

**CHINESE INTERNATIONAL SCHOOL STUDENTS
DISCUSS SUSTAINABILITY:
A MIXED METHODS STUDY
IN GUANGDONG, CHINA**

Carly E. Thomas

**A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
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Abstract

As the number of international schools in China increases, along with the severity of environmental impacts worldwide, international school teachers need tools to effectively reach their Chinese students. This mixed-method study was conducted at an international school near Guangzhou, China and included a total of 40 Likert-scale questionnaires, a focus group (with eight participating students) and nine individual interviews with the 100% Han Chinese student population. Significant results demonstrated that many of the ideas about sustainability shared by students were interconnected and could not easily be separated, that students felt that awareness was an important first step to acting sustainably (but they need a secondary reason to act sustainably), that despite moving around students were connected to special places and that this student population was able to internalize seemingly contradictory ideas about sustainability. While this study focuses on a specific student population, several strategies for teachers are proposed, which may prove effective in any classroom around the world. The strategies are: the inclusion of humans in food webs and other ecological models used in class, as well as two assignments designed to help students see hidden consequences of their choices and how a big impact can be made through many small impacts.

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List of Abbreviations

A.D.	<i>Anno Domini</i>
ANOVA	Analysis of Variance
AP	Advanced Placement
AQI	Air Quality Index
ASA	American Schools Abroad
B.C.E.	Before Common Era
CCP	Chinese Communist Party
EAL	English as an Additional Language
EE	Environmental Education
GCPS	Guangdong College Prep School
IE	International Education
KMT	Kuomintang (Nationalist Party)
NEP	New Ecological Paradigm
PLA	People's Liberation Army
PRC	People's Republic of China
SE	Science Education
SPSS	Statistical Package for Social Sciences
VOC	Volatile Organic Compound
VPN	Virtual Private Network

Foreword

It was while I was teaching high school Biology and Advanced Placement (AP) Environmental Science in southern China that I was first inspired to conduct research regarding the way in which culture influences students thinking about the environment. Having taught Environmental Science in both Canada and China I found the students similar in some ways and drastically different in other ways. It was in my quest to motivate my students to make sustainable choices that I first began to understand how little was known about this topic, especially within the context of an International School in southern China with a 100% Chinese National student population.

My training in science education had not prepared me to conduct this kind of research and so I sought a graduate program that would help me fill these gaps and conduct research that would hopefully yield results that would help international school teachers in China. This thesis is the final component of my Plan of Study, wherein I carefully chose courses to help me learn about culture, environmental education and philosophy so that I could conduct this research effectively. While this topic has shown itself to be more complex than expected I feel that this thesis has accomplished my goal of conducting research in environmental education in China and formulating strategies for teachers.

Chapter 1: Introduction

This research project's target audience includes international school teachers and environmental education practitioners; however, it also intersects with the fields of cultural anthropology and science education. In this chapter these fields of intersection will be defined and described to construct the framework within which the research project was conducted. The researcher's experience and positionality, as well as the project's goals and objectives will also be outlined.

Environmental Education

For the purpose of this study the Global Development Research Centre's definition of environmental education (EE) will be used. They define EE "...as a process in which individuals gain awareness of their environment and acquire knowledge, skills, values, experiences, and also the determination, which will enable them to act - individually and collectively - to solve present and future environmental problems" (Srinivas, 2004, paragraph 1). The interconnectedness of environmental issues necessitates that environmental education is also interdisciplinary and teaches students a wide variety of knowledges, skills and ways of thinking. Sauve, Berryman & Brunelle (2007) elaborate, stating that "environmental education finds its specific and essential 'niche' in one of the three interrelated spheres of interaction at the basis of personal and social development: the self, the others, and the environment (p.49)."

Research in the field of EE has been conducted for many years; according to Wals *et al.* (2014) "much research in EE has focused on the effectiveness of EE

activities in changing individual environmental behaviours (p.583).” They go on to share that it is this focus on changing behaviour that has led to the “persistent but ill-founded assumption” that knowledge, awareness, attitude and environmental behaviour are connected in a simple, linear manner (Wals *et al.*, 2014, p.583). Sauve, Berryman & Brunelle (2007) state that “education is seen as the main strategy to “mobilize minds” towards the achievement of sustainable development (p.49)”, an idea that builds off the idea of changing behaviour through EE. While Smith & Williams (1999) begin to look for alternatives by asking if the educational structures that currently constrain EE are the product of the same “cultural outlook” that has created our environmental problems. While much has been researched in the field of EE to date, there still remains a good deal to learn about cultural differences.

Science Education

While this study fits best within the field of environmental education (EE) there are definite connections to science education (SE). The researcher is a science teacher by training and the classes from which the participants were selected were high school Biology classes; it is also likely that the findings will be used in science classrooms. *In my experience very few international schools have dedicated EE programs, and therefore many of the skills and topics considered to be part of environmental education are taught in science and social studies classrooms¹.* Wals *et al.* (2014, p.583) clarify the difference between science education and environmental education: “science

¹ The researcher’s personal experiences and anecdotes are *italicized* throughout this thesis to clarify the source.

education, which focuses primarily on teaching knowledge and skills, and environmental education, which also stresses the incorporation of values and changing behaviours.”

According to Knudtson & Suzuki (1992) the focus in science on separating variables and prioritizing human needs may contribute to a sense of “psychological, emotional, and spiritual detachment from the rest of the natural world. We might legitimately ask what sort of ecological values, if any, are likely to flow from such a human-centred view of the natural world” (p.65). While Alsop & Fawcett (2010) ask “Whose knowledge gets to count as knowledge in science education?” (p.1028) and “How can we make science education more representative of cultural knowledge claims?” (p.1028) It is clear that as we move forward in science classrooms around the world things need to change; more input from EE pedagogy may be the way to go. Wals *et al.* (2014) state that many of the urgent issues facing the world today, including climate change, loss of biodiversity and malnutrition are “highly complex and contested in both science and society” (p.583) and that to prepare students to deal with these issues both SE and EE need to “develop a mature symbiotic relationship” (p.583).

International Education

This research takes places in an international school and its principal goal is to provide resources for international school teachers. For the purpose of this study, Slethaug’s (2010) definition of international education (IE) will be used; they define IE as “intercultural and cross-cultural education that transcends the geographical and pedagogical boundaries of a particular nation” (p.1). This definition is fitting of the current variation in styles of international schools around the world. While international

schools began as schools for the children of missionaries and diplomats, where the children of expatriates could learn in a school with a curriculum, pedagogy and even teachers from their home country (Pearce, 2013; Slethaug, 2010), things have changed.

In 2010 about two million students were educated in international schools around the world (Slethaug, 2010) and many of these schools are found in Asia (Pearce, 2013). While many of these schools still cater to expatriate families there is an increasing demand by local families who see IE as a path to a high quality education and a launching pad for admission to top universities around the world (Pearce, 2013; Slethaug, 2010).

Culture and Education

This study originally hoped to find ways to leverage culture to help international teachers motivate their students to act sustainably; however, throughout the process of completing this thesis the problematic nature of the idea of “culture” has come to light.

According to Williams (1976):

Culture is one of the two or three most complicated words in the English language. This is so partly because of its intricate historical development, in several European languages, but mainly because it has now come to be used for important concepts in several distinct intellectual disciplines and in several distinct and incompatible systems of thought. (p.87)

According to Wang (2010) the ‘culture concept’ was first posited by anthropologists in 1871 but did not gain traction until the early twentieth century. It originated as a way to differentiate between worldviews and included art, custom, knowledge and other

“capabilities and habits as acquired by a man [person] as a member of society” (p.150); prior to the adoption of the ‘culture concept’ many differences between groups were simply categorized as either ‘civilized’ or ‘savage’.

In recent decades the idea of culture itself has come under scrutiny as scholars have launched various critiques of the ‘culture concept’, arguing that it is no longer a useful way to “conceive of and explain difference among people” (Wang, 2010, p.149). For example, Heine (2011) points out that culture changes constantly and that the ‘rules’ of a particular culture change so much that any research being conducted should be thought of as a snapshot of a moment in time. That being said, many education researchers continue to discuss cultural influences on children’s ways of seeing and interacting with the world around them (Weston, 2004; Aguirre-Bielschowsky, Freeman & Vass, 2012; Bai & Romanycia, 2013; Barraza & Walford, 2002 and Bechtel, Corral-Verdugo, Asai & Riesle, 2006). For the purpose of this research project the use of the word “culture” will be avoided whenever possible due to its inherent ambiguity.

The Need for a New Way to Teach Environmental Education

While environmental education (EE) is not a new idea many scholars have pointed out the need for a change (Leal-Filho, 1990; Bai & Romanycia, 2013; Weston, 2004 and Aguirre-Bielschowsky, Freeman & Vass, 2012). Bai & Romanycia (2013) argue that schools can and must help to change the habits of the human heart and mind as “the present global culture of consumeristic capitalism that has a stranglehold on almost all human societies on this earth is like a hermit crab’s old shell and has become a threat to the inhabitant’s viability and even survival.” (p.101) While Weston (2012) states that

the small stopgap measures in place are not enough, we need to make more significant changes with “more audacity, nerve,chutzpah, sass” by “mobilizing the green imagination” in a culture-wide initiative (p.xvi).

The need for ‘culturally’ appropriate educational practices is pointed out by Alsop & Fawcett (2010) as well as Aguirre-Bielschowsky, Freeman & Vass (2012) who state that “understanding how culture influences children’s notions of the environment assists in making EE appropriate to the local context, while at the same time contributing to building an environmental rationality that supports international goals for sustainability.” (p.94) Van Petegem & Blicek (2006) reiterate the need for research considering the effects of cultural context on children’s worldviews, their preferences towards the environment, and nature usage. While Schultz & Zelezny (1999) emphasize the global nature of environmental problems and the need for global solutions which requires “multinational understanding of the values and motives that underlie environmental concern and behaviour.” (p.264) By examining how Chinese students discuss sustainability this research project hopes to help international school teachers in China to choose culturally appropriate practices, bring awareness of students’ worldviews and thereby help students move towards sustainable action on global environmental issues.

Situating the Researcher

As a white, heterosexual, cis woman I approach this research from a place of privilege. As a white woman conducting research in Asia I must acknowledge the power dynamics within which this research was conducted. While mainland China was not colonized by

European nations, there have long been isolated colonies of Europeans in Guangzhou (formerly Canton). These colonies, along with the ceding of Hong Kong Island to the British Empire in 1842 (Sullivan, 2007) elucidate the influence of European colonialism in China. While China has, for the most part, controlled how it allows foreigners to enter the country and interact with its people *I have found that there is a sense of admiration and prestige that white skin brings.*

The second power dynamic that must be acknowledged is that of the teacher and student, as well as that of the researcher and participant. The school where this research was conducted, Guangdong College Prep School (GCPS, name changed for anonymity) is one where the researcher taught for four years and while their former students have all graduated and moved on the researcher is still known to many of the students on campus as a teacher. For this reason, both of these power dynamics must be acknowledged.

It must also be recognized that, as a science teacher, the researcher brings a science education perspective into this research. The questions asked of the students were designed to be open-ended to allow for authentic responses; however the researcher's interpretations and choices of follow-up questions were guided by their priorities and prior experiences, however indirectly.

Why China and Canada?

The original goal of the study was to compare how Chinese and Canadian students think about sustainability and specifically how teachers might motivate their students to act more sustainably. These two countries were chosen because the researcher has

taught for four years in both countries and therefore felt that they have sufficient knowledge and experience to effectively approach this extremely intersectional research. Unfortunately, research was not conducted in Canada due to the researcher's inability to find a Canadian school to work with (see Research Design p.25).

In cross-cultural studies it is suggested that choosing cultures that vary significantly is ideal for comparison (Heine, 2011). Western and Asian cultures are often described in opposite manners (Heine, 2011), and while the student population sampled is Han Chinese they have been studying in a Western school for at least two years and are therefore a distinct group.

As the researcher has significant experience with this student population their insights have been included where they can help to explicate a phenomenon. To facilitate the auto-ethnographic nature of this thesis the researcher's words are included when they help clarify a relevant phenomenon.

Goals and Objectives

The primary goal of this study is to help international school teachers motivate their Chinese students to act sustainably. In order to do this, a better understanding about how Chinese international school students think about sustainability is a necessary first step. It is the nature of international teaching and learning that both teachers and students come from different nations with different cultural norms and both move between countries and schools throughout their academic careers.

It has been established that choosing culturally appropriate environmental education strategies is important if teachers want to be able to plan effective lessons

(Friedel, 2011). This specificity paired with the shortened time frame that many international school teachers have to learn about their new student population clarifies the need for this research and applicable strategies for teachers.

Chapter 2: Research Context

A Brief Note on the History of The People's Republic of China

With over 4000 years of recorded history (Twitchett *et al.*, 2018) it would be foolish to even begin to presume that a summary of China's history can be included in this chapter; however, the major political events and the history of modern China are extremely relevant to this research project. The students who participated in this study, their parents and their grandparents were all impacted by China's recent tumultuous history. For this reason an extremely brief discussion of China's history has been included: it is in no way complete or representative of the nation's extremely long and complex history, but should provide some contextual insights for readers.

In 2100 B.C.E. the Xia Dynasty became the first of twelve dynasties to rule China until the Chinese Revolution of 1911-1912 (Sullivan, 2007). This new, democratic, central government was strongly influenced by Western ideas, including "science" and "democracy" during the New Culture Movement (*Embree & Gluck, 1995*). According to Twitchett *et al.* (2018) the stirrings of a national revolution was led by the Nationalist Party (KMT) and the Chinese Communist Party (CCP) during the interwar years of 1920 to 1937. The Nationalist government attempted to bring the entire country under its control, but due to domestic revolts and the war with Japan (1937-1945) they were unsuccessful (*Embree & Gluck, 1995*).

Following the defeat of Japan, the Civil War (1946-1949) between the Chinese Communist armies and the Kuomintang (KMT) resulted in the eventual defeat of the KMT, who fled to Taiwan (Sullivan, 2007), and the establishment of the People's

Republic of China (PRC) on October 1, 1949. The communist victory in 1949 created a new nation, whose first goal was industrialization and the raising of China's status to that of a great power (Twitchett *et al.*, 2018). While the impacts of the various policies implemented by the CCP are both varied and extensive, for the purpose of this study only the Great Leap Forward of 1958-1960 (Sullivan, 2007) and the Cultural Revolution of 1966-1976 (Sullivan, 2007) will be discussed in brief.

The Great Leap Forward was meant to address China's industrial and agricultural problems by organizing the population, particularly into large-scale rural communes (Twitchett *et al.*, 2018; Meisner, 1999). It was the hope that by emphasizing human power rather than machines the process of industrialization would be accelerated, bypassing the gradual accumulation of capital stage (Garver, 2016). An example would be the creation of small steel furnaces to make steel girders in almost every village rather than purchasing expensive industrial-scale furnaces. The forced relocations and hard labour required for this system to work affected almost the entire population and the famine caused by the exhaustion of agricultural land cost upward of 30 million lives (Sullivan, 2007).

The "Great Proletarian Cultural Revolution" can be described as the personal crusade by Mao Zedong and his radical supporters to purge the CCP of their political and ideological opponents (Sullivan, 2007), due to Mao's fear that China's focus on development would lead to capitalism (Garver, 2016). It began with public attacks on cultural figures whose words and actions did not align with the CCP's goals, often being described as "capitalist roaders (zouzipai)" (Sullivan, 2007). As the Cultural Revolution progressed and the Red Guards were established (a massive organization of the

country's urban youths) the attack moved on to broader targets, namely all traditional values and anything considered "bourgeois" (Meisner, 1999) including teachers, intellectuals and elderly people, many of whom were physically abused, relocated and/or incarcerated and many of whom died (Twitchett *et al.*, 2018).

Since the mid 1970s political retrenchment and economic reform were employed to help the PRC return to its goal of industrialization and raising China's global status (Embree and Gluck, 1995). Within a peaceful and stable environment, China's focus on domestic economic development was once more a priority (Twitchett *et al.*, 2018). According to Garver (2016) China has successfully transitioned from a planned command economy to a globalized market economy, raising hundreds of millions of Chinese to the middle class and becoming one of the leading global economies.

The People's Republic of China: One-Child Policy

China's controversial one-child policy is an important component of the lives of the students who participated in this study, as they were all born between 1998 and 2002 and therefore, their family structure is a consequence of this policy. According to Hesketh, Li and Xu (2005) when the policy was introduced in 1979 it was meant as a short-term measure, Greenhalgh & Bongaarts (1987) specify that it was to be abandoned at the end of the century (in the year 2000). The policy was created to help slow down, and eventually control China's previously exponential population growth (Greenhalgh & Bongaarts, 1987); at the time of its creation China was home to a quarter of the world's population with only 7% of the world's arable land (Hesketh, Li and Xu; 2005).

While the policy's impact on gender ratios has been discussed around the world (Hesketh, Li & Xu; 2005) it has been my experience that few people are aware of the complexities of this policy. ²*It was when speaking with a Chinese friend that I first learned that there were exceptions to the one-child rule, such as that if one or both of the parents were from a cultural minority (not Han Chinese) they could have two children, if both parents didn't have any siblings they could have two children and finally that if you wanted to have more than one child, you could pay a significant fine.* According to Tatlow & Piao, (2015) the fine could be over 200,000 RMB (\$31,470 USD) for having a second baby. *Due to the socioeconomic status of many of the students at Guangdong College Prep School (GCPS) quite a few of them had siblings, one student in particular had three younger brothers.*

When I was teaching AP Environmental Science at GCPS I had to teach a unit about population, and naturally, China's population growth and unique solution to control it was an important case study. The American textbook we used was quite direct, stating that boys were valued more than girls in Chinese culture (Withgott & Laposta, 2014). I was quite concerned about the students reaction to this topic, as discussed from an American perspective and had allocated quite a bit of class time to the discussion of this particular idea. I was shocked by the students' calm discussion of this case study and the fact that many of them felt that the One Child Policy was an effective tool for population management and should be used around the world to reduce human impacts on the planet.

² Italicized font indicates that the information shared is from the author's experiences and in their narrative voice.

The People's Republic of China: Education and the Chinese Curriculum Reform

Education in China has a long history, although it is only relatively recently in its history that formal education has been an option for the majority of the Chinese population (Hannum, 1999). Education has long been valued in China, in part due to the Confucian idea that anyone can improve themselves through education (Gunde, 2002; Hu, 2002). Taylor & Choy state that “Confucianism may be defined in large measure as the teaching and practices associated with the historical teacher Confucius and his followers from the sixth century B.C.E. through the twentieth century” (2005, p.ix); traditional Confucian values include “communitarianism, respect for knowledge and the traditional” (Ryan, 2010, p.48). While many scholars focus on the impact of Confucianism in Chinese education this must be done with caution. According to Phan, McPherron & Phan (2011), as well as Shen & Tran (1995) Confucianism has come in and out of use in the Chinese education system, while Ryan (2010) points out that Confucianism is multi-dimensional and its interpretation depends on its use.

According to Chen Zen (1931) the “dynastic Chinese system of education selected leaders from the masses of the population by a series of examinations which laid emphasis on ethical ideas and flowery literary expression but neglected the cultivation of scientific and critical point of view.” (p.206) The education system has been reformed numerous times throughout China's history, in 1905, at the end of the dynastic era, in 1912 after the formation of the Republic of China, in 1922 (Chen Zen, 1931) as well as in 2001 (Mingying, 2012; Ryan, 2011; Xu, 2011). In 1905 the reforms focused on the examinations, changing the focus from being literary in nature to including “modern subjects” adapted from Japanese and Western models (Chen Zen,

1931). While the aim of the reforms in 1912 was “to pay special attention to the development of morals, technical and military training, and cultivation of aesthetic power” (Chen Zen, 1931, p.208). The 1922 reform of the school system included seven objectives, the most notable of which included “to develop the democratic spirit in education” and “to make education accessible to the masses” (Chen Zen, 1931, p.208). All of these goals changed significantly after the formation of the People’s Republic of China; the Chinese Communist Party used “moral education... to instil socialist values and a love of country in the educational curriculum, but denied ancient traditions such as Confucianism” (Phan, McPherron & Phan, 2011, p.137).

According to Mingying (2012) the Ministry of Education in China released the Basic Education Curriculum Reform Outline in June 2001 for grades 1-12 “to improve the educational system and quality as well as to prepare its citizens for an increasingly global society.” (p.99) Shen & Tran (1995) pointed out the need for major changes to the education system in China, long before the 2001 reform began. Education has been highlighted as one of China’s most pressing national priorities by both the current President Hu Jintao and Premier Wen Jiabao, and its role in securing and maintaining China’s economic position has been highlighted (Ryan, 2011). Many Chinese scholars feel that the country can benefit from looking to the models of developed Western countries to improve the local education system while keeping in mind the localized context of the People’s Republic of China (Heng, 2012).

After the formation of the PRC in 1949 Russian became the dominant foreign language being taught (Zong, 2011). Several decades later, after the Reform and Opening Policy of 1979 English became the additional language of focus. English

language skills are now considered a gateway to success in China (Jin & Cortazzi, 2011), along with a university education.

Since 1952 the path to a university education in China has been through the “*gaokao*” an extremely challenging exam written by students in Grade 12. While students spend years preparing for the *gaokao* the historical pass rate has been less than 50% (Davey, Chuan & Higgens, 2007).

Today in China’s education system globalization is a major consideration (Chen & Kompf, 2012) with many wealthy parents choosing an English-speaking liberal curriculum that they feel will best prepare their children for their careers of choice (Forse, 2010; Jin and Cortazzi, 2011). According to Slethaugh (2010) Asia has seen the biggest increase in international schools “as prosperous local and international workforce tries to secure the best education and opportunities for its children.” (p.2) These Chinese national students in international schools are described as being ‘fourth-culture students’; Jabal (2010) defines this as learning in a system that is “not their home system, not a foreign system in a foreign land and not an international school abroad, but an international school in their home country which does not represent their native culture and beliefs.” (p.76)

The People’s Republic of China: Censorship

Censorship is still in active use in China and while there are ways in which one can access most sources of information with some effort, the scale and frequency of censorship in China has an impact on communication as well as the availability of knowledge (Hong, 2011). According to King, Pan and Roberts (2013) “the size and

sophistication of the Chinese governments' program to selectively censor the expressed views of the Chinese people is unprecedented in recorded world history." (p.1) Their thorough analysis of social media censorship in China found that the purpose of the censorship program is to "reduce the probability of collective action by clipping social ties whenever any collective movements are in evidence or expected" (King, Pan & Roberts, 2013, p.1). While this study focused on the use of hand censoring (online posts are read and may be removed by individual censors), they also described two other forms of internet censorship in China, namely "The Great Firewall of China", which blocks specific websites, including Facebook, Google and their related websites, as well as "keyword blocking" which prevents specific words or phrases from being posted online (Hong, 2011; King, Pan & Roberts, 2013). Examples of keyword blocking include "free Tibet" and "falun" (most likely of 'Falun Gong' a political group which often protests in Beijing), both sensitive political topics (Li, 2010. p.100).

Among the various strategies used to get around this censorship is the use of a Virtual Private Network (VPN) which can be described as "internet connections that bypass the country's [China's] firewalls and online censorship" (Li, 2016, paragraph 1). While many people use VPNs in China to get around the "Great Firewall of China", at times even a VPN cannot give access to foreign websites. *In my experience the reliability and quality of VPN services varies significantly.* According to Li (2016), the authorities intensify their crackdown on VPNs when major political events occur, such as political gatherings in Beijing.

During my time teaching at GCPS we regularly had to work around obstacles created by censorship. While the campus was equipped with a VPN on its network,

when students left campus they no longer had access to their gmail account, google docs or YouTube, all of which are often used at GCPS, a 1:1 laptop school³. Being unable to access something online was a frequent excuse for incomplete homework and teachers had to find creative solutions to these obstacles.

Censorship impacted course materials as well, when I began preparing to teach AP Environmental Science for the first time I spent many hours carefully selecting the resources I would need, including the textbook. A few months after placing the textbook order I was informed that the text I had chosen wasn't allowed in China and I had to pick another one. Censorship was an even bigger issue in the Social Studies department, the former department chair shared that no modern history courses were permitted and when the school settled on AP Human Geography as a course they could offer they had to search for a special textbook where the maps included Taiwan as part of the People's Republic of China (S. Boulware, personal communication, May 17, 2018). It is important to note that the rules for this kind of censorship were never made clear to teachers and seemed to change often and are therefore representative of my time at GCPS, although a current teacher at GCPS has confirmed that the online censorship remains the same (M. Domingues, personal communication, May 16, 2018).

International Schools in China and Guangdong Province

The number of international schools around the world, and in Asia in particular has increased dramatically since the new millennium; in 2000 there were 2,584 international schools worldwide, while in 2013 the total market had increased to 6,400 international

³ A school in which every teacher and every student has their own laptop is called a 1:1 laptop school.

schools worldwide (Pearce, 2013). Within Guangdong province, in the South East of China (see Figure 1), and where GCPS is located, a total of 37 international schools were found using a members-only website used by international teachers to review schools and administrators (International Schools Review, 2018). While this website does not provide a comprehensive list it is safe to say that there are a minimum of 37 international schools in Guangdong province alone.

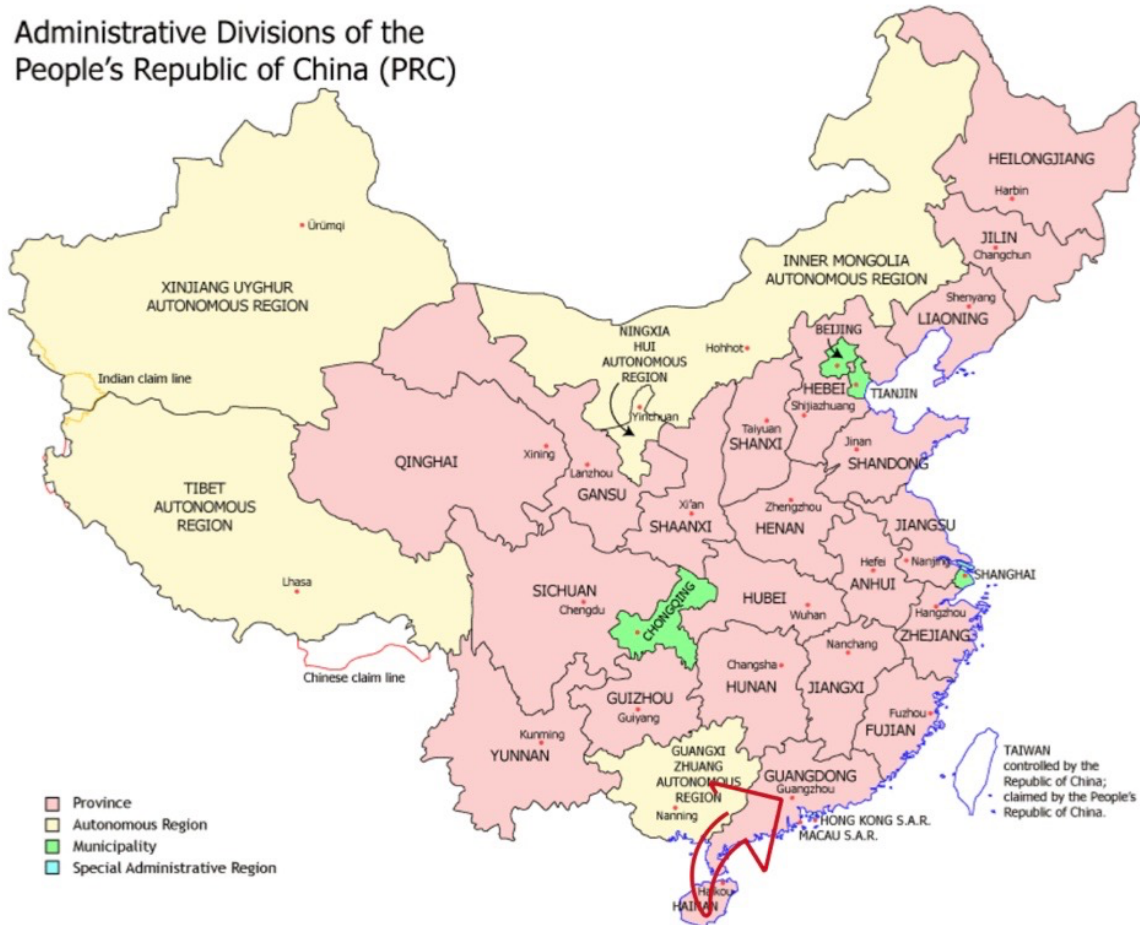


Figure 1. Randy McDonald, “China Administrative Map” March 16, 2010 via Flickr, Creative Commons Attribution. Red arrow added by researcher to indicate Guangzhou.

The Capital of Guangdong Province: Guangzhou

The city of Guangzhou (historically referred to as Canton) is situated on the Pearl River and by population is the fourth largest city in China (Sullivan, 2007). Guangzhou's population was reported at 11.1 million in 2017 by worldpopulationreview.com. According to the China Statistical Yearbook 2017, the population of Guangdong province in 2016 was 110 million people. This major metropolitan city is close to both Hong Kong and Shenzhen (see Figure 2), both of which are major hubs for international trade and very populous themselves with 10.4 million people in Shenzhen and 7.4 million in Hong Kong (worldpopulationreview.com). Guangdong College Prep School is located in this general area and most of its students' families are from Guangdong province and live close enough to campus to travel home on the weekend.



Figure 2. Map of the Pearl River Delta. By Croquant [CC BY 3.0 (<https://creativecommons.org/licenses/by/3.0/>)], from Wikimedia Commons. Stars were added by researcher for reader reference.

Canton has a long history as a major trading port, beginning in the Tang dynasty (618-907 A.D.) and has been a base for trading with Portuguese, British and Dutch traders, eventually becoming the site of a trading post of the British East India Company (Sullivan, 2007). Under the “Canton System” foreign trade with China was restricted to a small district of Guangzhou in the 18th century, this trade’s eventual halt led to the Opium Wars (Sullivan, 2007). According to Sullivan (2007) Guangzhou has become the “central hub of transportation, trade, and banking and finance in South China” (p.232), as well as “the site of numerous industries, including steel, paper mills, textiles, machinery, bicycles and automobiles” (Sullivan, 2007, p.232). *Many of the students at GCPS have shared that their parents own factories in the area surrounding GCPS.*

The air quality in Guangzhou is often described as “not as bad as Beijing” and in my time at GCPS the Air Quality Index (AQI) ratings increased year after year, indicating worsening air quality. During my most recent visit to collect the data for this research project the AQI had worsened significantly although it varied day by day. A pagoda is located on a hill just behind the GCPS campus and many students and teachers judge the air quality by the clarity with which they can see the pagoda from their classroom windows. On the day the focus group was conducted the AQI was high and there was a definite haze in the air, blurring the edges of the pagoda. According to Zhang et al. (2017) the ozone formation potential of ambient Volatile Organic Compounds (VOCs) in Guangzhou is very high and the secondary organic aerosol formation potential of ambient VOCs in Guangzhou is even higher. While VOCs are only one component of air pollution, they often lead to the formation of tropospheric ozone, a major component of photochemical smog (Zhang et al., 2017).

Guangdong College Prep School: School Profile, Goals and History

In 2012, I moved to Guangzhou as the first science teacher at Guangdong College Prep School and was both an active participant in, and witness to, the building of this school. At the time GCPS was advertised as 'the first American-style school for Chinese students in southern China' and I can attest to the process of building a 'new type' of school in a foreign country. A school with a 100% Chinese national student population, an American curriculum with English as an Additional Language (EAL) strategies and instruction embedded into every course, although once a new idea this kind of school is becoming more and more common in China.

