, in schools and homes. Therefore, it is clear that PT can provide valuable insights into developing future educational processes in schools established to tackle climate change. The influence of individually oriented behavioural theories is investigated in the next section in connection to pupil meal satisfaction, which was found to play a significant role in reducing FW volume in the literature (Boschini et al., 2018; Derqui et al., 2018).

7.5 The Impact of Pupils' Meal Satisfaction on the FW volume production in WA

Together 1293 SSs and 240 pairs of Meal Pictures (MPs) were collected on WA during ten days of data collection. In total, 553 boys and 702 girls filled the SSs, while 40 pupils did not specify their gender. Most of the pupils who took part in the SSs were between 9-10 years old (n= 470). Daily, three main meal options have been served with the school's 'packed' lunch option called 'Ready to Rumble (RtR)' available for older pupils for a small fee of £9 a week. The headteacher points out that home-packed lunches often do not provide the necessary nutritional value for pupils while creating a lot of packaging waste that becomes non-recyclable due to food contamination. He argues that: "It is necessary to create a way for pupils to reduce the packaging waste and consume healthier meals". Observations and interviews point to the increasing preferences of older pupils for RtR instead of traditional HSM options during the lunch: *"Pupils love Ready to Rumble"* (Interviewee, Lunch Supervisor, February 10, 2020). Meal Pictures (MPs) analysis showed that the average plate waste of pupils choosing RtR was only 7% which is significantly lower than any other meal option served in

the canteen. These findings point to the positive impact of 'school packed lunches' on both environment (packaging and FW reduction) and pupils' health (Evans et al., 2016).

Overall, pupils' satisfaction with meals during lunch was calculated by re-coding SS answers and displayed as percentages (see Table 32). The data shows that overall satisfaction with the meals is relatively high (78%). In general, pupils are satisfied with all meal options served in the canteen while the best overall score received RtR (83%) followed by Jacket Potato (76%) while surprisingly, pupils were the least satisfied with their home-packed lunches (75%). However, the difference among these options is not statistically significant.

Table 32: Meal Satisfaction in WA

Day	Option 1	SS%	Option 2	SS%	JP %	RtR %	HSM %	HPL %	OS%
10.02	Pizza	84	Vegi Pizza	65	75	78	80	75	78
11.02	Salsa Pasta	50	Chicken Pie	80	75	77	75	73	74
12.02	Beef Burger	82	Cheese Omelette	38	63	80	77	81	79
13.02	Roast Pork	81	Vegetable Tartlet	80	69	79	79	79	79
14.02	Bean Casserole	53	Salmon Fish	59	80	80	70	85	77
25.02	Stockman Pie	74	Vegi Meat Balls	82	94	78	79	81	80
26.02	Quorn Hot Dog	93	Toad in the hole	93	50	88	90	74	80
27.02	Baked Ham	91	Vegetable Tartlet	-	83	88	89	81	84
28.02	Soup and Toast	80	Fish Kedgeree	50	80	88	79	83	82
02.03	Pizza	87	Vegi Pizza	83	-	94	89	75	83
	AVERAGE				**76**	**83**	**80**	**75**	**78**

Legend: SS%: Satisfaction displayed in a percentage
JP%: Jacket Potato displayed in a percentage
RtR%: Ready to Rumble displayed in a percentage
HSM%: Hot School Meal in a percentage
HPL%: Home Packed Lunch displayed in a percentage
OS%: Overall Satisfaction displayed in a percentage

The Spearman correlation test explored the impact of the pupils' meal satisfaction on the volume of plate waste. Surprisingly no significant correlation was found. This shows that although schools and eco-programmes focus on improving the cooking processes, this is not a significant factor in improving food consumption or FW reduction in schools. Therefore, more attention needs to be paid to the development of practices which directly affect pupil eating habits in the canteen, in ways which will reduce the volume of FW produced.

The fifth question in the SSs focuses on food leftovers and the reasons for pupils' wasting practices. Out of 1293 collected SSs, 537 times (41.53%) pupils responded positively to the question*: "Did you have any leftovers?"* while 724 (55.99%) times pupils claimed to finish the whole meal. While more than half of the pupils eating in the canteen claimed to finish their served food, the analysis of the FW volume per-pupil shows that pupils in WA waste significantly more food (78.81g) compared to HS (66.54g). This suggests that the plate waste volume in the WA is not distributed evenly; while more than half of the pupils finished their whole lunch, the rest of the pupils wasted much more food than expected. This shows that the current educational activities implemented in the school are not effective as they only affect around half of the pupils during lunch. Moreover, these findings point to the failure of schools and eco-programmes to reduce pupil plate waste during lunch. Therefore, more practices need to be implemented in the school canteens to reduce pupils' FW production.

Pupils who had food leftovers were then required to answer the second part of the fifth question: *"If Yes, can you stand a reason?"*. Answers from all pupils are displayed in table 33, while Table 34 excludes the pupils bringing home-packed lunches. However, the results do not change considerably after sample adjustments. The most common reason for pupils leaving

leftovers was their taste preferences (24.72% resp. 18.03%), followed by the portion size (16.80% resp. 11.16%). The third most popular reason for pupils' leftovers changed after removing pupils who brought a home-packed lunch, and while more pupils with a home-packed lunch blamed the feeling of not being hungry enough for their FW, pupils with HSM stated that their dislike of vegetables was the main reason for their food leftovers. These findings are consistent with Evans et al. (2016) findings that home-packed lunches are not nutritious enough, assuming that parents do not pack enough vegetable items into the pupils' lunch boxes.

Table 33: The reasons for pupils' leftovers in WA (Overall)

Reasons	Number of Pupils	Percentage of Pupils
I did not like the taste	184	24.73%
Too big portion	125	16.80%
I am not hungry	102	12.71%
Vegetable	109	14.65%
Bread	87	11.48%
Others	40	5.28%

Table 34: The reasons for pupils' leftovers in WA (School Meals only)

Reasons	Number of Pupils	Percentage of Pupils
I did not like the taste	161	18.03%
Too big portion	104	11.16%
I am not hungry	87	9.55%
Vegetable	101	11.05
Bread	70	7.65%
Others	38	4.15%

On the other hand, MPs analysis shows that when pupils in WA with HSM have food leftovers, they are primarily vegetable-based (see Table 35).

Table 35: The most found plate waste item in MPs evaluation in WA

Day	Plate Waste item 1 Found	No.	Plate Waste item 2 Found	No.
10.02.2020	No Leftovers	11 times	Potatoes	7 times
11.02.2020	Carrot	15 times	No Leftovers	9 times
12.02.2020	Beans	11 times	No Leftovers	10 times
13.02.2020	Lettuce	12 times	Cole	7 times
14.02.2020	Jacket Potato	7 times	No Leftovers/Salad	6 times
25.02.2020	No Leftovers	11 times	Meat Balls	7 times
26.02.2020	No Leftovers	14 times	Potatoes/Lettuce	3 times
27.02.2020	Salad	14 times	No Leftovers	9 times
28.02.2020	No Leftovers	14 times	Salad	6 times
02.03.2020	Potatoes	12 times	No Leftovers	8 times

The same results have been found in other schools surveyed in this thesis and other studies (see, e.g. Derqui & Fermandez 2017; Derqui et al., 2018), showing that not enough nutrition is consumed in the schools. This shows that although pupils in WA have been subject to food education practices as part of the daily curriculum, this does not significantly influence their taste preferences and dislike of vegetable items. Insights from PT suggest that pupils' meal preferences and a dislike of vegetables can be overcome by developing routinised eating practices implemented in schools and homes (Schatzki, 1996; Warde 2013; Shove, 2010). The practices need to be not only effectively developed to tackle the dislike of vegetables among pupils, but they need to be easily reproduced in both environments to become effective performances with a positive impact on climate change (Evans et al., 2012).

In conclusion, this section was designed to explore the impact of the SSs on the volume of FW produced in the WA during lunchtime. In total, 1255 SSs were collected during the data collection from pupils between 7-11 years old. SSs show that the pupils prefer school packed lunch option - 'Ready to Rumble', confirmed through MPs evaluation showing that pupils receive RtR waste only about 7% of their portion on average. This is significantly lower compared to pupils receiving HSM options wasting on average about 23% of the served meal, similarly to children in other European countries (Eriksson et al., 2017). Therefore, the school packed lunches approach taken by WA is one of the most effective ways to reduce the FW volume production, as it serves healthy meals for pupils while bringing sustainable practices to the school environment.

However, as not all pupils and parents prefer the RtR option for the school lunch, this study explores the reason for pupils' leftovers to understand what practices need to be changed to reduce FW volume production. SSs analysis showed that most pupils do not finish their HSM meal because of their unsatisfied taste preferences. Although the school tries to reconnect pupils to their food through the implementation of various pro-environmental activities such as gardening, cooking, food education and others, the dislike of vegetables among pupils remains the main reason why pupils will not finish their lunch, which was also confirmed through the evaluation of MPs. These findings indicate that the school may not understand the implementation of eco-programme practices fully. To reduce FW, WA needs to transform its understanding of the pupils eating practices from a linear practice approach (when pupils' food choices depend on their knowledge, attitudes, and behaviour (Shove, 2010; Ham et al., 2015)) to an approach based on routinised compound eating practices (when other practices influence pupils' food choices and later attitude, knowledge and behaviour). In this way, the implementation of effective dispersed and integrative practices would become central to the school's focus.

7.6 What have we learned in WA?

This chapter has explored the impact of the practices used by WA on the volume of FW produced through research into the wider environmental involvement of the school, school participation in various eco-programmes, pupils and staff individual environmental awareness and pupil satisfaction with the food served during school lunches. The implementation of school practices into the pupils' curriculum through eco programmes participation (e.g. FfLP, DEMETER, TastED and more) points to some transformation of the school's environmental understanding that moves from an individual, behavioural-oriented approach towards an understanding based on practice performances. Practices such as community lunches, dining with the staff members, gardening, composting and more have demonstrated a positive impact on pupils' healthy eating habits (Jones et al., 2016; Orme et al., 2011). However, this study identifies certain parts of these programmes that continue to develop their environmental strategies within the ABC behavioural models while failing to address issues like reducing FW. Therefore, a series of recommendations are provided here to improve the practice reproduction (Evans et al., 2016), focusing on the FW volume reduction processes in schools. This study suggests that while the implementation of pro-environmental food practices positively impacts the healthy eating habits displayed by pupils, the same approach needs to be used to reduce the volume of FW that they produce.

The practices currently used to improve pupils' healthy eating have not been effective at reducing the FW volume in the schools. Comparative analysis shows that WA wastes on average 15% more food than schools without involvement in any particular pro-environmental activity that would affect pupils' healthy eating habits. This shows that the pro-environmental practices implemented in the eco-schools not only fail to reduce pupils' FW production, but what is more, they seem to increase it. I assume that the paradox in higher FW production in schools with extensive environmental

activities might be connected to pupils' misconceptions about composting and its impact on the environment. However, as interviews with pupils were not part of the methodological design of the thesis, this can be viewed now as a limitation and future research needs to be conducted to prove or negate this assumption. In this way, this study highlights significant unintended consequences of practices implemented in the school environment while demonstrating the necessity of practice development considering its impact on all three aspects of SD: economic, social and environmental.

Nonetheless, the disposal practices adopted by the school, most notably the practice of composting food waste, reduce the volume of food sent to landfills significantly. While WA would send to landfills about 78.81g of FW per pupil per day, the implementation of raw food composting practices reduced this number by 36% (see table 28), which based on the 170 days school year decreases the volume of food sent to landfill by 500kg per academic year. These findings point to the effectiveness of composting practices in diverting food waste from landfills. On this basis, it can be suggested that the implementation of composting practices in schools can potentially reduce the volume of FW sent to landfills by at least 30- 40%.

Exploring school lunch routines at WA shows the impact of the FFLCM achieved through cooperation with the FfLP. As a result, more importance is placed on the quality of the ingredients and on creating healthy meals for pupils rather than profitable meals, as seen in other schools that use external catering suppliers. However, as I argued before, as well as eating healthy, wasting food is part of the eating compound practice, and therefore eco-programmes such as FfLP need to start paying more attention to pupils’ current food-wasting routines.

Moreover, this research found that while in other schools' communication between the meal provider and schools creates issues for the provision of

healthy school meals, recycling and FW disposal, WA runs an in-house kitchen which tends to eliminate all of these issues. The chef consults the headteacher directly about menu development after discussions with the pupils and staff members. In this way, meals are created with the attention to pupils' taste preferences and their eating habits while staff members also remain aware of the food practices performed in the school. One of the most favourite meal options among older pupils is 'Ready-to-Rumble', offered daily for a lower fee of £9 a week. WA implemented this meal option as an alternative to home-packed lunches, which also eliminates packaging waste. However, this research found that the RtR option not only reduces packaging but also significantly reduces FW.

Another section of this chapter explored the impact of pupils' level of EA on the volume of FW produced. This study found that pro-environmental involvement in WA does not significantly increase pupils' awareness of FW, demonstrating how eco-programmes underestimate FW issues. The analysis of the EATs shows that while in some areas, pupils attending WA are more aware of the environmental impact of FW, their wasting practices are not influenced by these concerns. This directly points to the ineffectiveness of the schools' current education processes, which focus on developing pupils' knowledge and attitudes hoping to positively impact individuals' behaviour (Ham et al., 2015). The individual behaviour-oriented approach, based on a linear model of practice influence, was found to be an ineffective tool used to tackle climate crises and reach sustainability. Therefore, it is necessary to carefully develop and establish practices with a positive impact on all pillars of sustainability. In the school environment, this would develop practices that balance the social perspective of healthy eating through FW environmental concerns and consider the organisation's economic power. Implementing additional practices in the school canteen, such as public FW measurements or participation in motivational competitions to reduce FW production (for example, this could work in the same way as the ETTDT competition) are

just some of the examples WA could adopt to adjust its current food practices to reduce the daily volume of FW production.

Another issue was found while exploring the implementation of practices in the pupils' home environment. According to Evans et al. (2012), practice reproduction is a crucial factor in developing effective practice performances. In alignment with their finding, this study shows that although pupils are being served more vegetables in WA, SSs showed that their dislike of vegetables continues to be the main factor causing FW. This further demonstrates why eating practice reproduction may be ineffective in the homes of pupils. Pupils perform practices to reconnect to food through gardening, composting or healthy cooking, leading to compound healthy eating practice performance in school (Warde, 2013). However, these practices are not reproduced in their homes, leading to their efficiency decrease. Therefore, this study shows the importance of parents' involvement in the school food practices, as this would increase the effectiveness of school-induced practices. This could be achieved by implementing food diaries and food practice trackers for pupils and their parents to help them reproduce. However, most importantly, practices implemented in the school need to be developed with an understanding of how they can be reproduced in homes, as this would assure the efficacy of the adopted programmes. In conclusion, this study found that both schools and eco-programme developers need to explore the implementation of practices in-depth while considering the three pillars of sustainability, practice effectiveness, and more intense parent-school-pupil involvement.

Chapter 8: Conclusions

This study set out to investigate the volume of food waste (FW) produced in primary and secondary schools in the UK during the school lunch break. I chose to explore the production of FW in schools as they will have a significant influence on the views of food held by future generations. Research (Just & Price, 2013; Derqui & Fermandez, 2017; Derqui et al., 2018; Eriksson et al., 2018 and more) also indicates that the volume of FW produced in schools has dramatically increased since the last national FW measurements in the UK schools (WRAP, 2011), making it essential to explore why and how waste is produced in schools and the most influential factors causing it. The findings of this study are intended to help schools understand why and how FW is produced during the lunch break and explore methods that might reduce the environmental footprint of schools.

Three schools, two primary schools and one secondary school were recruited for this study. The secondary school in Dewsbury was selected to act as a pilot school to explore the feasibility of the methods in the school canteen environment. This assisted with identifying and eliminating the flaws found in the research design before proceeding to primary schools for the main study. The main investigation of the FW phenomenon took place in primary schools as studies show that the volume of FW produced in primary schools is significantly higher compared to secondary schools (WRAP, 2011). The two primary schools were selected based on the level of their involvement in pro-environmental activities as this was found to impact the eating practice performances (Jones et al., 2016; Orme et al., 2011). Hence, the differences among the practices performed in various institutions could be compared to analyse their impact on FW production. While the Washingborough Academy (WA) in Lincoln is one of the most pro-environmentally engaged schools in the UK, with participation in national and international platforms, the schools in Huddersfield and Dewsbury are

more representative of *'average UK schools'* with limited involvement in pro-environmental activities.

The main aim of this study was to explore how school food practices may affect SD and assess how changes in these practices might help achieve the Sustainable Development Goals (SDGs). While goal number 12: Sustainable consumption and production, and indicator 12.3, which focuses on reducing the production of FW per capita, might seem the most relevant elements of the SDGs for this study (UN, 2015), this research shows the significant impact of FW production on at least 11 other goals (see Figure 4). In this way, this thesis addresses the total environmental impact of FW by exploring the practices that lead to the production of FW instead of focusing exclusively on practice performances relating to FW.

In this chapter, the most critical findings are re-visited and explored to highlight the theoretical and empirical contributions of this thesis. The research questions are answered by drawing connections between the most influential empirical findings from all three schools to explore how each of the proposed factors influences the volume of FW produced in the school canteen. Later, separate theoretical reflections outline a new way of understanding data from a PT perspective when helping to comprehend the flaws of viewing the school food system through the lenses of traditional behavioural theories. In this way, this research reveals influential differences in how practitioners use different theories to explain certain phenomena in the schools and how these need to be transformed to achieve sustainability goals.

8.1 Discussion: Answering Research Questions

This research was designed to investigate critical factors from the literature that were found to have the most significant influence on the FW volume production:

- The involvement of schools in environmental initiatives (Jones et al., 2016)
- Levels of awareness about food waste among staff and pupils
- Pupils' meal satisfaction (Derqui & Fernandez, 2017).

These factors were explored separately in each school, but the relationships between these factors and the volume of food waste produced are described in the following section.

8.1.1 To what extent does a school's pro-environmental involvement influence the volume of food waste during daily school lunch?

UK secondary schools are relatively limited in their ability to engage with and participate in pro-environmental projects. One of Healthy Schools UK representatives revealed during an informal discussion that targeting primary school meal routines is often more accessible for those leading school food programmes because primary schools have more regulated food policies. In contrast, secondary schools' food policy regulations are somewhat looseer. Secondary school pupils are also often not interested in or do not have time to adjust to the requirements of a particular eco-programme. These schools often try to change pupils' behaviour through additional educational processes, which secondary school pupils often refuse to participate in (Shove, 2010).

However, this study shows that even among the primary schools, there are significant differences in the school's involvement with external environmental campaigns and projects. While WA is one of the most environmentally engaged schools in the UK, Huddersfield school (HS) is not involved in any internal or external pro-environmental activity with low intention to increase its environmental engagement. This research has found two main reasons that can explain this situation.

First, schools might be hesitant to join eco-programmes due to the necessary funding allocations for successful participation. The headteacher in WA admits that extensive funding needs to be allocated for participating in these programmes, especially in the early stages when broad changes need to be implemented into the school environment. The hesitation to participate can be connected to the deprivation index level in their area and the limited funding available for these schools. Hence, the high levels of deprivation in Huddersfield could be the primary reason explaining the limited participation in eco-programmes among schools (GOV.UK, 2019). However, it is necessary to point out that although the HS is indeed located in a highly deprived area, data shows that the financial resources available for schools have not been fully used since 2017 when the school balances showed a positive cash flow (GOV.UK, 2020). On the other hand, WA often ends a school year with a negative cash flow balance (GOV.UK, 2020). This shows that although the schools are located in different deprivation areas, the financial resources available to them are not the most significant reason for limited eco-programme involvement. Although the schools for this study were not recruited based on the differences in their deprivation indexes, these findings show the need for further research to explore why schools in less deprived areas are more likely to participate in eco-programmes.

The second reason for limited eco-programme involvement among schools could be the limited information provided by the programme founders. In an interview, the school manager discussed why the school in Huddersfield

is not involved in pro-environmental programmes. The school manager admitted that the school did not have the necessary information about changing its environmental position. This shows that schools might be excluded from eco-programmes targeted marketing as they might not fulfil the initial criteria. Hence, this study suggests that the eco-programmes need to become more accessible to schools by cooperating with local and central governments that often provide most of the funding for schools. In this way, those leading school food projects would have additional opportunities to make a profit while the schools in the local area would get an opportunity to join the programmes.

Interestingly, this study suggests that the level of pro-environmental involvement at a school does not automatically guarantee that pupils will waste less food during lunch. In fact, the relationship appears to be inverted, as the average FW per pupil in WA (78.81g) is almost 20% higher than in HS (66.64g), which has a lower level of engagement with environmental programmes. On the other hand, although pupils in WA indeed waste more food, the school's overall environmental footprint is lower as it has implemented composting practices. Composting reduces the volume of FW sent to landfills by almost 50%, giving the school a low environmental impact. Therefore, WA sends on average 36% less FW to landfills than the primary school in Huddersfield, despite higher volumes of food wasted per pupil. One of the reasons to potentially explain this paradox could be connected to pupils' misconceptions about school's composting and recycling processes. These practices can possibly encourage pupils to waste more fruits and vegetables as they might perceive this as helping the environment through contributing to schools' composting activity. However, it is important to add that this assumption could not be confirmed in this study as the pupils' interviews were not conducted which raises a need for future research to explore this assumption in greater detail.

Although the research question about the impact of schools' pro-environmental involvement on FW production has been answered, new questions about conflicts between ethics and the environment are raised here. Before starting FW research, scientists need to establish their own framing for why wasting food is a problem. Is it because of the ethical consideration of others going hungry, while elsewhere food ends up in the bin, or is it because of the impact of FW on the environment and atmosphere through methane leaks? Therefore, it is essential to consider these questions when investigating the impact of school participation in pro-environmental programmes. Although I have not chosen any particular framing of FW production, this study aimed to bring all those issues together, so schools can decide what is important to them.

8.1.2 To what extent does pupils' environmental awareness influence the volume of food waste produced during daily school lunch?

In this section, the results from the EATs conducted in schools are explored in connection to the volumes of FW produced during the school lunch. Test of statistical significance (p-test) confirms that the differences among pupils' levels of Environmental Awareness (EA) in schools are not significant; on average, pupils in WA scored 82%, HS 76% and pupils in DS scored 69%. This shows that pupils are, in general, aware of the importance of FW reduction. It also points to differences in the level of EA among primary schools when pupils attending the WA scored slightly higher than pupils in HS. However, this might be partially influenced by the non-participation of the younger pupils attending WA school[21]. According to behavioural theories based on EA (Ham et al., 2015), pupils with high awareness about the food will automatically stop wasting it.

[21] Only older pupils (years 3, 4) participated in the EATs due to the concerns of the headteacher about younger pupils' understanding of the questions asked in the test.

Nevertheless, this study shows that the level of EA about the FW does not significantly impact FW production. Controversially, this study suggests that pupils with better food education waste more food than those with limited food engagement in school. The findings of this study undermine the linear model of behaviour-centred theories, as the findings suggest that strictly influencing pupil knowledge and attitudes fails to provide satisfactory behavioural change to ensure reductions in FW in school canteens. Although the research question about the impact of EA on FW production is now addressed, this study reveals some further issues connected to the awareness of schools about the school food system and its impact on the environment.

Firstly, this study revealed issues with recycling processes in the Kirklees Council, which forces schools located in the area to increase their environmental footprint. Although pupils in most of the schools in the area are required to separate their waste in the canteens, the impact of these practices does not have a real effect on the planet when all the waste produced ends up in the landfill. While the management in DS realises this situation and admits that pupils do not recycle on the school premises, school leaders in HS are not aware of the missing council recycling practices assuming that recycling is one of the perks of cooperating with Kirklees Catering- the meal provider organised by the council. This gap in school awareness about waste management practices shows how individuals (school leaders) often try to shift responsibility for waste management to councils, while their voluntary non-awareness allows councils to prioritize convenience over sustainability. However, if the schools become more aware of the current waste management practice performed on the school premises, they would be able to create pressure on the council to implement a new waste management system. Therefore, establishing effective recycling practices in schools operated by Kirklees Council needs to become the priority when moving towards sustainability in the area.

Secondly, the Dewsbury school (DS) currently faces severe issues with unsustainable food policies leading to the increased consumption of unhealthy meals by pupils during lunch breaks, which ultimately endangers pupils' health. The most detrimental aspect of this policy is a 30-minute lunch break for more than 600 pupils. This study found that younger pupils have sometimes only 5-7 minutes to eat their food. In this way, a short lunch break has a significant impact on pupils' food choices, as more than 70% of pupils choose pizza, cookies or sandwiches over the main meal of the day, which would take more time to eat. The meal provider adjusted to the current food policies of the school by serving quick, less healthy meals as it assumed that pupils would not choose healthier meal alternatives, as they do not have the time to consume them. However, the volume of FW produced in DS during the lunch is significantly lower compared to both primary schools. This paradox might be related to short lunch breaks in DS. Pupils often manage to eat smaller portions of food and as they do not have access and time to eat sizeable lunches, therefore, they might have a smaller margin for wasting food. Although it might seem that short lunch breaks contribute to FW reduction in the schools, this assumption needs to be explored more through in-depth interviews with pupils and increased sample size.

Third, pupils in DS do not separate their FW, and other material in the canteen as no recycling bins are provided during lunch. The informal discussion revealed that the recycling bins had been turned into mixed waste bins after school management realised pupils failed to recycle in the canteen. While this might be connected to issues with a short lunch break, staff members are aware of pupils' limited understanding of recycling processes. Therefore, the combination of these two factors has been found to have the most significant impact on the school's failed recycling policy in the canteen. Additionally, pupils are not required to clean their plates after they finish eating as they are forced to leave the canteen to create

space for pupils queuing outside the canteen, moving the responsibility for the disposal of FW to lunch supervisors.

These findings lead us to explore the known ethical dilemma connected to FW production in this context: *'Is it more important to serve pupils healthy meals or to reduce the volume of FW in school canteens?'* Although food policies in DS mean that pupils eat fewer healthy meals, their impact on FW production is surprisingly positive. In comparison to WA, DS waste around 60% less food per pupil per day. Nevertheless, it is essential to remember that current DS's food policy negatively impacts pupils' health and promotes convenience over sustainability. In the long term, this will decrease pupils' connection to the environment and increase their overall environmental footprint after leaving compulsory education by failing to establish sustainable food routines. In this way, a new question is raised: *'How do we reduce FW production in schools while serving healthy meals?'* To answer this question, a new study investigating FW management practices among eco and non-eco-schools must be conducted.

8.1.3 What is the impact of a school's employees involved in food processes on FW volume during daily school lunch?

In this section, the most influential findings emerging from staff' EATs and interviews are examined together to provide insight into how schools employees affect the volume of FW produced in the canteen during the lunch break. According to Derqui et al. (2017), staff members' positive attitudes and awareness about FW significantly influence the FW volume produced in schools. However, this study found that the level of EA among staff members is very similar in all three schools (HS: 63%; DS: 62.5%; WA: 67.5%) while the FW volume production differs significantly. Although staff members understand environmental issues connected to FW, this knowledge does not significantly influence how much food is wasted in the

canteen. On the other hand, this study shows that employees are generally unaware of how much food is daily wasted during the school launch, corresponding with Derqui et al. (2017) results. Therefore, this shows that although the general level of EA does not influence FW volume production, staff awareness about how much pupils waste might. Hence, schools should implement practices of measuring daily FW volumes as well as regularly announce the results of these measurements to staff, pupils and possibly parents.

Although question three has now been answered, interviews and EATs revealed some of the food practices that might explain the increase in FW production in some schools. EATs showed that more than 80% of staff members would finish their food even if they were not hungry. On the other hand, the number of pupils that would do the same is significantly lower (46%). Statistically, the changes in the food practices might explain the steady increase in FW volumes in both schools and households since the middle of the 20th century (Evans & Halpert, 2009; Evans et al., 2012; WRAP, 2011). This shows a significant transformation in food practices within the last decades and highlights the importance of understanding what has changed.

Therefore, both pupils and staff were also asked why they generally finish their food. While pupils' answers generally related to environmental protection and the feeling of being hungry, all staff members answered that they would finish their portion because of their upbringing or the eating habits developed as children. This shows that although staff members had not been taught much about the environmental impact of FW, or the danger of climate change during compulsory education as found in EATs, their food practices were developed in line with environmental protection and sustainable development. This suggests that it is not knowledge and attitude that influence peoples' choices as behavioural theories suggest, but rather it is the development of sustainable habits and routines

influencing human-environmental footprints. The relatively high level of EA among staff indicates that their knowledge and attitudes have been developed in line with already performed sustainable eating practices. This shows that attempts to change people's eating habits cannot begin with the development of pro-environmental attitudes and knowledge but rather with the implementation of sustainable practices in schools and pupils' homes.

8.1.4 To what extent does pupils' satisfaction with school meals influence plate waste volume during daily school lunches?

This section explores the fourth research question investigating the impact of pupils' satisfaction on FW production in school canteens. The results from satisfaction surveys (SSs) are explored in connection to their influence on the volume of FW produced in all three recruited schools. Data shows that the differences between satisfaction levels in both primary schools are not statistically significant. On average, pupils in HS enjoyed served food (75%) slightly less compared to WA, where the overall meal satisfaction is higher (80%). On the other hand, pupils in secondary schools were served the most popular meals such as pizza, various kinds of sandwiches and sweets which based on the opinions of the cooks should lead to a significant increase in average meal satisfaction. However, the data shows that the average level of meal satisfaction in DS was the lowest (60%) among recruited schools. This shows that serving popular *'junk foods'* in the school canteen does not automatically increase meal satisfaction.

This could be explained in two ways. First, the low rating of junk food by pupils could be connected to their habitual taste preferences. If pupils regularly visit fast-food restaurants serving the same meals as the meal provider in DS, pupils expect the same taste. However, as part of the government nutritional recommendation programme, cooks are required to limit certain ingredients such as added salt, oil or sugar, which might impact

the final taste of the meals and therefore pupils' overall meal satisfaction. Secondly, pupils might appreciate consuming healthier meals in the school environment as they may be aware of the nutritional benefits of healthy meal consumption, as shown in the EATs. Either way, this study shows that pupils' meal satisfaction does not significantly impact the volume of FW produced in the school canteen when no correlation was found between volume of FW and satisfaction (see Table 36). Although pupils in DS are the least satisfied with the food served in the canteen, the volume of mixed waste per pupil per day was calculated to be only 32.6g which is about 60% lower than in WA, the school with the highest measured food satisfaction. Moreover, daily FW and satisfaction measurements do not point to any correlation between these two categories.

Table 36: Average daily FW and HSM satisfaction measurements

	Huddersfield		**Washingborough**		**Dewsbury**	
	Satisfaction	*FW*	*Satisfaction*	*FW*	*Satisfaction*	*MW*
Day 1	77%	25.15 kg	78%	10.55 kg	53%	22.21 kg
Day 2	87%	19.55 kg	78%	11.97 kg	69%	20.17 kg
Day 3	69%	21.25 kg	79%	10.38 kg	61%	17.20 kg
Day 4	70%	27.65 kg	79%	10.17 kg	73%	21.10 kg
Day 5	76%	16.15 kg	79%	9.37 kg	60%	18.00 kg
Day 6	77%	23.35 kg	80%	7.19 kg	51%	18.77 kg
Day 7	79%	22.7 kg	80%	4.75 kg		
Day 8	76%	17.5 kg	84%	8.15 kg		
Day 9	71%	18.2 kg	82%	8.88 kg		
Day 10	75%	16.45 kg	83%	7.03 kg		
AVERAGE	**75%**	**20.98kg**	**80%**	**8.85 kg**	**60%**	**19.57 kg**

Legend: MW – Mixed Waste

Surprisingly, this study shows that pupils' satisfaction does not significantly impact FW volumes. Hence, these results transform the current

understanding of how pupils' satisfaction and FW volume correlate or rather do not correlate. In this way, further studies need to focus on what practices should be implemented in the school canteen to reduce FW volume instead of increasing pupils' meal satisfaction.

8.2 Theoretical Reflection

This section explores the theoretical contribution of this thesis based on the framework developed to understand the volume of FW produced in schools. This study brought together three of the most influential models currently used in social science research: Practice Theory (PT), the concept of Sustainable Development (SD) and behavioural theories based on models such as Environmental Awareness (EA) and ABC framework. The main aim of the study was to explore how FW in schools emerges and how can we understand this issue through concepts relating to practices, behaviour and sustainability. The methodological framework was developed within the basic principles of behavioural and PTs while achieving sustainability, and SD thus became an overreaching theme of this thesis. While most methods aiming to collect quantitative data were developed in line with the principles of behavioural theories, the qualitative data explored reality outside the individual, as it positioned practices at the centre of the social world. As a result, theoretical analysis of the sociological debate over *'Practice or Behaviour?'* is spread throughout the thesis.