Guangdong College Prep School opened its doors in 2012 to about 100 Chinese grade 9 students from around Guangzhou and southern China. Today (2018) the school has grown to include 547 students in grades 7 to 12 and a total of 65 certified faculty members, most of whom are native English speakers. GCPS is a private, co-educational, American curriculum boarding school operated in partnership with a private Chinese educational group and American Schools Abroad (name changed for anonymity), a non-profit New Jersey based organization with 16 schools around the world. The school's mission statement describes the school as a community whose priorities include academic and social excellence and therein GCPS describes itself as an English-language immersion school preparing students for higher education. University preparation is such an important component of GCPS' marketing and overall goal that it is included in the school's name and one of the first things found on the school's homepage is the list of current university acceptances and scholarships.

Both the public school and university systems in China require students to write substantial entrance exams after middle school as well as after high school and the results of these exams determine which school(s) a student will be able to attend (Kirkpatrick & Zang,2011). When GCPS students and their parents choose to leave the Chinese system there is no going back, they have committed to a private international education as well as sending their child abroad for university. This is a significant cost and therefore limits the school population to students from upper-middle and upper-class income families. This year (2018) the tuition and boarding fees at GCPS were listed as 175,900 RMB (about \$36,000 CAD) per year for high school students and 165,900 RMB (about \$34,000 CAD) per year for middle school students.

Sample Demographics

As discussed above the student population at GCPS comes from upper-middle and upper class families, this was confirmed by the students themselves when 95% of them reported that their household income was either “comfortable” or “very comfortable” (see translation note in Chapter 3) in the demographic section of the questionnaire completed by 40 students. One hundred percent of the students surveyed reported that both they and their parents were born in China and they all self-identified as Han Chinese (the dominant ethnic group in China). According to Poston & Jing (1992) there are fifteen major minority groups in the People’s Republic of China and “ethnic conflict has been a recurrent feature of China’s historical record.” (p.574)

Both the ages of the students and the number of the years they reported studying in Western schools varied; ages varied from 16 to 20 years of age, and years varied

from 1.5 to 12 years spent studying in Western schools, although most had been studying in Western schools for three or four years. A total of 22 female students and 17 male students (and 1 of unknown gender) volunteered to complete the questionnaire, while the focus group and interviews included two males and seven females.

Students

Students at Guangdong College Prep School choose to enter this school for many reasons, but in doing so they have chosen to leave the Chinese education system behind. They will not be eligible to write the “*gaokao*” and therefore cannot be admitted to a Chinese university. For this reason it can be said that the students and their families are making a long-term commitment to a Western education at significant expense. Many parents prefer a local international school because it provides a best of both worlds scenario, where students can learn English in a Western curriculum, but are able to travel home on weekends so that “they do not become too socialized in liberal Western ways” (Slethaugh, 2010, p. 30).

GCPS students and their families have experienced the many ups and downs of the formation and development of the People’s Republic of China. The students’ parents, and if not then surely their grandparents would have lived through the Civil War, the Great Leap Forward and the Cultural Revolution. All the generations of the family from student to grandparent would have experienced the One-Child-Policy, as well as the worsening air pollution.

GCPS students are unique in that they have spent several years in the traditional Chinese system and several in a Western international school. For this reason they can

be described as “fourth-culture kids” (Jabal, 2010), as well as Chinese students. Ryan (2010) discusses the importance of avoiding stereotypes with Chinese students, sharing that previous educational experiences are more important than geographical origin when grouping students, so a Chinese student who has spent ten years in an international school would be significantly different from one who has spent only two years in international schools.

In my experience speaking to current and former GCPS students, many plan to leave China for their post-secondary education so that they can then come back to China to apply their Western knowledge to their families’ business and help China to continue its economic development. While the students at GCPS are confident that they can learn quite a bit from a Western school their goal is not only a successful career, but also to help China along its path of development.

The Role of the Teacher in China

In China teachers enjoy a special place in society, they are highly respected by students and parents in the community. Hu (2002) states that “the reverence with which a teacher is held is reflected in many popular sayings, one of which runs ‘being a teacher for only one day entitles one to lifelong respect from the student that befits his father’ (*yiri weishi zhongshen weifu*).” (p.98) According to Hu (2002) in the Chinese “culture of learning” a teacher is expected to “know what is useful and important to the students, has an intimate knowledge of the students’ level, carefully prepares lessons, has all the correct answers at all times, and dissects, presents and explains knowledge in a masterly manner to ensure ease of learning by the students”. (p.99) *For this reason*

foreign teachers sometimes feel pressure to be worthy of this respect, much more so than in their home countries, although in my experience the 'otherness' of Western teachers allows for some flexibility in this role.

While the students who participated in the study were never my students during my four years at GCPS they all know me through other school activities, or they know of me. For this reason, as a researcher I tried to emphasize that I am no longer a teacher, but a student who wants to learn from them. It is also for this reason that I stepped back during the focus group and interviews, trying to provide an environment in which they would feel they could speak freely. One of the student participants, Fiona, was in the swimming club which I oversaw one trimester in my last year at GCPS and it was my interactions with her that led me to see how my 'otherness' could allow students to speak openly with me. Clapton & Fitzgerald (2017) define 'otherness' as the degree of variation from the norm, while in Guangzhou, I was certainly 'other', not being a Chinese national, or even of Chinese descent. Over the course of several weeks Fiona and I discussed such personal topics as tampon use and women's reproductive rights, both of which are sensitive topics for young Chinese women, and therefore, not easily discussed. While there are definite benefits to being a Western teacher at GCPS, the complexity of both language and cultural differences must always be kept in mind.

Chapter 3: Research Design

In this chapter the methods using for both data collection and analysis will be described, as well as the various decisions made during the research process. As with many research projects the original design changed throughout this process. This study was initially intended to be a comparative analysis between Chinese and Canadian students; however, approval to conduct research in a Canadian school was not granted and the study evolved into a research project exclusively about Chinese students in an international school.

This change affected the student questionnaire significantly as it was designed as a comparison tool and two of its three scales were neither reliable nor valid on their own. The focus group and interviews were relatively unaffected by the change, although the comparisons in their analysis were conducted between students, between responses from the same student and between different phases of the data collection rather than between schools and nationalities as previously planned.

Due to the structure of Grounded Theory the research design of this project had to be flexible in nature. Charmaz (2014) defines Grounded Theory as “a rigorous method of conducting research in which researchers construct conceptual frameworks or theories through building inductive theoretical analysis from data and subsequently checking their theoretical interpretations” (p.343); she continues to elaborate, stating that “this method involves the researcher in data analysis while collecting data. Data analysis and collection inform and shape each other in an iterative process. Thus, sharp distinctions between data collection and analysis phases of traditional research are internally blurred” (p.343). For this reason, the details of this research design,

specifically the interview questions, could not be planned in advance as they were based on analysis of student responses to the questionnaire as well as the focus group presentations and discussion. While this chapter is laid out in a fairly linear fashion it must be noted that the research did not proceed in a linear fashion, while data collection was conducted in the sequence described the analysis of the data took place throughout the data collection process as well as afterwards.

To ensure transparency regarding the data collection process and to establish both validity and reliability for the readers (Chenail, 1995; Ryan & Bernard, 2003; Mays & Pope, 2000) examples of the decisions made are included in this chapter. To further increase the dependability of this research process (Mayan, 2009) excerpts from the researcher's reflection journal are available to readers in Appendix A. By including reflection journal entries, the reader is given insight into the thought process and various steps followed by the researcher, for example, in the April 17th entry the researcher makes a note to check for biases and preconceived ideas and to double-check that the student's words are closely connected to what the researcher understands in them. In the April 22nd entry, the researcher notes that the previous coding method took the codes too far from the student's words and so went back and made the necessary changes. These insights provide an opportunity for readers to better understand the research process.

Methodology

To reiterate, the methodology of this project relies on Grounded Theory, specifically referencing the work of Kathy Charmaz (2014); Grounded Theory was chosen to support the examination of collected data as insights were sought into how teachers

could best motivate their Chinese students to act sustainably. To achieve a greater understanding of the research question the data was triangulated (Flick, 2018; Mays & Pope, 2000) through the collection of student responses in questionnaire, focus group and interview form, as well as responses that were written, drawn and spoken by students. The data collection phases were designed to begin with a narrow set of Likert-scale questions to allow for comparisons between schools, then open up with the short answer questionnaire questions, and explore further with the very open-ended focus group prompt. Using the student responses in both the questionnaire and the focus group the interview questions narrowed the focus of the data collection asking specific questions. The second set of interviews allowed for clarification of student responses from the first set. Given the change in the study, specifically the loss of a comparative data set, the data collection in China became even more salient. Adhering to Grounded Theory methodology data was transcribed, analyzed, compared and interpreted continually throughout the process, adapting the methods as guided by any gaps in the data.

In constructivist Grounded Theory methods the researcher's experiences have an impact on the research process, and while significant effort was used to remove biases from the research process as Charmaz, Thornberg & Keane (2018) state it would be false to claim that researchers come to the research process as a blank slate. The constant comparative method and constant reference to the data, both key components of Grounded Theory (Kolb, 2012), supported the endeavour to verify that any decisions made regarding the research process and conclusions drawn are grounded in the data and not in personal experiences. Due to the limited time available

to both collect data and complete this thesis, the goal of reaching theoretical saturation, which is key to any Grounded Theory study (Taber, 2000), was not obtained; although it is a particularly challenging and somewhat unrealistic goal in the time frame allowed for a Masters thesis. With two or three more focus groups and around ten more interviews, with follow-up interviews theoretical saturation could be reached, although the amount of necessary data is hard to predict. While ideas such as human dependency on nature were repeated throughout the data set some topics require more information to clarify differing ideas, such as the way students described the role of the government in environmental issues.

Ethical Design

All participant names, as well as the name of the participating school and its parent organization were anonymized using alternate code names, and all electronic data (including student answers, transcriptions, recordings and images) were securely stored on a password protected laptop within a further password protected folder; all paper data (namely student drawings) were kept in a locked file cabinet. Alternate English code names for students were created. Most Chinese students choose or are given an English name when they begin to learn English and these names rarely have a connection to their real name; many students change their English names throughout their education. *For example one grade 9 boy, named Jack came back from the summer break and told me that his English name was now Nathan...his family had decided that Jack was too simple of a name for him and that Nathan was a more respectable choice. Another student, Frankie kept his name for two years before*

changing it in his grade 11 year to Chris, when asked why he simply said he liked Chris better.

Participants were made aware of their confidentiality and rights as part of the study, including their right to withdraw from the study at any time and the potential use of their confidential data in this thesis as well as in other publications, namely in academic journals and as part of teacher resources. Online consent was obtained for the questionnaire and both signed consent and assent forms were collected for focus group and interview participants (see Appendix B) due to Guangdong College Prep School administration's preference. Final results were shared with participants in a infographic (see Appendix C); this particular method of sharing the results was chosen with the GCPS student audience in mind (Keen & Todres, 2007) with both clarity and anonymity as priorities.

Translation

To reduce cross-cultural error both Mandarin and English were used for the questionnaire questions as well as the consent forms; due to a lack of Mandarin language skills on the part of the researcher, as well as a desire for easily comparable data, English was used for the short answer questionnaire responses as well as for the focus group and interviews. The translations were a collaborative effort undertaken by three native Mandarin speakers associated with GCPS. The first translator was a Mandarin teacher who spent several years studying in the United States and the second translators were second year university students and alumni of GCPS who have studied AP Environmental Science and worked collaboratively to edit the initial translation with opportunities to consult the researcher with questions regarding translation choices.

There were two particularly challenging translations that required significant discussion. The first was the translation of the word “community” as part of the Likert scale question “I make decisions with my role in my community in mind”. The idea of community being a group of people you live with and around was not directly translatable in Mandarin as the scope, size and meaning assigned to this word is very subjective. According to one of the translators most Mandarin words that might be close translations to “community” are group names based on geographic characteristics; therefore the translation required a description of the idea of the English word “community” rather than a direct single word translation (B. Luo, personal communication, November 7, 2017); the finalized translation was “我在做决定时会考虑我所在的社会团体中的其他人”. The second translation challenge was regarding the translation of “comfortable” in terms of income/ socioeconomic status in the demographic section of the questionnaire, the best solution was to include two translation options for this idea, namely “富裕” and “舒适水平” as some students may have a different idea of how much it takes to be comfortable in terms of income.

Sample Population and Recruitment

The participants were recruited by the researcher during a short presentation at the beginning of class, with students sixteen years of age or older who are currently taking Biology or AP Biology at the Grade 10, 11 or 12 level as the recruitment parameters. Presentations were made in five upper year Biology classes asking students to participate in the study. The researcher introduced themselves to the class, explained the goal of the study and asked for students to volunteer to complete the questionnaire,

clearly stating that it was not mandatory and would have no impact on their grade in the Biology class. One of the participating teachers Dr. Carson reinforced the importance of research and participating as a learning experience in her class, while the other Mr. Smith simply thanked the researcher for their time. After a few days had passed and only a few students had completed the questionnaire the researcher visited the grade 11 study hall one evening and made a group reminder announcement once again asking for their participation and emphasizing that it was voluntary. That same week Dr. Carson gave students ten minutes in class to complete the questionnaire or work on their homework, once again reiterating that the questionnaire was voluntary and would have no impact on their grade.

After about a week a total of 40 students had completed the questionnaire and the researcher returned to the classroom one more time to distribute consent forms to students who were interested in participating in the focus group and the interviews; at the request of the school, parent signatures were obtained for this portion of the study by students when they travelled home for the weekend. Of the nine students who chose to continue with the focus group and interview portions of the study eight were from Dr. Carson's classes and only one from Mr. Smith's classes; as students are randomly assigned to Biology classes based on their course schedules this will most likely have no impact on this research. Both the focus group and the interviews were conducted on campus after the school day had ended, sometimes in an empty science classroom and sometimes in a library meeting room depending on available space, as a quiet, semi-private space is considered ideal for interviews (Jacob & Furgerson, 2012).

Questionnaire

The questionnaire was designed to be conducted at both a Canadian and Chinese school and focused on Likert-scale questions (Nemoto & Beglar, 2014); which were designed to compare cultural factors including individualistic versus collective cultures, importance of family and history of time spent in nature, among others. The Likert-scale questions were designed with no middle response for the questions, allowing only “Strongly Agree/Somewhat Agree/Somewhat Disagree/Strongly Disagree” and “I don’t know” (see Appendix D for questionnaire). To avoid a response set, questions were worded in both a positive and a negative manner, which necessitated reverse-coding student responses before further analysis could be conducted (Lewandowski, Ciarocco & Strohmets, 2016). *In my experience teaching students at GCPS, this student population has a tendency to choose the middle whenever asked for their opinion, and research has shown that Chinese students are more likely to choose the central response (Lee et al., 2002); consequently, designing the questions with no middle response was deemed appropriate.*

Due to the inability to obtain permission to conduct research at a Canadian school the questionnaire was only conducted at Guangdong College Prep School in southern China and was therefore not used as a comparison tool. The questionnaire was conducted through a Google Form and the sample size was 40 students in upper year Biology classes at GCPS. An online survey format was chosen to facilitate immediate analysis and to gather elicited documents (Charmaz, 2014). According to Gosling *et al.* (2004) there is no difference in the quality of results between data collected electronically and that collected in more traditional survey techniques; Risko,

Quilty & Oakman (2006) found that self-reporting measures were equivalent between web and written questionnaires. Two short answer questions were asked to begin to collect data for coding and theoretical sampling; the prompts were: 1) “To me, being sustainable means___” and 2) “I think being sustainable is important because___”. Following Grounded Theory methodology these student responses were coded, compared and memos were written regarding this initial data set before moving on to the second step of the research process (Charmaz, 2014). While the focus group structure did not change based on student responses during the questionnaire, the responses did inform the questions asked during the first set of interviews.

Focus Group

The focus group was conducted with a group of eight students, after school had finished for the day in an empty science classroom. To reduce the impact of translation issues the initial task was to have students draw in response to the prompt: “ _____ makes me want to be more sustainable.”; this prompt was designed to be open-ended to facilitate discussion (Kambereliz, Dimitriadis & Welker, 2018). Students were given approximately 20 minutes to reflect and do their drawing and were then asked to share their drawing and their perspective with the group. While questions and comments were encouraged from other students in the group many students chose to listen to the presentations and then discussed overlapping ideas at the end of the presentations.

Inspired by the work of Guruge *et al.* (2015) drawings were included in the focus group structure (see Appendix E for large copies of student drawings) due to their ability to cross language barriers and provide a support for students to share their thoughts and provoke discussion, as well as to provide a second set of elicited documents for

analysis (Charmaz, 2014). The students presented their drawings themselves and this was key in helping to avoid assumptions on the part of the researcher, as Margolis & Zunjarwad (2018) state “an image does not describe itself” (p.617) and meaning can only be created. The researcher’s goal was to facilitate, but not participate in the discussion. The focus group was audio recorded using two devices; namely, a digital voice recorder and a cellular phone. The drawings were photographed and analyzed, examined for patterns including image size, frequency of images, colour use, detail and image position and the discussion was transcribed, coded and memos written based on comparisons between students as well as with other sources of data.

Interviews

A total of nine students volunteered to participate in the interviews, eight of them having participated in the focus group and all of them having participated in the questionnaire. The interviews were conducted in a quiet, semi-private space, namely an empty science classroom or a library meeting room (Jacob & Furgerson, 2012), based on availability after school, over a two week period. The interviews were also audio recorded using two devices. Following Grounded Theory methodology after conducting several interviews the recordings were transcribed, coded, compared and analyzed to see if more data was needed to be collected or if it was sufficient to reach data saturation, keeping in mind the limited timeframe and the scope of this research as a Masters Thesis. Six interviews were conducted and analyzed with the first set of eight questions, then three more interviews were conducted with slightly different questions to try and

address both the gaps in the data and new interesting questions that came up during earlier interviews (for full interview scripts see Appendix F).

During the first set of interviews a total of eight questions were asked using a semi-structured interview format (Dilley, 2000) with question wording chosen with care. Then prompts listed below were used as needed (Turner, 2010) to allow for comparisons between students as well as the flexibility to follow interesting leads (Brinkman, 2018). Using theoretical sampling, a key component of Grounded Theory (Cho & Lee, 2014) questions were constructed based on student responses during the questionnaire and focus group. For example, the idea of awareness was brought up in eight student questionnaire short answer responses as well as during the focus group and for this reason it became a sensitizing concept (Charmaz, 2014). This concept of awareness led to the following interview question: “In the survey and focus group some students mentioned that it is important to be aware of environmental impacts. What do you think about this?” With the following prompts below to guide further questions: “Awareness does not necessarily lead to sustainability” and “Can you be sustainable without knowing why?”. This question generated some interesting student responses and was therefore used in the second round of interviews as well.

Some interesting points arose from the first set of interviews which led to new questions in the second set of interviews; for example “Many students have said that it is up to the government to change laws and make the people be more sustainable, what do you think about this?” This question came from students who thought it was up to the government to enforce sustainable choices, it included the following prompts/notes: “Be

careful (a note to the researcher to be careful with word choice regarding this sometimes sensitive topic)", "Will people listen?" and "How will it be enforced?".

Transcription

The focus group and subsequent interviews were transcribed using F5 Transcription software immediately after the focus group/interview occurred to reduce transcription error and facilitate theoretical sampling. Time stamps were automatically inserted by the software whenever the speaker changed and was noted in the following format: #hours:minutes:seconds-milliseconds#; timestamps were included for each quote shared in the Findings Chapter. There are many decisions to be made when transcribing an audio recording (Lapadat, 2000) and while transcripts are both useful and necessary they should be considered as an imperfect representation of speech (Lapadat, 2000; Poland, 1995).

With the purpose of this study in mind the following choices were made: every word spoken would be transcribed, including "um" and sighs, ellipsis would be used when words trailed off or a student paused, long pauses would be noted as (long pause) in brackets, notes would be made when students laughed with the note (laughing) or (whispered) and any word or phrase that was emphasized would be **bolded** in the transcript, punctuation would be used to further clarify intonation and increase readability. These components of speech were included in the transcript to ensure the accuracy of the representation of the students' discussion, knowing that they were all non-native English speakers and increased detail in transcription could prove

helpful in analysis. Each transcript was first transcribed then checked twice for typos and transcription errors to ensure the highest degree of accuracy possible.

Coding, Comparison and Memo-writing

Initial coding of the short answer questionnaire responses and the focus group transcription were done immediately following their completion. Initial coding used a line-by-line format with an emphasis on using gerunds to code in the hope that avoiding static descriptions, insights into thought processes would begin to come together as suggested by Charmaz (2014). Unfortunately, in this case the use of gerunds drew the codes too far from student's words and codes had to be reworked at a later stage in the research process. Early memos were written throughout the initial coding process as a way to gather together similar student responses and develop interview question ideas. After each set of interviews was transcribed it was immediately coded in the same manner, using gerunds whenever possible in a line-by-line fashion. After the completion of the initial coding process transcripts were printed, cut into quotes and sorted, an activity which allowed for six potential categories to emerge (Turner, 2010), at this early stage of the analysis process, they were: 1) Thinking Locally, 2) Humans as Priority, 3) Equal Opportunities for Future Generations, 4) Making Sustainable Choices, 5) It's Inevitable and 6) Making a Personal Connection. This movement between coding and analysis, called codifying by Saldaña (2015) was key to both theoretical sampling and discovering emergent categories.

During the focused coding process repetitive ideas, outliers and ideas which seemed particularly interesting or relevant were chosen as focused codes, keeping in mind the study's goal of helping teachers motivate Chinese students to act sustainably.

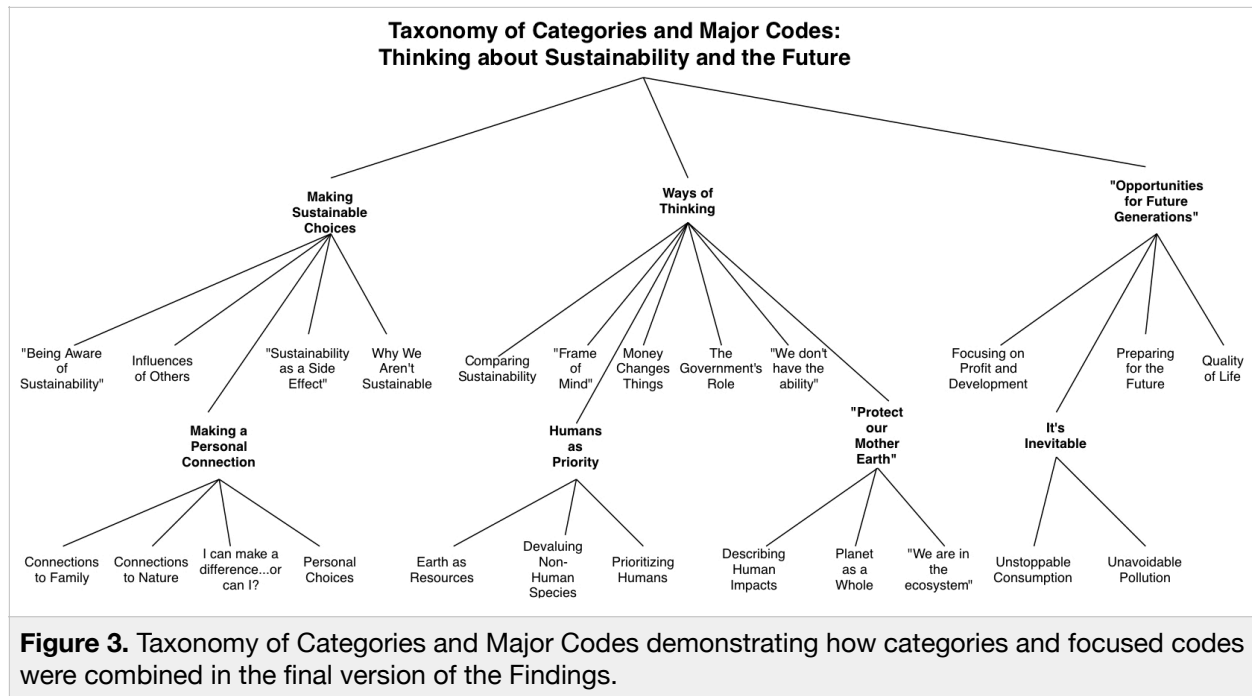
Some codes were modified and codes using student's words (*in vivo* codes) were sought whenever possible, this led to a total of about 290 focused codes. One of the first *in vivo* codes to be identified was "Opportunities for Future Generations" from the questionnaire short answer responses, which would eventually become a category name. To determine which categories might be the most useful quotes were chosen to begin to build a more complete picture of each category. As a tool to begin to organize these focused codes a Codebook (see Appendix G) was created where each code was placed into one or more categories and its location in the raw data was recorded. The nine categories used in this process included the initial six categories as well as: 'Save the Earth!', 'Earth as Resources' and 'Ways of Thinking'.

Memo-writing continued and it became clear that there were simply far too many focused codes and that using gerunds had removed the codes too much from the student's words and allowed for the insertion of personal biases and interpretations. For this reason the categories and codes were examined once more and a table was created which allowed for the creation of 'major codes'. The initial approximately 290 focused codes and nine categories were regrouped into seven categories with a total of 34 major codes. Major codes were used to bring several related ideas together which could then be used to build a category, these major codes were carefully connected to quotes from students and *in vivo* codes were used whenever possible. Through this process the categories were reorganized into the following seven: 1)Ways of Thinking, 2)Humans as Priority, 3)Opportunities for Future Generations, 4)Save the Earth!, 5)Making Sustainable Choices, 6)Making a Personal Connection and 7)It's Inevitable. 'Earth as Resources' was redefined as part of the 'Humans as Priority' category and

'Thinking Locally' was absorbed into the 'Making a Personal Connection' category. A Table of Codes (see Appendix H) was created to organize the new major codes and categories.

Following the creation of the Table of Codes and in an effort to return to the student's words, a table was created for each category which broke the category down into its major codes, the focused codes and where the original data could be found. Beneath this first descriptive row student quotes were pulled from each phase of data collection and used to clarify and define each category as well as to allow for ease of choosing student quotes to include in the Findings and Discussion chapters (see sample in Appendix I). While this step finalized the categories and major codes only some of the categories and major codes were included in the Findings chapter simply due to the necessity of choosing some aspects to focus on and discuss in depth for the purpose of this thesis, rather than achieving only a superficial analysis of the complete data set.

The remaining seven categories were retained, in a reorganized format in the final version of the Findings chapter, several categories were nested, one inside the other to increase readability and avoid repetition (see Figure 3). For example, the category 'Making a Personal Connection' had significant overlap with the category 'Making Sustainable Choices' and therefore the former was embedded into the latter (see Appendix J for a breakdown of the organization of major codes and categories before and after this change).



To further demonstrate the connections between the categories and major codes several diagrams were constructed for inclusion in the Findings chapter, including a +/- chart to show connections between categories (see Figure 10) and network diagram of both categories and major codes (see Figure 11). To communicate the frequency with which major codes appeared in the data set a Heat Diagram was also constructed and included in the Findings (see Figure 12).

Choosing Student Quotes

When choosing which student quotes to include in the research findings several steps were followed, the first was to eliminate any quotes whose wording was not clear, perhaps due to a language difficulty or a difficulty in the transcription process. The second step was to choose quotes which contained detail in their response and therefore provided more information than a simple yes or no answer. Any quotes which

could be considered outliers and provided a unique perspective were included and if several quotes described the same idea student repetition was verified to ensure that the quotes were not all chosen from the same student's interview and/or focus group discussion to ensure that the quotes represent the broad sample as accurately as possible.

Statistical Analysis

As the questionnaire was originally designed as a comparison tool its statistical analysis was complicated by the presence of only one student sample. Therefore using SPSS software a variety of statistical tests were performed to look for any significant findings among the 40 students who completed the questionnaire at GCPS. The first step was to determine the reliability of the three different scales. The religious scale contained only one question and was therefore deemed unreliable; using Cronbach's Alpha reliability was determined for the individualistic and the environmental scales which were compared to the standard acceptable value of 0.67, only the environmental scale was deemed reliable by this test. To determine the validity of the environmental scale an Independent Samples T-Test was used to compare the environmental scores of students who chose only to complete the questionnaire (Group 1) and those students who chose to continue with the study and participate in the focus group and/or interviews (Group 2). This test was chosen because it examines the difference between two groups who were tested only once. If students who chose to continue with the study had a significantly higher environmental score the scale would be considered valid, as one would expect students who demonstrated that they care more for the environment

to be more likely to volunteer their time to participate in a study about environmental education.

To determine if there was a relationship between student responses to different questions, Pearson's R Correlations were calculated, with p values less than 0.05 being considered significant. This test was chosen because it examines the relationships between two variables. Finally, a one-way ANOVA was used to determine if the number of years students had spent studying in Western schools had an influence on their responses to the Likert scale questions. As students were broken down into six groups based on the number of years they had spent in Western schools (responses varied from 2 to 12 years) and it examines the difference between more than two groups who were tested only once a one-way ANOVA test was chosen.

The Data Set: Reliability and Validity

The questionnaire was designed as a comparison tool and although it was not used as such some of the Likert scale questions were determined to be reliable and valid. Using Cronbach's alpha the reliability of both the Individualistic scale and environmental scale questions were tested and while the Individualistic scale had a result of 0.413, which was below the standard reliability score of 0.67, the Environmental scale had a score of 0.716 and was therefore deemed reliable. To test the validity of the environmental scale questions an Independent Samples T-Test was conducted to compare the values of those students who volunteered to complete the questionnaire only and those who volunteered to complete the questionnaire as well as the focus group and/or individual interview. Four of the items were found to have a significant p value ($p < 0.05$), as well

as the environmental scale mean (see Table 1), the students in group 1 demonstrated significantly higher scores than those in Group 2. This indicates that the environmental scale was valid as well as reliable and has therefore been included in the findings of this research.

Table 1. Determining validity using Independent Samples T-Test Comparing Group 1 (the 9 students who volunteered to participate in the focus group and/or interviews) with Group 2 (the 31 students who volunteered to complete only the study). Questions which were found to be significant ($p < 0.05$) using SPSS software are reported below in order of significance.

	p value
Environmental Item Q.11 "It is important to learn about nature."	0.017
Environmental Item Q.12 "When I purchase new items I consider their environmental impact."	0.022
Environmental Scale Mean	0.022
Environmental Item Q.10 "I have a good understanding of how the natural world works."	0.026
Environmental Item Q.8 "I regularly spend time outside in natural environments."	0.033

Reflections for Future Research Design

There are several ways in which this research design could be improved should a similar research project be undertaken in the future. While the mixed methods format of this research helped to increase both its reliability and validity, with some small changes it could be improved. In terms of the quantitative data collection, the use of an established questionnaire such as the New Ecological Paradigm (NEP) Scale (Anderson, 2012) would allow for easier comparison in the established literature, as well as ensure both reliability and validity of findings. More opportunities for data collection, with longer intervals between would increase the likelihood of reaching theoretical saturation as well as facilitate theoretical sampling. In terms of the qualitative data, the

ability to interview students a second time would allow for clarification of salient quotes. While in the coding process, the use of student words over gerunds may increase the relevance and accuracy of both categories and emerging patterns.

Chapter 4 Findings and Discussion: Thinking About Sustainability and the Future

The findings of this research include data in three distinct forms, first from the questionnaire completed by 40 students, second the drawings produced by eight students during the focus group and third the transcribed words of the students in both the focus group and the nine individual interviews conducted. In order to most effectively communicate these findings these various sources of data have been included throughout this chapter as they fit into the three largest categories developed throughout the data analysis process: 1) Making Sustainable Choices, 2) Ways of Thinking and 3) Opportunities for Future Generations. It is important to note that many student responses fit into multiple categories, for this reason each section will include related quotes from several categories and the intersections will be identified throughout. Each category has been broken down further into what are called 'major codes', which function to group similar ideas within categories and provide a structure which allows for comparison and analysis between both categories and major codes (see Figure 3 Taxonomy of Categories and Codes). Three stories shared by students have been included to further demonstrate the numerous intersections found in this research as well as to help narrate the trends in the research findings.

Making Sustainable Choices

This category is arguably the most relevant to teachers and to answering the research question of this study working towards the goal of motivating students to act more sustainably. Throughout the data collection process students discussed how their

own actions might contribute to sustainability, shared stories about their families, and about their connections to specific places, as well as nature in general. Rather than discuss each major code individually, included quotes are sequenced by their connections, reinforcing or contradicting their ideas and major codes. Reed's story about river pollution in his hometown is used as an example to help demonstrate the intersections and connections between several major codes and categories.

Within the original category of 'Making a Personal Connection' a total of four major codes could be found, including 'Connections to Nature', 'Connections to Family', "I can make a difference...or can I?" and 'Personal Choices'. As significant overlap was found between the categories "Making a Personal Connection" and "Making Sustainable Choices" it was decided to embed the former category into the latter. In its original form the category "Making Sustainable Choices" included four major codes, namely the *in vivo* code "Being Aware of Sustainability", 'Influences of Others', "Sustainability as Side Effect", another *in vivo* code and 'Why we aren't Sustainable'. Whenever possible *in vivo* codes were used, this use of the students' own words to organize the data helps to ensure that findings closely follow the students' discussion.

Being Aware of Sustainability

For many environmental educators the importance of teaching students about environmental impacts stems from the importance of environmental awareness and the major code "Being Aware of Sustainability" is one students brought up throughout the data collection process. As student #25 shared, in response to the questionnaire question about what being sustainable means: "I have to be aware of my use of all

sources in the world⁴". Student #3 seemed to agree, stating: "To live sustainably means considering the environmental footprint of every choice I made and try to reduce their impact...". In response to questionnaire question 2, "I think being sustainable is important because..." student #9 said "It's good for the Earth which is our living environment. Human beings have made many damages to the Earth and the way to make contribution to the Earth is being aware of sustainability" (see Appendix C for the complete Questionnaire). In their interviews both Kristie and Vanessa expressed that in order to solve environmental problems we must first be aware of them. Vanessa said "Um, in order for us to solve the problems we need to first be aware of the problems existed" (#00:08:30-9#) while Kristie shared that "Yes, it is really important to aware, like if you didn't aware anything you will never change it..." (#00:10:37-0#).

Guangdong College Prep School (GCPS) students seem to agree that environmental awareness is important; the idea of awareness was mentioned time and again throughout each stage of the research process and while students seem to consistently agree that awareness is not sufficient for action they also feel that it is an important step in acting more sustainably. During the focus group discussion about overconsumption and pollution, Fiona shared that "The problem is that humans need to realize how much they are, how severe they we are polluting this planet" (#00:28:49-4#). While Danny brought up a 'Connection to Nature' during his discussion of the importance of awareness:

Um, well, being aware is to me, its just not being aware, like. Everybody knows, like, like the greenhouse effect or global warming or El Nino or something like

⁴ All student responses are quoted verbatim.

this they are just phrases or nouns that we will barely actually experience in our whole life maybe, for some people. But for me being aware of these issues that you have to know what is, like for example what is related to your life, because for example like global warming you can experience. You won't know the concepts by just telling you "like, global warming oh, the temperature is getting up", but you will feel that the summer are getting hotter and hotter and even sometimes winter are getting warmer and warmer. (#00:07:35-0#)

The first story to be shared was told by Reed during the focus group, and later elaborated on during his interview, he shared how he was not aware of river pollution in his hometown until his father pointed it out to him. Reed's drawing (see Figure 4) shows two people on a raft in the centre of a river in his hometown of Zhuhai. The people are cleaning out the garbage in the river, you will also notice a frustrated fisherman, pollution from the factories along the river bank, and lots of dead fish in the river. Here is how Reed presented his drawing to the rest of the students during the focus group discussion:

I have also talk about, something about water pollution. So this is my own experience. Once ... my Dad and I went out to have a meal together and in our way to the restaurant we see this river. And there was a boat, (laughing) and there was a boat and there were two people using something like a stick to grab the garbage in the river and my Dad told me, uh, that they are hired by the government to pick up some garbage from this river. And this river was, uh, used to be very clean when he was young and he used to, uh, go fishing there and he can get a lot of fishes and shrimps. But now the water become, like, dark, and

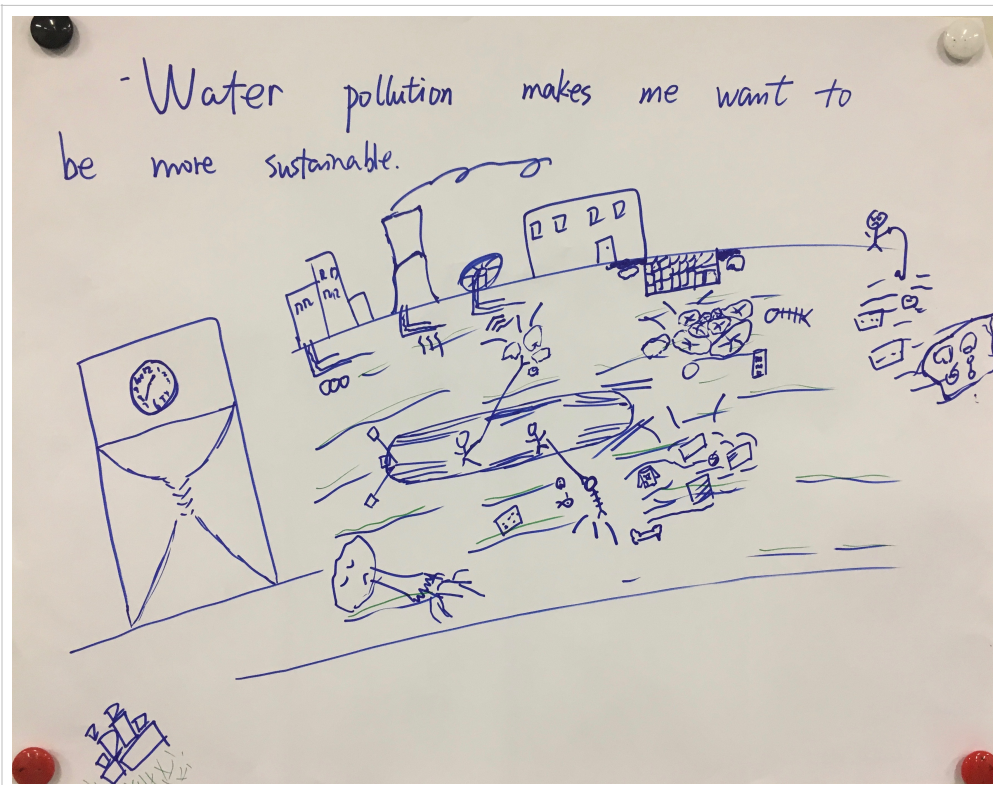


Figure 4. Reed's drawing from the focus group based on the prompt "_____ makes me want to be sustainable".

dark green, so its very dirty and I think no animals would like to live there. So I think, uh, the government should not just hire people to clean their, clean

our garbage, but they should raise our awareness of these kind of things, that will make us more sustainable. (#00:18:42-1#)

Reed points out the need to increase awareness, looking to the government to do so and stating with awareness comes increased sustainability. Zoe would disagree with Reed's statement, during her interview she shared the next steps after awareness "I think um, it is a good start to be aware of this impact, but after we learn more about the sustainability and the like the consequence of our actions then we need to take the real action." (#00:07:22-5#)

Connections to Family and Nature

Connections between students, nature and their families as well as other people were all major codes which intersect within the category 'Making Sustainable Choices', as well as with Reed's story. In Reed's story a connection to nature is notably absent, he doesn't notice the river until his father points it out, despite having walked by it regularly. This missing connection was brought up by two students during their interviews and demonstrates that some students are aware of the possibilities a 'Connection to Nature' may bring. Jamie spoke about appreciation toward nature when she was asked about the difference between Chinese students and Western teachers saying that:

I feel like um, like Western teachers they are more, uh, like they like to do many activities outdoor like uh, doing sports and in the nature, but, uh Chinese students like they spend less time in nature and um this might decrease their uh, their appreciation toward nature. And I think Western people they have more, like more appreciation of natural, uh, natural, natural, like parks and the natural reserve. (#00:14:19-1#)

Interactions with family members popped up throughout students' responses, if we think about Reed's story about river pollution it is closely tied to his Dad and how his Dad responded to the pollution when they noticed it together on their way to a restaurant. Later on in his individual interview Reed returned to this story and shared some insights into the proximity of pollution to his life, falling neatly into the 'Making a Personal Connection' category that intersects with his 'Connections to Family' as well as 'Being Aware of Sustainability'.

interviewer: Okay, thank you. Okay, um, some students described an important event that changed the way they feel about the environment, have you experienced anything like that? #00:07:42-2#

Reed: Yeah, actually I, I talk about it in the discussion. That I, when I, when my Dad and I went to a restaurant to have a dinner and on the way we saw a river which is polluted by some uh, by some waste water or some garbage and I ask my Dad that, how is this water, how is this river look like when he was young and he said that he used to go fishing there and it was very clean and people can swim or wash clothes there and now it is all, uh, I don't know how to describe it, very dirty and... #00:08:31-1#

interviewer: So why do you think that affected you so much? #00:08:32-7#

Reed: Um, I never seen the, I never think that water pollution is so near to me. I live there for about four years and I actually I walk by the river many times. Uh, I never notice it, but when I ask my Dad the question I really know that sustainability is very important for us. Otherwise other rivers will like this. #00:09:06-8#

Both Reed and Fiona discussed how they have learned to be more sustainable from family members; Reed from his grandmother “Um, maybe my grandma told me to, uh, collect some bags from the supermarket and reuse them because she always went to the supermarket and buy some food and cook for dinner and she collects any bags and reuse them. And she told me to do so.” (#00:10:04-7#) While Fiona learned from her mother:

I don't think so there's like not a very huge things that happened in my life for me to change, but I always have the concept to protect the environment like to, um, I think it is from my Mom. My Mom always told me to like, wash your hands ... and when you take the soap and rub your hand you should turn off the tap and sometimes you leave the room you turn off the light... (#00:10:32-0#)

Zoe discussed how her family's consumption patterns have changed over time and specifically how her Mom and Dad disagree about online shopping on Tao Bao⁵:

Interviewer: Okay, thank you. Do you think that your choices make a difference?

#00:11:35-2#

Zoe: Yes, because I still remember that in every Chinese New Year my Mom will collect a lot of old clothes and uh, like maybe sell to the, some like waste recycle store or just give it to my sister. And, but I think in recent year our homes old clothes is decreasing, which is much better I think. #00:12:02-3#

Interviewer: Okay, thank you. Um, some people said that they felt guilty about their choices, um, especially about the purchases they made, like on Tao Bao. Have you ever felt like that?

#00:12:15-4#

Zoe: Um, actually, I do not have any Tao Bao account, I don't have this account.

#00:12:20-3#

Interviewer: But have you ever felt guilty about any choice? #00:12:25-1#

Zoe: Um, I don't feel guilty, but I notice that my father, like he didn't use Tao Bao I think he just started to use Tao Bao like one years ago and I noticed that he started to buy a lot of things and (laughing) he just cannot stop it. Like, uh, at the time that he doesn't use Tao Bao he always ... like argue with my Mom because my Mom buy a lot of things and my father just cannot understand it, but after he started use Tao Bao he also (laughing) do the same thing. Because when he saw the price is really cheap and also like you can, when you buy a things like 1 + 1 stuff, so it will, like, attract him to buy this stuff. When I saw this I will feel a little bit, like uncomfortable because I know my Dad is just buying this not because they, he need this he just think it is cheap. #00:13:33-6#

Influences of Others

Throughout many student's stories and responses to various questions they shared how other people influence how we act; these descriptions form the major code 'Influences of Others'. In Reed's story about river pollution his father's influence was quite clear.

During the focus group Annie described how society in general has a significant

⁵ *TaoBao is a Chinese online shopping website, similar to Amazon, where you can get most things.*

influence on the actions people take, which Danny neither agreed nor disagreed with.

Annie: Yeah, I know there is opinions or wills of the societies that we don't actually check the environment, we just protect the environment because we need to protect ourselves, we need to protect the humans from being extinct because of the polluting environment. The earth doesn't need us to protect herself, we can just be function. #00:21:40-8#

Danny: Maybe. #00:21:46-5#

While Vanessa felt that copying others may be a way to make sustainable choices, without awareness.

Interviewer: Okay, thank you. Um, do you think its possible to be sustainable without being aware, without knowing why you're doing it? #00:09:15-7#

Vanessa: So, maybe I, I will see others they are doing something sustainable so I may act like them, but not knowing the, the reason or I can ask them so I will know the reason behind, uh, what they are doing. #00:09:44-4#

Both Zoe and Jamie shared examples of when they influenced others to be more sustainable. During the focus group Zoe shared that she visits schools and speaks to the students about sustainability “And I also do a lot of, like kind of small species around different school to, uh, tell the students there, that, how serious, how important that we need to protect our forest and also this animal.” (#00:07:02-0#) Jamie was able to influence her family who she hopes will then influence others to act sustainably “Um, I think if I am doing something than, um, I might like, I inspire my family to like buy less because of my action and they kind of accept my ideas so I think, um, if I inspire my family and my family will inspire other people so this will like make a greater difference.” (#00:10:25-6#) These student quotes were coded as ‘Influences of Others’ although they could equally well have been considered ‘Personal Choices’. While our personal choices always impact our own sustainability they can sometimes impact others as well.

Personal Choices

During the focus group Kristie shared several examples of 'Personal Choices' she and her classmates make in terms of sustainability (see Figure 5). Kristie's drawing includes a large, central image of a cake in a shipping box, which she later explained indicates the impact of over-packaging from online shopping. Her drawing also includes three people wearing masks due to smog and a girl in the shower. Online shopping, shower length and use of scratch paper are all 'Personal Choices', while 'haze' is a 'Human Impact'. During her presentation of the drawing she clarified:

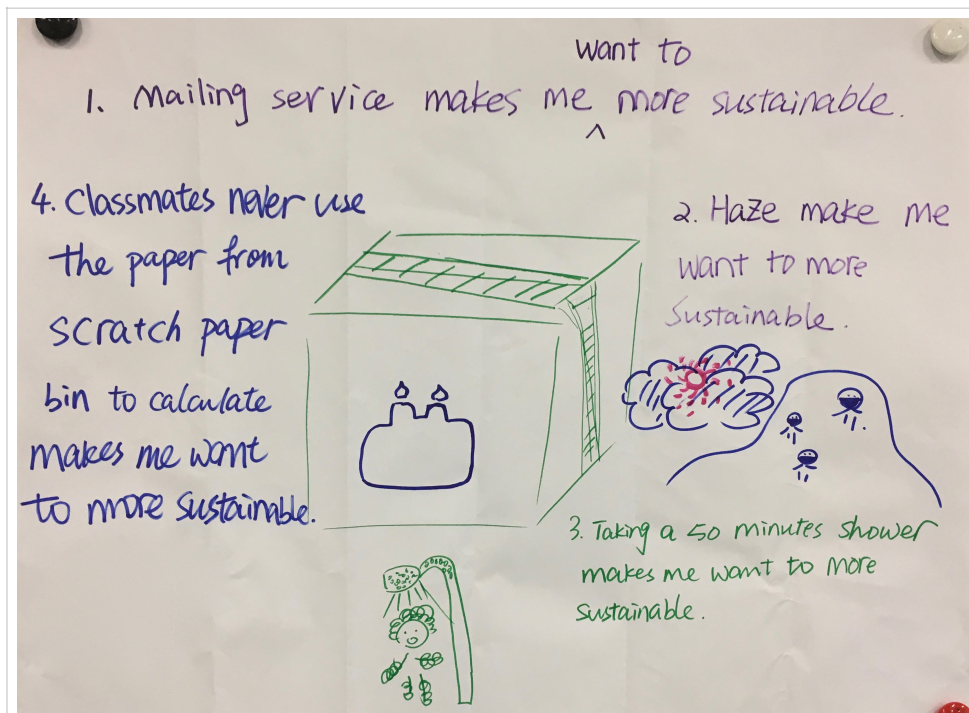


Figure 5. Kristie's drawing from the focus group.

Yes, I agree with, uh, Fiona's idea, cause, ... I also write down the mailing service makes me want to be more sustainable

because based on my personal experience I bought a lipstick, which already has a package... And the mailing service system gives me a, this big box, about like 15, 15 cm square, like that and only one like lipsticks inside of it and other, others

are just some plastics and some things that, uh... keep the lipstick from broken, but actually it doesn't need that kind of like package, ...to pack my lipsticks, so it's really like waste, it's just really waste. And... also when I am taking a shower I, I usually taking the like, 30 minutes shower and I never realized that 30 minutes can drop a lot of water into the (Chinese)... Ok, into the sewage. So it's kind of like really waste, right? (#00:17:11-9#)

Later on during her interview Kristie spoke extensively about wasting water with frequent baths and long showers, eventually revealing a strategy that she has chosen to use to help her reduce her water use, making a 'Personal Choice' to act more sustainably through 'Being Aware of Sustainability':

Yes, I think so, cause like, just like I said while I was taking a bath I usually took my phone in the bath and uh, I usually saw the time, for example I was inside the bathroom when it was 10 o'clock and when it was 10:30, cause usually set the music for 30 minutes and when the music stops I know, oh, it's 10:30 and I have to ... finish the shower and go back to dorm, yeah. To aware that. (#00:11:15-0#)

Zoe explained why students focus on small 'Personal Choices' during her interview, stating that:

I think maybe because we are students and like uh, focus on the small things around us is the most easier things for us to act, take action. Like we can participate in many like committees to protect environment or maybe we can just do stuff ourself to like decrease the pollution and over wasted, so its really easy for us to do this stuff. So maybe many student consider this part. (#00:05:23-7#)

Martha discussed both water conservation and food waste in her interview interestingly sharing that the water her fellow students waste when brushing their teeth is not a forgivable 'Personal Choice':

I made a choice every time. (laughing) To, by that I mean, like every morning I uh, go, I go out of my dorm and uh, go out of my bedroom to like brush my teeth and uh, I saw every, everyone around me like was, they just turn on the water and didn't turn it off when they don't need it so they just turn on the water and uh, to go to do something else, like uh, clean their face or just pick out some instruments out of their pockets, so. Um, they turn on the water even if they don't need it, so for me its, its kind of unforgivable because like, um, they just use, I think that their habit to just, to be possible to be more efficient if they just didn't turn off the water if they don't need it. But for me that is just, I will turn on and turn off the water to be correct amount for my needs but, but for them that is like, a lot, it just feels strange to them for my doing so. But I think my action is like saving water every time and I will ask the staff in the cafeteria every time, to like give me less rice because I, just couldn't eat that much rice, when I, there for my need so I can like, eat everything in my, in my meal and then just I think thats kind of like sustainable. (#00:18:52-9#)

Martha later goes on to describe how the food she sometimes wastes when she can't eat it all is a forgivable 'Personal Choice'⁶

Sometimes I does because like sometimes I just didn't have the mind to like, eat things, and that time I will like order something but then just couldn't eat it

⁶ Major Code and Category names are indicated using ' ' and "" for *in vivo* codes or category names

and I just threw it up. That, that makes me feel a little guilty because like, that was the food I was supposed to be eat, eaten, but I was not. But I think that's a choice, a forgivable choice because I just, sometimes its just too hard to, to do it otherwise even if its sustainable. (#00:21:08-1#)

The 'Personal Choices' we make and our ability to 'Influence Others' are all components of 'If we can make a difference or not' in terms of sustainability. The ability of students to make a difference is an important component of this research and student responses regarding their ability to make a difference varied significantly. Two students said that they would not make any difference, Annie stated that "I don't think it is necessary to be aware of the environmental impact because I means, uh, the power of the individual is small and it's hard to change some things, if you, like one people cannot change the whole environment." (#00:11:34-9#) while Jamie shared that "we might think of they are little things and they do not matter. As a whole, like compared to the more serious problems." (#00:04:49-2#)

I can make a difference....or can I?

Both Kristie and Martha felt that they could make some difference, but it would only be a small difference; Kristie shared that "Make a difference...uh, I believe that if I do it little bit, step by step I will see effect maybe these effect will, will not influence the whole entire world, but I believe that I still make it a little bit, maybe sustainable than before make this world a little bit sustainable than before." (#00:14:43-8#) while Martha emphasized how a small change can add up over time "Um, because I've, (laughing) literally calculate, calculated the amount of water I've like save every day, like for me

that's like, for, maybe its like, uh, 1/4 of, 1/4 of pounds, gallons, litres! 1/4 litres of water every day, but um, for me thats like not enough to make me more sustainable but to if it's a daily progress it will be a lot of sustainable than others." (#00:19:58-7#) Finally, when Fiona was asked if her choices made a difference she emphatically said "Yeah, of course. Like providing less plastic garbage that cannot be decomposed by the environment." (#00:11:30-5#)

If students feel that they cannot make a difference with their choices it would most likely be more difficult to motivate them to act sustainably. To help further determine why students do or do not make sustainable choices it is important to examine how students explain the reasons why they do not make sustainable choices, the major code 'Why We Aren't Sustainable' comes from this. There was no consistent pattern to these student responses, they varied from valuing comfort and convenience to being unable to change our old habits and the inability to readily see the impacts of our choices.

Why We Aren't Sustainable

Sometimes it is particularly challenging to understand why a person might choose to act unsustainably. If we think back to Reed's story about discovering the river pollution with his father it can be said that the pollution bothered both Reed and his father. When asked about how Western teachers differ from Chinese students Reed discussed his father's factory and shared some intergenerational information:

interviewer: Okay, thank you. Do you think, um, Okay, last question here. So how do you think that Chinese students are different from the western teachers in terms of the environment, in terms of environmentalism? #00:12:57-6#

Reed: Um, I think they, I think you, like other teachers you have very strong sense of protecting the environment from maybe very young, but in China we just, we are a new generation who are aware of the environment, but in the past for example my Dad he has a factory and they and he and sometimes he told me that his factory has some pollution and waste water to the environment and then he just kept doing it because the punishment is, is less severe compared to just shut up the factory. #00:13:53-6#

interviewer: Um, what kind of punishment? #00:13:55-0#

Reed: Maybe just give some money to the government organization. #00:14:00-5#

While at other times, the reason why someone might not act sustainably is surprisingly direct and clear. In response to questionnaire short answer question #1 “To me, being sustainable means....” student #18 shared “Living in an environmental friendly condition, may be less comfort”. Annie and Kristie both discussed how convenience causes them to make unsustainable choices, Annie shared that:

(laughing) Well I believe that most people are lazy, yeah. For me, I (sigh and laughing). For me I just want to, um, so if I have to make a choice between the sustainable life and a more wasteful life I will still want to choose the more wasteful one because it make me more comfortable. Yeah, I can turn on the air condition whenever I like and it feels great. (laughing) Yeah, and in a sustainable life I have to limit myself, my behaviours and sometimes it, it is not convenience to do that decision. (#00:05:41-9#)

Kristie emphasized the convenience of deliveries in her interview, bringing in cost-benefit analysis:

Interviewer: Okay, thank you. So when we see those kinds of big environmental impacts, why do you think we don't change our behaviour? #00:05:06-0#

Kristie: Cause, it's comfortable, like if I can call just for delivery and that restaurant is like 40 minutes away from me and I call the delivery I can stay in the home especially the weather is so cold right now and I don't really want to go outside to like to find, to take the bus or to drive a car or so and call for delivery is really comfortable for me and I can just stay in home and other people will, uh, will deliver the food for me and I only have to pay a little money, yes. I think the cost and effect, the cost and my benefit is, yeah, my cost is low, but my benefit is high. #00:05:52-3#

Zoe shared her insights into why we might make unsustainable choices even if we both know about their impact and we feel guilty about the choices we make:

Interviewer: Okay. Why do you think that when people do feel guilty, why do you think we don't change our behaviour, it doesn't stop us from doing it again? #00:13:40-6#

Zoe: Hmm, um, I think maybe the first reason is maybe like human has already kept doing this for like really long years and now we kind of just started to realize there will be a really bad consequence, but its really hard for a person to change their habits and also maybe some people will think "I will just do this once, only once" but they cannot never stop. Like every time they do this they just think "I will just do one more time" and they cannot stop. #00:14:24-9#

Finally, Danny shared a novel idea during his interview when he described that our inability to see the direct consequences of our choices allows us to make unsustainable choices with ease; he even suggests a way to fix this issue:

Well, its hard for me at least hard for me to see the consequences what our choice will cost, like. For example like if you give me a picture like saying if I purchase something online a tree will die or something like this maybe I will start just before I make a purchase if you show me something like this I will reconsider it and maybe will stop purchase because I don't really need that thing, we, I just bought. So, it is I believe the important thing is letting people know what are the consequences before they actually make the decision. (#00:16:29-5#)

Sustainability as a Side Effect

To learn how to motivate students to make sustainable choices we must also look at positive examples of when they did make a sustainable choice, the *in vivo* major code “Sustainability as a Side Effect” came about when students were asked to share a time that they made a sustainable choice and several students discussed choices they had made for another reason, which happened to be sustainable. Vanessa spoke about taking the stairs from the subway for exercise rather than to save energy:

Um, like, a, when I, when I go to Guangzhou to study I, I need to travel by an underground and I don't, I usually I will go to the stairs to uh, because many people they will choose the elevator to go from the, the underground to the... ground but I chose to walk because I want to exercise and I, I think this may help a little bit. (#00:12:26-8#)

and Annie shared that she chose to take the subway to her SAT prep class rather than a taxi due to financial savings

(sigh) (laughing) Uh, well it is a sustainable choice, but ... well I believe that three months ago I decided to take the subways, um, to go to the place I study SATs rather than, instead of the taxis, what, I think it is a sustainable choice, right? But I make this decision just because the price for the taxis (laughing) expensive than the subway. It is a sustainable choice, but I make decision because of the price. (#00:16:01-9#)

When asked to share about a time that he made a sustainable choice during his interview Danny shared several examples of “Sustainability as a Side Effect” and this *in vivo* major code comes from his words:

I didn't make the choice because I wanted to be sustainable but actually being sustainable is kind of like a side effect because I take public transport so often. Like, for example every day... I took buses to home and back to school because I am a day student. Not because, well, yeah I know it is sustainable but because how it is convenience because the public transportation now is, uh, even more convenience than you just drive your own car, at least in China. We don't people don't have to use, you don't need to drive so you don't need to, worry about like the gasoline price or something like that. Hmm and being sustainable is kind of like a side effect and sometimes, well we, like my father he just purchase new car because he choose a car which is, has less carbon emission than the original car we own so the government is giving him money for it, to make that choice. Actually he make the choice because of the money (laughing) instead of trying to be sustainable. (#00:13:19-4#)

If we return to Reed's story one more time we can see how the complexity and layers of this story exemplify the intersections of this category, major codes from this category as well as others are added in brackets and quotation marks. Reed shared a 'Personal Connection' to the river, through a 'Connection to his Family' (father) as well as the river itself ('Connection to Nature'). While he was unaware of the river pollution ('Being Aware of Sustainability') his father pointed it out to him and it has resonated with him ever since ('Influences of Others'). Yet Reed's father allows his factory to pollute the river ('Personal Choices') due to the low cost of government fines ('Why we aren't Sustainable' and 'The Government's Role'). The frank and factual manner in which Reed described his father's factory pollution contrasts greatly with the concern he

shared over pollution in the same river during his story; while more clarification is needed it would appear that Reed did not seem to see any issue with valuing the river and polluting it at the same time. The reasons why GCPS students 'Make Sustainable Choices' are neither clear, nor consistent.

Ways of Thinking

The 'Ways of Thinking' category was created after several rounds of data analysis to group together a number of codes in which students described the ways that they and others see the world and the ways in which they think about the world, specifically in the context of sustainability. The categories 'Humans as Priority' and the *in vivo* category "Protect our Mother Earth" were both embedded into the larger, 'Ways of Thinking' category to avoid repetitiveness and emphasize patterns, intersections and possible contradictions. The significant ($p < 0.05$) findings of both the one-way ANOVA test and the Pearson's R bivariate test have been included because they exemplify 'Ways of Thinking'. The Pearson's R test results clarify how their decisions are made as well as their beliefs about the environment, while the one-way ANOVA test findings are useful in the comparison of Western teachers and Chinese students.

The major codes were organized to build a narrative and describe the numerous relationships between the 11 major codes included in the 'Ways of Thinking' category. They include 1) "Frame of Mind", an *in vivo* code, 2) Describing Human Impacts, 3) Planet as a Whole, 4) Prioritizing Humans, 5) Devaluing Non-human species 6) Earth as Resources, 7) "We are in the ecosystem", an *in vivo* code, 8) Comparing Sustainability, 9) Money Changes Things, 10) The Government's Role and 11) "We don't have the

ability”, another *in vivo* code. Closely related major codes and student quotes have been grouped to allow for comparison and to illustrate intersections.

Frame of Mind

As seen above, the *in vivo* major code “Frame of mind” includes several ways in which students explained why we do not act sustainably in terms of personal attributes, such as selfishness and laziness as well as emotions such as feeling guilty about our choices. Also included here are the statistically significant ($p < 0.05$) findings when different questions on the individualistic, religious and environmental Likert scale questions were compared using a Pearson’s R correlation (see Table 2). Both the student quotes and the quantitative data included help to clarify how this group of students make decisions about the environment as well as their feelings toward the environment, important information for teachers looking to help motivate their students to make sustainable choices.

In his interview Danny described how selfishness and a missing need to protect the environment were important factors to consider.

interviewer: Um, so if we see these kinds of things happening, like we see, for example, the air last week and the air was pretty bad. If we see that, why do you think we don’t change? #00:05:15-5#

Danny: We don’t change. #00:05:18-7#

interviewer: Um-hm, we don’t change our habits even though we see the, the bad things in the environment happening. #00:05:23-5#

Danny: ...not everyone have these same feeling of we should protect the environment or else we will extinct or something like this they just, they’re I have to say, there are some people in society, at least in China, the society of China we have some people they only care about their profit. #00:06:16-1#

Vanessa described selfishness and a lack of courage as reasons why we do not make more sustainable choices during her interview:

Interviewer: Un-hun, do you think it's, if you're aware you're automatically going to be more sustainable because you know about the problem? #00:08:38-5#

Vanessa: Maybe not. (laughing) #00:08:41-6#

Interviewer: Why not? #00:08:44-3#

Vanessa: Uh, (laughing) like, maybe we are a little selfish and although we know that we are doing something wrong, but maybe we don't have, we don't have the courage or the um, we just continue on what we are doing. #00:09:07-5#

The results of the Pearson's R Correlation test (see Table 2) provided some valuable information. A particularly strong correlation ($p=0.000$) helped to confirm that with this particular student population spending time outside in nature is positively correlated with feeling that it is important to learn about nature. A correlation that would appear to be similar to what you might expect in a Western classroom (Cheng & Monroe, 2012). A second insight into 'Ways of Thinking' from this data is the very strong ($p = 0.001$) correlation between having a good understanding of how the natural world works and purchasing new items with a consideration for environmental impact; an example of the connection between 'Being Aware of Sustainability' and 'Making Sustainable Choices'.