In line with Shove's (2010) and Evans et al.'s (2012) critique of individual-centred approaches based on what Shove calls *'ABC theory'*, a number of relevant issues emerged from this thesis. These issues are often related to the limitations of understanding the world through the behavioural patterns of individuals. Firstly, this study indicates that individual levels of EA have only a minor impact on FW production. According to ABC and behavioural theories around EA (Ham et al., 2015; Shove, 2010), by increasing pupils' and staff members' awareness about the environment and improving their

environmental attitude, individuals will likely make better food choices and act responsibly towards the environment. In this case, this means that they will stop wasting food. However, it is clear now that even though pupils and staff members may be environmentally aware and know of the pro-environmental involvement of a school as shown in the interviews (staff) and EATs (pupils and staff), this does not have a significant impact on their food choices as behavioural theories suggest. The results of this study show that the opposite is true. Schools whose pupils reached the highest level of EA waste the most food. This directly undermines the linear foundations of behavioural theories by showing that the policies focusing on individuals' food choices and behaviour are not an effective way to achieve sustainability in schools.

Theoretically, these findings point to the importance of understanding the differences between the behavioural and PT approaches. It is clear now that pupils do not need to be taught about waste but rather that they need to be shown and allowed not to waste. On this basis, schools need to shift their understanding of pupils' actions from behavioural to an approach informed by PT. In this way, this study suggests that as long the school educational systems focus on influencing individuals purely based on environmental behaviour through the development of theoretical knowledge and pro-environmental attitudes, the unsustainable waste situation in the schools cannot be solved.

Secondly, this study highlights the limited impact of individual food satisfaction rates on the volumes of FW produced in the school canteens while noting the constant school attempts to increase pupils' meal satisfaction. This demonstrates that schools often understand the school food system through the principles of individual-centred behavioural approaches instead of exploring why food-wasting practices emerge in the first place. A satisfaction-oriented approach positions individuals at the centre of social reality, and in this case, FW is approached through the

relevant behavioural theories. However, this research found that pupils' food satisfaction rates are similar in primary schools while their FW volumes vary significantly. This is connected to individual experiences with meals served in the schools. Although it is clear that pupils in WA are being served better quality, healthier meals in comparison to HS or DS, pupils cannot fully appreciate the meals as they did not experience lower quality foods before. In other words, a pupil attending WA had never been served what a typical HS pupil would, and therefore, meal satisfaction rates are based on the personal experience instead of objective reality.

Finally, this thesis explored the impact of school participation in environmental programmes on the volume of FW produced. This study shows that although eco-programmes are useful tools to improve school sustainability standards while being beneficial to pupils' health, their impact on reducing FW is limited. These findings suggest that there are two fundamental issues with the development of eco-programmes. While some eco-programmes that focus specifically on individuals were found to have a limited environmental impact, others that were in transition to a practice-oriented approach underestimate the importance of reducing FW. This was found when investigating the impact of the Food for Life Partnership (FfLP) on the volume of FW produced in schools. Although it was clear that the programme is indeed transitioning towards a practice-centred approach, its potential impact on the volume of FW production in schools is both underestimated and under-researched (Orme et al., 2011, Jones et al., 2016; Weitkamp et al. 2013). The programme founders have assumed that implementation of certain practices such as gardening, composting, or nutritional discussions at lunchtime, that have been proved to have a positive impact on pupils' health and their reconnection to food (Jones et al., 2016; Orme et al., 2011), will also create a positive impact on FW volume reduction. However, this study found that this assumption is not entirely correct. Although composting has been found to have a significant impact on the reduction of school environmental footprints, sustainable

waste management only reduces the impact of the FW problem instead of reducing the volume of FW produced in schools. Nevertheless, composting practices should be implemented in every school, but they need to be accompanied by practices that reduce the volume of FW produced.

In line with this, this study confirmed the argument made by Evans et al. (2012) that in order for practices as performances to create significant change in social reality, they need to be developed based on the principles of effectivity and easy reproduction. In WA, the practices performed by pupils are being easily reproduced, but they have not been designed to effectively tackle FW production and therefore failed to achieve this goal. This shows that the founders of eco-programmes should not only be required to place practices at the centre of understanding social change but also should ensure that the reduction of FW is a priority for the practice implementation of the programme design.

So far, this study has demonstrated that the traditional, behavioural view of the social world that schools and eco-programme developers often acquire is not adequate when it comes to FW reduction. Therefore, as long as schools place individual pupils at the centre of the school food system, the issue with the FW cannot be solved. However, this draws attention to the problems with the behavioural approach in other areas such as healthy eating, recycling or separation practices in the canteen. These have been observed mainly in secondary schools, where pupils are not required to perform basic practices that generally positively impact schools' environmental impact (Derqui et al., 2018). In the following section, I explore the issues of how school views of the food system affect the implementation of pro-environmental routines into pupils' school environment.

One of the best examples for understanding the impact of an individual-centred approach in schools is found in Dewsbury. Theoretically, the

establishment of current food policies in DS is directly aligned with the traditional behavioural approach that schools acquire. Firstly, school management staff rely on the theoretical knowledge of pupils about the importance of healthy meal consumption and positive attitudes that should influence their food choice in any circumstances. This approach is based on behavioural theories when an individual's choice is influenced by behaviour, attitudes, and knowledge (Ham et al., 2015; Shove, 2010). The school effectively blames pupils for choosing to eat unhealthy food instead of influencing their eating habits through the establishment of a more sustainable eating environment. This not only has a damaging effect on pupils' health but allows schools to shift responsibility for ensuring healthy eating on the school premises to either meal providers or the pupils themselves.

Secondly, the school's short lunch break encourages meal providers to serve less healthy meals that pupils can consume quickly. Cooks argue that pupils would not eat HSMs – *'sit-down meals'*, as they do not have time to do so in the canteen. In this way, the meal provider focuses on following school food policies instead of appealing to the school to adjust these policies to create positive change. And while cooks keep providing pupils with unhealthy eating options, the school blames pupils for choosing to eat unhealthy food when arguing that pupils are taught about the nutritional impact of food and therefore should choose differently. This approach is again directly aligned with the traditional individual choice-oriented view of the school food system. Exploring the current situation in DS through the theoretical understanding of how practices emerge shows the harmful impact of school food policies on pupils' eating habits. However, it is important to add that while school's short break practices negatively affect pupils' healthy eating habits, they seem to have a positive impact on the FW reduction due to significantly smaller portions served to pupils in the canteen. In this way, schools must establish a balance between practices reducing FW and practices that promote healthy eating as focusing

primarily on any one of these factors might have a damaging impact on other environmental, social or economic aspects.

Thirdly, non-recycling practices in the school canteen are being excused by school staff when they blame the high level of FW on negative attitudes to recycling among pupils. Indeed, EATs show that one-third of pupils would not use recycling bins even if they were available in the canteen. However, school employees fail to see why pupils' attitudes towards recycling in the canteen are so negative and how this is connected to the unsustainable eating practices that pupils are forced to perform in the canteen during the lunch break. It is illogical that schools expect pupils to have a positive attitude to recycling in the canteen when pupils' meals are served on disposable plates they are not required to recycle while being rushed out of the canteen due to the short lunch break. These practices enforced by school food policies are directly aligned with pupils' negative attitudes towards both recycling and healthy eating, as shown in EATs. This study develops an understanding of practice implementation in the social world. It is clear now that it is not attitudes and knowledge that influence pupils' behaviour, but rather it is the practices performed in the canteen that affect the pupils' attitudes. In this case, pupils developed negative attitudes towards recycling in the canteen because current food policies do not require nor encourage them to recycle during lunchtime. Therefore, I argue that pupils need to be first allowed to perform practices to develop positive attitudes towards them.

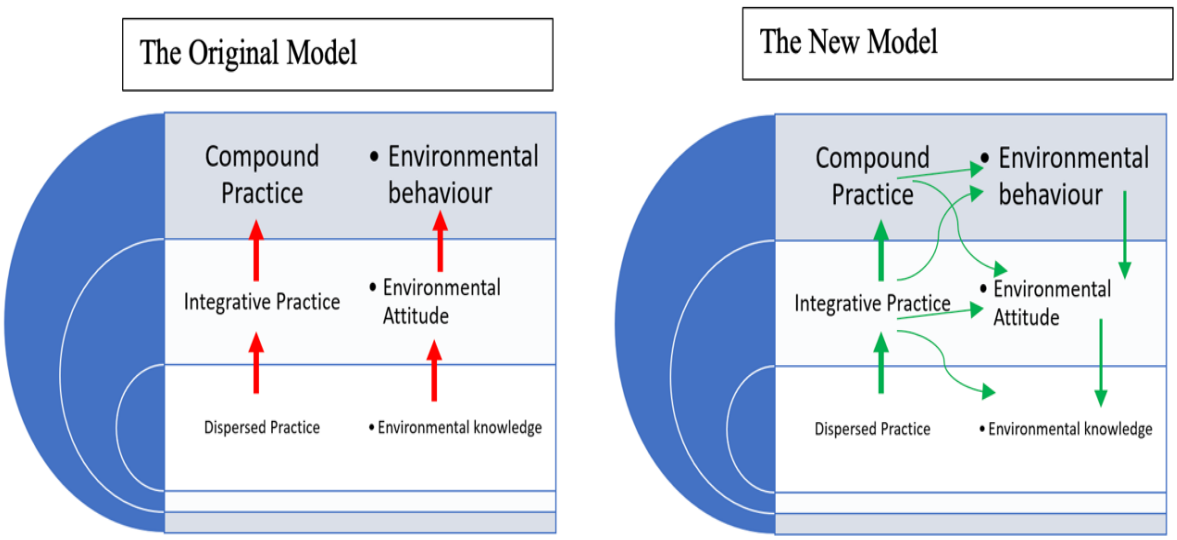
In conclusion, this thesis has explored the damaging impact of traditional behavioural theories on pupils' development of anti-environmental practices in recruited schools. It is clear now that schools' individual-oriented view of the school food system allows them to blame pupil upbringing or the council for pupils' unsustainable eating practices. This often leads to shifting responsibilities between schools, parents, pupils, and the council for environmental issues such as unsustainable waste

management. This section shows that to deal with these issues, schools need to change the view of the current school food system towards a practice-orientated approach, allowing school management to understand how and why certain practices emerge. In this way, schools would start understanding the significance of creating pro-environmental policies while allowing pupils to perform practices more sustainably. Moreover, this section demonstrates the inefficiency of traditional linear models of behavioural theories where school responsibility starts and finishes with giving pupils a theoretical understanding of the world's environmental issues. In fact, this study shows that an individual-centred theoretical approach can become damaging not only to the environment and pupils' health but also endangers future generations and, in this way, goes against the basic principles of SD.

By returning to the model of exploring the connections between practices and behaviour this study has established how theories of practice and behaviour relate to each other in the school environment. Figure 12 shows how the understanding of linear models of PT and EA separately did not provide a suitable framework to explain schools' environmental positions. Instead, both PT and behavioural theories frameworks are interfering with one another and they both are needed to fully understand the FW phenomenon in schools. And while the level of practice complexity increases from dispersed to compound practices, behaviour is often disturbed in the social world and the linear character is transformed from knowledge and attitudes influencing behaviour to behaviour (practices) impacting the development of individuals' attitudes and knowledge. It is now clear that pupils' knowledge has a limited impact on pupil attitudes, while pupils' attitudes and intentions fail to significantly impact behavioural patterns in school canteens, as the linear model of EA would suggest. However, what was found to have a significantly positive impact on pupils' attitudes were performances of integrative practices such as recycling, separating food scraps, gardening and composting, among others. It was

found that purely performing these activities improves attitudes towards them and, in a sense, becomes their pro-environmental behaviour while directly or indirectly impacting attitudes and knowledge development (see Figure 12). This study develops a theoretical understanding of the importance of practice implementation in schools. It is clear now that if we are to achieve a reduction in the environmental footprint of schools, school management and government need to start focusing more on the implementation of new practices into the school environment rather than exclusively focusing on the individual through the development of theoretical knowledge to change his behaviour.

Figure 12: New Theoretical Model of Environmental Practices



8.3 Limitations and Future Research

This section is designed to explore the limitations of the conducted study and discuss future research needed to further investigate the findings. As previously mentioned, one of the biggest limitations of this study is the sample size of both primary and secondary schools. The sample size is small because of the limited cooperation from schools when more than 70 leaflets have been sent to schools around the UK but only four schools

replied and one pulled out after the initial interview. Therefore, there is a need for multi-school research and more funding to motivate schools to participate. However, while the willingness of primary schools to cooperate was low, recruitment of pro-environmentally involved secondary schools was not successful at all in this study. This could be connected to the issues around the lack of schools' control over performed practices and pupils' coordination (Informal discussion - Healthy Schools UK representative). Although this is one of the biggest limitations of this research, it also highlights the current situation in secondary education showing secondary schools' limited pro-environmental involvement. Hence, secondary schools have a lower chance to improve their environmental position and a smaller chance to contribute to the achievement of SDGs.

Another limitation of this study is connected to methods of data analysis. Qualitatively, content analysis was chosen to analyse qualitative data collected in schools and although the selected method brought a lot of analytical insights, it is important to acknowledge that other, more robust and structural methods such as thematical analysis could have been used to bring a more comprehensive understanding of collected qualitative data (Lorelli et al., 2017). Moreover, a more robust content analysis of the interviews needs to be performed for journal paper publication while interviews with pupils could bring interesting insights into how practices are formed in the school environment. Quantitatively, more advanced statistical methods (e.g. mathematical or equation modelling) could have been used to analyse quantitative data in more depth and bring more statistical insights. However, it is important to add that working with some of the more advanced mathematical models could lead to misinterpretation of the data and in so, reduce the credibility of the study, especially for non-statisticians (Zulkarnaen, 2018).

Although the overall results concerning the factors that affect FW production cannot be applied to a broader population of schools in the UK,

more extensive qualitative and quantitative research with more schools needs to be conducted to confirm these findings. Moreover, I recommend an extensive investigation into the practices necessary to positively influence current school food systems, which could be implemented in the current school environment. For example, one of the most influential findings emerging from the observations of pupils' eating practices showed that some of the routinised practices encourage pupils' to finish their lunch while others never did. Therefore, it is important to investigate where and how these practices emerge and how they can be reproduced in the school environment.

This study found that although composting is one of the most effective ways of reducing the schools' environmental footprint through reductions in landfill waste, not all schools had the necessary assets to set up a compost bin in their school gardens. Therefore, the schools with different locations and levels of environmental engagement need to have resources available to help them change current food-related practices, and advice should be available from local councils and external organisations.

Moreover, this study reveals a gap in the literature concerning FW volume production among the schools located in the UK's highest and lowest deprived areas. Although many studies focus on differences in the quality of meal provision in schools in highly deprived areas (Thomas et al., 2019), the impact of poverty on the volume of FW produced is still under-researched. To address this, I recommend conducting a large-scale study to explore the impact of deprivation on FW production in schools across a wide area. However, no specific conclusions regarding FW and the school's deprivation areas could be drawn due to the small sample size and the extreme differences between the deprivation indexes of the areas of the recruited schools (HS: 1926; DS: 5262; WA: 29 911) (GOV.UK, 2019).

8.4 Implications of this research and policy recommendations

In this final section, this research's practical and theoretical implications are discussed alongside an investigation into why and how government bodies should use this study to improve school food systems in primary and secondary schools in the UK. The most important finding from this thesis is that schools need to change their individual-centred view of the school food system to a practice-based approach. This study found that developing pupils' knowledge and attitude to improve their behaviour is an ineffective way to move towards sustainability. The results clearly show that pupils with the highest level of EA waste more food during the lunch break. Therefore, it is clear that schools need to remove the traditional behavioural approach when changing the way pupils act in canteens. Moreover, it was found that pupils do not need to understand practices but that it is essential to implement new practice performances in school canteens regardless. Although pupils are not always aware of why they are performing certain practices, such as waste separation practices, the performance of these routines helps schools to build the foundations of recycling and build long-term habits for pupils improving schools' overall sustainability standard.

This thesis strongly argues that by implementing reproducible practices into the school environment, schools cannot only significantly reduce their environmental footprint and improve pupils' eating habits but reduce FW production as well. In this way, the study also indicates that particular eco-programmes may need to be transformed to avoid the currently dominant behavioural-centred approach that aims to influence pupils' behaviour through the development of knowledge. It was found that the traditional linear behavioural approach to this issue, in which knowledge is understood to affect attitudes and thus behaviour, is not a functional model in school canteens. On this basis, both local and central government bodies should start re-evaluating eco-programmes based on how they wish to achieve

change in the schools while allocating more funding to organisations using a practice-based approach as a foundation to achieve pro-environmental change.