Table 2. Likert-scale questions which were calculated to be significantly related using a Pearson' R Correlation ($p < 0.05$) calculated using SPSS software.		
	Question(s) found to be significantly related	p value
Individualistic Item Q.1 "I make decisions by placing the needs of my family and friends as the #1 priority."	Q.6 "I make decisions keeping in mind the ideas and opinions of my family."	0.015
Religious Item Q.4 "I make decisions with my religious background in mind."	Q. 11 "It is important to learn about nature."	0.04
Environmental Item Q.7 "I am proud of the natural beauty that my country has to offer"	Q. 8 "I regularly spend time outside in natural environments."	0.032
	Q. 9 "I believe that nature is very valuable."	0.00
	Q. 11 "It is important to learn about nature."	0.022
	Environmental Scale Mean	0.000
Environmental Item Q10 "I have a good understanding of how the natural world works."	Q. 11 "It is important to learn about nature."	0.044
	Q. 12 "When I purchase new items I consider their environmental impact."	0.001
Environmental Item Q11 "It is important to learn about nature."	Q. 8 "I regularly spend time outside in natural environments."	0.000
	Q. 9 "I believe that nature is very valuable."	0.044
	Q. 12 "When I purchase new items I consider their environmental impact."	0.028
Environmental Item Q13 "I always do my best to reduce my waste in any way possible."	Q. 12 "When I purchase new items I consider their environmental impact."	0.008
	Q.14 "I consider the environmental impact of my methods of travel and make an effort to reduce them."	0.00

During Fiona's interview she provided some very interesting insights into how awareness does not always lead to action, for which she blames laziness.

Interviewer: Um, do you think if you are aware you're automatically going to become more sustainable? #00:07:37-2#

Fiona: I think awareness is, um, not good enough for actions. Awareness is different from our action, even though we are, like, we are, everyone is aware of our

environment is being polluted and we need to be more sustainable but action is hard to achieve. #00:07:57-7#

Interviewer: Why do you think that is? #00:07:58-1#

Fiona: Humanity. (laughing) I don't know, I don't know. Maybe we are have, like laziness and I don't, like, like they are, uh, some, is things that we have, we have the feeling that we have to study hard, but we just, uh, but we, but the time when we are have to, we are knowing that we have to study hard, but we just stay there and be lazy. I think it is, it is like the same series of like to being sustainable. #00:08:33-8#

Many students described how they felt guilty about their choices during the focus group and this led me to ask about feeling guilty during the first round of interviews.

Zoe, Danny and Jamie all had particularly interesting things to share about feeling guilty.

This idea was originally its own major code; however, it was decided that it belonged with other "Frames of Mind" for ease of comparison and building a complete picture.

During her interview Zoe shared how desire wins out over guilt.

Interviewer: Okay, um, so when we see these kinds of different environmental impacts in the world, why do you think we don't change? #00:05:33-3#

Zoe: I think maybe humans desire is like, kind of control us, just like for me I, I really love to watch some TV dramas, but I know I still have work I need to do. But when I watch TV drama I know "Oh, I have work to do" but I just keep watching it. The, uh, maybe we will feel guilty, but sometimes the desire will fight over the guilty. #00:05:59-1#

Jamie shared an example of how she feels guilty about wasting school supplies when she purchases way more than she can use and how we sometimes forget about our guilt as time goes on. When Jamie was asked if she ever feels guilty about her choices she shared the following.

Jamie: Um, I remember when I bought tons of, like, um, the, how to say it, the school supplies and because it was uh before the school term begins and I bought to, bought a whole box of them and, and at the end I, I couldn't use them all and some, like the ink in the pens they, because I don't use them as soon as possible they, like

after a long time they might uh, they cannot use. And so I felt guilty because I wasted almost half of those box (laughing) of school supplies. #00:11:26-2#

interviewer: Okay, um, why do you think guilt doesn't stop people from doing the same thing again? #00:11:32-6#

Jamie: Um, maybe they, every time they will tell themselves not to do, do so again, but actually when they encounter the same like situation they will, uh, they will kind of forget or, or think "Ah, I will do that later". Like this. #00:12:07-1#

Describing Human Impacts

Throughout our interactions, students regularly shared examples of 'Human Impacts', (a major code), consistently in their focus group drawings, and how they chose to share those drawings with the group. When Zoe shared her drawing (see Figure 6) she spoke about five different ways in which humans have impacted other organisms:

So, um, um, my poster is generally about my personal experience, uh, I really like to

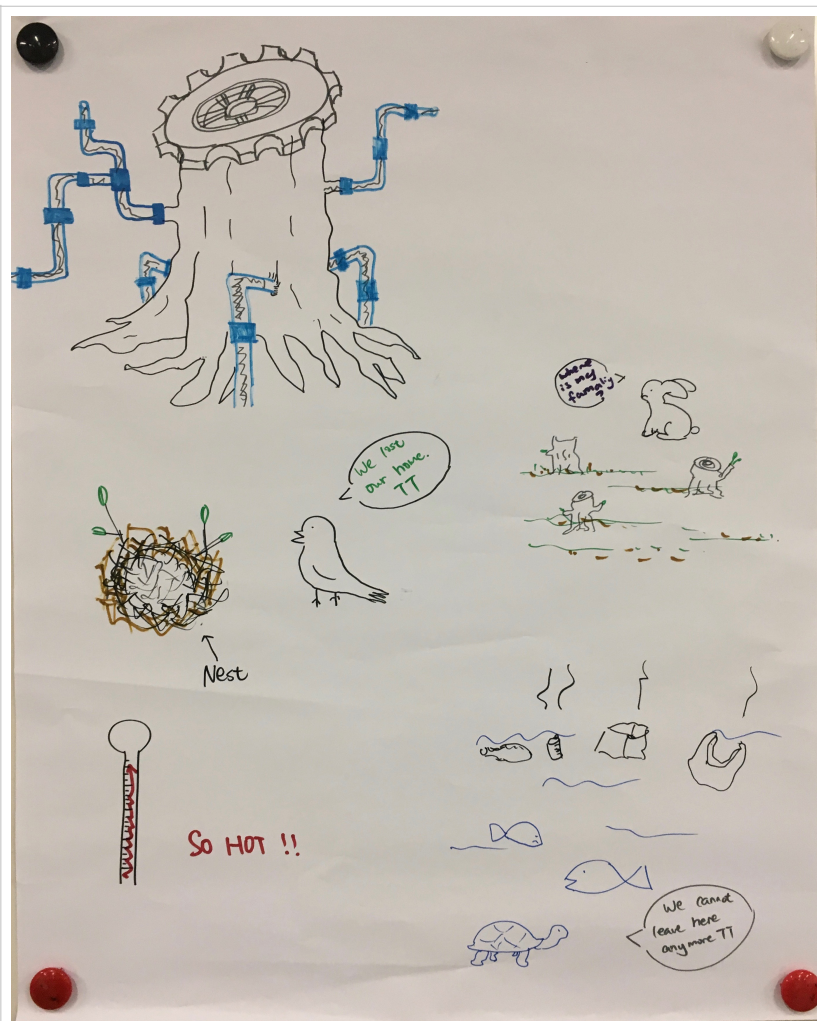


Figure 6. Zoe's drawing from the focus group.

watch birds, so I usually went to many countries like Thailand. ... there are many, uh, trees like in the national park or in some other like small forest have been cutted...So, uh, birds like they lost their home and also, uh, I went to Thailand for whale watching and I noticed there the sea there a lot of rubbish on the sea so water pollution is kind of serious too. So, ...like many people want to cut trees down then, not only birds but also a lot of animals that live in that ecosystem, uh, will be, uh, threatened by this kind of human actions. ... (#00:07:02-0#)

In my experience, in many environmental science and social studies classrooms it is these big human impacts that are taught. While students later focused on smaller, local issues it would appear that when asked about sustainability they tend to think big.

Vanessa's drawing (see Figure 7) and presentation during the focus group adds further evidence to this major code, 'Describing Human Impacts', she chose to discuss four impacts that she blames humans for causing. It is interesting to note that Vanessa did not include a single person in her drawing, despite the fact that she describes the Tornado as having cost human lives. She was the first to present in the focus group and shared that:

Um, this is my poster. I drew four pictures, the first one is a, the ice are melting because of global warming in the South Pole and North Pole and the polar bears, they, they lose their home (laughing) and this is a polar bear. And, uh because of global warming the ice are melting and there are a lot of, uh flood they will happen later. And the second picture is also about climate change it is like... the difference between the temperature in summer and winter⁷ is not

⁷ These students live in a subtropical region where the winter is colder than the summer, but it does not snow.

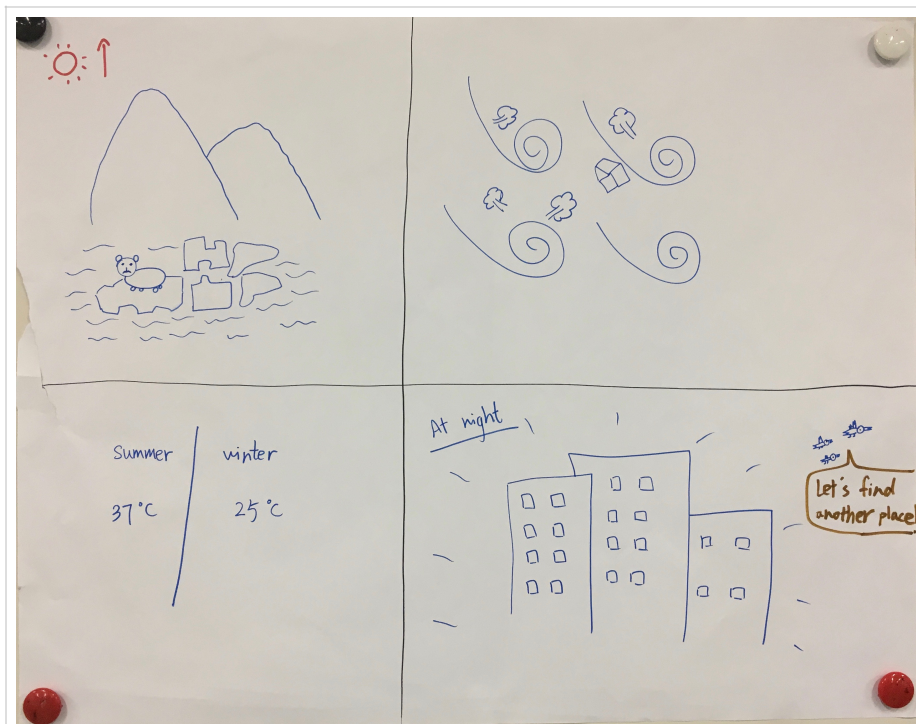


Figure 7. Vanessa's drawing from the focus group.

very obvious and not very big. And this is also global warming that is a serious problem. And the third picture is about the tornado (Chinese word) and, so, uh, last year Florida have a, um, a

serious tornado happen... And I think this is because of, uh human actions that uh, impact our Earth and the Earth is, like responding to our actions. And the fourth picture is about light pollution, so at night the cities are blooming and uh many bright lights and the birds, not only the birds there are many other animals that they, they can't live in a very bright situation... (#00:03:37-8#)

Planet as a Whole

The major code 'Planet as a Whole' was created to group together quotes that discuss sustainability on a global scale rather than focusing on smaller, local issues. In an international school setting it is usually considered important to discuss international issues, such as the 'Wicked Environmental Problems' that we face today (Balint *et al.*, 2011). This idea appeared in the focus group and is clearly shown in Jamie's drawing

(see Figure 8) in which she drew several different issues that impact the environment in a variety of places around the world. When she presented her drawing with the group Jamie shared that:

The things that, uh, make me want to be sustainable are, the first thing is, um,

like the

desertification

of Earth

because now

the

desertification

rate is really

rapid, like, um,

in some

tropical

countries

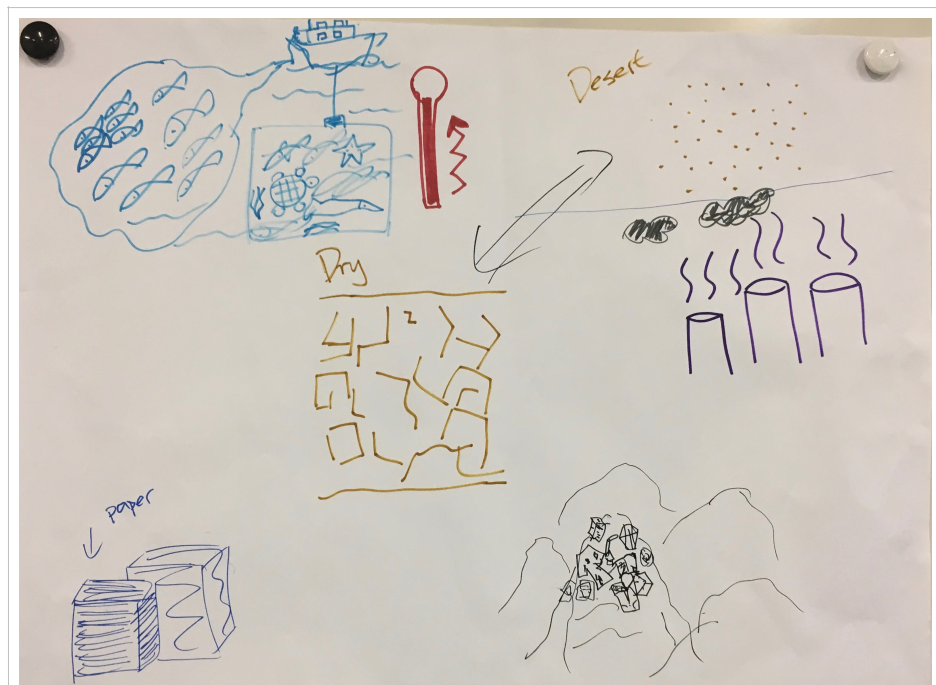


Figure 8. Jamie's drawing from the focus group.

and countries in Africa and also in some areas in China, the desert area are very large and this impact the lives and animals living in that area and and also on the desert the climate is very extreme. ...And also, uh, air pollution as mentioned before and also, like nowadays we buy many things, but we don't actually like, need them, we just, they just, they are what we want. And so, uh, for example the clothes or some like, uh, things that are not our necessities we always want to buy them and then, at the end we just waste them. And it costs a lot of waste, which cause a serious problem with like, landfill or there is no space on Earth

that people, that we can put our waste, uh, in. ... And, finally the overproduction, uh, no...overfishing, yeah, the problem with overfishing is that, like the waste, because we are extracting extremely large amount of fish from the sea and, um, overfishing also causes, like, um, the issue of by catch which harms other species, uh, in the sea. ... (#00:14:05-5#)

Prioritizing Humans

The idea of saving humanity has sometimes been connected to the idea of saving the Earth, but not always. While some students acknowledge our dependence on the planet and say that we are a part of the ecosystem, others focus exclusively on the needs of humans; thinking back to 'Ways of Thinking' and students statements about selfishness this may be part of the reasoning. During the same focus group discussion Danny agreed with Annie's earlier point about the possible extinction of humanity and then added:

I agree to this idea, ... for example if human disappear forever, if everyone, every single individual of human disappear on Earth and the everything else, everything else in the environment for example wildlife or plants they just still go on... But, but, like if we like human try to ... fight against the natural, for example we are trying to get, gather in resources which are extremely large amount and the nature cannot provide us and which breaks the whole ecosystem. For example, overfishing and something else, um, the, if the whole ecosystem is collapse no human can survive its and also the other lifes. So, this kind of like

means we, Earth from now on, like at least for now the Earth is the only place we can live so we destroy this place and uh, we are going extinct. (#00:21:08-5#)

Many of the students prioritized humans in their discussion and responses, but when directly asked if humans are more important, the majority answered with a resounding no. During her interview Jamie added that she feels that all organisms on Earth have value.

interviewer: Okay, do you think humans are more important than other organisms?
#00:00:59-5#

Jamie: Um, I don't think so, like I think every organism has its own value.
#00:01:08-0#

Zoe shared a similar thought in her interview and then went even further with it when she stated that:

Interviewer: Interesting, ok. Do you think humans are separate from the rest of the ecosystem? #00:01:20-7#

Zoe: Hm, I don't think so because... I also mentioned in the group discussion I really like birdwatching and I uh, go to many country's national park and um, after I, uh knowing this

activity I always think of question about like. What, what are humans different from birds? Maybe we are both the same it is just a energy reflection. Uh, so if we lost each other we will both get harmful results, consequence. Like if, our ecosystem uh lost birds then maybe trees will be less and their, uh, habitats like the forest will become less and less and human cannot survive without have forest. So, like the animals, the plants, all the things are connected. #00:02:26-2#

The major code 'Prioritizing Humans' emerged quite early in the analysis and therefore includes data from each component of the data collection process. It includes examples of instances in which humans were prioritized, either without thought to the impacts on other organisms or when students deliberately and clearly stated that

humans are, or should be, the priority on Earth. An example of the automatic prioritizing of humans can be seen when Vanessa discussed the loss of the jellyfish in Palau; she was sad because the missing jellyfish prevented her friend from “having the chance to, um, experience this kind of wonderful event”. Vanessa does not share any other reason why the absence of the jellyfish is sad.

‘Prioritizing Humans’ appeared in the first stage of data collection with the short answer portion of the questionnaire and was the most common focused code (see Heat Diagram, Figure 10). In response to the open-ended questionnaire question about the importance of sustainability student #3 replied: “I think being sustainable is important because it promotes our own mental health. Besides the neglectable benefits it brings to our environment⁸, being eco-friendly also makes us proud of ourselves because we think we are doing the right things, which to me, is joyful to think of” and student #29 shared: “could make the environment more easy to live on FOR⁹ human”. This major code provides important insights into the worldview of these students; without relevant information regarding the worldview of their students teachers will struggle to make appropriate lesson plans, truly connect with their students, and motivate them to make sustainable choices.

Early in the focus group Vanessa discussed how light pollution impacts wildlife and both Danny and Reed commented that wildlife were not the only ones affected by light pollution, they brought the discussion back to humans.

⁸ Emphasis added by researcher.

⁹ Emphasis in original response.

Danny: Um, well, that light pollution problem not only affect the environment or the wildlife actually human can also be affected by the, by the light pollution because in order to, in order for us to sleep we need a certain degree of darkness but now it seems like that is hard to find some place in our city which is completely dark, even at night time. #00:04:46-5#

Reed: I agree to you, I think a dark environment is very helpful for sleep when you sleep in a very dark area you may, uh, fall asleep quicker. #00:05:04-3#

Later during the focus group Annie very clearly prioritized humans in both her drawing (see Figure 9) and her presentation of it. You can see in her drawing that every image is directly related to humans, with human life tied to a healthy planet, war between humans caused by resource shortage and famine, natural disasters killing humans, and overpopulation and resource depletion impacting humans. In her presentation she stated that:

So, oh, the death make me want to protect the environment because if you don't

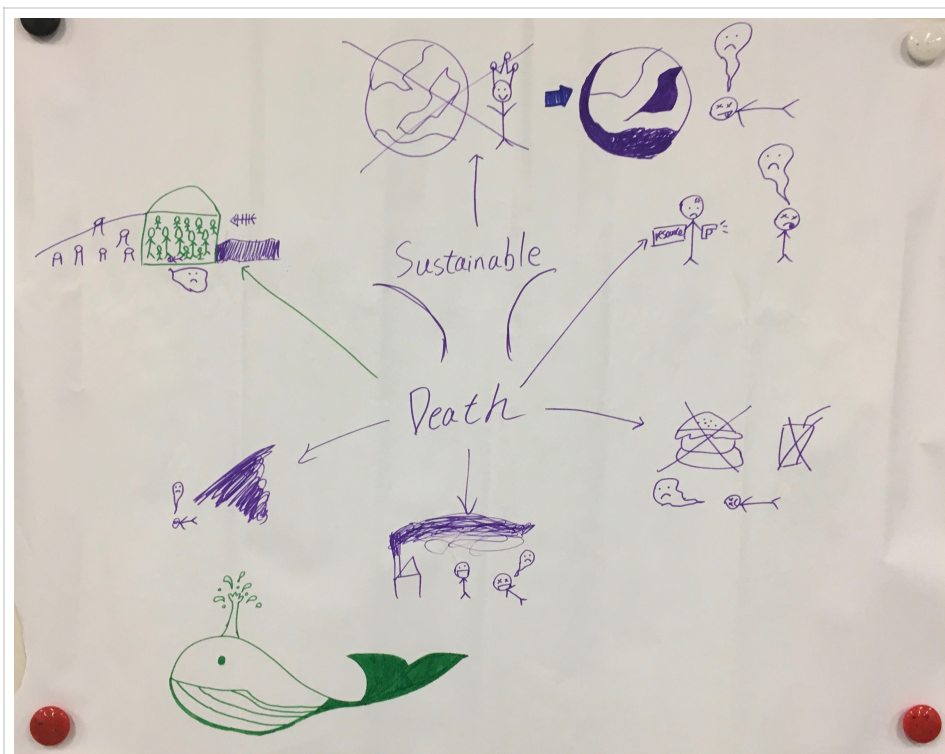


Figure 9. Annie's drawing from the focus group.

protect the environment people will die because of this. We can die from hunger, no food or drink and the air pollutions so people cannot

breathe and they just die. And many natural disaster can also be caused by the polluted environment, um, also the most important part is... people may fight for the resources and kill each others because they want to have the more resource. Um, and the final one is, um, if you don't protect the environment then eventually, uh, human cannot live on this Earth and other species might replace us and become the dominant species. And humans can be extinct because of this, so.

(#00:19:56-5#)

While her drawing does include a whale she did not discuss this part of her image in her presentation and unfortunately we do not have any explanation for its inclusion.

During the interview phase of the data collection process students were directly asked why they thought humans were being prioritized and the subsequent responses helped to clarify this perspective.

interviewer: ...Um, the first question is, during the focus group some people focused completely on the needs of human beings, why do you think that is? #00:00:31-5#

Jamie: Uh, because we are human beings so we like to focus on ourselves and also like, like we, we like to focus on what we did and what we can do and try to think of solutions that we as human beings can accomplish. #00:00:55-7#

Interviewer: Hmm, okay. Do you think humans are separate from the rest of the ecosystem? #00:01:32-3#

Vanessa: Uh, (pause) no. #00:01:36-5#

Interviewer: No, why? #00:01:37-2#

Vanessa: Huh, because it depends on other, uh, like other, like we, we need to eat food from the animals and um, we need to breathe so we need oxygen and so its from the plants and but I think many people think they are, like, uh, superior than the other, other species like animals or um just like human is the top of the ecosystem. #00:02:13-3#

interviewer: Um-hm, why people focused completely on human beings in their answers in the focus group. #00:00:38-1#

Danny: Well, our answer may be, hm, not, we, our answer may be because we ourself, we are as human beings so, um, we kind of, as human beings we must concern of our own survival. So that, yeah, its kind of selfish, but the truth is every species will want to make sure that our species will survive for as long as possible. #00:01:09-3#

Devaluing Non-Human Species

The major code 'Devaluing Non-Human Species' was created to differentiate between intentional and specific instances of prioritizing humans and the more general examples seen in the 'Prioritizing Humans' major code. In this major code students describe instances of choosing humans over other species with their eyes wide open. The second story to be shared, was told by Danny after his interview had ended and can be used to clarify the difference between 'Devaluing Non-Human Species' and 'Prioritizing Humans'.

After saying good-bye at the end of his interview Danny paused and asked what Americans think of sustainability, after quickly turning the recorder back on sustainability was discussed from a Western perspective. At the very end of this discussion Danny shared this story about a particularly delicious species of eel that provides interesting insights into the choices people make about other species. This second story is shared as it can be connected to a large number of major codes, namely 'Devaluing Non-Human Species', "Frame of Mind", 'Unstoppable Consumption', 'Influences of Others' (in this case Japan over China), "Being Aware of Sustainability", 'It's Inevitable' and 'Personal Choices'.

Danny: Yeah, well obviously I had heard stories like about one kind of eel fish is going to go extinct because we overfishing. Those who are from Japan, so, and also this eel you sometimes see them in Chinese territory, no, like the sea. But, oh well, the Japanese people think, believe they are tasty and also, well Chinese people think Japanese people know how to consume this eel so if they think this is tasty we also think this tasty. So we fish this kind of eel and now is, is nearly extinct. #00:02:10-8#

interviewer: Wow, because everyone likes the same kind of eel, hun? #00:02:11-5#

Danny: They are trying to because this eel is, yes, is hard for us to memory, like keep them alive because for some reason the, it just not quite possible to raise this fish and then make it grow, grow large enough to be consumed, but and yet they tried to do that, but and it cost a large amount of money and a waste of other resources. So, they believe that it is not quite possible yet this, the market is still there we still need to consume this kind of eel so it is just getting less and less. And someone has a funny saying that well, we should be guilty because we hurt this kind of fish and these things, so we don't, but everybody wants to try to at least taste before it goes extinct. (laughing) #00:03:02-7#

interviewer: Oh, my gosh. #00:03:04-9#

Danny: So what are they going to tell their children, like are we going to have this fish extinct because we ate them all? Because we heard they is going extinct so we ate them all." #00:03:15-6#

If we think about Reed's story it also shows his father's deliberate choice placing humans (and specifically money) as a higher priority than his hometown river and the fish that live in it, despite his earlier sadness about the change in water quality from his childhood. This example arguably falls between these two major codes 'Humans as Priority' and 'Devaluing Non-Human Species' as Reed's father cannot be described as being unaware of the impact water pollution has on his local river's fish population; the choices Reed's father has made point to a deliberate placing of humans above other species. Although not having spoken to Reed's father we cannot know how he made the choice.

Earth as Resources

'Earth as Resources' was originally a category in its own right, but was reduced to a major code due to its contribution to helping build the category "Humans as Priority". The idea of the Earth as a source of resources for human use appeared in the first stage of data collection with the short answer portion of the questionnaire and provides further insight into these students' worldview. In response to question 1: "To me, being sustainable means___" student #11 replied: "Being sustainable means that all the resources are used and recycled effectively for the next round of consumption". While in response to question 2 "I think being sustainable is important because___" student #5 said "I think being sustainable is important because we have to protect ourselves from extinction. If human overuse the resource on the Earth, then the environment would be harder for human to live on. No matter what, life is the most important thing in the world"; while student #6 said: "Because the sustainable style of living are able to supporting long-term ecological balance, and protecting the natural resources. It's the most important thing that the resources are limited and scarce, but population are growing rapidly".

During the focus group once again students focused on resources without any guidance from the researcher. The first instance was when Zoe presented her drawing to the rest of the group and she spoke about the waste of paper resources "also human use a lot of, like waste a lot of resource like papers and also like, uh, woods that from trees. ... Um, so generally for my own experience I learn about this, uh, and learn about the consequence that human, uh, waste their, uh, waste our valuable resource." (#00:07:02-0#)

Later in the same focus group discussion Danny made some points about poorly managing our resources when he presented his drawing to the group:

Um, well, what I first wanted to present you is kind of, its something, well **maybe**¹⁰ will happen in the future. Like, if we don't care about our environment and trying to be more sustainable. ... And well, and also some resources are, we don't use them more carefully they, we will run out of some resources soon, for example like gasoline, like maybe in the next decade the price of gasoline will rise up maybe some day we will reach a point that no-one, nobody can afford gasoline anymore. So, that's it. (#00:09:53-1#)

Finally, in the interview stage of the data collection process Martha used an economic model to discuss the importance of resources for humanity's use:

Martha: Um, uh, I think its not that we don't want to be sustainable but it just our demands are too much. We have like a very large population compared to any other organisms in the planet but uh, but due to that our supplies do not very much, uh, match our demand. #00:09:33-3#

interviewer: What kind of demands do you mean? #00:09:35-0#

Martha: Resources, um, to by them, I mean like, to raise a child or to like make yourself, make yourself survive in this world you may need, um, many resources to, either to trade, to consume or to like to generate energy for everybody else's daily needed. I think its a large, very large demand... #00:10:54-8#

We are in the Ecosystem

While students discussed resources for us to use they also discussed our interconnectedness. The major *in vivo* code "We are in the ecosystem" first appeared in the initial questionnaire and provides an important contrast to responses where humans

¹⁰ Bolded text indicates student emphasis when speaking.

are described as separate from or above the rest of the ecosystem. While there are often overlaps between the major code 'We are in the ecosystem' and the major code 'Planet as a Whole', the data included is on a more local scale and explicitly states that humans are part of the ecosystem. In response to question 2, student #26 said: "It can protect our environment that we are highly rely on to live." This idea of human reliance on the environment reappeared in the focus group when Danny shared that "...like at least for now the Earth is the only place we can live so we destroy this place and uh, we are going extinct." (#00:21:08-5#) It is important to note that despite their prioritizing of humans and resources these students know that we need the environment as a whole to survive, it is not just a resource shopping centre to them, despite earlier comments.

In her interview Jamie further elaborated on this idea that humans are part of the ecosystem by including us in the community of life on Earth:

interviewer: Um, okay and do you think humans are separate from the rest of the ecosystem? #00:01:14-4#

Jamie: Um, I think humans, uh, are not separate because we depend on the ecosystem and we depend on the natural resources like in the ecosystem and so we are a. We human beings and all the animals on the planet are, like a whole community. #00:01:41-2#

Comparing Sustainability

The major code 'Comparing Sustainability' includes examples of comparisons between Chinese students and Western teachers (in response to an interview question that was asked) as well as other comparisons such as between northern China and southern China. This major code provides some interesting insights, but should be approached with caution as these quotes stand alone and have no comparison from Western students. Students seemed to focus on larger, more commonly known differences and

while these may be a good place for teachers to start there are many more subtleties to consider. While the students have varying amounts of experience with people from Western countries they have all been taught by Western teachers during their time at Guangdong College Prep School (GCPS).

In her interview Vanessa discussed how knowledge about the environment differed between the Western teachers and Chinese students as well as how the life experiences of each group may have impacted their perspective on environmental issues:

Vanessa: I think western teachers may have uh, may have better understanding on, uh sustainability than Chinese students. #00:16:43-7#

Interviewer: Anything else you can think of? #00:16:46-4#

Vanessa: Um, maybe because we experience different things, so our views to the environment or sustainability will be different. #00:17:08-3#

Interviewer: That's very interesting, what kind of things do you think we experience that are different? #00:17:11-6#

Vanessa: Hmm, maybe the, the pollution is worse in China. (laughing) #00:17:22-5#

Interviewer: So you think that makes people think about the environment differently? #00:17:29-4#

Vanessa: Un-hun. #00:17:30-5#

When asked the same question Martha discussed virtues in Chinese cultural norms:

Because we are living in like an international school, we can't like, we can tell the difference but we cannot very compare it because we are international but some difference I felt um, is that uh, like for western people um, to save food, to save water is um, is a life that is a kind of way that will, they will do to be (laughing) that they will do if they are really, truly guilty or aware of the sustainable,

sustainability. But for, but often they didn't like aware or didn't consciously doing to save food, to be sustainable and for Chinese we have um, we have an virtue that is just basically meaning that if you save food you will be, you are a good person. So, um, to us, is the virtue is the virtue to save food so we will even if we didn't like, didn't even if teacher didn't teach us to like to be more sustainable we will sometimes to be aware and consciously doing that. So I think that's a difference. (#00:24:46-1#)

Notice how Martha labels herself and other GCPS students as 'international' a good reminder that these students represent a specific population and not Chinese students as a whole. Fiona had a different perspective, which was important to include.