This research identified a large gap in the recycling policies of local councils in which schools are often left without the means of becoming more sustainable. Although Kirklees Council provides multiple bins for household recycled material, the schools are left unattended. This is one of the downfalls of shifting responsibility for SDG achievement from central government to local councils while allowing them to implement recycling policies based on their current resources. Therefore, while cooks complain about the current unsustainable situation in which no waste produced by schools gets recycled, the school management is not aware of this situation and unintentionally shifts responsibility for waste management to the council. Of course, this situation extends to food and FW when the council fails to implement FW only bins or help schools start recycling food on their own by implementing new practices such as composting. Composting was found to significantly reduce the FW produced in schools and therefore should become the main priority in reducing the schools' environmental footprint. However, as mentioned before, both school managers and local councils must first become more informed about the current unsustainable waste management situation in schools and implement new compulsory recycling practices to implement environmental sustainability.

Additionally, both central and local governments need to pay more attention to secondary school lunch break regulations. This study shows how a pupil can develop unhealthy eating habits in DS due to limited time allocations for lunch, as more than 600 pupils are required to dine within the 30 minutes time limit. This does not only lead to pupils being unable to separate their waste, but it also endangers their health, as healthy eating habits also disappear from the school canteens alongside these regulations. Therefore, it should become a priority to establish new policies regarding

pupils' dining experiences in school canteens. Firstly, instead of regulating meal providers with nutritional guidelines, the provision of junk food such as pizza, burgers and sweets should be regulated directly and limited mainly in secondary school settings. Secondly, meal providers should be supported in meal preparation processes, ensuring pupils' health takes precedence over profit. And finally, it is necessary to establish guidelines for schools regarding the number of pupils allowed to enter the canteen simultaneously. It is neither environmentally nor socially responsible for allowing 30 minutes lunch break for more than 600 pupils. Therefore, such practices in schools need to become more regulated as they are endangering sustainable growth as well as the health of future generations.

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Appendices

Appendix 1: Environmental Awareness Test - Pupils

Write the answers on the line and circle the ones that the most represent what you think. You won't be marked.

Environmental Awareness Questionnaire

Are you attending school lunch? A: YES B: NO
What gender are you? A: BOY B: GIRL
How old are you? A: **7** Years old B: **8** Years old C: **9** Years old D: **10** Years old E: **11** Years or older

1. **Do you have FOOD ONLY container where you can place your leftovers after school lunch?**
   A: YES * B: Don't know C: NO *

***If Yes**: Are you regularly using it? A: YES B: NO
***If No:** would you use such a container? A: YES. B: NO

2. **What do you think the term: 'food waste' mean?** (Do not use the word '*waste*' in the answer)

   _____

3. **Have you been taught anything about the food waste in school?**
   A: YES B: NO

4. **Have you been taught anything about the food at all?**
   A: YES* B: NO

If Yes: What? _____

5. **Do you think it is important to have food every day?**
   A: YES* B: NO *

If Yes: Why? _____

If No: Why?_____

6. **Where do you think food goes when you throw it into the bin?**

   _____

7. **Do you think wasting food is bad?**
   A: YES* B: NO*

If Yes: Why?_____

If No: Why? _____

8. **How many times a day do you normally eat?**
   A: once a day B: 2-3 times C: 4-6 times D: 6 and more E: I don't eat every day

9. **Have you ever grown your own food (e.g. fruit or vegetable)?**
   A: YES B: NO

10. **Have you ever prepared your own meal?**
    A: YES B: NO

11. **Do you normally finish your school lunch?**
    A: YES B: NO*

If Yes: Why?_____

If No: Why?_____

12. **Even if you are full, do you try to finish your school lunch?**
    A: YES B: NO

Appendix 2: Satisfaction Survey

Satisfaction Survey *card number:* ☐

1. **Are you:** a) Boy b) Girl
2. **How old are you?** a) ≤ 7 years old b) 8 years old c) 9 - 10 years old d) 11 ≥ years old
3. **What meal did you choose today?** (write on the line)
   a) home packed lunch b)_____
4. **How satisfied are you with taste and quality of today's meal?**
   a) Terrible b) Slightly satisfied c) Satisfied d) Very satisfied e) Excellent

5. Did you have any leftovers?
a) yes * b) no
If yes, can you stand a reason?
a) It did not like the taste
b) Too big portion
c) I am not hungry
d) I did not like how the food looked
e) inedible parts (bones, egg shelves etc.)
f) Others……

Appendix 3:Semi-structured Interviews – chef

1. What is your role in the school?
2. Was there any special training required for this role?
3. What are your regular daily responsibilities, try to briefly describe them?
4. Is it normally you who plans menu for pupils or how is it working?
   IF YES: Based on what requirements are you planning meals for pupils?
   IF NO: Who does? (team or just one individual, Council?) is it repeating patterns?
5. Does school has any saying in what meals are served or do you run independently?
6. Now I would like to ask you couple of questions about the food provision:
   - are you supplying normally food locally or globally?
   - What do you think about the quality of the ingrediencies from your suppliers?
   - Would you change a suppliers if bigger budget was available?
   - Would you change some types of meals that are served here if possible or if your budget would allow that?
   - Is government supporting this school's meal provision in any way? (free lunch?)
   - What do you think about nutritional requirements for pupils of various ages set up by government? Is it possible to maintain them in school environment?
7. Are you normally discussing within the team possible improvements to increase the effectivity of the way food is managed e.g. experimenting with the meals maybe by adding more fruits or vegetable into daily menu, ,?
   IF YES: can you name any?

IF NO: do you think there could be any improvements, maybe in type of meals you serve or waste management?

8. Is or have ever been this school enrolled in any of the eco-programs that would influence food system in any way?

   IF YES:

   - What do you think about implementation of this eco program in your school? Have you observed any improvements/ made things worse?
   - Are there any skills that required improvement after school implemented Eco-program?
   - Has anything changed in the cooking practices after implementing Eco-program?

     IF Yes: What has changed?

   - Has the menu changed after implementing program? If so, what was the reaction of pupils?
   - Based on your knowledge would you say that nutritional intake for pupils has improved after implementing of Eco-program?

- Was there any change in order to tackle environmental issues after implementing of the Eco program? (any positive changes in daily practices)
- Did program influence budgeting issues?
- Do you think implementing of the program helped with food waste reduction?
- What do you think, was the implementation of the program overall good or bad decision for school to make?
- Do you have any knowledge about other Eco-programs currently running in other school?

  If yes:

  What Programs?
  Do you think it would be positive for this school to get involved? Why? **If no:**
  Do you think it would be good if school would be enrolled in any Eco- program?

  IF NO:

  Do you think it would be good if school would be enrolled in any Eco-program?

  If yes: why?

  If no: why?

9. Do you have any knowledge about other Eco-programs currently running in other school?
10. Is there any other activity that school performs and you think it has changed the way pupil's behave in the canteen or their eating habits?

11. How the serving system works? How do you know how many meals are you supposed to make? How is it working?
12. What do you think about the food waste in this school?

    Serious issue (why) Not that important (why)

13. Would you say that there is a lot of kitchen waste (during the preparation processes)? Or after lunch lots of unsed food?
14. Are you normally reusing cooking ingrediencies that has not been used during cooking? What about food that has not been served?/ Do you know how many meals have you actually served on the end?
15. What about the salad bar? (the serving table opposite the kitchen counter?)
16. Would it be possible to fill this part of the table?

1. The number of planned and real number of meals (cooks) Planned Actual

Number of planned meals (meal 1) Number of planned meals (meal 2) Allergenic menus
Diet menus

17. Would you say there is lots of food waste during the lunch?
18. Would you say that you can handle food waste better at home or at school?

19. Do you think pupils will be able to fill this short survey after each lunch? (showed questionnaire)
20. How much does a lunch cost?
21. Do you think there is anything that could be improved generally in food system in this school?
22. Do you consider yourself to be environmentally aware person, maybe in comparison to your other colleagues or your friends?

Appendix 4: Semi-structured interview – management

1. What is your role in the school?
2. Was there any special training required for this role?
3. What are your regular daily responsibilities, try to briefly describe them?
4. Does school has any saying in how and what meals are served?
5. When did you start having your own kitchen? And who was your meal provider before? Council or Private?
    - Could you compare them?
6. What do you think about the quality of the meals in canteen now? And before?
7. Would you say that kitchen serves healthy meals? Or is there something that still needs to be improved regarding the meals?
8. Is government supporting this school's meal provision in any way except the free lunches?

9. So, I know that this school is involved in multiple programs

   IF YES:

   - Would you be able to name the most important ones that In your opinion help the school the most to become more sustainable?
   - What do you think about implementation of this eco program in your school? Could you name any improvements after implementing the program?
   - Was there a lot of practices school needed to change after enrolling to this various programs?challanges
   - Has anything changed in the cooking practices after implementing Eco-program?

   IF Yes: What has changed?

   - Has the menu changed after implementing program? If so, what was the reaction of pupils?
   - Based on your knowledge would you say that nutritional intake for pupils has improved after implementing of Eco-program?
   - Did program influence budgeting issues? Budget for enrolling into the program itself? And the when you had to change certain daily practices in your school looking for local food suppliers how did that influence the overall budget of the school? Is it very challenging task?
   - What would you say is the initial investment schools need to bring in and how state could help? What would you advise them to do? Where to start?
   - Do you think implementing of the program helped with food waste reduction?
   - Do you have any knowledge about other Eco-programs currently running in other school that you consider to apply in this school?

     If yes:

     What Programs?

     Do you think it would be positive for this school to get involved? Why?

   IF NO:

   Do you think it would be good if school would be enrolled in any Eco-program?

   If yes: why?

   If no: why?

10. Is there any other activity that school performs and you think it has changed the way pupil's behave in the canteen or their eating habits?
11. I could see that there is fruit provided for pupils at the reception next to the entrance, could you explain how this works?
12. What do you think about the food waste in this school?

Serious issue (why) **Not that important (why)**

13. Would you say there is lots of food waste during the lunch?

14. Do you think there is anything that could be improved generally in food system in this school?
15. Do you consider yourself to be environmentally aware person, maybe in comparison to your other colleagues or your friends?
16. Is here someone particular I should've talk to about the food system in this school except cooks, lunch supervisors or you?

Appendix 5: Semi-structured Interviews – Cooks, Supervisors

1. What is your role in the school?
2. What are your regular daily responsibilities, try to briefly describe them?
3. Are you normally discussing within the team possible improvements to increase the effectivity of the way food is managed e.g. experimenting with the meals maybe by adding more fruits or vegetable into daily menu?
   IF YES: can you name any?

   IF NO: do you think there could be any improvements, maybe in type of meals you serve or waste management?
4. Is or have ever been this school enrolled in any of the eco-programs that would influence food system in any way?
   IF YES:
   - What do you think about implementation of this eco program in your school? Have you observed any improvements/ made things worse?
   - Are there any skills that required improvement after school implemented Eco-program?
   - Has anything changed in the cooking practices after implementing Eco-program?

   IF Yes: What has changed?
   - Has the menu changed after implementing program? If so, what was the reaction of pupils?
   - Based on your knowledge would you say that nutritional intake for pupils has improved after implementing of Eco-program?
   - Was there any change in order to tackle environmental issues after implementing of the Eco program? (any positive changes in daily practices)
   - Did program influence budgeting issues?

- Do you think implementing of the program helped with food waste reduction?
- What do you think, was the implementation of the program overall good or bad decision for school to make?
- Do you have any knowledge about other Eco-programs currently running in other school?

  If yes:

  What Programs?

  Do you think it would be positive for this school to get involved? Why?

  If no:

  Do you think it would be good if school would be enrolled in any Eco-program?

IF NO:

Do you think it would be good if school would be enrolled in any Eco-program?

If yes: why?

If no: why?

5. Do you have any knowledge about other Eco-programs currently running in other school?/ maybe in Kirklees?
6. Is there any other activity that school performs and you think it has changed the way pupil's behave in the canteen or their eating habits?
7. What do you think about the food waste in this school?
   Serious issue (why) **Not that important (why)**
8. Would you say that there is a lot of kitchen waste (during the preparation processes)? Or after lunch a lot of unused food?
9. Are you normally reusing cooking ingrediencies that has not been used during cooking? What about food that has not been served?/ Do you know how many meals have you actually served on the end?
10. Would you say there is lots of food waste during the lunch/ leftovers after pupils?
11. Would you say that you can handle food waste better at home or at school?
12. Do you think there is anything that could be improved generally in food system in this school?
13. Do you consider yourself to be environmentally aware person, maybe in comparison to your other colleagues or your friends?

Appendix 6: Interview Consent Form

THE SCHOOL FOOD WASTE PROJECT

Consent to Take Part in Research

- I ……...voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I understand that I can withdraw permission to use data from my interview within one month after the interview, in which case the material will be deleted.
- I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that participation involves answering interview question best to my knowledge and filling environmental awareness questionnaire provided by researcher straight after the interview
- I understand that I will not benefit directly from participating in this research.
- I agree to my interview being audio-recorded.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.
- I understand that disguised extracts from my interview may be quoted in final PhD thesis, journal articles, conference presentations or other formats following confidentiality agreements
- I understand that if I inform the researcher that myself or someone else is at risk of harm they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.
- I understand that signed consent forms and original audio recordings will be retained in private password protected computer of which only research has access.
- I understand that a transcript of my interview in which all identifying information has been removed will be retained for minimum 7 years by University of Huddersfield with no more than 25 years
- I understand that under freedom of information legalisation I am entitled to access the information I have provided at any time while it is in storage by contacting researcher or University of Huddersfield.
- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

--- ---

Signature of participant Date

I believe the participant is giving informed consent to participate in this study:

--- ---

Signature of researcher Date

Appendix 7: Interview Information Sheet

University of HUDDERSFIELD
Inspiring tomorrow's professionals

School Food Waste Project

INFORMATION SHEET

You are being invited to take part in a study evaluating the factors influencing the volume of plate waste produced by pupils during daily school lunch. Before you decide to take part it is important that you understand why the research is being done and what it will involve.

What is the project about?
School Food Waste Project evaluates the volumes of food waste produced by schools in England during daily school lunch. The project investigates possible impact of the school food waste production on the environment while suggesting new techniques to support food waste reduction in schools. This project should generate new theoretical and practical knowledge for scientists and institutions focusing on food waste reduction in schools by applying holistic approach while investigating this phenomenon.

Why I have been approached?
You have been asked to participate because you have been identified by the school as your position is key to explain various factors influencing pupil's daily plate waste. While investigating school food practices, your opinion on school food system may be key to improve school practices in the UK and eventually lead to overall food waste reduction.

Do I have to take part?
It is your decision whether or not you take part. If you decide to take part you will be asked to sign consent form and return it back to researcher. You will be free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your position in the school as all material provided is used within strict confidentaility without direct access to these data from school or anyone else except researcher. You have a right to withdraw without prior discussion to headteacher by contacting researcher (contact deatil below)

What will I need to do?
If you agree to take part in the research you will be asked to answer the questions during the interview best to your knowledge and fill in questionnaire looking at your environmental awareness which will be placed in the sealed box annomyously. The interviews will be recorded and typed into password protected computer to which only researcher has access based on the strict ethics crateria of University of Huddersfield. Interviews will be recorded and transcribed using a coded reference to which only researcher has access. You can obtain full access to the interview transcript at any point prior to request.

Will my identity be disclosed?
All information disclosed within the interview will be kept strictly confidential, unless information about you or someone elses harm are rivieled so researcher may have to report this to relevant authorities which will be discussed with you first but may be required to report with or without permission. Your name and all personal information will be coded and transcripted in the password protected computer to which only researcher has access.

What will happen to the information?
All information collected from you during this research will be kept secure and any identifying material, such as names will be removed in order to ensure anonymity. It is anticipated that the research may, at some point, be published in a journal or report. However, should this happen, your anonymity will be ensured, although it may be necessary to use your words in the presentation of the findings and your permission for this is included in the consent form.