Fiona: Uh, let me think. But, uh, in some, in some times I always think that even a Western teacher is don't care, don't care about the environment than ours because I think, like, uh, some teachers they all left GCPS (school name changed) they always using the like big poster to us, like to provide us to like write some ideas about it and then after class they just throw away the paper. I think it is like, very waste of the resources. In traditional Chinese school we don't do that, we like use the, like the scratch paper for example, we, uh, use the like pencil to like scratch for the first time and then use the pen, like the darker colour to use it the second time so it is more sustainable for the environment. Not just using one time and using that big paper and blank paper. #00:14:27-7#

Interviewer: Okay. What do you think matters the most to Western teachers vs. Chinese people when it comes to the environment? What's the most important thing to them? #00:14:32-9#

Fiona: I think um, I think Chinese, Chinese students care about their resources, but Western teachers they are, they care about like the big, the big picture about the environmental like, uh like not the small things like around us, but uh, ecosystem things they are doing researchers or in some specific areas to study sustainability, (laughing) like you, right? And Mr. Smith. #00:15:11-4#

As we consider the differences between Chinese students and Western teachers it must be noted that this specific student population has spent an average of four years in Western schools, which may have had some influence on their ways of seeing the

world; hence Martha's earlier labelling of them as 'international'. To test this hypothesis, I grouped the students into six groups based on the number of years they have spent in Western schools as reported in the demographic section of the questionnaire and then ran a One-way ANOVA to see which of the Likert-scale questions were significantly related to the number of years spent in Western schools. The only two significant ($p < 0.05$) findings are shown in Table 3 (see below), both questions relate to ways of seeing the world and moving through it in daily life. These results tell us that those students who have spent more time in Western schools agree more strongly with Items Q.5 and Q.9, while this is not sufficient evidence to form any conclusions it would appear to agree with the notion that school culture has a significant impact on students (Ryan, 2010).

Table 3. Using a One-way ANOVA the following questions were significantly related to the number of years students have spent in Western schools (broken down into six 2-year intervals) with a sample size of 40. Questions which were found to be significant ($p < 0.05$) using SPSS software are reported below in order of significance.

	p value
Individualistic Item Q.5 "I make decisions without letting the ideas and opinions of others influence me".	0.033
Environmental Item Q.9 "I believe that nature is very valuable."	0.035

One student, Kristie, brought up differences between Northern and Southern China during her interview and this is important to consider as China is a very large country with a substantial population and this is a good reminder that these findings are from a very specific local population (see Context Chapter) that does not represent the whole of China. Kristie discussed water use patterns when asked about why students focused on 'big impacts' with their focus group drawings:

And also if I took like, uh, 40 minutes shower and I feel like at, while I am taking the bath, and uh, taking the shower maybe the people in northern China, cause I was from northern China and I was, when I was little, when I was like 3 or 4 years old I took bath like a week for one time and the water is not so hot, so while now, right now, I am like, I live in southern China and I took like 40 minutes bath, shower every day and I feel like it's, yeah, it's just not so fair for me to take 40 minutes bath, but people in the north, northern part of China have no water to like, maybe sometimes we don't have water to drink, yes. #00:04:59-8#

Money Changes Things

'Money Changes Things' is a major code that was brought up by the students, who shared how rich people act differently from poor people in terms of sustainability. The socioeconomic status of these students, as well as that of most international school students, should be kept in mind when examining this data. The significance of this major code is directly linked to the fact that despite not asking a question about wealth and sustainability, several students discussed this idea without any direction from the researcher.

Jamie shared that while many people feel guilty about unsustainable choices they may make, rich people do not: "Like for people, for those who are, like um, who are rich and who can buy a lot of things and um they don't, they don't care about how their behaviours impacts the environment and for some economic companies they just focus on the interest and not like, uh, the effects on the environment." (#00:12:48-3#) Annie shared a story from her own family and how becoming wealthy over the last few

generations has made her family act less sustainably (an increase in wealth over the last few generations is common in China, see Context chapter).

Interviewer: Okay. Can you think, is it possible to be sustainable without knowing why you are doing it? Like without awareness can you still be sustainable? #00:12:21-8#

Annie: Um, no. #00:12:43-9#

Interviewer: Why? #00:12:45-9#

Annie: Um, I still believe that the consumption is part of the human nature so people will consume something whatever they reach a (incomprehensible). Even if they have, even (sigh), um, (sigh), even like my, my parents they, um, (sigh) they have sustainable life when they are young because they were poor then. They have no stuff to be waste, but after they grow up they become rich and have some monies they become wasteful. Yeah. #00:13:37-5#

The Government's Role

The relationship between the Chinese government and the citizens of China is one that is quite different from the relationship between the government of many Western countries (Seifert and Chung, 2009) and its citizens. When the government was mentioned during the focus group and then again during the first set of student interviews I decided to inquire into the government's role in sustainability in a very general way during the second set of interviews, resulting in the major code 'The Government's Role'. *Most international school teachers are told to avoid discussing the government with students and hence no questions about the government were included in the first set of interviews; however, students brought up the topic and it was decided to include the government in the second set of interviews. This information is helpful for teacher understanding and breaking down misconceptions, such as the idea that people cannot criticize the government.* The students had several different ideas about the role that the government might play in sustainability.

A very different perspective shared by Danny discussed how the government might force people to act in a more sustainable manner.

interviewer: Okay, thank you. Um, do you think its possible to act sustainably without knowing why you are doing it, like just doing it because that's the way it is or...?
#00:08:13-4#

Danny: Um, certainly it is, like if the government are willing to make these policies, like for example they force their people to live in a sustainable way without their understanding why they are doing this they will automatically act the way the government want because they don't want to break the law. At least the majority will do such thing, but I cannot, I cannot say everyone in society will choose to do that.
#00:08:40-3#

interviewer: So you think the government, um, people will follow what the government says? If they say to be sustainable? #00:08:46-7#

Danny: In certain ways, like as long as they are not like getting like for example, too extreme. Because some people will be angry if for example, if the government trying to be sustainable some people will be angry like they, like in the middle winter the government just shut down your, like your, they don't allow you to use air condition because they don't want you to waste a large amount of electricity or something. Some people will be angry about this because it's, well, inhuman. But, well, I believe that if the government makes such law only people can, people can say like, only complain, like, but at least we don't have, ah, because of the law, we don't want to break the law. #00:09:38-5#

While Fiona felt that while the government should educate people and increase their awareness it was the responsibility of the people to act in a sustainable manner.

Interviewer: Okay, thank you. Many students said um, that its up to the government to change laws and make people be more sustainable, what do you think about that?
#00:11:40-4#

Fiona: I think government make, uh, like, government make a huge, how do you say that, they need to advertise, they need to advertise to bring aware, like to evoke the awareness of people. But it is not their responsibility to protect the environment, it is our responsibility. #00:12:08-3#

The idea that the government should be responsible for educating people brings us back to Reed's story about river pollution, when his father told him that the two

workers cleaning the trash from the river were hired by the government Reed suggested that they should instead focus on educating people to avoid pollution in the first place: “So I think, uh, the government should not just hire people to clean their, clean our garbage, but they should raise our awareness of these kind of things, that will make us more sustainable.” (#00:18:42-1#)

Kristie shared an interesting perspective on how the government helped to improve air quality in Beijing, by forcing factories to move outside of the city rather than changing their manufacturing process or using other strategies to reduce air pollution.

Interviewer: You had a sort of an event that, some students spoke about travel they went on or something that happened to them that changed the way they thought about the

environment. #00:12:14-3#

Kristie: Uh, change the way they thought about the environment...uh, maybe when I went to Beijing like two years ago and the air is really polluted and now I went to Beijing like last, two months ago and uh, the air becomes much more better and I asked, I asked my Mom

why because she said government said they, those factories has to close and to, uh, to stop polluting the air, they have to like move site, move outside of Beijing, yes, so. #00:12:55-8#

This student quote is surprising and a good reminder that both teachers and researchers need to remember to keep an open mind and avoid thinking that they truly understand the ways people think, especially people from a different place.

We Don't Have the Ability

The *in vivo* major code “We don't have the ability” provides important insights into why students do not make sustainable choices and how to motivate them, the original purpose of this research. Throughout several interviews students described various

reasons why they were unable to act sustainably at this time and/or why they should look to someone else to make the sustainable choices.

Both Fiona and Vanessa shared the same sentiment that they are just young people. Fiona said: “I think students just, you do not need to concern about big things like how to, like diminishing the deforestation or like how to decrease, diminish the, the, air pollution. I think these are not the things that we are needed to worry in our age. I think we should do the best to, um, around us, like the small things.” (#00:17:50-0#)

While Vanessa shared that:

Vanessa: Uh, because we don't have the ability. #00:07:33-0#

Interviewer: Um, okay, can you give me an example of that? #00:07:40-7#

Vanessa: Um, um, like we are still students learning and I think this problems may be can solved by the um, scientists or the people in government so we don't need to change anything. #00:08:01-5#

Jamie also looked to others to solve the issues when she was asked why we don't change our behaviour “Um, part of the reason might be, um, we think there are people out there who will, like, uh, solve those problems and um, those daily behaviours, like closing the electricity when leaving our home is just we might think of they are little things and they do not matter. As a whole, like compared to the more serious problems. #00:04:49-2# ”. This is important information for teachers to have; we need to help students see that the little things do matter and that they are a necessary part of the solution to these environmental problems by increasing their sense of agency, they could become the scientist that solves the problem.

Intersections and Connectivity

The layers of connectivity between ideas shared by students, as well as which ideas appeared with more or less frequency in the early stages of data analysis are important to discuss. The student responses are complex and multifaceted and exemplify why research such as this project needs to be conducted; there is no simple response or way to motivate students to act sustainably.

The final seven categories of this data are connected in several ways (see Figure 10), (as are the major codes included within these categories, see Figure 11). In both of these figures the complementary, and hence reinforcing, connections dominate; however, there are several instances where categories and codes contradict one another, either all of the time or depending on the datum. For example, the category “Opportunities for Future Generations” is reinforced by the category ‘Humans as Priority’: when students discuss (either directly or indirectly) humans coming before other organisms they are thinking of the needs of both current and future generations. Conversely, “Opportunities for Future Generations” contradicts the category ‘It’s Inevitable’ as most students want to improve the situation for future generations (in a variety of ways and with varying degrees of importance), while the quotes in ‘It’s Inevitable’ point to the lack of options for changing both the present and the future. When ‘Ways of Thinking’ supports “Opportunities for Future Generations” it is because of attitudes that focus on increasing sustainability, such as the Government educating the population, as discussed in Reed's story. On the other hand, when ‘Ways of Thinking’ contradicts “Opportunities for Future Generations” it is due to a major code such as ‘Money Changes Things’ where, according to Kristie, Zoe and Annie, people

are more concerned about spending their new found wealth than ensuring the next generations have a safe place to live and prosper.

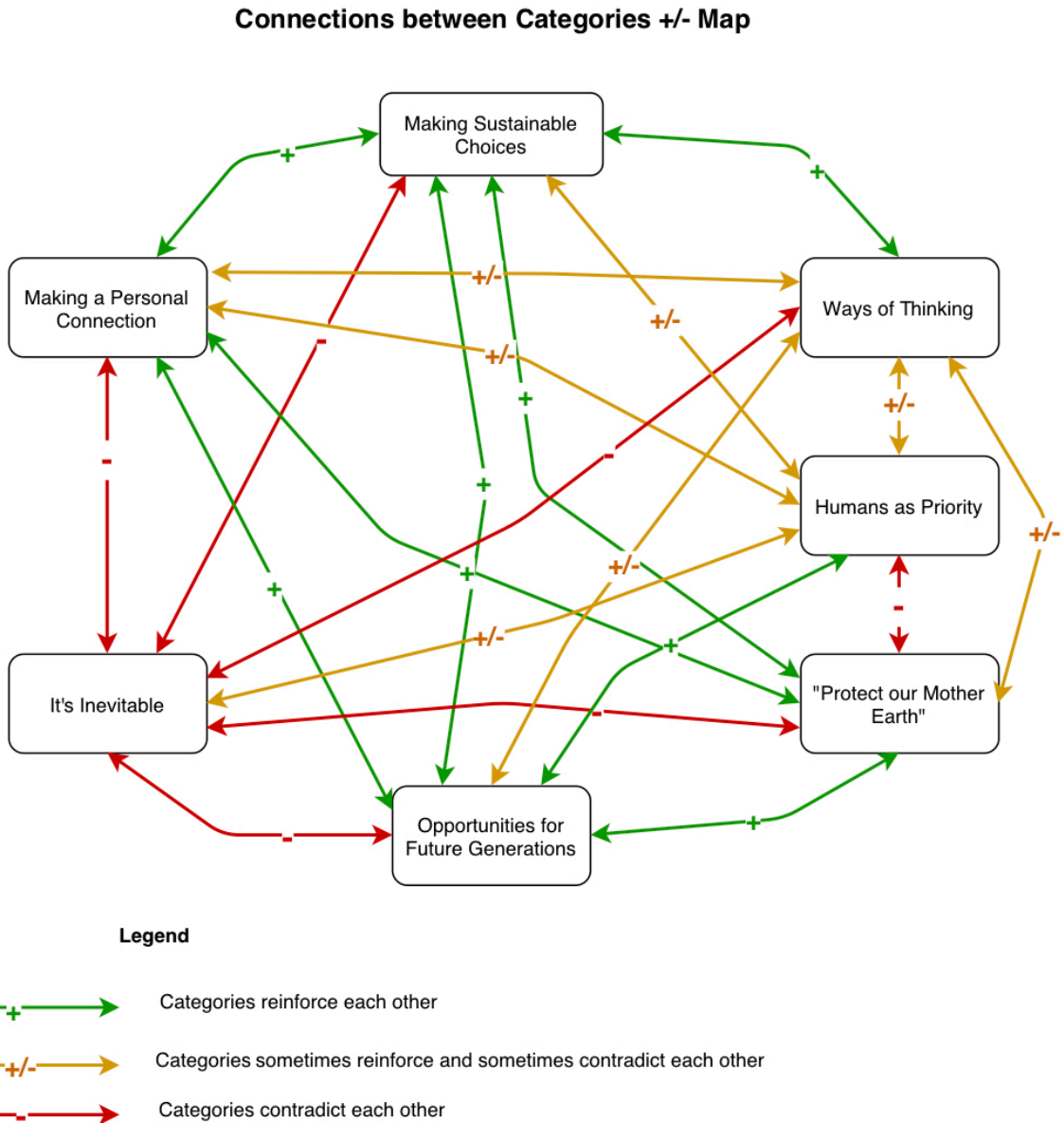


Figure 10. Connections between Categories +/- Map. This diagram helps to clarify the connections between the seven final categories, illustrating contradicting ideas (-, red arrow), complementary ideas (+, green arrow) and categories which contain ideas that sometimes contradict and sometimes complement one another (+/-, yellow arrow).

Category and Code Network Diagram

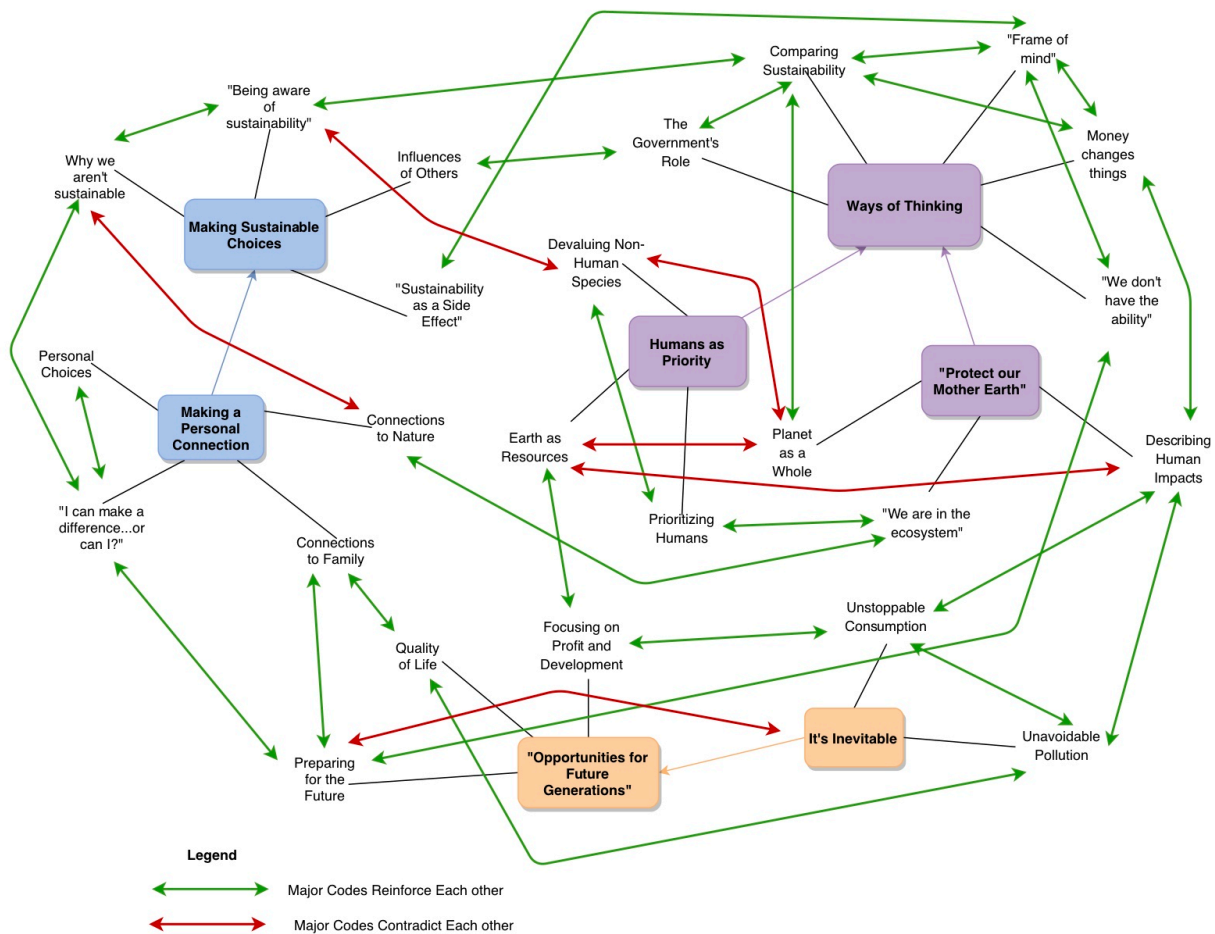


Figure 11. Category Connections Network Diagram This diagram helps to clarify the connections between the seven final categories as well as their major codes, illustrating contradicting ideas (red arrow) and complementary ideas (green arrow). The three categories used to divide up the data in this chapter are shown in ellipses, with blue for 'Making Sustainable Choices', yellow for "Opportunities for Future Generations" and purple for "Ways of Thinking" with their sub-categories in the same colour.

While the student quotes included in this chapter were chosen with care to create a thorough description of the variety of responses students shared, it must be stated that some ideas were shared more frequently than others. The Category and Major Codes Heat Diagram (see Figure 12) aids in visualizing which major codes appeared with more or less frequency during the focused coding stage of the analysis process. The 'hotter' the major code's colour is, the more focused codes can be found within and

the more students spoke about that idea (see legend). It is interesting to note that the major code ‘**Prioritizing Humans**’ appeared the most frequently, with 36 focused codes fitting into this major code, while the major codes ‘Devaluing Non-Human Species’ and “We don’t have the ability” appeared the least, with only four and two focused codes identified, respectively.

Making Sustainable Choices		Ways of Thinking			“Opportunities for Future Generations”	
Making Sustainable Choices	Making a Personal Connection	Ways of Thinking	Humans as Priority	“Protect our Mother Earth”	“Opportunities for Future Generations”	It’s Inevitable
Why we Aren’t Sustainable (16)	Personal Choices (13)	“Frame of Mind” (14)	Prioritizing Humans (36)	“We are in the ecosystem” (9)	Focusing on Profit and Development (10)	Unavoidable Pollution (7)
“Being Aware of Sustainability” (15)	I can make a difference...or can I? (11)	Comparing Sustainability (10)	Earth as Resources (13)	Describing Human Impacts (9)	Preparing for the Future (10)	Unstoppable Consumption (6)
Influences of Others (12)	Connections to Family (7)	The Government’s Role (10)	Devaluing Non-human Species (4)	Planet as a Whole (8)	Quality of Life (9)	
“Sustainability as a Side Effect” (5)	Connections to Nature (6)	Money Changes Things (5)				
		“We don’t have the ability” (2)				






Categories & Codes Heat Diagram Legend		
Colour		# of Focused Codes
Red		20 +
Orange		15 - 19
Yellow		10 - 14
Green		5 - 9
Blue		0 - 4

Figure 12. Heat Diagram of Categories and Major Codes

Opportunities for Future Generations

When asked about considering future generations during her interview Vanessa's response inspired the *in vivo* category "Opportunities for Future Generations". Thinking of the future is key in any discussion about sustainability and therefore this category should provide useful insights regarding the way GCPS students think about the future. The idea of thinking about the future came up during the initial questionnaire questions, as well as during the focus group discussion and therefore it was decided to follow up on this idea during the student interviews. Students discussed the importance of air quality and a good environment for future generations, as well as how continuing to develop China's economy and build financial security are key both now and in the recent past. Many students discussed how their parents and grandparents worked hard to build a better future for their children. The last major code for this category discusses how students are looking to prepare for this future, whether it's preparing the next generation through education or developing new sustainable technologies. The subcategory 'It's Inevitable', now embedded into the larger category "Opportunities for Future Generations" was created due to the fact that several students brought up numerous instances in which environmental damage or human actions were described as inevitable, unavoidable and/or unstoppable. It is an important idea to discuss opportunities, inevitabilities and intergenerational knowledge since our goal is to understand what motivates students to act more sustainably.

The two major codes within the subcategory 'It's Inevitable' are: 'Unavoidable Pollution' and 'Unstoppable Consumption'. They overlap with codes from the category "Opportunities for Future Generations", namely 'Quality of Life' overlaps with

Unavoidable Pollution’ and ‘Unstoppable Consumption’ with Focusing on Profit and Development’. As with the two earlier categories, a student’s story is included in this category, Vanessa’s story about the lost jellyfish in Palau.

When considering the future as discussed by GCPS students it is important to remember the context in which they are living, specifically the focus on economic development. The major code ‘Focusing on Profit and Development’, and its contradictions with the major code ‘Quality of Life’ exemplify a tension between profit, development and environmentalism which appeared again and again throughout this research project (see Figure 12 for specific codes).

Focusing on Profit and Development

During the focus group several students discussed how companies focus on profit rather than the environment, this particular excerpt comes from a discussion about electronic waste and the challenges of disposing of old cell phones.

Kristie: And I have no idea how to deal with it and I have a lots of wasting phones (laughing) and nobody and when I call Apple they say “Oh, ok, oh, I’m sorry you just, just leave it there...like they don’t really care about how to recycle those phones. #00:31:09-7#

Danny: Yeah, the companies they only care about their profit they are just trying to sell as much like, as many product as they can to you and they don’t care what you do with those product. #00:31:20-7#

Kristie: Yeah, so, yeah, so the, re-recycle of the things that could be recycled is really important. #00:31:32-2#

Fiona shared the importance of industry and economy in China during her interview: “I think because in our environment China is, has the, we are building our industrial and I think our industrial is very important for our economy. ... And I think it is very commonly among economists right, they chose their profits over uh, environment... #00:03:58-3#

”. Kristie was able to provide some context for the importance of economic growth in China during her interview, stating that:

...when China uh, established in 1949 and everyone was really poor in that time and so everyone wants to make money like and so they all said you have to make money, you have to make money. Why Chinese people are like insane, insane to buy estate is because they thought if they have estate their money will not, ... if they become poor, but they have a home... They still have that estate means they still have money, they still have money means they still have hope, yes kind of like this, so they are really uh, insane to make about, to make money so if the government didn't regulate them they would just put the money in the first place. Cause while I was doing the global issue class in grade 10 we talk about the issue about the pollution too and most of the Chinese factories, they put their money in their first place and because if they have to change ... those sustainable machine they have to spend like \$1 000 000 in it, but if they didn't change the sustainable machine they just pay the government for the pollution cause Chinese government charge for how much pollution they eliminate, they maybe only cost like \$10,000 or \$20,000, so it's a \$1 000 0000 vs. \$10 000 or \$20 000 so that easily to see that... (#00:16:50-5#)

If we think back to Reeds's story about river pollution this provides some further insight into why Reed's Dad allows his factory to pollute the river he cares about. During his interview Reed shared that “Well, I think in China they don't care about environment in the past years because the government just focus on economic growth and

expansion industry. They want to save a poor country to make it more stronger, to send out in the world, so they don't pay much attention to the environment." (#00:03:57-4#)

Unstoppable Consumption, Unavoidable Pollution and Quality of Life

A related major code, 'Unstoppable Consumption', is closely tied to the idea of economic growth and therefore the major code 'Focusing on Profit and Development'; the products produced by these factories need to be purchased by consumers, a fact that students pointed out during their focus group discussion and interviews. Both consumption and focusing on economic development are important factors in how students make choices and are therefore important to consider when working to help motivate students to act more sustainably. Students discussed consumption in several different manners throughout the data collection process and while online shopping was a major topic of discussion during the focus group it certainly was not the only consumptive pattern that students noticed. If we think back to Danny's story about the delicious eel this is an example of human consumption of a "resource" that cannot be stopped despite the awareness that the eel was going extinct and could not be farmed successfully.

During the focus group Fiona shared a list of what makes her want to be sustainable (see Figure 13) and while many of her reasons hint at consumption, such as over-packaging, waste of paper and over filled garbage cans she explicitly states that "Over-consumption makes me wants to be more sustainable" with an image of a girl surrounded by shoes and saying "I've got dozens of shoes I don't wear!". Fiona elaborated when she presented her drawing to the group:

... Um, I'm not a very good like, painter so I wrote letters, wrote sentences. Like the over-packaging you just mentioned about, we order many things that we don't need from like TaoBao (laughing) and yeah, you

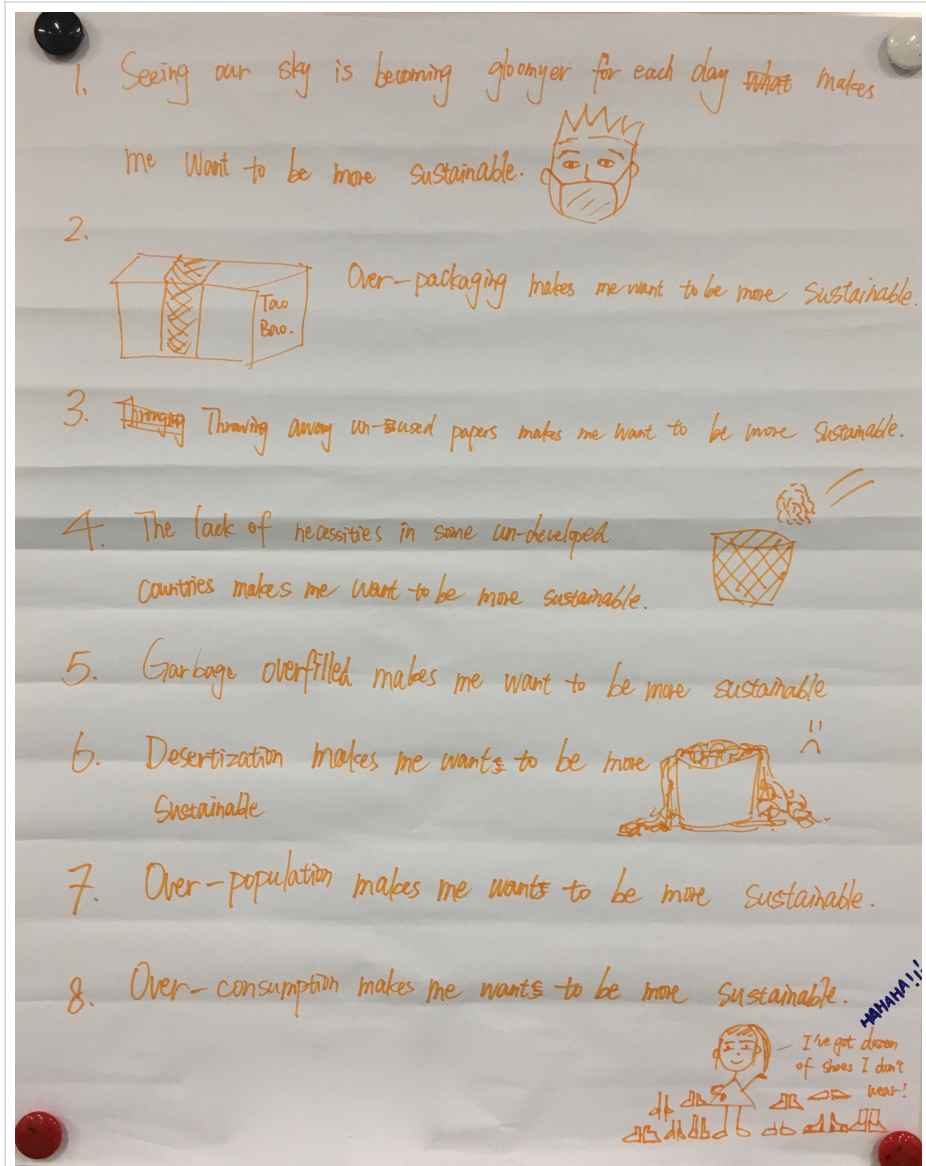


Figure 13. Fiona's drawing from the focus group.

know, from internet. This can also shows us like, uh, in GCPS many of us is comes from the wealthy families that we don't, like, we don't have the experience of what is the lack of necessity in our life means. And so overconsumption is, like it is a phenomenon amongst teenagers in our school I think. Like this girl is saying that I have thousands of shoes and I don't wear... Also the ... garbage overfills this, so this has some commons with your point. And, yeah, and like

throw away unused papers makes me want to be more sustainable, like sometimes our, when we drop by the math department we can see many scratch paper is unused, like just dropped there, dropped in their, dropped in the tables or the garbage can that I feel very sorry for that waste. (#00:15:41-0#)

Interestingly, during the focus group Kristie shared a similar sentiment during the discussion about consumption, stating that “You can’t just stay home and buy nothing, you can’t just stay in your home you have to go out and buy something.” (#00:26:23-0#)

This idea appears to be significant to these students as Fiona once again brought up online shopping during her interview and stated that “So we, like, girls like me always buy things from internet, like make-ups and stuff like that and over-packaging is a huge topic on, on this industry I think. So it provide a lot of garbage on this, in this industrial so I think it is very, but we cannot change it, right, we cannot like, to stop buying from the internet. It is not possible.” (#00:06:00-6#) During her interview Annie shared that humans need to consume “Um, I still believe that the consumption is part of the human nature so people will consume something...” (#00:13:37-5#)

The third story to be shared, Vanessa’s story, brings together ideas about the inevitability of human impacts ‘It’s Inevitable’ in the manner in which she tells her story, as well as connecting to the major codes ‘Humans as Priority’, ‘Devaluing Non-Human Species’ and ‘Describing Human Impacts’. When asked about an event in her life that changed the way she feels about the environment Vanessa chose to discuss a trip to

Palau¹¹.