Who can I contact for further information?
If you require any further information about the research, please contact me on:

Name: Michaela Polomska
E-mail: michaela.polomska@hud.ac.uk
Telephone: 0730588247

Appendix 8: Environmental Awareness Test – Staff Members

Environmental Awareness Questionnaire

POSITION: TIME IN THIS POSITION: GENDER: M/ F

1. **About 70 billion farm animals are produced annually for meat production. What percentage of these do you think are factory farmed*?**
   A: 20% B: 90% C: 33% D: 66%

2. **What do you think the term: 'food waste' means?**

   _____

3. **Annually about 4.33 billion tons of food is produced globally. How much of it is wasted every year?**
   A: 1/3 resp. 1.3-billion-ton B: 1/2 resp. 2.16 billion ton
   C: 1/4 resp. 1.08-billion-ton D: 1/10 resp. 433 million tons

4. **Do you consider food waste to be one of the major global environmental problems?**
   A: YES * B: NO*
   ***If Yes: Why?** _____

   ***If No: Why?**_____

5. **Did you learn about food waste during your compulsory education?**
   A: YES B: NO

6. **What do you think is more important in order to reduce food waste?**
   A: Individual actions B: Governmental actions C: Business actions

7. **Have you ever grown your own food (e.g. fruit or vegetable)?**
   A: YES * B: NO

   If Yes: Could you provide some details? _____

8. **Even if you are not hungry do you try to finish your lunch?**
   A: YES B: NO

   If Yes: Why?_____

   If No: Why?_____

9. **Do you think school management is concerned about food waste produced during daily school lunch?**
   A: Yes, constant attempts to reduce food waste B: Yes, but the problem are limited resources
   C: No, missing motivation to reduce food waste C: Yes, school is concerned but with zero actions

10. **What do you think, is the volume of food wasted during one lunch in this school (in lb or kg)?**

    _____

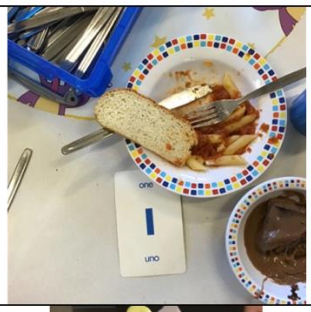
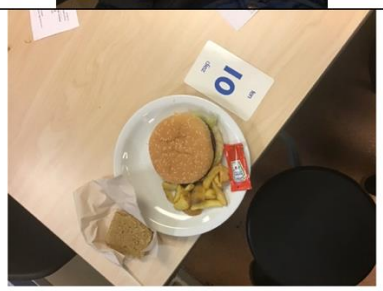
11. **Do you know where food waste ends up after school lunch?**
    A: Landfills B: Anaerobic Digestion Plants C: Local Farms D: Compost

12. **Circle the answer that comes to your mind when you think about the environment?**

A: I think we pay too much attention to our environment which is destroying our economy
B: I have heard that environment is on the edge of global environment catastrophe, but I don't think it is true
C: I think we are on the edge of global environmental catastrophe but there is nothing I can do about it
D: I think we are on the edge of global environmental catastrophe and the way I behave can make a difference
E: I think scientists lie or at least exaggerate when they talk about global environmental scenarios

* factory farms animals endure, cramped, disease-ridden, conditions before they are slaughtered

Appendix 9: Meal Pictures Examples

	BEFORE	AFTER
WA		
HS		
DS		

Appendix 10: Triangulations and Research Questions

Research Question 1 -sub question 1: To what extent does school's pro-environmental involvement influence the volume of FW during daily school lunch?			
Data Analysis	**Methods**	**Analytical Approach**	
Investigation of school's pro-environmental involvement through published eco-activities	Website search, Government documents, External Sources	Thematic and comparative analysis	

How each of the eco-program or activity influence canteen practices	Web search, observations, Interviews	Thematic and comparative analysis, methodological triangulations	
How schools' eco-involvement influence EA of staff and pupils	EATs questionnaire	Comparative analysis	
Research Questions 1 -sub question 2: To what extent does pupil's environmental awareness influence the volume of FW produced during daily school lunch?			
Data Analysis	**Methods**	**Analytical Approach**	
Investigation pupils' level of EA	Pupils' EATs questionnaires	Comparative analysis, data triangulations	
Eating Practices during the lunch does the level of EA influence FW volume?	Observations, EATs questionnaires	Comparative analysis, Methodological and data triangulation	
Impact of Staff level of EA on pupils' level of EA	Pupil's and Staff's EATs questionnaires,	Comparative analysis, methodological triangulation	
Research Question 1 -sub question 3: To what extent does pupil's satisfaction with school meal provision influence the volume of plate waste during daily school lunch?			
Data Analysis	**Methods**	**Analytical Approach**	
Measurements of pupils' Satisfaction with their meals	Satisfaction Surveys, Menu Analysis, Meal Pictures	Comparative analysis, Data and Methodological Triangulation	
Are pupils' preferences influenced by schools' eco-engagement?	Satisfaction Surveys, web search, interviews	Thematic and Comparative Analysis, Data Triangulation,	

Development of meal plans: how is a menu created?	Interviews, Observations, Menu analysis	Methodological and Data Triangulation	
Does pupils' level of EA influence pupils' satisfaction with school meals?	Satisfaction Surveys, EATs questionnaires	Comparative, Data Triangulations, Statistical Correlations	
Research Question 1 -sub question 4: What is the impact of a school's employees involved in food processes on FW volume during daily school lunch?			
Data Analysis	**Methods**	**Analytical Approach**	
Canteen practices during the school lunch	Observations	Comparative analysis	
Employees level of EA and how that influence their practices in the canteen during school lunch.	Observations, Interviews, EA staff questionnaires	Comparative, Data Triangulation, Methodological Triangulation, Statistical Correlation	
Impact of schools' food activities on staffs' canteen practices	Interviews, Observations, Web search,	Data Triangulations, Thematic Analysis,	

Appendix 11: Postgraduate Research Ethics Form

THE UNIVERSITY OF HUDDERSFIELD
Business School Research Ethics Committee

POSTGRADATE RESEARCH STUDENT ETHICAL REVIEW FORM

Please complete and return via email to alex.thompson@hud.ac.uk along with the required documents (shown below).

SECTION A: TO BE COMPLETED BY THE APPLICANT

Before completing this section please refer to the Business School Research Ethics web pages which can be found under Resources on the Unilearn site (Ethics Policies and Procedures). Applicants should consult the appropriate ethical guidelines.

Please ensure that the statements in Section C are completed by the applicant (and supervisor for PGR students) prior to submission.

Researcher(s) details	Michaela Polomska U1673654
Project title	School Food Waste Project
Award (where applicable)	
Supervisor details (where applicable)	Dr John Lever
Project start date	16/09/2019

SECTION B: PROJECT OUTLINE (TO BE COMPLETED IN FULL BY THE APPLICANT)

Issue	**Please provide sufficient detail for your supervisor to assess strategies used to address ethical issues in the research proposal. Forms with insufficient detail will need to be resubmitted.**
Aims and objectives of the study. Please state the aims and objectives of the study.	The main aim of this study is to measure food waste volumes produced by schools and evaluate all (quantitative and qualitative) factors influencing food waste in the selected school. This study will be comparing various school's data and looking for the possible improvements in schools' daily practices in order to achieve long-term food waste reduction. This study focuses mainly on pupil's food leftovers during school lunch while the food waste produced by kitchen will be regularly measured without further analysis, this is only to inspect the ratio between kitchen and pupil's daily food wastage.
Brief overview of research methodology The methodology only needs to be explained in sufficient detail to show the approach used (e.g.	Research methodology is divided into two parts both in detail explained in the consent form which in is my study represented by Memorandum of Understanding for the schools participating (document attached, however as

survey) and explain the research methods to be used during the study.	school holiday just finished some schools did not replied with signed memorandum of understanding therefore emails confirming participation are attachted) First part (first week of the study) includes: - Pupils observations during school lunch in order to adapt allocation of instruments for methods used in the second part of the study; - Interviews with staff (4-10 based on the school) enrolled in food school processes in order to examine school food system (interview information sheet, consent form and semi structured interview questions attached); - Testing environmental awareness (of staff following after interview (Adult questionnaire attached); - Testing environmental awareness of all pupils attending the school during any lesson teacher considers appropriate. Questionnaire will be given to teachers during first day of project starts. Questionnaires are divided into 4 groups for younger pupils, older pupils and staff. (Questionnaires attached); Second Part (second and third week of the study) includes: - Taking Pictures of 5 random pupil's served meal portion of every type of meal served by kitchen help to determine average meal portion; - Selecting approximately 5% of students attending school lunch to place their leftovers into sealable see-through plastic bags provided by researcher for later analysis; - All students capable of reading and writing are asked to fill in satisfaction survey after each lunch (satisfaction survey attached); - Placing food waste and liquids into allocated bins provided by school/researcher; - Measuring the weight of the pupil's food waste after lunch by using measuring scale provided by researcher; - Measuring the weight of kitchen food waste after lunch by using measuring scale provided by researcher, the results will be recorded into daily food diary; - Filling daily food diary with the help of one kitchen staff which has been approved by each school (daily food diary attached)
Does your study require any permissions for study? If so, please give details	The study requires permission from the school to participate and allow researcher to collect appropriate data. Full explanation of schools and researcher's rights and responsibilities is attached in memorandum of understating which is required to be signed prior the study by each individual school participating in the study. Moreover study needs a permission from parents as they

	may anytime withdrawal their child from the study, information sheet will be sent to them by school however no additional consent form is necessary.
Participants Please outline who will participate in your research. Might any of the participants be considered 'vulnerable' (e.g. children)	**School staff** enrolled in School Food System through interviews: before interview every member of staff will read information sheet (attached) about the project and sign consent form (attached). Staff interviews can reveal the processes of food system in the school and influence of qualitative factors towards volumes of food waste (sample of four schools) **Pupils** attending school are examined through waste collection, satisfaction survey, environmental awareness tests and meal pictures. However direct contact is required only during asking pupils to place their lunch leftovers into see-through plastic bags in case lunch supervisor won't be available. Pupils involvement is explored through collecting quantitative data to evaluate actual food waste volumes and qualitatively through evaluating their environmental awareness.
Access to participants Please give details about how participants will be identified and contacted.	Staff in the school will be identified by school and will be contacted directly during the study by the main teacher cooperating with the researcher on the project (in most of the schools it is head teacher or teacher for food education if applicable). However, during recruitment process kitchen staff and lunch supervisor agreed to have an interviews. Pupil's participation in the study and access to them is strictly directed though the school prior approval to participate in the study.
How will your data be recorded and stored?	Data will be collected and accessed only by researcher. The data consist: - recordings and later typed interviews; - answers to environmental awareness tests of both staff and pupils; - pictures of pupil's served meals which will be transferred from phone device to password; protected computer on the end of each school day; - filled daily school diary including pupils and kitchen food waste volumes; Data will be treated with the strict confidence in line with the standards of University of Huddersfield. Data will be securely stored in a password- protected computer and

	all paper documents will be stored in locked folder accessible to researcher only. In line with GDPR child's and staff's names won't be used in this project.
Informed consent. Please explain how you will inform your participants about the study and whether they will be in a position to give informed consent.	As the main participants of the study are underaged children, schools are obliged to send to parents information sheet and leaflets (see attached) about the study. If parents don't want their child to participate, they need to contact the school or researcher and report child's name which will be excluded from the study. For pupils who do not wish to participate in the study, separate bin will be provided for food waste disposal moreover they won't be asked to fill satisfaction survey or environmental awareness test. Information consent will be provided for staff prior to interviews and environmental awareness test.
Right to withdraw Please identify whether you are offering your participants a right to withdraw from the study and/or to withdraw their data from the study and how this will take place. If you are not offering a right to withdraw, please explain why.	The option of withdrawal from the study is explained in the Memorandum of Understating for schools (attached). The withdraw period is anytime during data collection and one month after project ends as the data collected will be pooled with other responses and anonymised. In case of withdrawal schools are required to contact researcher on email address or phone number presented in Memorandum of Understating of which one copy is kept by the school permanently. The withdrawal conditions for the school staff is the same which is one month after study ends. Staff member participating in the study as interviewee has a right to withdraw without prior discussion to headteacher by contacting researcher however if the school decides to withdraw, data collected from staff will not be used in the study at all.
Confidentiality Please outline the level of confidentiality you will offer respondents and how this will be respected. You should also outline about who will have access to the data and how it will be stored. (This information should be included on Information your information sheet.)	The responses will be collected and access only by researcher. Data will be treated with the strict confidence in line with the standards of University of Huddersfield. Data will be securely stored in a password- protected computer and locked folder which is accessible to researcher only. In line with GDPR child's names won't be used in this project. The conditions of anonymity of the school are provided in memorandum of understanding

	and will be explained to schools in details prior the study starts.
Anonymity If you offer your participants anonymity, please indicate how this will be achieved.	Schools are required to select options about how they wish their name to be used throughout the study in Memorandum of Understanding, anonymity section. Concerning Staff, interviews will be recorder for accuracy and type up on the secure computer. The names of the participants will be automatically coded by using pseudonyms which will be used in final write-up based on GDPR regulations. Interviews will be recorded and transcribed using a coded reference to which only researcher has access. Participants can obtain full access to the interview transcript at any point prior to request as mentioned in interview consent form which is signed by participants prior to interview. The Environmental Awareness Tests does not require the name of any participant only general position in the school of the staff. Pupil's personal information won't be collected during the second stage of the research and the environmental awareness requires only information about age with no other connection to individual as the data will be analysed based on age and attending lunch variable.
Harm Please outline your assessment of the extent to which your research might induce psychological stress, anxiety, cause harm or negative consequences for the participants (beyond the risks encountered in normal life). If more than minimal risk, you should outline what support there will be for participants. If you believe that that there is minimal likely harm, please articulate why you believe this to be so.	The research may cause harm in form of embarrassment or discomfort to staff members if they feel like they don't know a lot about environment issues raised during environmental awareness questionnaire and they feel they are tested. Moreover, it is possible that participants may feel they should not talk about certain issues concerning school food processes from various reasons (loyalty to school, afraid of job etc.) To eliminate this issue all participants will be prior to interviews ensure that their answers will be fully anonymous. Researcher will not take any notes during interview process so participants don't feel judged. The environmental awareness questionnaire filled by staff will be place into black box so participants don't feel tested. Pupils may feel similar discomfort during filling environmental awareness test as they may not be familiar with some issues raised in the test however teachers are

	required to read to pupils prior the start of the test information ensuring that pupils are not be judged based in their answers with no necessity of writing their names (see test attached). Moreover, pupils will place their filled tests into the black box so they don't feel judges by researcher or teacher. During the qualitative data collection while placing food waste into separate bins pupils may feel confused as they may not know what is happening. However to ensure smooth run of the study researcher is required to observe pupil's lunch during first week and maintain methodology in non-disturbing way towards pupil's natural lunch environment. Moreover, school supervisor (person pupils know and trust) will be helping pupils with accomplishing all tasks and explaining what they are required to do.

Retrospective applications. If your application for Ethics approval is retrospective, please explain why this has arisen.

SECTION C – SUMMARY OF ETHICAL ISSUES (TO BE COMPLETED BY THE APPLICANT)

Please give a summary of the ethical issues and any action that will be taken to address the issue(s).

Cooperation with the children in school environment may be very challenging and unpredictable. There is possibility of pupils getting scared or confused while placing their food leftover into the allocated bin or filling satisfaction survey after the lunch. However, all schools participating in the project have lunch supervisor providing support to pupils and researcher throughput the lunch time as agreed by school. The researcher has a minimum direct contact with pupils which should satisfactorily eliminate the risk of pupil's fear or confusion during or after the project. The adults participants may feel tested by researcher or they may feel like they can't share certain information towards school food processes however interview questions ensuring participants that the data mainly concern their opinion and jus secondary their knowledge. Moreover, prior to interviews participant have a time to reed information sheet which is ensuring of full anonymity without any consequences from the school or researcher.

SECTION D – ADDITIONAL DOCUMENTS CHECKLIST (TO BE COMPLETED BY THE APPLICANT)

Please supply copies of all relevant supporting documentation electronically. If this is not available electronically, please provide explanation and supply hard copy.

I have included the following documents

Information sheet	Yes ☐	Not applicable ☐
Consent form	Yes ☐	Not applicable ☐
Letters	Yes ☐	Not applicable ☐
Questionnaire	Yes ☐	Not applicable ☐
Interview schedule	Yes ☐	Not applicable ☐

SECTION E – STATEMENT BY APPLICANT

I confirm that the information I have given in this form on ethical issues is correct. (Electronic confirmation is sufficient).

and (for PGR students only)

Affirmation by Supervisor (where applicable)
I can confirm that, to the best of my understanding, the information presented by the applicant is correct and appropriate to allow an informed judgement on whether further ethical approval is required

Supervisor name/signature:

Date: 29/08/2019

Dr John Lever

Name of applicant (electronic is acceptable)

Date: 29/08/2019

Michaela Polomska

All documentation must be submitted electronically to the Business School Research Ethics Committee Administrator, Alex Thompson, at alex.thompson@hud.ac.uk.

All proposals will be reviewed by two members of BSREC. If it is considered necessary to discuss the proposal with the full Committee, the applicant (and their supervisor if the applicant is a student) will be invited to attend the next Ethics Committee meeting.

If you have any queries relating to the completion of this form or any other queries relating to the Business School's Research Ethics Committee in consideration of this proposal, please do not hesitate to contact the Chair, Dr Eleanor Davies (e.davies@hud.ac.uk) ☎ [47] 2121 or the Administrator Alex Thomson (alex.thompson@hud.ac.uk) ☎ [47] 2529

Appendix 12: Risk Management Form

THE UNIVERSITY OF HUDDERSFIELD: RISK ANALYSIS & MANAGEMENT

ACTIVITY:			**Name:**	
LOCATION:			**Date:**	**Review Date:**
Hazard(s) Identified	**Details of Risk(s)**	**People at Risk**	**Risk management measures**	**Other comments**
Loss/Theft of data	Security of Data	Interviewees	• Electronic data to be stored only on password secured computer equipment and storage devises. • Digital cameras used in form of the phone device and Dictaphones with audio recordings to be transported in a lockable case.	
Environmental Awareness Test	Feeling embracement	School Staff/ Pupils	• The tests will be fully anonymous in both cases (pupils and school staff) to reduce possible embarrassment of not being able to answer the questions	All tests will be placed into black plastic box where participants should place their folded answers to ensure full anonymity
Manual handling	Personal Wellbeing	Researcher	• To move and carry equipment with consideration of personal health and well-being	Equipment included: bins which cannot be provided by the schools, measuring scales, plastic boxes for tests, boxes for plate waste placed in see through plastic bag

Appendix 13: Recruiting Flyer

The School Food Waste Revolution

USDA
United States Department of Agriculture

Food Waste Collection & Satisfaction Survey

- Overall volume of Food Waste will be measured after every lunch during the period of 10 days
- Weight of average portion will be evaluated every time before the start of the lunch time
- 15 – 20 random pupils will be asked to place their food waste into see through plastic bag which will be measured and analysed each day after lunch by researcher
- 10 seconds satisfaction surveys will be provided to fill in after each lunch during the period of 10 days

LOVE SCHOOL FOOD hate waste

Interviews

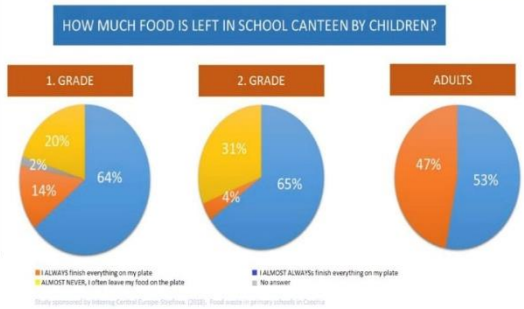
- Semi-structured interviews with staff involved in school food system (cooks, school board members, staff etc.)
- The interviews will be conducted during the first week of study

Environmental Awareness Test

- Environmental Awareness Tests will be given to staff involved in food system in school shortly after interview
- Environmental Awareness Tests will be provided for pupils on the beginning of study and may be filled in on any class during the length of the study
- The length of the test won't be longer than 15 minutes in both cases

General Information

- The overall length of the study is three weeks, divided into two stages
- Stage one (1st week): observation of the school lunch, environmental awareness test and interviews with school members involved in food processes in school
- Stage two (2nd and 3rd week): food waste volume measurement and pupil's satisfaction survey during the period of 10 days.
- All data, names of participants and name of school are strictly anonymous based on the University of Huddersfield Code of Practice for research see: https://research.hud.ac.uk/media/policydocuments/Code-of-Practice-for-Research.pdf
- Participants may withdraw anytime during the study and one month after study finishes



Appendix 14: Memorandum of Understanding

School Food Waste Project

Memorandum of Understanding

Name of the School:

Date:

School Food Waste Project evaluates the volumes of food waste produced by schools in England during daily school lunch. The project investigates possible impact of the school food waste production for the environment while suggesting new techniques to support food waste reduction in schools. This project should generate new theoretical and practical knowledge for scientists and institutions focusing on food waste reduction in schools by applying holistic approach while investigating this phenomenon. Mixed methods research design will be used in order to understand the connection between qualitative and quantitative data influencing food waste volumes in the schools. This study is supported by the University of Huddersfield as PhD research project and will be evaluated at the end of the PhD program in form of final VIVA examination.

This document sets out the relationship between the University of Huddersfield and schools participating in the School Food Waste Project between September 2019 and July 2020. All schools taking part in this project are asked to confirm their agreement to this relationship by signing their copy of this document. School Head Teacher or a participating teacher should sign this document to confirm that the school will fulfil the requirements of their participation in the project as identified in this document.

A. All school agree to

- Identify members of staff anyhow involved in School Food System to be part of data collection during the period of first week of the project;
- Provide non-direct access to pupils during the duration of the project;
- Send out the project information letter to parents/ caregivers of the participating students and inform researcher of the names of any student that do not want to participate;
- Insure the support of lunch supervisor to pupils while filling satisfaction survey or placing leftover into the right bin;
- Allow researcher to visit the school to conduct the following research activities with staff and pupils:

i. Conduct interviews with staff involved in School Food System;
ii. Test Environmental Awareness of the staff by filling a questionnaire provided and collected by researcher on the end of the interview;
iii. Observe pupils during school lunch in order to accommodate research methodology without interfere into particular set up of School Food System;
iv. Test Environmental Awareness of all pupils capable of reading who attend the school by filling a questionnaire provided by researcher during the first week of the project;
v. Randomly select approximately 5% of the pupils attending daily school lunch to place their food waste into see through sealable plastic bags for a later analysis;
vi. Take a picture of 5 random pupil's portions of each meal served during the school lunch to evaluate average lunch portion;
vii. Place food waste and liquid bins into the canteen where pupils will dispose their lunch leftovers;
viii. Allow all pupils capable of reading to complete short satisfaction survey after each lunch during the second part of the project for the period of 10 school days;
ix. Fill in daily food diary concerning amounts of food prepared to be served during the lunch time with the help of one kitchen staff;
x. Measure the weight of kitchen and pupil's food waste on the end of the school lunch during the period of 10 school days;

B. Researcher agrees to

- Provide all necessary material for successful completion of the study including measuring scales, bins, camera for pupil's meal portions, material for satisfaction survey, environmental awareness test etc.;
- Have a direct contact with pupils only during asking to place the food leftover into sealable see through plastic bag;
- Organise the methods of data collection around the lunch system already placed in the school without change of the school lunch regime;
- Ensure that the whole project is run to strict ethical guidelines (this involve researcher gaining ethical approval according to University of Huddersfield guidelines);
- Use any personal data obtained for the purposes of the project and then archiving the data in the securely protected servers at University of Huddersfield;
- Provide support required to complete the activities mentioned in the section A;
- Provide the school with the final report at the end of the project;

How we use our data

The Project involves data collection procedures as outline in this document. The responses will be collected and stored on the password protected device available to access only by

researcher. Data will be treated with the strict confidence in line with the standards of University of Huddersfield. The University of Huddersfield may store your data for no less than 10 years after the research project finishes. Data will be securely stored in a password- protected folder which is accessible to researcher only. In line with GDPR child's names won't be used in this project. If requested, the name of the school will remain fully or partially anonymous (based on the school preference) by using pseudonyms in the final write-up and/or excluding the school from any acknowledgement (see form below). Interviews will be recorder for accuracy and type up on the secure computer. If anonymity is requested, interviews will be recorded and transcribed using a coded reference to which only researcher has access. Participants can obtain full access to the interview transcript at any point prior to request. The information will be used to support PhD final Thesis at University of Huddersfield, to which participating schools can have full access. The final document will be available in the University of Huddersfield library and some data may be used in the future academic journals, publications and other formats following confidentiality agreements.

AGREEMENT TO PARTICIPATE AND WITHDRAWAL OF PARTICIPATION

Participation in the project by your school is voluntary. The school can withdraw from the study anytime during data collection or one month after project finishes by informing researcher Michaela Polomska on 07305882473 or Michaela.polomska@hud.ac.uk. Any publicly available information that you share may still be included in the study. By completing, signing and returning this form you confirm your understanding of the project and agree to all aspects of taking part in it.

School Anonymity Form (select one option)

Do you wish for school name to be fully acknowledged throughout the whole study with the connection to all results collected during the research and recognized in the final thesis acknowledgements, academic journals, publications and other formats following confidentiality agreements?	

OR

Do you wish the school name to be pseudonymed throughout the study to ensure there will be no connection between results and the school in final version of PhD, with the name of the school recognized in the final thesis acknowledgements, academic journals, publications and other formats following confidentiality agreements?	

OR

Do you wish the school name to be pseudonymed throughout the study to ensure there will be no connection between results and the school in final version of PhD, with the name of the school NOT recognized in the final thesis acknowledgements, academic journals, publications and other formats following confidentiality agreements?	

Signatures

School Senior Leader	Name: Position in school: Email: Date: Mobile: Signed: _____
Researcher	Michaela Polomska

	(PhD Researcher at University of Huddersfield) Date: 1/08/2019 Signed: _____
University of Huddersfield	Dr John Lever (Senior Lecturer at University of Huddersfield and main supervisor of the School Food Waste Project) Date:01/08/2019 Signed: John Lever

Appendix 15: Information Sheet for Parents

University of HUDDERSFIELD
Inspiring tomorrow's professionals

Study Information Sheet | Parent/Guardian
School Food Waste Project

We would like to invite your child to take part in a research study. Please take time to read the following information carefully before you decide whether or not your child can take part. Talk to others about the study if you wish or ask researcher (details below) if there is anything that is not clear or if you would like more information.

What is the project about?
School Food Waste Project evaluates the volumes of food waste produced by schools in England during daily school lunch. The project investigates possible impact of the school food waste production on the environment while suggesting new techniques to support food waste reduction in schools.

Do I have to take part?
Your child's participation in the study is entirely voluntary. It is up to both of you to decide whether or not your child will take part; choosing not to take part will not disadvantage you/your child in any way. If you do decide that your child can take part, your child is still free to withdraw at any time without giving a reason.

Why have I been approached?
You have been approached because the school your child is attending agreed to take part in the study and requires informing you about the processes necessary for successful completion.

What will happen if I take part?
If you agree that your child can take part, you do not have to do any further steps. Your child won't be in direct contact with any member of research team. All pupils will be given questionnaires testing their environmental awareness which they fill in anonymously and place them in dark box. Pupil's answers won't be seen by school members and won't influence pupil's grades or any way interrupt school processes. One-week observations of kitchen and pupil's practices during school lunch will be needed in order to adapt methods for collecting pupil's plate waste during second and third week. Random pupils will be asked to place their plate waste into see-through plastic bags for later analysis and some pupils will be asked to hold a plate for researcher be able to take a picture of the meal only. Moreover, pupils will fill after each lunch short questionnaire concerning their satisfaction with meals during school lunch. More information about the processes required for successful completion are described in the flyer attached.

What are possible disadvantages of taking part?
Some pupils may find it difficult to place their plate waste into allocated bins or confused while filling satisfaction survey asking them about their opinion on the food eaten. To prevent this, lunch supervisor will be always able to help each pupil to avoid any further confusion and ease up the process. Moreover, teachers will be able to help students with any questions they do not fully comprehend during satisfaction survey and environmental awareness questionnaire.

Will my involvement in the study be kept confidential?
Yes. We will follow best ethical and legal practice and all information about you/your child will be handled in accordance to University of Huddersfield strict confidential regulations. All information will be moreover collected and stored in accordance with the Data Protection Act 1998. No personal details of your child will be collected in accordance with GDPR regulations. Any personal identifiers will be removed and won't be presented in any report or publication.

What will happen if I want to withdraw from the study and how to do it?
Your child can withdraw from the study at any point, without having to give a reason. If your child decides to withdraw, we will stop collecting data from him/her. However, data that has already been collected up to the point of withdrawal will remain in the study. You can withdraw your child from the study by contacting researcher directly or the school your child attends.

Further Information
A summary of the study's findings can be emailed to those who are interested. Please let the researcher know if you would like that. More information is attached in the flyer however if you would like to hear more about the study please do not hesitate to contact researcher directly on: Email**:** Michaela.polomska@hud.ac.uk

Thank you for your interests in the study!

Appendix 16: Results of Investigation – Dewsbury

University of HUDDERSFIELD
Inspiring global professionals

Results of Investigation:

Food Waste Phenomena in Schools in UK

Westborough High School (Dewsbury)

This report was developed to summarize the findings from the PhD research investigation focusing on food waste volume production in primary and secondary schools in England (UK). The main aim of this research was to investigate why and how food waste in the school canteen emerges as well as to explore schools' current environmental practices and their impact on food waste volume production. This summary paper has been developed for one of the tree schools recruited to participate in this project – Westborough High School in Dewsbury. This report is divided into four main sections. First, the section *About the School* summarizes the information collected about the school from secondary sources such as government and school website, Ofsted reports or other studies the school participated in. Second, the section *Research Methods* describes the methods and techniques used during the data collection. Third, the sections *Results* and *Comparative Analysis* bring all qualitative and quantitative data together while comparing schools' practices and test results with the rest of the schools participating in the study. And finally, based on the results from all schools this report suggests what could the school change not only to reduce food waste production but improve its current overall environmental position as well.

ABOUT THE SCHOOL (themes of the report):

- 898 pupils attending school during the study
- Schools Initiatives: MindED for Families and Kirklees Local Offer
- No eco-programme involvement
- Meal provider: Chartwells (private)
- Neither recycling of canteen waste in place or food separation practices in place during the lunch
- 42.4% of pupils eligible for Free School Meal
- 30 minutes lunch break for more than 600 pupils
- Buffet style school lunch
- Nor pupils or staff members are satisfied with the meal quality served to pupils

Author: Michaela Dhas

RESEARCH METHODS:

Quantitative Methods	*n*	Qualitative Methods	*n*
Environmental Awareness Tests (EATs) Pupils	232	Official Recorded Interviews	4
Environmental Awareness Tests (EATs) Staff	4	Informal Discussions	Not know
Meal Satisfaction Surveys (SSs)	236	Observations (notes) from 12 days	18 pages
Meal Pictures (MPs)	65 (pairs)		
Food Waste Measurements (FWM)	6		

EATs were evaluated based on the positive/negative connection towards the environment and food waste. SSs were collected after the lunch based on voluntary principle. About 10 pupils a day participated in meal pictures evaluations. Food waste measurements were measured for 6 days after all pupils left the canteen.

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The consequences of short Lunch Break

While most of the school staff working in the canteen understands the negative impact of short lunch break for pupils attending Westborough High School, school management fails to respond to these concerns. This study points to fundamental issues connected to too short lunch break the school needs to change to improve its overall environmental position:

1. 30 minutes lunch break provided for more than 600 pupils is not only environmentally unsustainable (no time for recycling) but it significantly influences pupils eating habits in a negative way. Pupils are often forced to choose quick meals (pizza or cookies) with less nutritional benefits while having direct impact on their well-being and health.

2. Interviews showed that many cooks consider the allocated time for a lunch break inadequate when pointing to a fact that some pupils must perform all eating practices within 10 minutes after entering the canteen.

3. The observations showed that short lunch break in Westborough High causes not only environmental, health and behavioural issues but is the main cause of chaos and disorganisation in the canteen during the lunch. It is found that about 20% of pupils have no place to sit down while staff members need to constantly rush pupils finishing their meals out of the canteen to free the seats for less fortunate pupils queuing outside.

Pupils and Recycling

This study shows that the school compensates for its short lunch break by not requiring pupils to recycle their waste material in the school canteen. However, what was found is that as soon as pupils leave the canteen, they throw their waste on the floor which attracts birds with the possibility of spreading diseases and causing health concerns.

The findings from EATs showed that almost 20% of pupils attending Westborough High School think that after disposing of their waste material in the canteen, their waste gets recycled or composted. This misunderstanding of the recycling practices as well as pupils inability to recycle themselves points to school's incapability of application of sustainable routines in the canteen. Although this study found that pupils understand the consequences of non-recycling, they fail to acknowledge their practices contribute to climate change as well as negatively affecting local communities.

Pupils' eating habits

This study found that the most popular meal option ordered in the canteen during the school lunch is pizza with cookie while most of the pupils prefer fizzy drinks over water. On the other hand, EATs show that pupils understand the importance of having well nutritious meals. Interestingly, the opinions of staff members regarding the unhealthy eating pupils' habits differ. One some say that pupils have a heathy food available they choose just to eat junk, others blame school's short lunch break as they argue that most pupils simply do not have enough time to sit down and eat.

Although cooks criticize school for establishment of such an unsustainable food routine (lunch break), instead of communicating their concerns to school management, they decided to simply produced more fast food meals and consider school as a simple clinet without considering moral obligations to provide healthy food for pupils.

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	Birby Junior School (Primary school)	**Lincoln School** (Primary school)	**Dewsbury School** (Secondary school)
EATs (pupils and staff)	76% (pupils) 63% (staff)	82% (pupils) 68% (staff)	**69% (pupils)** **62.5% (staff)**
Average Meal Satisfaction	77% (overall) 75% (hot school meal)	78% (overall) 80% (hot school meal)	**60% (overall)** **No packed lunches**
Food Policies and Practices	VIP Fridays, cooking classes, gardening, fruit shop, breakfast club.	Food education, cooking classes, empty plate and tried something new reward, gardening, SNAG meetings, food waste measurements, community lunches, Ready to Rumble, lunch with staff, music lunch, food market, plants market, director lunch, farm trips, older pupils lunch duty, composting, food tasting sessions and more.	**Cooking classes, breakfast club**
Average Food Waste Volume Sent to Landfill	66.54g (per pupil per day) 20.79 kg (per day)	78.81g (per pupil per day) – compost = 50.52g 8.95 kg (per day) – compost = 5.69 kg	**32.6g (per pupil per day** **19.58 kg (per day)**

WHAT TO IMPROVE AND WHERE TO START?