Vanessa: Um, uh, three years ago I went to Palau, it's an island and it was very beautiful and um, I saw, I swam in the ocean and saw lots of beautiful fish and uh, I don't know what the creature is called, its uh, transparent. #00:10:40-8#

Interviewer: Jellyfish? #00:10:42-2#

Vanessa: Yeah, jellyfish, and we, we can swim around the jellyfish and but, uh, but my classmate she went to Palau this year but she, but she said to me that many, the tour guide said that many, many fish and the coral reefs are, are disappearing and they, she didn't have the chance to swim around the jellyfish. Because she said according to the travel, the guide those jellyfish extinct. So I feel uh, sad and um, its pity for her that not having the chance to, um, experience this kind of wonderful event. #00:11:37-1#

Danny's drawing from the focus group (see Figure 14) paints a dismal picture of the future where people wear air masks, fish have disappeared, birds are dying and air pollution continues to be a substantial issue. This drawing is a reminder of the need to balance discussing the severity of environmental issues with students with more optimistic and hopeful stories so that they do not give up. There are numerous 'Human Impacts' here and while some animals are included, with humans front and centre and their needs the centre of his discussion it is safe to say that 'Humans as Priority' fits well here as well. When presenting his drawing Danny shared that:

Um, well, what I first wanted to present you is kind of, its something, well **maybe**¹² will happen in the future. Like, if we don't care about our environment and trying to be more sustainable. The first in this section of this drawing that is, a this, is a conversation between the father and son because the son saw

¹¹ Palau is an island nation located in the western Pacific Ocean known for its marine life.

¹² **Bolded** words to note student emphasis.

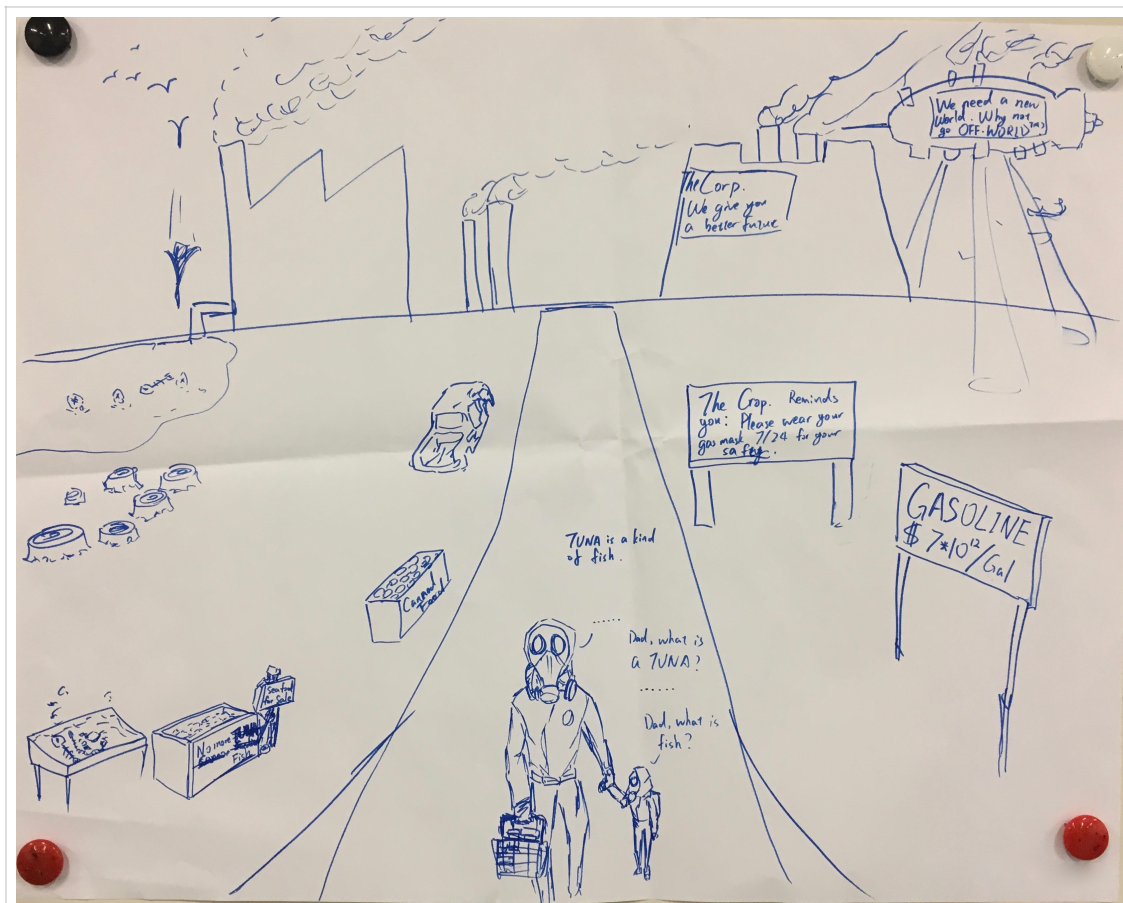


Figure 14. Danny's drawing from the focus group.

someone with, well, they **were** selling like some seafood, for example some fish and they cross out the word tuna, no more tuna, they cross out and no more fish right now. So the, the, the son asks his father: "Dad what is a tuna?" his Dad replies, "tuna is a kind of fish" and the son then ask "Dad, what is a fish?". The father can't answer that question because there is, in this world, this world I drew there are no more fish because the ecosystem have completely collapsed. ... polluting the air, making the air unsafe to breathe so that can you imagine, like, well someone who is very boring do this like, besides we are in China they

already started, like we have to wear gas masks in order to, to filter those harmful molecules floating around our air... (#00:09:53-1#)

Danny's story is unique, he was the only student to describe what the future would look like in such vivid detail. It is interesting to note that the people are easily the largest and most detailed parts of his drawing and that the story he tells focuses on human impacts and how the consequences of those impacts are affecting the father and son in his image. The manner in which Danny has portrayed the father, being unable to explain to his son what a fish even is paints a bleak picture. Danny goes to far to describe how some of these things are already happening in China, namely wearing masks due to air pollution.

During her interview Kristie also brought up a connection to family when considering the future, this discussion of air quality for her nephew¹³ connects directly to several major codes, including 'Quality of Life', 'Connections to Family', 'Opportunities for Future Generations' and 'Describing Human Impacts'.

Interviewer: ...So the first one is that several different students expressed the importance of being sustainable for future generations, um, do you feel this way? #00:00:23-1#

Kristie: Yes, I feel this way. #00:00:24-1#

Interviewer: Why? #00:00:26-1#

Kristie: Cause, cause, cause my, like my sister, I have a sister and she born her child this, this autumn, yeah, last year, like 2017, he's really cute he's my cousin and I really love him, but um, when I realize that there's like many reports that the carbon dioxide, the emission is really high right now, like China and especially in the northern part of China. Uh, the air condition, the air, the atmosphere, the environment is not so good, for like child to breathe or something, yeah, it's like that. And the food has been polluted so I feel like it's not the sustainable way to live, yeah. #00:01:15-1#

¹³ When Kristie described her sister's son as her cousin she most likely means nephew, although it has been my experience that some Chinese students describe their cousins as their siblings.

During Zoe’s interview she shared some insight into where this particular group of students may have seen this idea about future generations, which may be surprising considering their youth.

Interviewer: Thank you. Um, so many people expressed the importance of being sustainable for future generations, do you feel that way? #00:02:36-8#

Zoe: Um, yeah, I think so because like now I know in China many companies I want to invent like more uh sustainable cars and, or some, like uh, how do you say? Some more recycled stuff, product and also I notice that in many advertisements in China TV they said we need to uh, protect our environment for our next generation. We need to create a better environment for them, if we, uh, we do not do this stuff now, then our, then next future generation cannot have a place to live, so is I think it will influence the future generation. #00:03:32-5#

Pollution is directly linked to ‘Quality of Life’, as we have seen several students drew images of people wearing masks and clouds of gas. During the focus group and the interviews students discussed both air pollution and solid waste production. Their comments help provide insight into their perspective on this important issue in China where the Air Quality Index is checked daily and impacts whether activities will take place outdoors on any given day at GCPS and throughout China¹⁴.

It’s Inevitable

During the focus group several students brought up over packaging and Kristie pointed out how we are going to have waste: “So its kind of like if we are going to live on this planet we are going to have some, like waste.” (#00:27:50-8#) This matter of factness about pollution can also be seen in Vanessa’s story about the jellyfish, at no point in her story telling did she state or even hint that the loss of the jellyfish was avoidable, their loss was simply a fact.

¹⁴ The International School of Beijing is well known for its two sport domes, where students can ‘play outside’ in the filtered air of the giant domes.

Understanding why students think that things are inevitable is a big step in moving them towards solutions for environmental issues and motivating them to take ‘real action’. If we think about Reed’s story about river pollution and his later discussion about his dad’s factory pollution this comment about air pollution might help clarify his thinking:

interviewer: Okay, um, so we see things like air pollution in China, we see deforestation in other parts of the world, why do you think we don’t change our habits after we see those things? #00:05:35-9#

Reed: Um, for air pollution, uh, I think people can know avoid this happen because they have to go outstairs* and they have to drive cars or take, at least take some transportations like buses or taxis. And to keep this country or the industry going they have to have industry so the air pollution cannot be avoid. #00:06:14-6#

*by “outstairs” Reed most likely means outside.

Reed’s comment about the ‘Unavoidable Pollution’ is the source of this *in vivo* code and connects to the major codes ‘Describing Human Impacts’ as well as ‘Focusing on Profit and Development’ and ‘It’s Inevitable’. During her interview¹⁵ Martha discussed how we cannot control the waste produced from over packaging, her response connects to the major codes ‘It’s Inevitable’ as well as ‘Unavoidable Pollution’.

interviewer: Why do you think when we feel guilty about something, um, like ordering um, what was it, uh, Kristie was talking about a lipstick she ordered on Tao Bao and the box was this big and all of the packaging and she was saying how she felt guilty for all the waste, but she says she still buys lipsticks because she still wants them. So why do you think when we feel guilty about things, we, it doesn’t stop us from doing them again? #00:21:35-1#

Martha: Um, because, (laughing) um, ah, I think there is two reason one is because like me, ourselves cannot stop that wasting like, uh, for that person you are like uh, you are stating like she cannot control the packaging. She, like she feels guilty about wasting that’s true, but uh, but she cannot control the person that is packaging her lipstick to like, to be more sustainable. #00:22:42-5#

¹⁵ Martha was unable to attend the focus group, but really wanted to be interviewed, hence the description of Kristie’s statement about online shopping and guilt , made during the focus group.

Preparing for the Future

When considering future generations many students suggested ways in which we could prepare those generations (and the ones before them) for the future, mainly through education. These student quotes all fit under the major code 'Preparing for the Future' among other major codes. While Reed's river story does not seem hopeful, during his interview he expressed how this generation will be different saying that "Um, I think they, I think you, like other teachers you have very strong sense of protecting the environment from maybe very young, but in China we just, we are a new generation who are aware of the environment." The importance of education was repeated by both Kristie and Fiona during their interviews:

Kristie: ...for people I think they can educate students while they are really like, really, in really young age like for year, like 5 or 6 year old or so to like to tell them how to be sustainable, yes. Uh, so that this way will impact their, like whole entire life I think, yes... #00:19:00-7#

Fiona: ...China is very overpopulation now a days we have to control our population even though like in the few decades in the next few decades the population still will like pump up, so I think it is very important for us to learn sustainability and then, and like, transferring this information to the next generation. #00:01:21-8#

Zoe shared a different way of preparing for the future with an emphasis on developing sustainable technology as outlined in her discussion of considering future generations "Um, yeah, I think so because like now I know in China many companies I want to invent like more uh sustainable cars and, or some, like uh, how do you say? Some more recycled stuff, product..." (#00:03:32-5#)

Let us end this discussion of the category "Opportunities for Future Generations" by returning to Danny's story about the delicious eel and consider his final statement: "So what are they going to tell their children, like are we going to have this fish extinct because we ate them all? Because we heard they is going extinct so we ate them

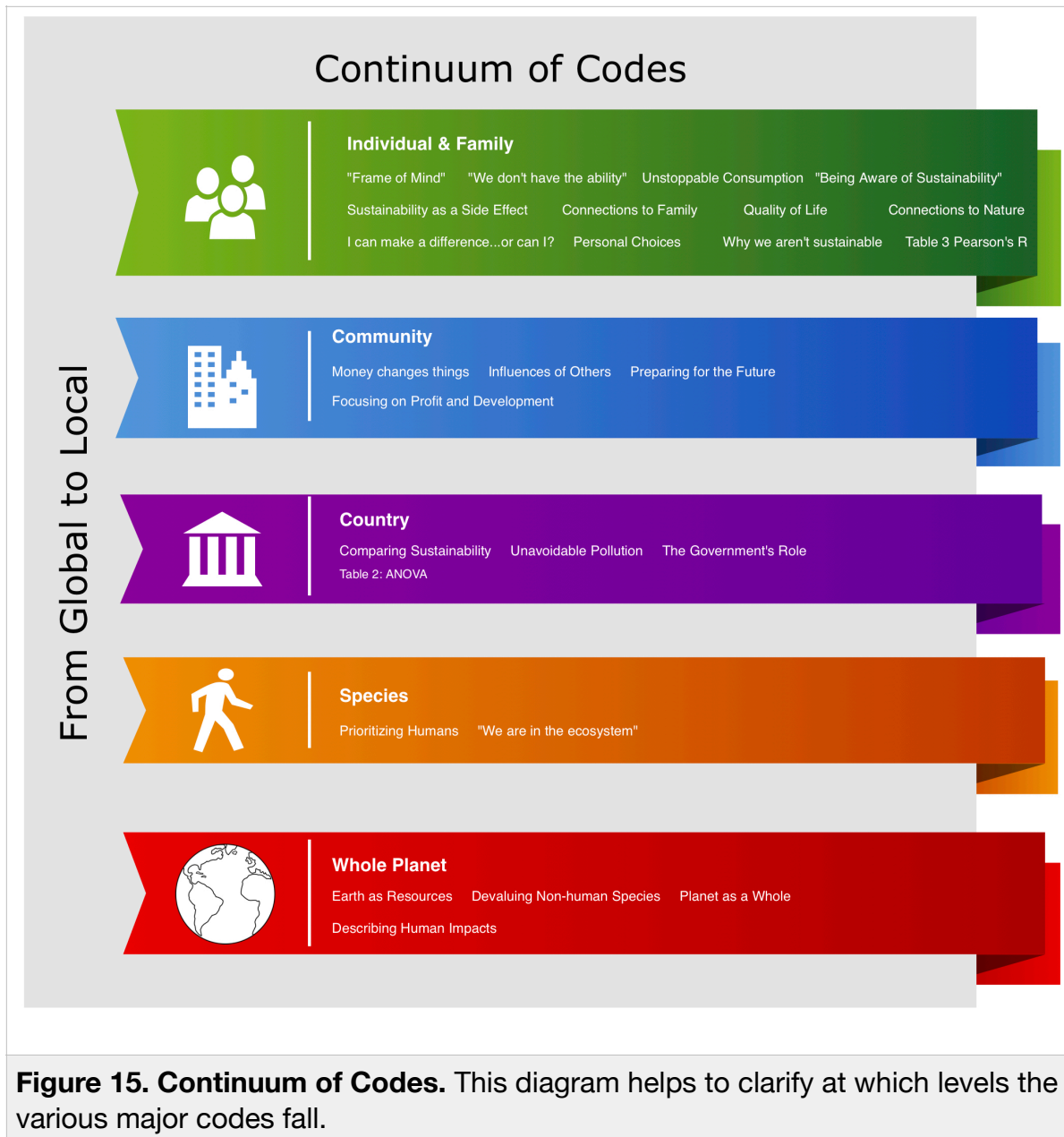
all." (#00:03:15-6#) We can clearly say that from the various insights shared that despite their youth this group of students have an eye on the future.

To answer the research question and motivate students to act more sustainably teachers need to consider the many facets of 'Thinking about Sustainability and the Future' described in this chapter. While the picture of how these students think about sustainability and the future remains incomplete, there is sufficient detail to both derail stereotypes about Chinese learners and give teachers several strategies to try in their classroom. A single solution for all Chinese students in international schools is impossible to achieve because every classroom, every teacher and every student is different.

Chapter Five: Conclusions and Implications - Considering the Chinese Learner

This research process has revealed a number of insights, some more surprising than others. As seen in Figures 7 and 8 the various ideas shared by students are interconnected and cannot easily be separated into discrete ideas and/or themes. While the interconnected nature of these findings ensures that in almost any teaching moment a connection can be found, the different ideas are not easily located for reference. For this reason, a Continuum of Codes (see Figure 15) was created to organize the codes in a more easily referenced format, from the local to the global. It is hoped that this diagram will assist both teachers and researchers in applying the findings of this research, whether that be in the classroom or in future research.

As a classroom teacher, using Figure 15 to assist me, I identified some codes I can readily address, including “We don’t have the ability” as well as “Being Aware of Sustainability”. In many science and social studies courses environmental impacts are discussed; to increase awareness and show students that they have the ability to make a difference, teachers could include actions that students can take to reduce their impacts and show students how their choices add up as part of their lesson and unit plans. One example focuses on the issue of marine plastic pollution; while this is a multifaceted issue focusing on one component such as plastic drinking straws could make this topic more approachable for students and teachers. Having students calculate the number of straws they use every year and then research how long it takes those straws to decompose; along with finding a solution they can live with, such as bringing their own straw or drinking from the cup directly, will help students to both increase their awareness and see that they do have the ability to make a difference.



Conclusions and Implications

Keeping in mind the research question “How do Chinese students think about sustainability?” several findings emerged which provide insights that begin to answer this question. The first finding is that several students shared that they feel that awareness is a necessary first step towards acting sustainably. The importance of

awareness is not a new idea and is found throughout the environmental education literature (Stapp, 1969; Hungerford, Peyton & Wilke, 1980; Littledyke, 2008); however, it is useful for teachers to know that Chinese students, as well as Western students, see the value of awareness. GCPS students also made it clear that awareness was not enough for action, a point also outlined by Hungerford & Volk (1990) after several years of focusing on awareness in EE. Many students shared that they need a secondary reason to act sustainably, such as monetary savings, increased convenience or exercise.

A second finding regarding the way these students think about sustainability is the surprising importance they have placed on environmental education beginning at a young age. Most of these students did not begin studying environmental education until they arrived at GCPS, in grade seven or grade nine. Several students felt that environmental education should start from a much earlier age and that this more educated generation, with more awareness, would be better prepared to act sustainably than those who came before.

When asked about what makes them want to be sustainable most students described large environmental impacts on a global scale, rather than a local scale, such as deforestation and air pollution; although the students struggled to connect these 'big impacts' to their actions and their daily lives. This struggle to connect the global to the local and personal has been discussed by Macnaghten (2003) who provides examples of social practices that allow for the embodiment of the environment. This finding is important for teachers in their lesson planning and helps to

clarify the complexities of scale that these students must consider while thinking about sustainability.

The remaining findings are more general and discuss thought patterns that could be attributed to cultural differences, while these findings are less tangible they are equally important in understanding how Chinese students think about sustainability. This student population was able to deal with what would appear to be contradictions in their responses (from a Western worldview), which may be an indicator of Chinese dualism (Fang, 2011) and dialectical thinking (Tingwu, 2012). According to Nisbett (2004), dialectical thinking is typical of Eastern reasoning processes and its circular, holistic nature allows for contradictions in a way that linear, Western logical thinking does not. Some examples of these seeming contradictions would include the numerous instances in which different students (all of whom come from upper-middle class or wealthy families) blamed the wealthy for acting in an unsustainable manner, there may be a continuum of wealth among these students that needs analysis. A second example of what would appear to be a contradiction, but which the student did not seem to notice, is how Reed's story about river pollution seems to contradict with the choices his father makes regarding his factory.

While pedagogy of place is a well established idea in environmental education (Smith & Williams, 1999; Suzuki, Mason & McConnell, 2007) finding connections to place was unexpected in a boarding school. Many of the students discussed places that were special to them, whether that be their hometown or a special place they had visited. This finding is particularly important for understanding how students think about sustainability in a globalized world; it also implies that strategies and tools from

the in-depth literature on this topic could be useful with Chinese international school students.

This observation connects with the work of David Gruenewald (2003), who discusses how we need to avoid the ‘doom and gloom’ manner in which many teachers discuss environmental issues and begin by helping students find ways to connect with the earth, and love it, before they are asked to save it. Connecting with the local environment is one way in which students can come to love the earth; as exemplified by the stories shared by GCPs students they can also connect with the earth in other ways, such as on trips to places that are special to them. These stories provide hope that students may be able to make the world ‘home’ in this age of globalization, an initiative that connects directly with the goals of UNESCO’s Earth Charter (<http://earthcharter.org/discover/>), which describes Earth as humanity’s home and provides numerous ways in which we can take care of our home. Some examples include “Be a living example” Earth Charter Action Guideline #2 and “Promote respect and understanding” Earth Charter Action Guideline #6.

The most important implication from this research is for international teachers to find a balance between avoiding stereotypes about Chinese learners, while still being informed of general cultural norms. An awareness of the Chinese culture of learning (greatly impacted by Confucian philosophy) and social norms such as ‘face’ are important for both teachers and researchers to be effective in their interactions with Chinese students.

One of the first things many teachers who are new to China are taught about is ‘face’; this subtle and complex component of Chinese social interactions (Ho, 1976)

impacts students' risk taking behaviour, an important component of many teaching strategies. *Many students are hesitant to volunteer their ideas, and therefore risk being incorrect in front of their classmates, which would cause them to lose face. This Chinese cultural norm makes it more challenging for teachers to gauge students' understanding as many students will not ask for help or admit that they do not understand a concept taught in class unless they are approached privately.*

As discussed in the context chapter, Confucianism is complex and has been interpreted in a variety of ways throughout China's history; however, some overall Confucian principles can be a helpful starting point for teachers and researchers alike. Leung (2010) describes some insights into Confucianism, stating that it assumes that individuals are basically benevolent, that individuals can and should improve themselves through education and that individuals "have the ability to cultivate their morality and self-control." (p.222)

While culture is a complex and intangible concept Benedict (1934/2006) describes it as the lens through which we see the world, as exemplified in the following anecdote. *During my first weeks teaching in China I struggled to 'read the room' and judge whether my students were understanding the lesson as the 'tells' I had become familiar with while teaching in Canada were completely absent. During these early days I relied on cultural stereotypes and oversimplified interpretations of Confucianism to help me learn how to interact effectively with my new students. Despite having worked with this student population for four years, I found many of the insights these students shared during this research surprising.* This illustrates the importance of avoiding the

internalization of cultural stereotypes and the challenging nature of understanding people from another culture.

Another important implication is that the students as a group do not have the same worldview or the same way of thinking about the environment and sustainability, despite their common nationality. Several of the students in this study demonstrated polar opposite ideas about the Earth; with some seeming to consider the Earth as a shopping mall for resources and others being more aware of the need for a complete and complex ecosystem for humans to survive. These two extreme ideas are interconnected, and while helping students move from an extrinsic value of the environment to an intrinsic one may be too big a leap to take in a single course, moving from 'Save the Earth' to 'Save the Humans' may be a good intermediate step. Ideally, using vertical curricular alignment¹⁶ over several years in the same school teachers will be able to help students see the intrinsic value of the environment.

Strategies for Teachers

While research is still needed to better understand how Chinese learners think about sustainability this research project has revealed some gaps in student knowledge and understanding that teachers can work to fill. The following strategies are meant to be used in a high school classroom where sustainability will be discussed, whether that be a science classroom, a geography classroom, a social studies classroom or any other.

One of the first strategies most applicable in the science classroom is to include humans in food web images and discussions of the interconnections of the ecosystem.

¹⁶ Vertical curricular alignment requires ensuring that as students move from one grade to the next the curriculum overlaps on key ideas and develops new information in a logical sequence.

In my experience most of the food webs found in textbooks and online do not include humans within them. This omission sends a message to students that they are not part of the ecosystem, an idea that many of the students in this study confirmed. While adding a human to a food web is a good start, showing multiple connections between humans and the environment, especially positive ones would help students begin to see themselves as part of the ecosystem. Looking to local and international Indigenous peoples (such as the Yao and She peoples) for examples of positive relationships between humans and the environment may be a good place to start; see the work of Kapryka & Dockstator (2012), Kimmerer (2013), and Suzuki, Mason & McConnell (2007) for information on Indigenous knowledges and environmental education.

Many students discussed how they forget about the consequences of their choices and Danny even suggested that when shopping online before you confirm your purchase a reminder could pop up about the environmental impacts of your purchase. A simpler, classroom assignment alternative would be to have students complete a thorough life cycle analysis of a particular product, utility or choice and then make an 'environmental consequences' label for it. Similar to the labels on cigarette cartons in Canada. The level of detail and the complexity of the product, choice or utility chosen would determine the level of difficulty of the assignment and is therefore a good way for teachers to differentiate based on their students' needs.

Several of the student participants stated that their choices would not make a difference, or if they felt that it would make a difference, it was a small one. Helping students better understand the scale of their choices and how they can make a difference is challenging, but with a little math they can begin to see how their choices

add up. One activity involves water conservation, students can measure the volume of water a faucet, shower or sprinkler releases in a short amount of time, maybe ten seconds. They can then track how much time that water source is used on a daily basis, starting with their own use and calculate the volume of water, from that specific source, they use in a year. Students can then test different strategies to reduce water use, such as the installation of a low-flow shower head or a faucet aerator, or simply reducing their use by turning off the tap or reducing shower time. In many cases these calculations can then be connected to the monetary value of the water as purchased from the public utilities; this could easily be connected to water quality in the local environment, as well as on a global scale.

A more challenging, but extremely relevant choice to analyze would be the monetary cost of plastic production, and recycling and pollution damage and clean-up. Students could begin by identifying the plastic types they use in their lives and then researching the lifecycle of each type of plastic, including the natural resources and energy required to produce it, distribution costs, recycling costs and post-recycling value as well as costs from this specific type of plastic pollution. Students could then calculate how often they use each type of plastic in their daily life and how making a different choice would reduce the amount of plastic both produced and in both landfills and the waters of the world.

Next Steps and Further Research Questions

While this research project collected a large amount of data there are definite gaps and many questions were left unanswered. The ability to return to GCPS or other similar

schools in China would allow researchers to build upon the ideas shared by students in their more recent interviews. There is much to learn about the way students think about the role of the Chinese government, a sensitive topic, as well as what it means to these students to “try their best” to be sustainable. The input of teachers would also be valuable in better understanding how to motivate Chinese students to act sustainably as they have insights into what has or hasn’t worked in their own classrooms.

If teachers could be found who are willing to implement the strategies suggested in this chapter it would certainly be an interesting research project. With the use of a common environmental education measure, such as the New Ecological Paradigm (NEP) scale (Anderson, 2012), student environmental values could be measured at the beginning of the school year and then at the end with teachers using one or more of the suggested strategies. While students’ way of thinking about the environment is multifaceted and layered, the NEP scale data paired with both student and teacher interviews should provide insights into the effectiveness of these strategies.

A comparison between international schools with a 100% Chinese learner population and a more traditional international school with students from a variety of nationalities would be a very interesting research topic. While the number of international schools around the world has continued to grow, the number of local students in them is increasing. As stated in the context chapter Ryan (2010) states that education context is more important than geographical location in terms of influencing the ways students think.

A final research question would be in responses to the wealthy students describing how rich people make unsustainable choices, in many instances blaming rich people for environmental impacts. This opens up questions about a possible continuum of wealth in China where so many people have moved to the upper-middle class in the last few generations with China's economic boom (Garver, 2016). It may also be worth considering if there is a different way of thinking among the newly wealthy in comparison with the more established wealthy families.

Environmental Education, specifically in the context of the People's Republic of China is important to consider as the process of globalization continues and environmental impacts continue to increase around the world. While there is much to learn, it is the hope of this researcher that this small contribution to the knowledge on this topic may help both teachers and researchers reach these students more effectively as they support their students to make more sustainable choices.

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Appendix A: Reflection Journal Excerpts

January 15th, 2018	<ul style="list-style-type: none"> - have GCPS schedule and will present to all Biology and AP Biology classes - Block E, spoke to Mr. Smith's class, emphasized importance of results, no impact on grades etc. - Block F, spoke to Dr. Carson's AP Bio class and encouraged them to participate - Block G, spoke to Dr. Carson's Bio class
January 17th, 2018	<ul style="list-style-type: none"> - Block A - Dr. Carson's AP Bio, gave students time to complete the questionnaire in class - Block C - Mr. Smith's class, presented and told them I will be here at study hall - Block D - Mr. Smith's class, presented and told them I would be at study hall *applause*
January 18th, 2018	<ul style="list-style-type: none"> - Blocks E and F distribute consent forms to interested participants - Block G Bio class time to complete Questionnaire and hand out consent forms (students were reluctant to ask for forms...because in front of whole group?)
January 22nd, 2018	<ul style="list-style-type: none"> - send emails to all students who were given consent forms, asking for info about attendance etc. - only a few replies...1 yes and 4 or 5 not...don't want to miss ASA, maybe reschedule to during study hall if not enough students show up tomorrow - didn't want to come to class for a 3rd time in a row and "bug" the classroom teacher, I need their cooperation
January 23rd, 2018:	<p>Focus Group Day!</p> <ul style="list-style-type: none"> - some students showed up quite early, were keen to start, 8 total, 2 boys and 6 girls - tended to write more than draw for initial starting phase, encouraged drawing - try to keep it casual, cookies, me not lurking etc. - some students using dictionary or phone Chinese-English
January 29th, 2018	<ul style="list-style-type: none"> - Interview Danny and Martha today, Reed tomorrow, Jamie later... - coding Focus Group transcript done, feels like nothing new...need to cut up and categorize - Interview Questions: 5 based on focus group and Questionnaire data and 3 proposed in December, resequenced to avoid bias/leading students

<p>February 1st, 2018</p>	<p>GCPS Interviews 1-6 thoughts after 1st analysis/sorting:</p> <ul style="list-style-type: none"> - Students are looking to others to make sustainability happen, they need a second reason to be sustainable, it's not enough to just want to be sustainable: <ul style="list-style-type: none"> - convenience - government laws and enforcement - scientists to find the solutions - fitness and energy conservation (taking the stairs) - rebates on newer more energy efficient cars - efficiency with public transit (easier, cheaper, less stress than driving) - Reed's grandma and re-using bags - No-one thinks awareness = action - Students focus on small things they can act upon (trash etc.) but they don't think small things really make a difference...this is contradictory - Zoe's story about sorting trash at Boston University...the garbage bins all over Guangzhou have two sections (recycle and not) why isn't she used to sorting her waste? (just for show?) - If humans always consider themselves first why don't they think of the environment? We depend on it for our survival! - Knowledge is a necessary step to being sustainable, but not enough on its own (Chinese vs. Western teachers Q and "aware" Qs) - What does it mean to take "real action" to be sustainable? - By saying things like "it's complicated" or "it's too late" are we just giving up/making excuses for ourselves? - Events that changes students ideas about the environment: <ul style="list-style-type: none"> - hometown x2 (Reed and Danny) - trip for nature x3 (Jamie, Vanessa and Zoe) - classroom experience x1 (Martha) - 5/6 students think their choices make a difference, 1/6 said "don't know"
<p>April 11, 2018</p>	<p>I have just completed the SPSS data analysis of the questionnaire Likert-scale questions and am preparing to go through the qualitative data once more with focused coding and start to look for relationships between categories and begin to build a theory of sorts. At this point I feel like quite a bit of my data is contradictory, students consider big impacts when they think about sustainability but then focus on themselves and small acts in other questions. Some students seem very focused on themselves and their needs and the needs of humans while others consider other organisms (most often animals). I am struggling with how to move forward from here, I don't want to make up a theory and then look for evidence to support as was suggested, I am using GT and need to build up from the data. I feel like at this point I need to go back to my book and read through the steps again and follow them closely, I don't want all my hard work to get away from me. Maybe through examining the data multiple times and writing memos I will be able to come up with something, see something I can't seem to see yet. I feel like I have a ton of interesting data, there is a lot here, but it hasn't come together for me in any way yet. I feel like I'm at the edge of a cliff and I'm too nervous to dive off still....what if there is nothing there?</p>

<p>April 11, 2018</p>	<p><u>Some things I am considering:</u></p> <ul style="list-style-type: none"> - considering these students as a specific population of Han Chinese-born and bred students from wealthy families (the population of most “international” schools in China) whose values and environmentalism fall somewhere between that of their parents and the West in a unique manner - China’s recent history with the Great Leap Forward, the Cultural Revolution and Economic boom have had a huge impact on values and priorities as opportunities and priorities shift between generations - This research may not reveal anything useful for teachers, this student population is so specific and so different from any other findings may not be useful beyond Chinese students and I’m not sure that I will find anything consistent to share about Chinese students either -> is this sample even big enough? - maybe some examples of how to appeal to Chinese students could be considered...they do seem to consider natural beauty to be important, and seem to think that nature is not so easy to understand...but is worth learning about, while humans are the priority it is not too hard to help them value other species as well
<p>April 17th, 2018</p>	<p>Focus Coding Reflections</p> <p>Am I noticing things that my biases and prior knowledge might make me look for....things like notes about population size, development and air pollution? Need to make sure that any focused codes or analysis that corroborate my preconceived ideas are really there and not just my own biases leading me there. But codes and student quotes that seem particularly interesting should not be dismissed out of turn...they don’t need to appear with a high frequency to be important or worth studying further.</p>
<p>April 18th, 2018</p>	<p>Focused Coding Reflections</p> <p>Having just finished going through the focus group codes I have added a few more categories...while I know at this point I should be moving to less categories instead of more it still seems like a good idea to organize my data into logical groups...and then I can choose which ones I want to discuss in detail. To that end I have added “Ways of Thinking” as a category due to the number of students who have described the importance of awareness, the discussion about development and blaming industry as well as points about “frame of mind”. While I had decided to create a new category “thinking globally” to contrast with the “thinking locally” category I have decided to embed those idea into a new In Vivo category “Save the Earth!” which includes examples of students describing Earth as a system, the interconnectedness of the Earth and the various organisms on it and humanity’s reliance on the Earth. I had also considered creating a new category called “Earth as Resources” because so many students shared this perspective in the questionnaire, but have decided to put those ideas under the umbrella of “Humans as Priority” since it is a further example of that and not a new idea.</p>

<p>April 22nd, 2018</p>	<p>Focused Coding Reflections</p> <p>I just finished the last of the interviews for Focused Coding. There are a lot of repeating ideas, which is a good thing and many of the codes will need to be rewritten to be more in the students words and to cover the same idea with one code only, not 17 versions of “being aware”. Some codes fit into multiple categories at this point, but my categories are still not well defined, I think that the clarify of their definitions will come as I finesse my focused codes and group them. I plan on printing the current exhaustive codebook and then choosing a category, going through all the codes that I have in there, editing/rewording them (based on student words) when necessary and defining the categories as I go. For example many students spoke about awareness, this needs to become a code or 2 at most that cover their ideas and fit into the category “Making Sustainable Choices”... and maybe “Ways of Thinking”. Although I think that I will use “Ways of Thinking” for comparisons between Western and Chinese teachers, people etc. and other statements about frame of mind, like Kristie’s comments about being happy with what you have and Zoe’s comments about feeling uncomfortable about her Dad’s spending on Tao Bao. I don’t want to eliminate the option of putting some codes into more than one category, but I want to make sure that I have a really good reason why they are there. Once I have recreated the codes I need to make a table of relevant quotes for each category, this will help to further define the categories and make sure I am seeing what is really there, not what I want to see. This process will take quite a bit of time, but I think this is the last major step of my analysis....once I have clear categories with definitions and clear codes with examples from students words then moving to the relationship to them will be much easier. Things should become clearer and begin to make more sense, a picture is starting to form. I need to make sure I write down ideas as they come to me...or use a voice recorder?</p>
<p>April 22, 2018</p>	<p>I have spent the last several days going through all of my focused codes one by one to try and eliminate repeats and place them in categories with care, often referring back to interview transcripts and original student words to clarify my codes. It would seem by choosing to code with gerunds I have distanced my words a little bit too far from the students words and by turning their descriptions into actions I have assumed that I understand which action they are implying/what they are feeling. I had read in Constructing Grounded Theory that coding with gerunds was ideal because it helped you to focus on processes and actions rather than descriptions and it is actions that are most often what we seek to understand and/or change. In going through my focused codes once more I decided to group them into ‘major codes’ or ‘sub-categories’ depending on how you choose to think about it. This took my almost 300 focused codes (many of which were repetitive) and narrowed it down to 34 ‘major codes’. In this process the category ‘Thinking Locally’ was eliminated as the codes which had previously made up that category fit into ‘Ways of Thinking’ and most codes are now in only one category, although some quotes fit well into more than one ‘major code’. For each major code and</p>

April 22, 2018	category I have listed examples of focused codes that fit into it, the places in the raw data where the quotes can be found and have begun to pull quotes for each. Once I have pulled quotes I want to build a definition of each category and edit the wording for the various major codes to make sure that they reflect students words...using <i>in vivo</i> codes if possible, although since these codes bring together similar ideas that may not be so easy to do.
May 2nd, 2018	<p>Today I finished finalizing my categories (I think) and the level immediately below them that I am calling my “major codes”. I eliminated major codes with insufficient data due to a lack of clear quotes to use or if they were not particularly interesting. I have also tried to remove repeats of code placements, although I am considering linking back to quotes that fit in more than one major code/category to help demonstrate the interconnectedness of the student responses. I have decided to move ideas that are significant repeats out of larger categories (such as Making Sustainable Choices) to smaller ones simply to make reading easier. Some major codes I have chosen to keep despite the lack of significant data simply because they are outliers, provide a good comparison to another major code or are particularly interesting, for example “Earth without humans” is only mentioned by Reed and Danny and then only briefly, but it is an interesting contrast to “we are in the ecosystem” from the previous category. I am certain that as I begin to write this up into actual paragraphs I will eliminate more major codes or quotes that are not flowing well or don’t seem to add to the data in an interesting way. I’d rather play it safe and keep more for now and then use Leesa’s advice to help me decide what stays and what goes.</p> <p>I organized them into the sequence suggested by Leesa and the organized the major codes below each into a logical order, many from big picture to smaller (such as “protect our mother earth” and “ways of thinking”) and others in a logical sequence that will facilitate comparison. I have decided where each student drawing will be placed, while there are four in one category (Protect our Mother Earth) the others are distributed throughout the categories with the remaining four all in different categories. I have also placed the three data tables of quantitative data in their chosen spots... Table 1 with the validity of the data set in the first section about the Data set...Table 3 in the major code “Comparing sustainability” within the Ways of Thinking category and Table 2 in the “Frame of Mind” major code also within the Ways of Thinking category.</p> <p>As suggested by Leesa I have chosen some stories from students to weave throughout the results chapter to help increase the readability and emphasize interconnectedness of ideas. I have chosen three stories and have found ways to connect them to each category. Since the various examples do not fit with the categories in chronological order I will have to tell the stories at the beginning and then refer back to them throughout the chapter. The first story chosen was about Reed, his Dad and the river pollution. This was the easiest to fit into multiple categories and really</p>

May 2nd, 2018	demonstrates the layers of thought here, it is an example of pollution. The second story I chose was Vanessa's story about the jellyfish in Pulao and it is about ways of thinking...or humans as priority, very interesting perspective. The final story I included was Danny's story about the tasty eel (which he told me after the interview was over) and how people want to eat it despite the fact that it's going extinct, how to we explain that to future generations? etc. I hope that these stories bring a sense of cohesion to a data set that may seem fragmented due to it's separation into categories for analysis.
May 9th, 2018	<p>After several days of work I have mostly completed the edits and additions to the Methods chapter. They were much more significant than I had previously thought, considering how much detail was lacking and how many things changed since I wrote this initial draft before data collection in early January. I am very thankful that I kept such clear notes in my notebook so that I was able to explain my decision-making process for categories as well as how the coding process changed as I went. It seem like I have a million appendices at this point, but I think it's better to include too much than not enough for now, it's easier to cut things than try and add them later. I need to look through my little red field notes book as well as the other notes I made on the category tables so I can add how I chose which major codes to eliminate from the final results chapter...this will also be necessary once Leesa and I discuss which categories and/or major codes to eliminate next Friday. I will also need to talk about the comparisons I do between categories, students etc. I don't know if there is much of a theory here or just a bunch of interesting tidbits...I need to think back to the theory that Peter had me describe to him orally and see if that exists in the data or if it's just my bias. I also need to return to Charmaz's methods book and see if there is any inspiration to be found there for theory building...I know that building a theory is a lofty goal for a Masters thesis, but I want to at least begin to build one and outline connections.</p> <p>Here is a thought I found at the end of my Methods draft: "Community is not a clearly defined word in China, is this because it is inherent to the culture and does not need to be explicit? Like "nature" in Indigenous languages?" - think about this for discussion</p>

Appendix B: Bilingual Consent Forms

Online Consent (Questionnaire)在线同意 (问卷) :

The goal of this study is to determine how culture impacts the motivation for conservation and sustainable action in high school students. The initial questionnaire requires a 10 - 15 minute time commitment from students and will ask a total of 14 multiple choice questions, two short-answer questions and six demographic fill-in-the-blank questions. Students do not have to answer any questions they do not want to and may stop the questionnaire at any time without consequence. Participation is completely voluntary and confidentiality will be provided to the fullest extent possible by law. 这项研究旨在探索

文化在高中生环保和支持可持续发展的行为的影响。第一部分为问卷形式，需要学生预留10-15分钟时间回答，总共会有14道选择题、2道简答题和6道个人/家庭背景问题。学生不需要回答任何他们不想回答的问题，并且可以无后果地选择随时停止问卷调查。参与完全是自愿的，所有的个人信息都将保密。参与完全是自愿的。我们将在法律的允许范围内对信息进行最大限度的保密。



Student responses will remain confidential through the storage of data in a password protected computer and through the collection of first names and last initials only. No demographic information that may be used to directly link the student to their responses will be collected and in the final publication(s) of the research all responses will be anonymized through the use of pseudonyms. 学生的回答将会被保密，其答案将仅以名字与姓氏首字母标注，并通过一台拥有密码保护的计算机存储。本研究将不会收集任何可能直接将问卷答案与学生个人身份联系起来的个人/家庭背景信息，并且在最终的出版物中，所有的回答都将通过使用字母数字的代码名匿名化。

Students do not have to answer any questions they do not want to and if they should choose to do so they can withdraw from the study at any time and should they request it, their responses will be destroyed. Any ethical concerns on behalf of the students/parents should be addressed to the principal researcher Carly Thomas (cthomas@yorku.ca) who will address those concerns immediately. Findings from this research will be published as a Masters Thesis and may be used in periodical articles as well as tools for teachers. 学生不需要回答任何他们不想回答的问题，如果他们希望这样做的话，他们可以选择随时退出研究；如果学生选择退出研究，他们的回答将会被销毁。任何关于学生/父母在研究中的伦理相关问题或担忧应向本研究的主要研究员Carly Thomas提出，而她将立即着手处理此类问题。本研究结果将作为硕士论文发表，并可用于期刊文章及教学工具。

The paper data collected (namely Focus Group drawings) will be stored in a locked file cabinet and the digital data will be stored in a password protected computer within a

password protected folder. All data will be destroyed after five years (by July 1, 2023) using a cross-cut shredder for paper data while the digital data will be deleted and memory erased of digital storage devices. 收集的纸质数据(即讨论小组图)将被存储在一个带锁的文件柜中，电子数据将被存储在一个有密码保护的计算机的加密文件夹中。纸质数据将在8个月后被一个交叉碎纸机销毁，而电子数据将被无限期地存档，以作为未来研究的潜在资源，并将用于支持教学资源的创建。所有数据将在五年后（即2023年7月1日）被销毁。我们将用交叉碎纸机销毁纸质数据，并将电子数据从电子设备内抹去。

This research has been reviewed and approved by York University's Ethics Committee. Should participants have any questions or concerns they can contact the Faculty of Environmental Studies Graduate Program Office at jcesario@yorku.ca or (phone: (416)736-2100 extension: 33196) or the Manager, Office of Research Ethics, York University, 309 York Lanes (phone: 1-416-736-5914). The principal researcher can be contacted at Carly Thomas, Graduate Student, York University Faculty of Environmental Studies, cthomas@yorku.ca and her supervisor Leesa Fawcett can be contacted at lfawcett@yorku.ca. 这项研究已经得到了约克大学伦理委员会的审查和批准。如果参与者有任何问题或担忧，请邮件联系环境研究学院研究生项目办公室 jcesario@yorku.ca，或致电:(416)736-2100 分机号:33196)，或写信至约克大道309号约克大学研究伦理办公室经理 电话:1-416-736-5914。主要研究人员Carly Thomas的联系方式：邮件cthomas@yorku.ca，地址：约克大学环境研究学院研究生部，她的导师 Leesa Fawcett的电子邮箱为lfawcett@yorku.ca。

Carly E Thomas, Principal Researcher
Carly E Thomas, 主要研究员

I am willing to complete the aforementioned online questionnaire:
我愿意完成前面提到的在线问卷调查：

Yes 是 No 否

Information and Substitute Consent Form (parents) 信息与替代同意书(父母):

The goal of this study is to determine how culture impacts the motivation for conservation and sustainable action in high school students. The study involves gathering cultural and experiential data from students in the form of a questionnaire and then hearing about their experiences, opinions and motivations in a focus group setting as well as possibly in an interview setting. 这项研究的目的是探索文化对高中生支持环保和可持续发展行为的影响。该研究将以问卷形式收集学生的文化背景和经历，然后学生将在一个讨论小组的形式下讨论他们的经历、观点和动机。采访的形式也有可能被采用。



The initial questionnaire requires a 10 - 15 minute time commitment from students and those who volunteer to participate in the focus group will require an approximately 1 hour time commitment and finally, interviews may last from 10 - 45 minutes depending on the questions asked and responses given. There are no risks to participating in the questionnaire, focus group or interview and the participants may learn more about their own decision making process and the importance of sustainability to them. 第一部分为问卷形式，需要学生预留10-15分钟时间回答，而自愿参加讨论小组的学生志愿者需要提供约1小时的时间。最后，根据所提出的问题和回答，采访可能会持续10-45分钟。参加问卷、讨论小组或采访没有任何风险，参与者可以从中更多地了解他们自己的决策过程，以及可持续性对他们的重要性。

Student responses will remain confidential through the storage of data in a password protected computer and through the collection of first names and last initials only. No demographic information that may be used to directly link the student to their responses will be collected and in the final publication(s) of the research all responses will be anonymized through the use of pseudonyms. Participation is completely voluntary and confidentiality will be provided to the fullest extent possible by law. 学生的回答将会被保密，其答案将仅以名字与姓氏首字母标注，并通过一台拥有密码保护的计算机存储。本研究将不会收集任何可能直接将问卷答案与学生个人身份联系起来的个人/家庭背景信息，并且在最终的出版物中，所有的回答都将通过使用字母数字的代码匿名化。参与完全是自愿的。我们将在法律的允许范围内对信息进行最大限度的保密。

Students do not have to answer any questions they do not want to and if they should choose to do so they can withdraw from the study at any time and should they request it, their responses will be destroyed. Any ethical concerns on behalf of the students/parents should be addressed to the principal researcher Carly Thomas (cthomas@yorku.ca) who will address those concerns immediately. Findings from this research will be published as a Masters Thesis and may be used in periodical articles as well as tools for teachers. 学生不需要回答任何他们不想回答的问题，如果他们希望这

样做的话，他们可以选择随时退出研究；如果学生选择退出研究，他们的回答将会被销毁。任何关于学生 / 父母在研究中的伦理相关问题或担忧应向本研究的主要研究员Carly Thomas 提出，而她将立即着手处理此类问题。本研究结果将作为硕士论文发表，并可用于期刊文章及教学工具。

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Carly E Thomas, Principal Researcher 主要研究员

I give permission for my child to participate in the aforementioned research study as a participant in the Focus Group and interviews if necessary. 我允许我的孩子参加上述的研究，并愿意作为讨论小组的参与者和接受必要的采访。

Parent/Guardian Signature 家长/监护人签名: _____

Date日期:_____

Assent Form (students) 同意书 (学生) :



The goal of this study is to learn how students from different cultures think about the environment and making sustainable choices. The study involves asking specific questions about students' experiences and decision-making processes as well as giving students a chance to share their ideas and opinions about sustainability in a small Focus Group or one on one interview. 本研究旨在调查不同文化如何影响学生对环境及可持续性发展的思考及决策。本次研究方法包括对学生过去经历和决策过程的提问，并提供学生小组讨论或一对一采访的机会，让其分享关于可持续发展的观点与看法。

The initial questionnaire requires a 10 - 15 minute time commitment from students and those who volunteer to participate in the focus group will require an approximately 1 hour time commitment and finally, interviews may last from 10 - 45 minutes depending on the questions asked and responses given. There are no risks to participating in the questionnaire, focus group or interview and you may learn more about your own decision making process and the importance of sustainability to you.

第一部分的问卷需要学生预留10-15分钟时间回答，而自愿参加讨论小组的学生志愿者需要提供约1小时的参与时间。最后，根据所提出的问题 and 回答，采访可能会持续10-45分钟。参加问卷调查、讨论小组或采访没有任何风险，你可以更多地了解自己的决策过程，以及可持续发展对你的重要性。

Your responses will remain confidential through the storage of data in a password protected computer and through the collection of first names and last initials only. No demographic information that may be used to directly link you to your responses will be collected and in the final publication(s) of the research all responses will be anonymized through the use of pseudonyms. Participation is completely voluntary and confidentiality will be provided to the fullest extent possible by law. All data will be destroyed after five years (by July 1, 2023) using a cross-cut shredder for paper data while the digital data will be deleted and memory erased of digital storage devices. 你的回答将全程保密，答案将仅以名字与姓氏首字母标注，并通过一台拥有密码保护的计算机存储。本研究将不会收集任何可能直接将问卷答案与你个人身份联系起来的个人 / 家庭背景信息，并且在最终的出版物中，所有的回答都将通过使用字母数字的代码名匿名化。参与完全是自愿的。我们将在法律的允许范围内对信息进行最大限度的保密。所有数据将在五年后（即2023年7月1日）被销毁。我们将用交叉碎纸机销毁纸质数据，并将电子数据从电子设备内抹去。

You do not have to answer any questions you do not want to and if you chose to do so you can withdraw from the study at any time and should you request it, your responses will be destroyed. Any ethical concerns should be addressed to the principal

researcher Carly Thomas (cthomas@yorku.ca) who will address those concerns immediately. 你不需要回答任何你不想回答的问题，如果你不希望作答，你可以随时退出研究；如果你提出退出的要求，你的回答将会被销毁。任何研究中的伦理相关问题或担忧应向本研究的主要研究员Carly Thomas (cthomas@yorku.ca) 提出，而她将立即着手此类问题。

This research has been reviewed and approved by York University's Ethics Committee. Should participants have any questions or concerns they can contact the Faculty of Environmental Studies Graduate Program Office at jcesario@yorku.ca or (phone: (416)736-2100 extension: 33196) or the Manager, Office of Research Ethics, York University, 309 York Lanes (phone: 1-416-736-5914). The principal researcher can be contacted at Carly Thomas, Graduate Student, York University Faculty of Environmental Studies, carly.e.thomas@gmail.com and her supervisor Leesa Fawcett can be contacted at lfawcett@yorku.ca. 本研究已经得到了约克大学伦理委员会的审查和批准。如果参与者有任何问题或担忧，他们可以联系环境研究学院研究生项目办公室 (jcesario@yorku.ca), 或致电(416)736-2100转33196, 或写信至约克大道309号约克大学研究伦理办公室经理 电话:1-416-736-5914。主要研究人员Carly Thomas的联系方式: 邮件cthomas@yorku.ca, 地址: 约克大学环境研究学院研究生部, 她的导师Leesa Fawcett 的电子邮箱为lfawcett@yorku.ca 。

Carly E Thomas, Principal Researcher 主要研究员

I give my assent to participate in this study. 我同意参加这项研究。

Student signature 学生签名: _____

Date日期:_____

Appendix C: Infographic shared with GCPS Students and Teachers

Sustainability & Motivation in Guangdong High School Students

Sharing Findings & Conclusions

Research Process Summary

In January & February 2018 a former GCPS teacher and current graduate student at York University returned to China to learn about sustainability from GCPS students. Thanks to the support of GCPS Administration, teachers and students a total of 40 students completed the survey, 8 participated in the focus group and 9 were interviewed after school.



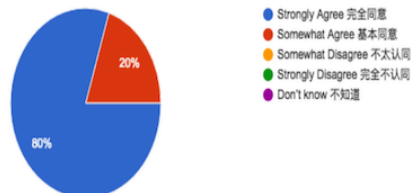
The Questionnaire



The first step of the research process was to collect quantitative data through a survey, which included both Likert-scale questions and two short answer questions. The two pie charts below share some particularly interesting findings. The quantitative data from the survey was statistically analyzed, through the use of Pearson's R, a One-way ANOVA and a T-Test.

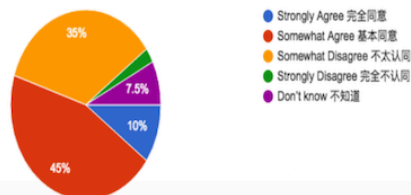
9. I believe that nature is very valuable. 我认为大自然很宝贵。

40 responses



10. I have a good understanding of how the natural world works. 我非常了解大自然的规律。

40 responses



The Focus Group & Interviews



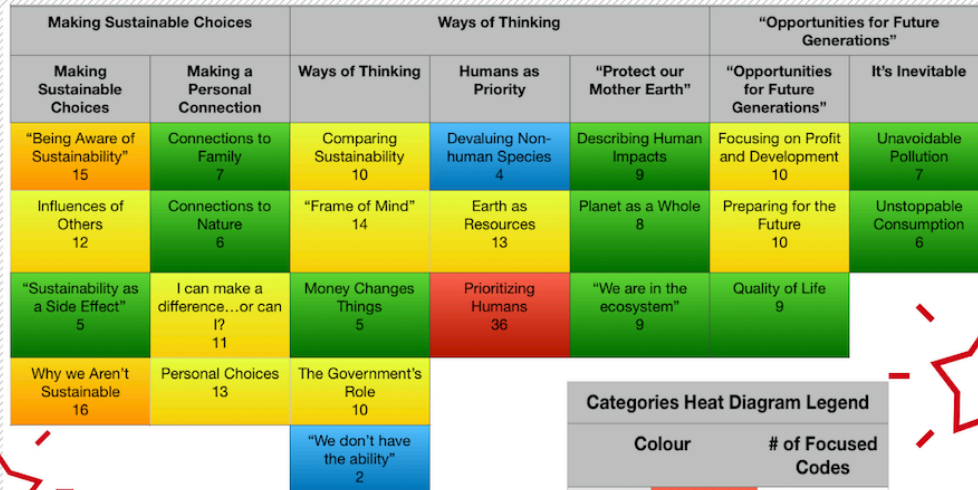
A group of 8 students came together to discuss sustainability one January day after school. These students were asked to draw "what makes me want to be sustainable" and then share their drawings with the group.

The student discussion was recorded and later transcribed, while the drawings were photographed and later analyzed. The individual interviews were also recorded and transcribed in preparation for data analysis.

To analyze the transcriptions the data was coded several times, the first time in a line-by-line manner with each data set, the second time looking for patterns and particularly interesting statements and the third time looking for 'major codes' which helped to bring together the ideas that appeared multiple times.

The 'major codes' were grouped into seven sub-categories and then further grouped into the three most significant categories.

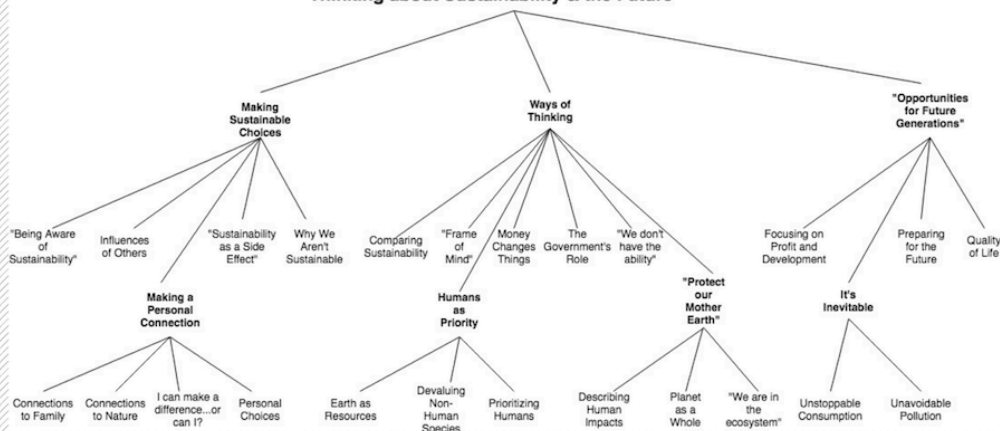
The diagrams below help to share these findings in a heat diagram, taxonomy diagram and a continuum of codes.



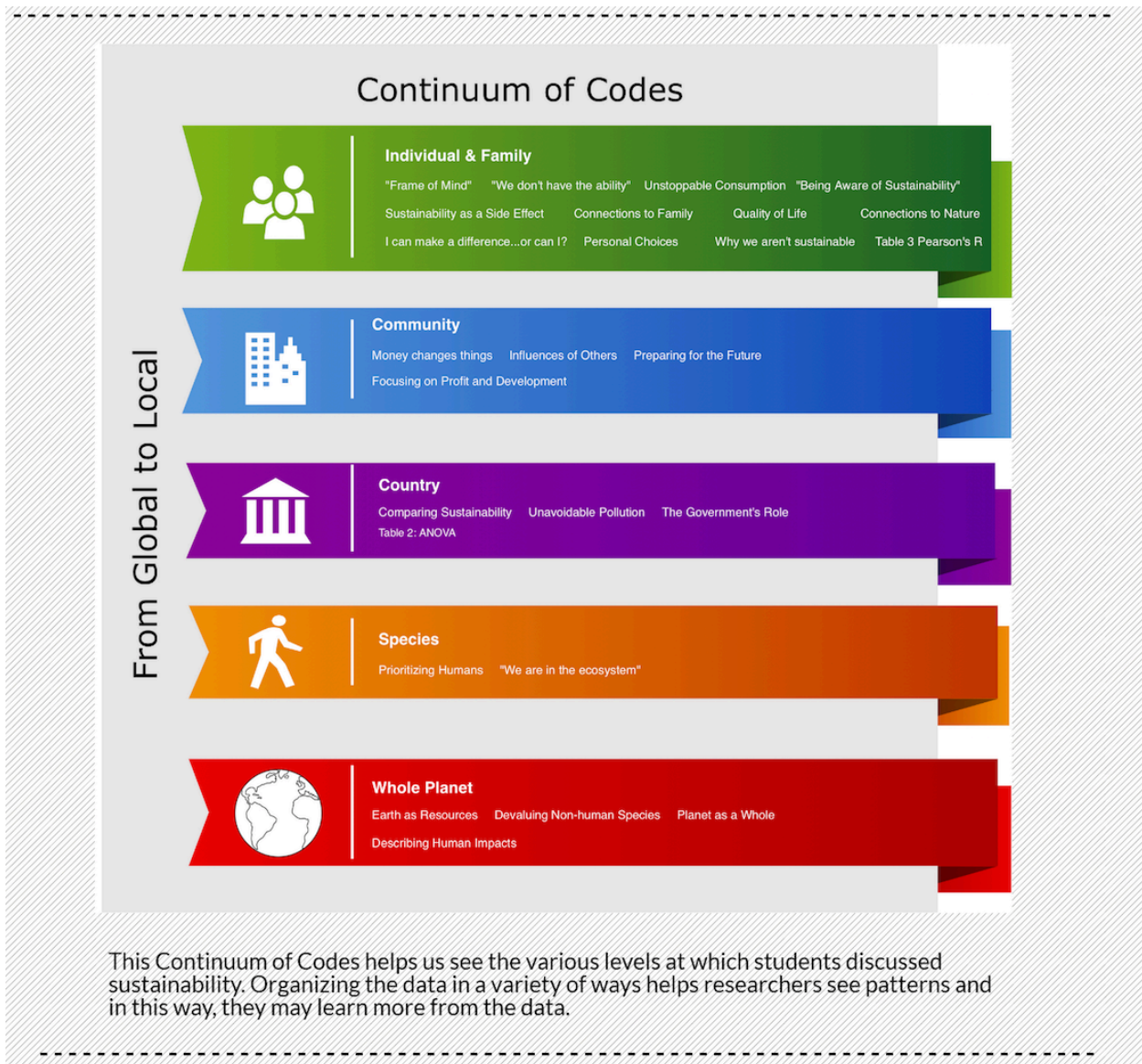
Categories Heat Diagram Legend	
Colour	# of Focused Codes
Red	20 +
Orange	15 - 19
Yellow	10 - 14
Green	5 - 9
Blue	0 - 4

This heat diagram helps us see which ideas were shared the most frequently in the data. The "hotter" a major code is, the more often it was brought up (see legend).

**Taxonomy of Categories & Major Codes:
Thinking about Sustainability & the Future**



This Taxonomy diagram helps us see how all the categories, sub-categories and major codes are connected and nested within each other.



Conclusions & Quotes



1

The first conclusion is that all of the major codes and categories are interconnected, and so are students ideas about sustainability.

One student said "I think it is a good start to be aware of [our] impacts , but after we learn more about sustainability and the consequences of our actions then we need to take real action." This quote was coded as 'Being aware of sustainability', 'Making Sustainable Choices' and 'Personal Choices'.

2

A second conclusion is that many students said they need a secondary reason to make sustainable choices; they thought that it would be unlikely for them to act sustainably just to preserve the environment.

Some of the secondary reasons shared by students are: taking the stairs instead of the elevator, which saves energy and is a form of exercise; taking the subway to SAT prep class instead of a taxi to save money and reduce CO2 emissions; purchasing a new car with lower emissions due to government incentives and taking the bus for convenience.



3

The third conclusion from this research is that while there were patterns between students responses regarding sustainability, different students had very different ideas about the environment and sustainability.

Thank you GCPS!

This research would not have been possible without the support of GCPS's amazing faculty and students. Special thanks go out to Dr. Murray, Ms. Li, Dr. Carson, Mr. Smith and all the Biology students who participated in the study.