1. **Rethink the Length of the School Lunch Break.** The most important issue that needs to be changed is the short lunch break leading to pupils' inability to consume healthy meals, non- recycling practices in the canteen and other behavioural issues. There are two possible options that can be implemented. Either increase the lunch break to at least 60 minutes, or split pupils into at least two groups dining in different times for 30 minutes each. In this way, the time for lunch for each pupil would significantly increase and the school management would be able to slowly start with implementation of more sustainable routines into pupils daily eating habits.

2. **Increase Hot School Meal (HSM) Take up.** Increasing HSM take-up needs to be aligned with providing pupils with longer time to eat. However, you can try giving meals a special name which has been found to have positive impact on meal take up. For example call: Red Beans with Rice as Traditional Cajun; Grilled Chicken as Tender Grilled; Seafood fillet as Succulent Filet etc. (Wansink, 2006).

3. **Start participating in whole setting eco programmes such as Food for Life or Rethink Food.** This could transform pupil's relationship with food, establish new school food culture, improve school overall environmental footprint as well improve pupils' attention during the classes, increase school meal take up, influence communities etc. For more see evaluation reports on: www.foodforlife.org.uk

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4. **Organise monthly meetings where cooks, staff members, managers and pupils' representative discuss food issues.** These meetings have been found to dramatically contribute to increase of pupils' meal satisfaction, advance their research and presentation skills as well as help schools to make better environmental and financial decisions while discussing various food related activities.

5. **Measure Daily Food Waste Production.** Measure food waste, if possible, in front of the pupils and publish the results on your website for both staff and parents to see.

6. **Talk to Kirklees Council about recycling policies in your area.** Inquire about why recyclable waste is not collected in your schools and what can you do to change it.

7. **Implement recycling practices in the canteen.** Allocate recycling bins in the canteen and encourage pupils to recycle in the canteen. Educate pupils about the importance of recycling materials and make them aware about what the school is currently doing for environment.

8. **Talk to Meal provider about using reusable cutlery and plates during the school dinners.**

9. **Select older pupils for lunch supervising duties.** Motivate older pupils to take on lunch supervising duties in the canteen. This will give them more responsibility, help lunch supervisors as well as help to develop friendships between older and younger pupils and possibly even prevent behavioural issues in the canteen.

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Appendix 17: Results of Investigation – Huddersfield

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Results of Investigation:

Food Waste Phenomena in Schools in UK

Birkby Junior School (Huddersfield)

This report was developed to summarize the findings from the PhD research investigation focusing on food waste volume production in primary and secondary schools in England (UK). The main aim of this research was to investigate why and how food waste in the school canteen emerges as well as to explore schools' current environmental practices and their impact on food waste volume production. This summary paper has been developed for one of the tree schools recruited to participate in this project – Birkby Junior School in Huddersfield. This report is divided into four main sections. First, the section *About the School* summarizes the information collected about the school from secondary sources such as government and school website, Ofsted reports or other studies the school participated in. Second, the section *Research Methods* describes the methods and techniques used during the data collection. Third, the sections *Results* and *Comparative Analysis* bring all qualitative and quantitative data together while comparing schools' practices and test results with the rest of the schools participating in the study. And finally, based on the results from all schools this report suggests what could the school change not only to reduce food waste production but improve its current overall environmental position as well.

ABOUT THE SCHOOL (themes of the report):

- 549 pupils attending school during the study
- Winner of Gold Award of Healthy Schools Programme
- Meal provider: Kirklees Council – Silver award from Food for Life Catering Mark
- No recycling of school waste in place
- 36.1% of pupils eligible for Free School Meal
- More than 40% of pupils prefer packed lunch
- Hot School Meal (HSM) cost £2.20 per pupil per day
- Food is separated during the school lunch in canteen
- No queue management during the school lunch
- Pupils are daily served vegetable that is mostly wasted
- Pupils, management and cooks are satisfied with the meal quality served to pupils

RESEARCH METHODS:

Quantitative Methods	*n*	Qualitative Methods	*n*
Environmental Awareness Tests (EATs) Pupils	366	Official Recorded Interviews	6
Environmental Awareness Tests (EATs) Staff	6	Informal Discussions	Not know
Meal Satisfaction Surveys (SSs)	1353	Observations (notes) from 12 days	28 pages
Meal Pictures (MPs)	257 (pairs)		
Food Waste Measurements (FWM)	10		

EATs were evaluated based on the positive/negative connection towards the environment and food waste. SSs were collected after the lunch based on voluntary principle. About 25 pupils a day were selected for meal pictures evaluations. Food waste measurements were measured for 10 days after all pupils left the canteen.

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RESULTS: What can be learnt?

Communication, Communication, Communication!

There are serious communication issues found between School Management, Kirklees Catering and cooks which effects many environmental issues in the school.

1. Nor cooks or school management are aware of Kirklees Catering Food for Life (FfL) award and therefore when asked where the food comes from they can't refer to the Silver award FfL standards stating that most of the food ingredients prepared on the school premises need to be locally sourced. In this way, the school is missing the opportunity to motivate parents to sign up their pupils for a hot school meal and improve their eating habits.

2. School managers are not aware of non-existent waste recycling practices (including paper, glass or carboard etc.) as school management suppose that the recycling activities are taking place on the school premises. This is caused by limited Although cooks are wondering why pupils are required to separate food waste material in the canteen when all waste is ending up in the same bin, they are not bringing this issue up with school management.

3. School managers are not aware of the schools' awards such as Healthy Schools -Gold award- which could be connected to award's limited impact on schools' environmental practices.

Food Policies – VIP Fridays

Except cooking and gardening practices which are currently a basic food related activities implemented in majority of schools, only VIP Fridays are implemented in Birkby Junior to improve pupils' food wasting practices.

Although VIP Fridays have a positive influence on some pupils, others had complained that pupils who didn't finish their lunch every day during the week often get the VIP Friday seat, as the system is based on pupils' honesty rather than cooks or lunch supervisors' evaluations. Moreover, cooks are quite sceptical about VIP Friday's impact on food waste volume reduction when they point to not visible changes in the food waste volume production have been observed since the start of this initiative.

Pupils and Connection to Food

EATs showed that only 57% of pupils claimed to regularly finish their lunch with even less number (37.5%) of pupils actually follow through during the school lunch.

Although cooks argue that pupils eat more vegetable now than ever, meal pictures evolutions showed that the vegetable items are most wasted item during the school lunch and therefore influencing the volume of food waste production the most. Unsurprisingly, this point to schools limited impact on the pupils' eating habits and their limited connection to food.

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COMPARATIVE ANALYSIS

	Birby Junior School (Primary school)	**Lincoln School** (Primary school)	**Dewsbury School** (Secondary school)
EATs (pupils and staff)	**76% (pupils)** **63% (staff)**	82% (pupils) 68% (staff)	69% (pupils) 62.5% (staff)
Average Meal Satisfaction	**77% (overall)** **75% (hot school meal)**	78% (overall) 80% (hot school meal)	60% (overall) No packed lunches
Food Policies and Practices	**VIP Fridays, cooking classes, gardening, fruit shop, breakfast club.**	Food education, cooking classes, empty plate and tried something new reward, gardening, SNAG meetings, food waste measurements, community lunches, Ready to Rumble, lunch with staff, music lunch, food market, plants market, director lunch, farm trips, older pupils lunch duty, composting, food tasting sessions and more.	Cooking classes, breakfast club
Average Food Waste Volume Sent to Landfill	**66.54g (per pupil per day)** **20.79 kg (per day)**	78.81g (per pupil per day) – compost = 50.52g 8.95 kg (per day) – compost = 5.69 kg	32.6g (per pupil per day 19.58 kg (per day)

WHAT TO IMPROVE AND WHERE TO START?

1. **Promote school's environmental activities among staff members and parents.** This could lead to increase of hot school meal take up and improve pupils' health, increase their readiness and improve school's environmental reputation in the area.

2. **Start participating in whole setting eco programmes such as Food for Life or Rethink Food.** This could transform pupil's relationship with food, establish new school food culture, improve school overall environmental footprint as well improve pupils' attention during the classes, increase school meal take up, influence communities etc. For more see evaluation reports on: www.foodforlife.org.uk

3. **Organise monthly meetings where cooks, staff members, managers and pupils' representative discuss food issues.** These meetings have been found to dramatically contribute to increase of pupils' meal satisfaction, advance their research and presentation skills as well as help schools to make better environmental and financial decisions while discussing various food related activities.

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4. **Measure Daily Food Waste Production.** Measure Food waste in front of the pupils and publish the results on your website for both staff and parents to see. Create competitions for pupils to encourage them to reduce wasting their food.

5. **Talk to Kirklees Council about recycling policies in your area.** Inquire about why recyclable waste is not collected in your schools? Schools are powerful organisations able to make a significant change.

6. **Improve your VIP Fridays.** Why not to increase number of VIP Friday tables? Make sure pupils are awarded when they finish their lunch, give them award stickers and after collecting five a week let them sit at the VIP table.

7. **Start community Lunches.** Community lunches have been found to decrease the volume of pupils' plate waste. Why not to ask elderly to come and have a lunch with pupils for a small fee?

8. **Educate Pupils.** Educate pupils about the importance of recycling materials and make them aware about what the school is currently doing for environment. This can be done together with Food Tasting Sessions for more see www.tasteeducation.com

9. **Improve Pupils' Fruits and Vegetable Consumption.** Although participation in whole school eco-programmes is the best way to improve pupils' vegetable and fruits consumption in long-term. You can start with giving fruits and vegetables names assonating with their impact on human body such as: Power Peas, Brainy Broccoli, Strong Bones Banana or Vision Carrots. In this way, cooks could ask pupils while serving the meal: 'Would you like Power Peas today'?

10. **Let older pupils be on the serving duty.** Let older pupils help supervisors and cooks with setting up the tables, plates and cutlery and helping with lunch their younger peers. This will give them more responsibility, help lunch supervisors as well as develop friendships between older and younger pupils.

11. **Develop Canteen Seating Plan.** The same way, there is a seating plan in the class in the same there should be a seating plan in the canteen. Create seating plan allocating each pupil a permanent seat in the canteen. In this way, pupils will have no reason to run around the canteen and look for a "best" seats which gives them more time to prepare for eating.

12. **Implement queue management.** Do not let pupils' queue in front of serving counter in unorganised manner anymore. Let them all sit down and then lunch supervisors will let pupils queue table by table. Do not let them leave the canteen as soon as they finish eating but rather all pupils should leave canteen together so pupils eating slower are not peer-forced to waste their food.

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Appendix 18: Results of Investigation – Lincoln

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Results of Investigation:

Food Waste Phenomena in Schools in UK

Washingborough Academy (Lincoln)

This report was developed to summarize the findings from the PhD research investigation focusing on food waste volume production in primary and secondary schools in England (UK). The main aim of this research was to investigate why and how food waste in the school canteen emerges as well as to explore schools' current environmental practices and their impact on food waste volume production. This summary paper has been developed for one of the tree schools recruited to participate in this project – Washingborough Academy in Washingborough (Lincoln). This report is divided into four main sections. First, the section *About the School* summarizes the information collected about the school from secondary sources such as government and school website, Ofsted reports or other studies the school participated in. Second, the section *Research Methods* describes the methods and techniques used during the data collection. Third, the sections *Results* and *Comparative Analysis* bring all qualitative and quantitative data together while comparing schools' practices and test results with the rest of the schools participating in the study. And finally, based on the results from all schools this report suggests what could the school change not only to reduce food waste production but improve its current overall environmental position as well.

ABOUT THE SCHOOL (themes of the report):

- 279 pupils attending school during the study
- Winner of Gold Award of Food for Life Programme
- Active Participation in other eco-programmes and projects such as: Tasted, School Health UK, DEMETER, Sustainable Food Trust and more.
- In House Meal Provider - Gold award from Food for Life Catering Mark
- Recycling and composting practices in place
- 9.4% of pupils eligible for Free School Meal
- Offers an option to have pre-packed school lunch for small fee of £9 a week.
- Hot School Meal (HSM) cost £2.30 per pupil per day
- Future Vision: No Home Packed Lunches

RESEARCH METHODS:

Quantitative Methods	*n*	Qualitative Methods	*n*
Environmental Awareness Tests (EATs) Pupils	97	Official Recorded Interviews	4
Environmental Awareness Tests (EATs) Staff	4	Informal Discussions	Not know
Meal Satisfaction Surveys (SSs)	1293	Observations (notes) from 12 days	23 pages
Meal Pictures (MPs)	240 (pairs)		
Food Waste Measurements	10		

EATs were evaluated based on the positive/negative connection towards the environment and food waste. SSs were collected after the lunch based on voluntary principle. About 25 pupils a day were selected for meal pictures evaluations. Food waste measurements were measured for 10 days after all pupils left the canteen.

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RESULTS: What can be learnt?

Eco Programmes and Food Waste!

Academy participates in multiple national and international eco-programmes and projects such as Food for Life, Tasted, DEMETER (Developing Interdisciplinary Methodologies in Education Trough Enhanced Relationship between Schools and Farms), Eat Them to Defeat Them etc. that are often based on the whole school setting approach and therefore it is assumed that they should have a positive impact on food waste volume reduction. Unfortunately, this study found that this assumption is not correct.

Comparative analysis shows that the school wastes on average 15% more food (see table below) during the school lunch in comparison to schools without external pro-environmental involvement directly affecting pupils' healthy eating habits. This shows that pro-environmental practices implemented in the school not only fail to reduce pupils' daily food waste volume production during the school lunch but what is more, they seem to increase it.

However, it is necessary to add that although pupils on average waste more food in comparison to non-eco schools, academy's environmental footprint is in fact lower. This is achieved as part of composting practice reducing the amount of food sent to landfills by 36%. This means that on average academy sends to landfill about 25% less food per day in comparison to schools that fail to compost.

Pupils and their Food Waste Practices

This study found that school's pro-environmental involvement does NOT significantly increase pupil's food waste awareness in comparison to other schools pointing to the eco-programmes underestimation of the food issues in the schools. It was found that only about 57% of students participating in EATs have a positive intention to finish their school lunch without leftovers while meal pictures evaluation shows that only about 38% of students actually do so during the lunch.

Fruit, Vegetables and Waste

Meal pictures analysis shows that pupils receiving Ready to Rumble waste on average only about 7% of their meal portion while the waste connected to hot school meals is significantly higher (23%). Although pupils should be more connected to food through school's involvement in multiple eco-programmes, both Satisfaction surveys and meal pictures evaluations confirmed that pupils dislike of the vegetable items stays one of the main factors why pupils won't finish their lunch in Washingborough academy.

These findings point to the gap in the school's theoretical understanding of the implementation of eco-programme practices regarding their impact on food waste. It is shown that the school needs to transform its understanding of the pupils' eating practices from linear practice perception (when pupils' food choices depend on their knowledge, attitudes) to establishment of effective eating routines in order to tackle the issues of food waste volume production.

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	Birby Junior School (Primary school)	**Lincoln School** (Primary school)	**Dewsbury School** (Secondary school)
EATs (pupils and staff)	76% (pupils) 63% (staff)	**82% (pupils)** **68% (staff)**	69% (pupils) 62.5% (staff)
Average Meal Satisfaction	77% (overall) 75% (hot school meal)	**78% (overall)** **80% (hot school meal)**	60% (overall) No packed lunches
Food Policies and Practices	VIP Fridays, cooking classes, gardening, fruit shop, breakfast club.	**Food education, cooking classes, empty plate and tried something new reward, gardening, SNAG meetings, food waste measurements, community lunches, Ready to Rumble, lunch with staff, music lunch, food market, plants market, director lunch, farm trips, older pupils lunch duty, composting, food tasting sessions and more.**	Cooking classes, breakfast club
Average Food Waste Volume Sent to Landfill	66.54g (per pupil per day) 20.79 kg (per day)	**78.81g (per pupil per day) – compost = 50.52g** **8.95 kg (per day) – compost = 5.69 kg**	32.6g (per pupil per day 19.58 kg (per day)

WHAT TO IMPROVE AND WHERE TO START?

1. **Measure Daily Food Waste Production.** Measure Food waste in front of the pupils and publish the results on your website for both staff and parents to see. Create competitions for pupils to encourage them to reduce wasting their food.

2. **Start VIP Fridays.** VIP Fridays are fun activity that can help schools significantly reduce the volume of food waste produced during the lunch time. It is based on pupils' motivation to finish their lunch. If pupils' collet empty plate award each day of the week, on Friday pupils scan sit at the special table where the food is served to them, special snacks are prepared or can choose to sit with favourite teacher, the options are limitless.

3. **Improve Pupils' Fruits and Vegetable Consumption.** Although participation in whole school eco-programmes is the best way to improve pupils' vegetable and fruits consumption in long-term. You can add giving fruits and vegetables names assonating with their impact on human body such as: Power Peas, Brainy Broccoli, Strong Bones Banana or Vision Carrots which was found to have positive impact on children's vegetable intake (Wansink, 2006). In this way, pupils on the serving duty could ask: 'Would you like Power Peas and Brainy Broccoli today'?

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Appendix 19: Menus Dewsbury School

Week 1	Monday	Tuesday	Wednesday	Thursday	Friday
Traditional	Chicken Shawarma, Paprika Wedges, House Slaw	Five Spiced Chicken, Beggers Noodles, Peas	Beef burger in a Bum, Seasoned Potato wedges Corn on the Cob	Beef Lasagne, Garlic Bread	Battered Fish and Chips, Mushy Peas, Baked Beans
Alternative 1	Feta & Potato Frittata (Quiche), New Orleans Red Bean Rice, Southern Greens	Special Marinated Chicken Drumsticks, Chop hop Salad, Diced Potatoes	Chunky Vegetable Pasta	Crispy Coated Vegetable Burger	New York Quorn Dog
Alternative 2	Veg Bolognaise Pasta	Mac 'n' Cheese, Garlic Bread			Veg & Bean Wrap
Alternative 3	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread
Speedy Italian	Margherita Pizza or Veg Topped Pizza	Margherita Pizza	Margherita Pizza or Mixed Pepper & Sweetcorn Pizza	Margherita Pizza or BBQ Quorn Pizza	Margherita Pizza
Week 2					

Traditional	Chipotle BBQ Chicken Wrap, Paprika Potato Wedges, Red Slaw, Peas and Sweetcorn	Lemon Ginger Chicken, Wholegrain rice, Wok Tossed Oriental Vegetable	Spanish Beef Hash, Lemon and Garlic Broccoli, Fajita Potato Wedges	Teriyaki chicken Thigh, Japanese Noodles, Pickled Cucumber Salad	Battered Fish and Chips, Baked Beans, Mushy Peas
Alternative 1	Quorn & Cheese Pattie in Bun	Marinated Chicken Drumsticks, Cajun Style Wedges, BBQ Baked Beans	Southern Fried Chicken in a Bun, Potato Wedges, Sweetcorn	Mac 'n' cheese Cujun Wedges, Apple Slaw	Corn, Black Eyes Bean & Feta Soft Taco, Missippi
Alternative 2	Arrabiata Pasta Bake	Herby Tomato Pasta	Louisiana Bean Pot	Marinated Chicken Wrap	Italian Chicken Pasta
Alternative 3	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread
Speedy Italian	Margherita Pizza or Spicy Veggie Pizza	Margherita Pizza	Margherita Pizza	Margherita Pizza or BBQ Chicken Pizza	Margherita Pizza
Week 3					

Traditional	Ultimate Cheese Burger, Seasoned Wedges, Lightly Spiced Sweetcorn with Lime	Chicken Gyros, Crispy Dried Potatoes	Chipotle Beef Chilli, Creamed Potatoes, Roasted Potatoes	Non-visible on the wallboard	Non-visible on the wallboard
Alternative 1	Cheesy Penne Pasta	Marinated Chicken Drumsticks, Southern Greens, Golden Rice & Beans	BBQ Chicken Pitta, Baked Garlic & Herb Wedges, Crunchy Red Slaw	Cajun Pulled Chicken Bean Wrap, Paprika Seasoned Wedges	Non-visible on the wallboard
Alternative 2		Vegetable Lasagne, Garlic Bread	Crispy Coated Vegetable Burger, Baked Garlic & Herb Wedges	Quorn Vegetable Skewers, Baked Beans, Paprika Seasoned Wedges	Veggie Bolognese
Alternative 3	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread	Fresh Salad & Bread
Speedy Italian	Margherita Pizza or Spicy Chicken Pizza	Margherita Pizza	Margherita Pizza or Mixed Pepper Pizza	Margherita Pizza or Cujun Spiced Chicken Pizza	Margherita Pizza

Appendix 20: Menus in Huddersfield School

Week1	Monday	Tuesday	Wednesday	Thursday	Friday
Menu 1	(Halal)Cottage Pie Served with Season Vegetable	(Halal) Southern Style Chicken served with Crispy Sliced Potatoes and Garden Peas	(Halal)Roast of the day served with Traditional Accompaniments Oven Roast and Creamed Potatoes and Seasonal Vegetables	Homemade Loaded Vegetable Pizza served with Herby Diced Potatoes and Crunchy Coleslaw	Crispy Crumbed Fish served with Oven Baked Chips and Garden Peas
Menu 2	Quorn Dippers served with Seasoned Wedges and Baked Beans	Organic Penne Pasta served with Italian Tomato Sauce and Garlic Bread	Vegetarian Sausage And Gravy served with Oven Roast and Creamed Potatoes and Seasonal Vegetables	Quorn Spaghetti Bolognaise served with Garlic Bread	Vegetable Balti Curry served with Fluffy Wholegrain Rice and Raita Sauce
Desert	A sponge of the Day served with Creamy Mustard	Chocolate Fudge Pudding served with chocolate sauce	Creamy Rice Pudding served with Mixed Berry Compote	Lemon Crunch Tart served with Creamy Custard	A Selection of Home Baking

Desert 2	Flapjack served with Fresh Fruit Juice or Chunky Fruit Pots	Fruit Jelly or Fresh Fruit Kebabs	A Selection of Reduced Sugar Deserts	Assorted Cupcakes or Chunky Fruit Pots	Organic Yogurts or Fresh Fruit Salad
Week 2	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Menu 1	Halal Chicken Sausage or Vegetarian Sausage and Gravy served with Creamed Potatoes and Seasonal Vegetables	Halal Chicken Tikka Masala served with Fluffy Wholegrain Rice and Raita Sauce	(Halal) Roast of the day or Quorn Fillet served with Traditional Accompaniments Oven roast and Creamed Potatoes and Broccoli Florets	(Halal) chicken Burger or Vegetable Burger in a Bread Bun served with Jacked Wedges and Golden Sweetcorn	Golden Crumbed Fish Fingers served with Oven Baked Chips and Garden Peas

Menu2	Mac & Cheese served with Garlic Bread	Creamy Quorn Pie served with Herby Diced Potatoes and A Medley of Peas	Salmon Fillet And Sweet Chilli Sauce served with Roast Potatoes and Broccoli Florets	Margherita Swirl served with Jacket Wedges and Baked Beans	Vegetable Pasta Bake served with Crispy Mixed Salad
Desert 1	Sticky toffee Pudding served with Toffee Sauce	Assorted Gateaux	Seasonal Fruit Crumble served with Creamy Custard	Hot Sweet of the Day	Jam Sponge served with Crispy Mixed Salad
Desert 2	Fresh Milkshake and Homemade Biscuit or Fresh Fruit Salad	Chunky Fruit Pots or Organic Yoghurts	A Selection of Reduced Sugar Deserts	Chocolate Slab Cake or Chunky Fruit Pots	A Selection of Home Baking or Fresh Fruit Kebabs

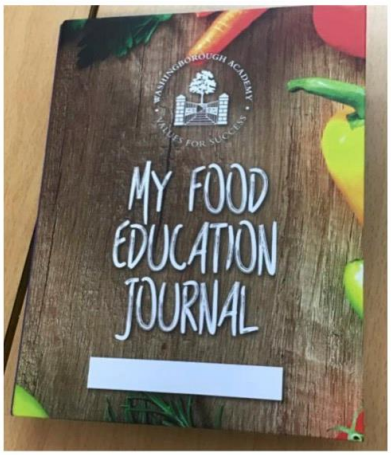
Appendix 21: Scoring System of pupils EATs

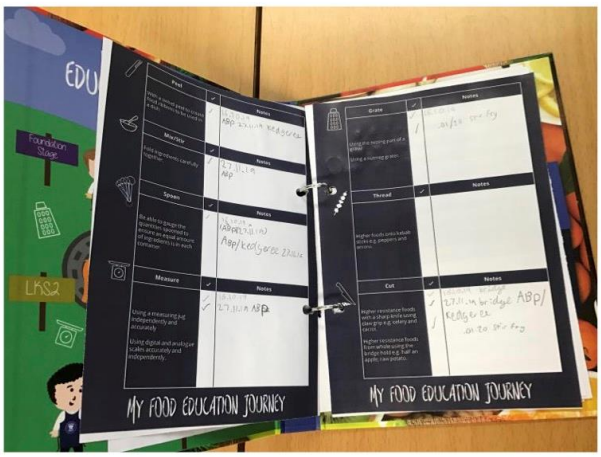
1. Do you have food only container where you can place your leftovers after school lunch? YES NO I don't know If Yes: Are you regularly using it? YES NO If No: Would you use such a container? YES NO
CODES: 1- YES, YES ……. **1 point**: shows positive practice towards using FW only bin 2- YES, NO ……. **0 point**: shows negative practice towards using FW only bin 3- NO, YES …….....**1 point**: shows positive attitude towards using FW only bin 4- NO, NO …….. **0 point**: shows negative attitude towards using FW only bin 5-I don't know……..**0 point**: not recognized any attitude or practice
2. What do you think the term food waste mean?
CODES: 1- Food in the bin……..**1 point**: correct answer 2- Leftovers\uneaten food……**1 point**: correct answer 3- Throwing food away…… **1 point**: correct answer 4- Used the word food waste in the answer……..**1 point**: correct answer 5- Wrong answers……**0 point**: incorrect answer
3. Have you been taught anything about the food waste in the school?
CODES: 1- YES……..**1 Point**: Shows positive influence of school on pupils' EA 0- NO……..**0 Point**: Shows lack of schools environmental education
4. Have you been taught anything about the food at all?
CODES: 1- YES……..**1 Point**: Shows positive influence of school on pupils' EA 0- NO……..**0 Point**: Shows lack of school's food education/practices

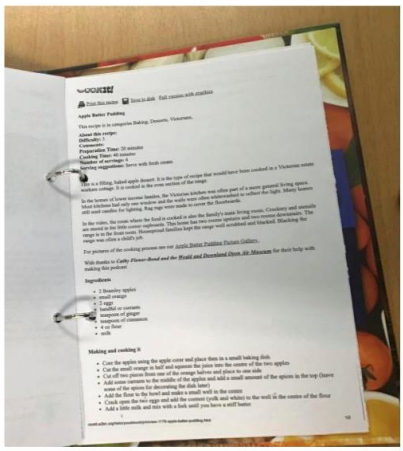
5. Do you think it is important to have food every day?
CODES: 1- YES……..**1 Point**: Shows understanding of the importance of food 0- NO……..**0 Point**: Shows misunderstanding of the importance of food and lack of education
6. Where do you think food goes when you throw it into the bin?
CODES: 1- Landfill/dump/hole/trash/garbage……..**1 point**: correct answer 2- Compost/Recycling……**1 point**: correct answer 3- Sea/Ocean……**1 point**: correct answer 4- Poor/Homeless……**0 point**: incorrect answer 5-Not related……**0 point**: non-related answer 6-Others……**1 point**: correct answer 7- Bin/bigger bin/van……..**1 point**: correct answer
7. Do you think wasting food is bad?
CODES: 1- YES……..**1 Point**: Shows positive attitude towards wasting food 0- NO……..**0 Point**: Shows lack of knowledge & negative attitude towards FW
8. How many times a day do you normally eat?
CODES: 1- Once a day……..**0 point**: not sustainable for children 2- 2-3 times a day ……**1 point**: 3- 4-6 times a day 4- 6 and more times a day 5- I don't eat every day

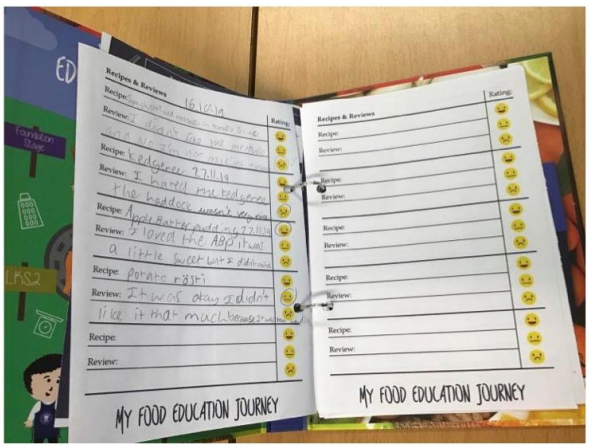
9. Have you ever grown your own food (e.g. fruit or vegetable)?
CODES: 1- YES……..**1 Point**: Shows positive environmental practices 0- NO……..**0 Point**: Shows lack food related practices
10. Have you ever prepared your own meal?
CODES: 1- YES……..……..**1 Point**: Shows positive environmental practices 0- NO……..……..**0 Point**: Shows lack food related practices
11. Do you normally finish your school lunch?
CODES: 1- YES……. **1 Point**: Positive food practices and positive school's involvement 0- NO……**0 Point**: Lack of positive attitude and school's failure in food education
12. Even if you are full, do you try to finish your school lunch?
CODES: 1- YES……**1 Point**: Positive influence of school practices pupils' attitude 0- NO……**0 Point**: Shows lack of school's involvement in pupil's food practices

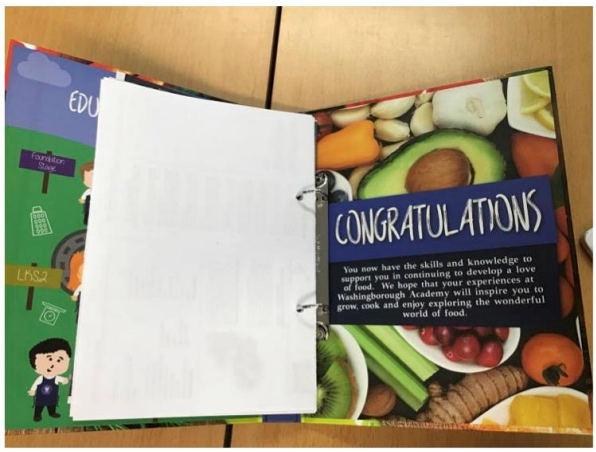
Appendix 22: Pupils Food Journal - WA











Appendix 23: Menu Washingborough Academy

Week 1	Monday	Tuesday	Wednesday	Thursday	Friday
Option 1	Deep Pan Tomato and Cheese Pizza served with Baked Herby Wedges	Salsa Pasta Bake served with Sauté Potatoes and Seasonal Vegetables	Beef Burger in Pitta Bread Pocket served with Homemade Baked Beans	Roast Leg of Pork, Sage and Onion Stuffing served with Roasted Potatoes and Seasonal Vegetable	Mixed Bean Casserole served with Roasted Vegetables
Option 2	Roasted Vegetable Pizza served with Baked Herby Wedges	Chicken Sweetcorn Pie served with Sauté Potatoes and Seasonal Vegetables	Cheese Omelette served with Homemade Baked Beans	Baked Vegetable Tartlet served with Roasted Potatoes and Seasonal Vegetable	Salmon fish Cake served with Roasted Vegetables
Option 3	Jacket Potato plus topping	Jacket Potato plus topping	Jacket Potato plus topping	Jacket Potato plus topping	Jacket Potato plus topping
Desert	Mixed Berry Muffin	Cherry Sponge	Fruit Crumble		
Week 2					
Option 1	Deep Pan Tomato and Cheese Pizza served with Baked Herby Wedges	Stockman Pie (Minced Porn and Minced Beef) served with Seasonal Vegetables	Quorn Hot Dog sewed with Mashed Potatoes	Baked Gammon Ham served with Roasted Potatoes and Seasonal Vegetables	Soup and Cheese Toasty served with Oven Baked Vegetables
Option 2	Roasted Vegetable Pizza served with Baked Herby Wedges	Vegetarian Meat Balls served with Seasonal Vegetables	Toad in the Hole served with Mashed Potatoes	Roasted Vegetable Tartlet served with Roasted Potatoes and Seasonal Vegetables	Mixed Fish Kedgeree served with Oven Baked Vegetables
Option 3	Jacket Potato plus topping	Jacket Potato plus topping	Jacket Potato plus topping	Jacket Potato plus topping	Jacket Potato plus topping
Desert	Mixed Berry Muffin	Apple Upside Down Cake	Chocolate and Coconut Sponge	Fresh Fruit Salad	Spiced Winter Fruit Bakewell