Appendix D: Bilingual Questionnaire: Online Student Version**Part 1: Multiple Choice** 第一部分：单项选择题

1. I make decisions by placing the needs of my family and friends as the number one priority. 我在做决定时会首先考虑我家人和朋友的需求。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

2. I make decisions by placing my personal needs as the number one priority. 我在做决定时会首先考虑我个人的需求。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

3. I make decisions with my role in my community in mind.

我在做决定时会考虑我所在的社会团体中的其他人。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

4. I make decisions with my religious background in mind.

我在做决定时会考虑我的宗教背景。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

5. I make decisions without letting the ideas and opinions of others influence me.

我做决定时不会受到别人的影响。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

6. I make decisions keeping in mind the ideas and opinions of my family.

我做决定时会考虑家里的想法和意见。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

7. I am proud of the natural beauty that my country has to offer. 我为祖国的大好河山而骄傲。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

8. I regularly spend time outside in natural environments. 我经常走出户外亲近大自然。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

9. I believe that nature is valuable. 我认为大自然很宝贵。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

10. I have a good understanding of how the natural world works. 我非常了解大自然的规律。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

11. It is important to learn about nature. 了解大自然是很重要的。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

12. When I purchase new items I consider their environmental impact.

我购买新商品时会考虑它们对自然环境的影响。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

13. I always do my best to reduce my waste in any way possible.

我总是尽量减少产生的垃圾。

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

14. I consider the environmental impact of my methods of travel and make an effort to reduce them. 我在选择交通方式时会考虑对自然环境的影响并且努力减少对环境带来的不良影响

a) Strongly Agree 完全同意 b) Somewhat Agree 基本同意 c) Somewhat Disagree 不太认同 d) Strongly Disagree 完全不认同 e) Don't know 不知道

Part 2: Short Answer第二部分 简答题

(please respond in English) (请用英文回答)

15. To me, being sustainable means... (please respond in English)
对我来说, 可持续的生活方式意味着..... (请用英文回答)

16. I think being sustainable is important because...(please respond in English)
我认为可持续的生活方式很重要, 因为..... (请用英文回答)

Part 3: Demographic Information 人员身份信息

1. a) In what year were you born? 出生年份 b) In what month was that? 出生月份

2. With which gender do you identify? 性别

a) Male 男性 b) Female 女性 c) Other 其他 d) Prefer not to say 不愿透露

3. a) In which country were you born? (please respond in English) 出生国 (请用英文回答)

b) If you were not born in China for how many years have you lived in this country?
如果不是中国出生, 在中国生活了多少年

4. With which ethnic group(s) do you identify? (please respond in English)
你是什么民族? (请用英文回答)

5. In which country/countries were your parents born? (please respond in English)
你父母的出生国是哪里? (请用英文回答)

6. In general, would you consider your household income to be 你认为你的家庭收入情况是:

- a) Very comfortable 很富裕 b) Comfortable 富裕 / 舒适水平 c) Tight 紧张
d) Very Tight 很紧张 e) Poor 很贫穷

7. For how many years have you been studying in Western-style schools?
你接受了西式教育多少年

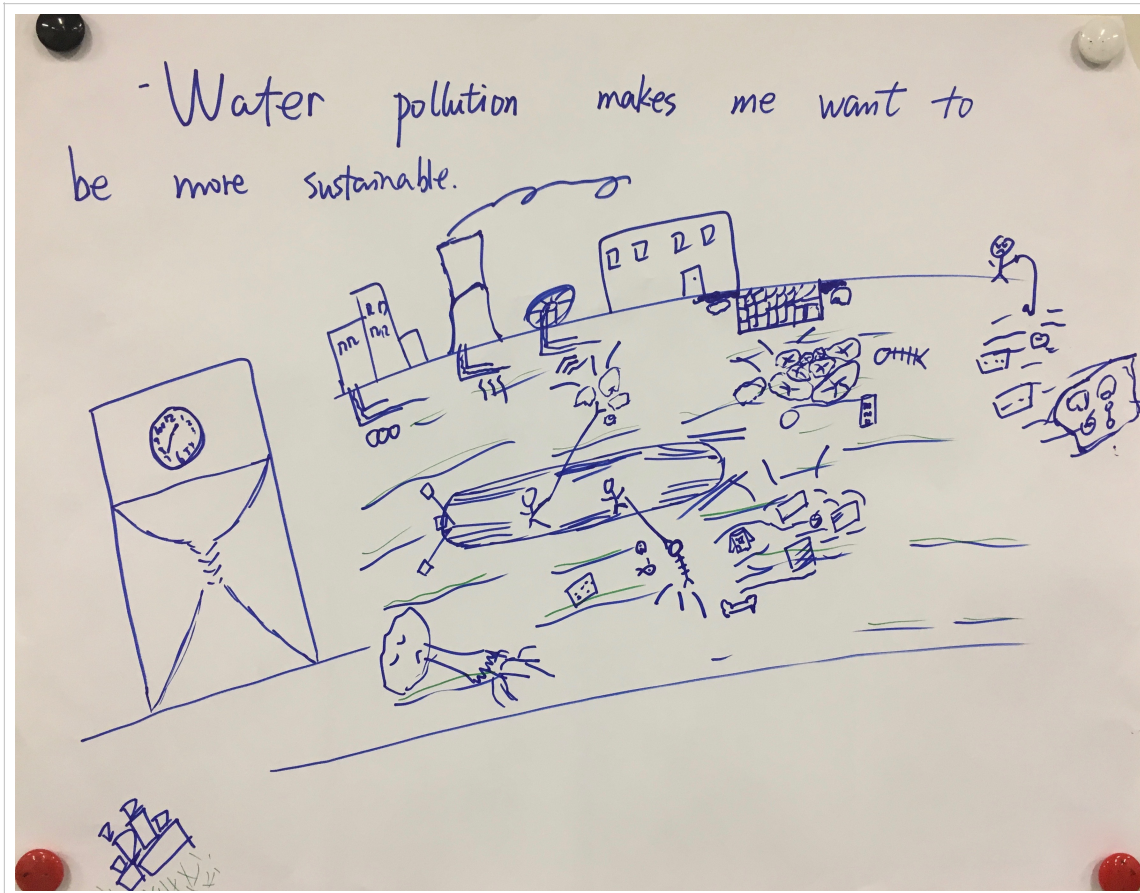
Appendix E: Large Image Size Student Focus Group Drawings

Figure 4. Reed's drawing from the focus group based on the prompt "_____ makes me want to be sustainable".

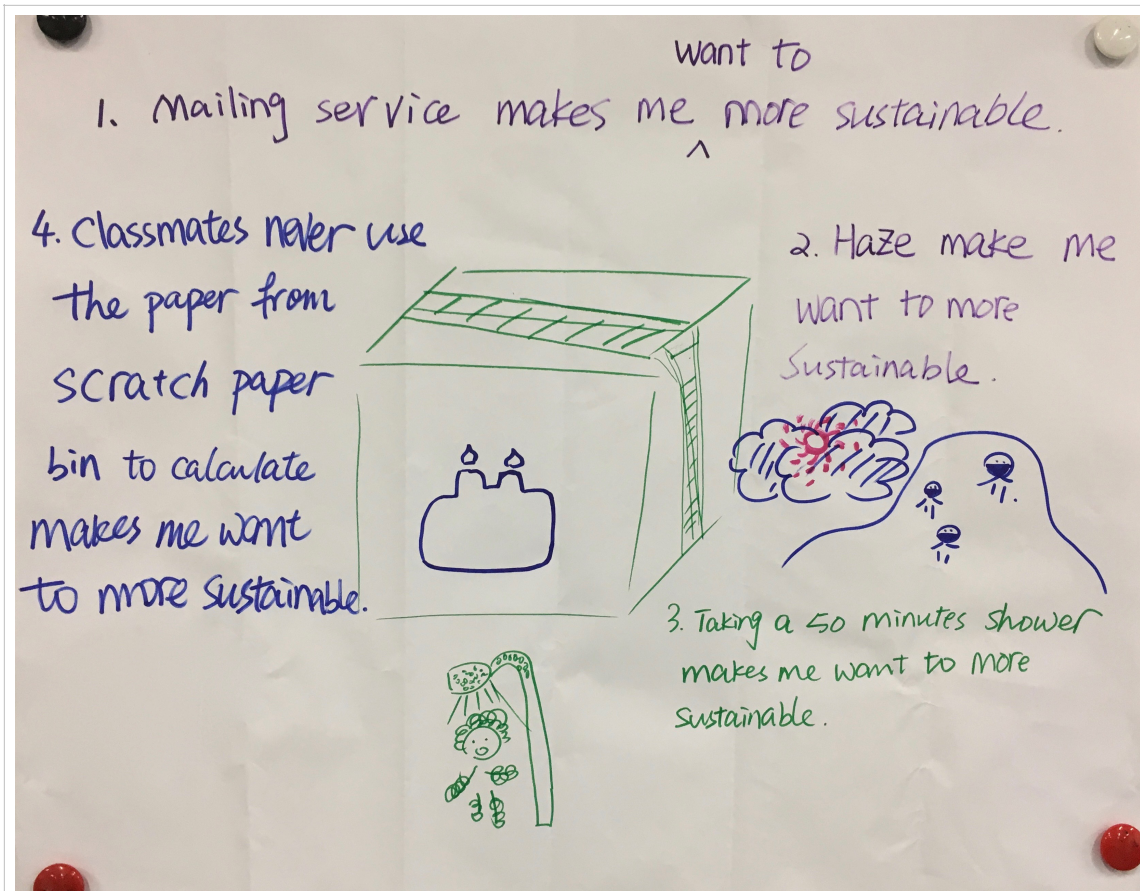


Figure 5. Kristie's drawing from the focus group.

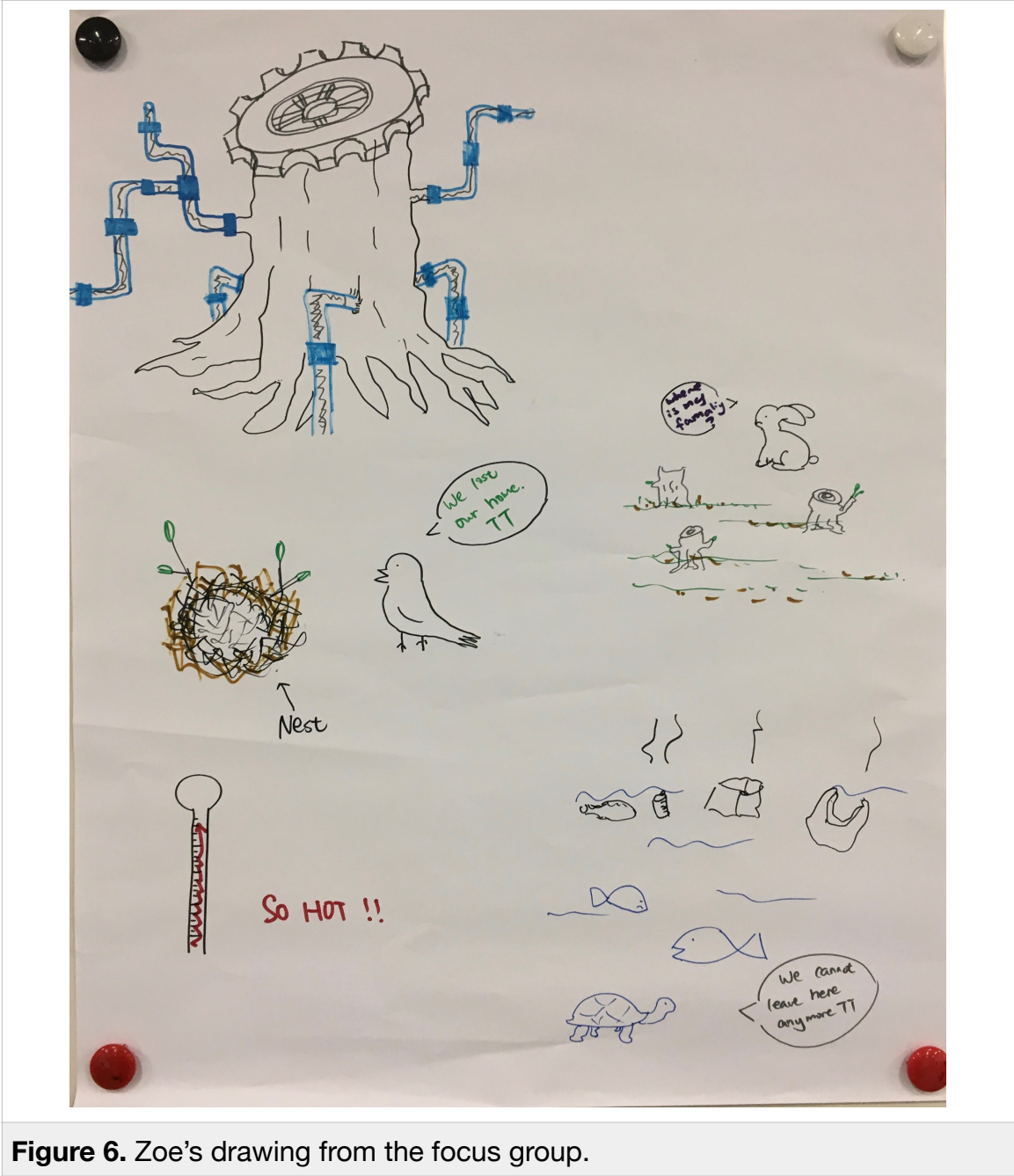


Figure 6. Zoe's drawing from the focus group.

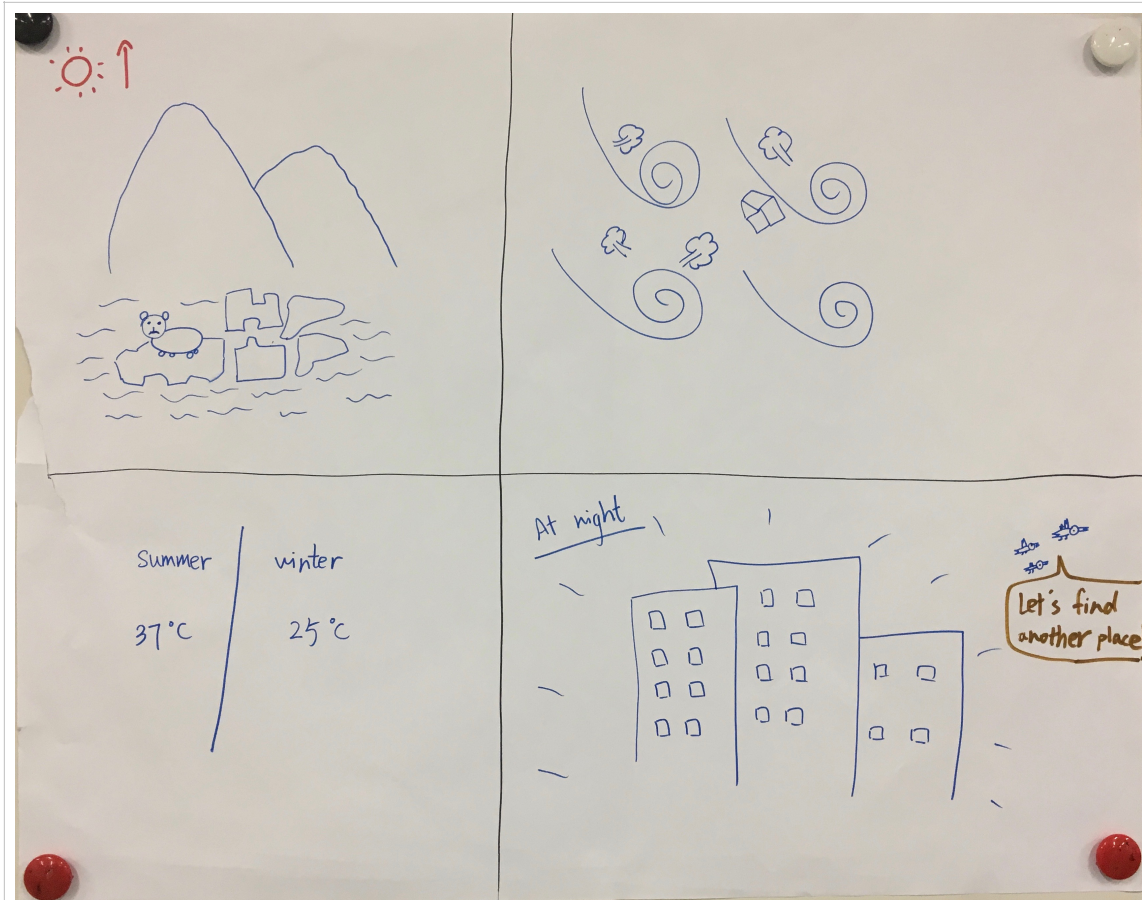


Figure 7. Vanessa's drawing from the focus group.

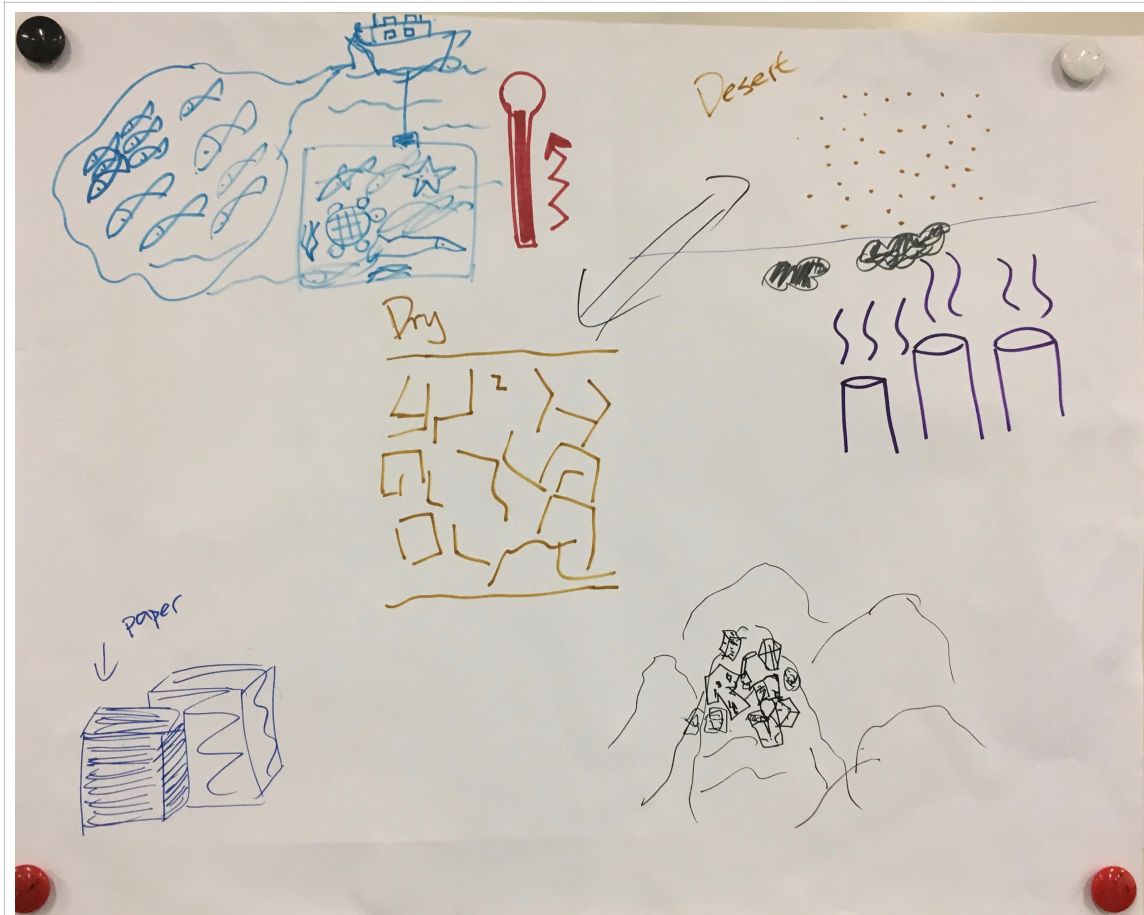


Figure 8. Jamie's drawing from the focus group.

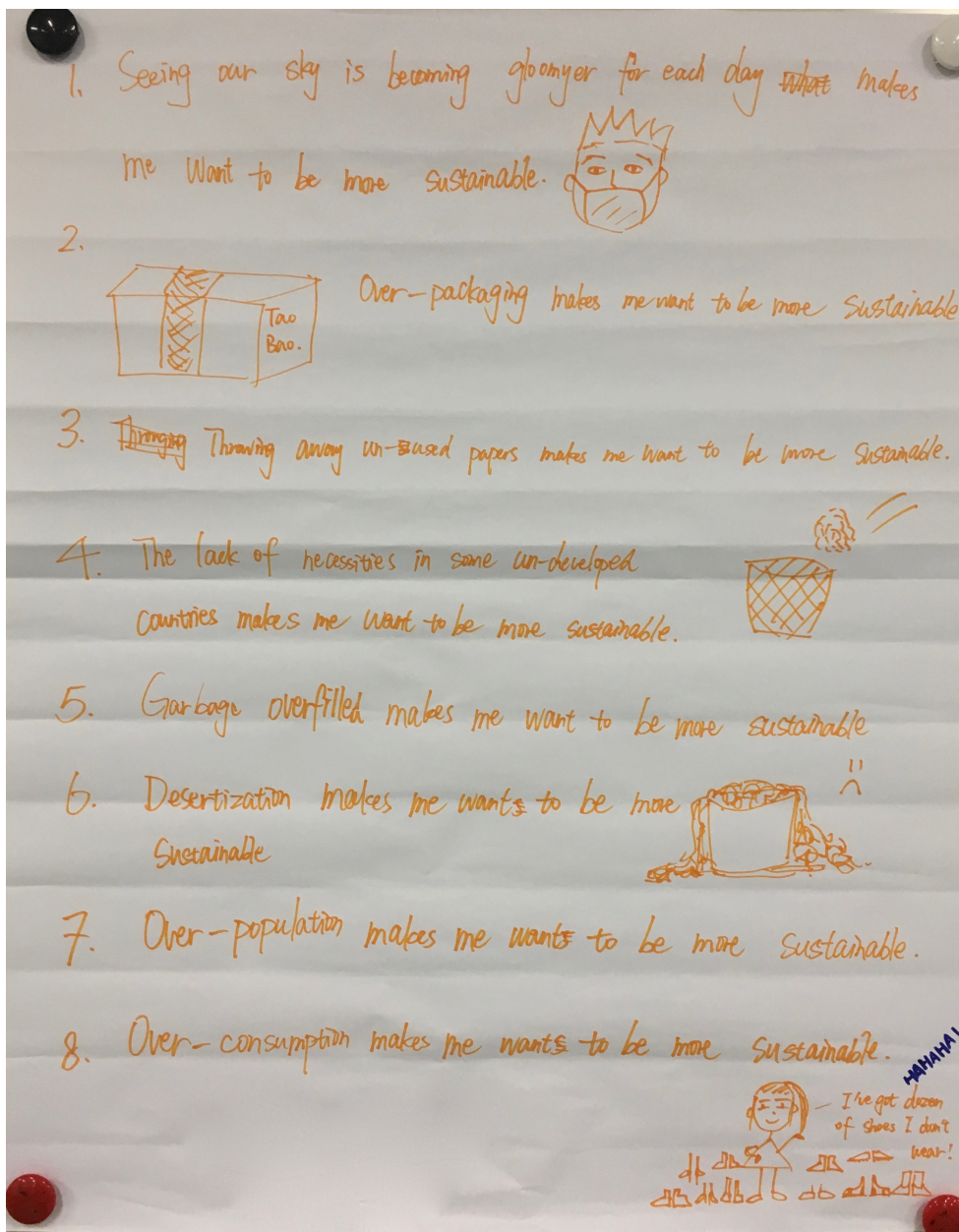


Figure 13. Fiona's drawing from the focus group.



Figure 14. Danny's drawing from the focus group.

Appendix F: Interview Scripts Round 1 and Round 2

GCPS Interview Script: 1st Round

Student: _____ Date and time: _____

1. During the focus group some people focused completely on the needs of human beings, why do you think that is?
 - humans more important?
 - humans separate from ecosystem?
2. Many people expressed the importance of being sustainable for future generations. Do you feel this way?
 - When do you think of your possible children and grandchildren?
 - Do you think your parents and grandparents considered you before you were born?
3. Most students listed a large number of environment impacts such as air pollution, deforestation and overfishing as what makes them “want to be more sustainable”. Why do you think that is?
 - We see these things, why don’t we change?
 - #1 issue in China is air pollution, how can we reduce it? Why don’t we?
4. In the survey and focus group some students mentioned that it is important to be aware of environmental impacts. What do you think about this?
 - Awareness does not necessarily lead to sustainability
 - Can you be sustainable without knowing why?
5. Some students have described an important event that changed the way they feel about the environment, have you experienced anything like that?
 - Zoe and birds
6. Can you tell about a time you made a sustainable choice? Why did you do that?
 - details
 - do your choices make a difference? Why?
7. Some people said they felt guilty about their choices, especially about the purchases they have made...have you ever felt like that? Can you tell me about it?
 - Why do you think guilt doesn’t stop you from doing it again?
 - Does everyone feels guilty about these things? Why?
8. How do you think Chinese students are different from their Western teachers in terms of environmentalism?
 - what matters most
 - which choices do they make

GCPS Interview Script: 2nd Round

Student: _____ Date and time: _____

1. Several students expressed the importance of being sustainable for future generations. Do you feel this way?
 - How does population size impact future sustainability?
 - Which is more important lifestyle choices or population size? Why?

2. Most students listed a large number of environment impacts such as air pollution, deforestation and overfishing as what makes them “want to be more sustainable”. Why do you think that is?
 - We see these things, why don’t we change?
 - #1 issue in China is air pollution, how can we reduce it? Why don’t we?

3. Some students have said that consumption, waste and making unsustainable choices are part of human nature, what do you think about that?
 - what about your parents/grandparents, would they agree?
 - history, example of grandma and the Depression

4. In the survey and focus group some students mentioned that it is important to be aware of environmental impacts. What do you think about this?
 - Awareness does not necessarily lead to sustainability
 - Can you be sustainable without knowing why?

5. Some students have described an important event that changed the way they feel about the environment, have you experienced anything like that?
 - Zoe and birds

6. Can you tell about a time you made a sustainable choice? Why did you do that?
 - details
 - do your choices make a difference? Why?

7. Many students have said that it is up to the government to change laws and make the people be more sustainable, what do you think about this?
 - be careful
 - will people listen?
 - how will it be reinforced?

8. How do you think Chinese students are different from their Western teachers in terms of environmentalism?
 - what matters most
 - which choices do they make

9. What does it mean to “try our best” to be sustainable?
 - Can you give me an example?

Appendix G: Codebook Excerpt

Thesis Code Book		
Focused Code	Category/Categories	Where to find it
A Allowing the ecosystem to adapt	Save the Earth! Ways of Thinking	Martha Interview
A being aware of impacts	Ways of Thinking Making Sustainable Choices	Questionnaire Q. 1
A Starting with awareness	Ways of Thinking Making Sustainable Choices	Zoe Interview
A always aware	Ways of Thinking Making Sustainable Choices	Questionnaire Q. 1
A Avoiding burning fossil fuels by keeping heat turned off	Ways of Thinking Making Sustainable Choices	Vivien Interview
A Adding pollution to the ecosystem through human involvement	Save the Earth!	Reed Interview
A aware at all times	Ways of Thinking Making Sustainable Choices	Questionnaire Q. 1
A admitting the difficulties of reversing environmental impacts	Save the Earth!	Reed Interview
A awareness of impacts	Ways of Thinking Making Sustainable Choices	Questionnaire Q. 2
A Awareness is a reasonable expectation	Ways of Thinking Making Sustainable Choices	Jamie Interview
A Stating that awareness does not necessarily lead to action	Ways of Thinking Making Sustainable Choices	Fiona Interview
A Placing importance on awareness	Ways of Thinking Making Sustainable Choices	Kristie Interview
A Adding up many small changes to a big change	Ways of Thinking Making Sustainable Choices Save the Earth!	Martha Interview
A Acknowledging that awareness does not always lead to sustainable choices	Ways of Thinking Making Sustainable Choices	Jamie Interview

Thesis Code Book		
Focused Code	Category/Categories	Where to find it
A unwilling to change simply based on awareness	Ways of Thinking Making Sustainable Choices	Danny Interview
A Assuming that humans are the priority	Ways of Thinking Humans as Priority	Martha Interview
A animals as an afterthought	Ways of Thinking Humans as Priority	Questionnaire Q. 2
A Lacking awareness in Chinese society	Ways of Thinking	Fiona Interview
A Acknowledging our small role in the environment	Save the Earth!	Focus Group Transcript
A abandoning Earth	Humans as Priority	Danny Drawing
A admitting to being selfish	Ways of Thinking	Danny Interview
B better for 'our environment'	Humans as Priority Equal Opportunities for Future Generations	Questionnaire Q. 1
B Becoming more affluent and wanting more things	Ways of Thinking Making Sustainable Choices	Kristie Interview
B Businessmen and economists focusing on profits rather than the environment	Ways of Thinking Humans as Priority	Fiona Interview
B breaking the ecosystem	Save the Earth!	Focus Group Transcript
B blaming fear	Ways of Thinking	Danny Interview
B blaming human actions for climate change	Save the Earth!	Focus Group Transcript
B Blaming human nature	Ways of Thinking It's Inevitable	Reed Interview
B Blaming human nature for waste production	Ways of Thinking It's Inevitable	Annie Interview

Thesis Code Book		
Focused Code	Category/Categories	Where to find it
B blaming corporations and their focus on profits	Ways of Thinking It's Inevitable	Focus Group Transcript
B Being aware of your consumption	Thinking Locally	Focus Group Transcript
B Becoming lazy is part of human nature	Ways of Thinking It's Inevitable	Kristie Interview
B Blaming selfishness and a lack of courage for not changing behaviours	Ways of Thinking Making Sustainable Choices	Vivien Interview
B Borrowing someone's water bottle to avoid buying bottled water	Making Sustainable Choices	Fiona Interview
B buying a low emission car due to government incentives rather than desire to be sustainable	Ways of Thinking Thinking Locally Making Sustainable Choices	Danny Interview
B Buying unnecessary things	Making Sustainable Choices	Zoe Interview
B Being more aware of environmental issues due to increased seriousness of impacts	Ways of Thinking Making Sustainable Choices	Jamie Interview
C cautioning the government from becoming too extreme	Ways of Thinking Thinking Locally	Danny Interview
C Choosing lifestyle as having more impact than population size	Ways of Thinking	Kristie Interview
C Copying others to be more sustainable	Ways of Thinking Making Sustainable Choices	Vivien Interview
C Considering mother's influence when it comes to sustainability	Ways of Thinking Making Sustainable Choices	Fiona Interview
C Creating air pollution is unavoidable	It's Inevitable	Reed Interview
C Carelessly using resources (Americans)	Ways of Thinking Making Sustainable Choices	Danny Interview

Thesis Code Book		
Focused Code	Category/Categories	Where to find it
C Having trouble considering impacts on your individual life from your choices	Ways of Thinking Making Sustainable Choices	Reed Interview
C children putting things in perspective	Ways of Thinking Making Sustainable Choices	Kristie Interview
C Considering the impacts of population size	Ways of Thinking Making Sustainable Choices	Kristie Interview
C complaining about the government while following the law	Ways of Thinking Thinking Locally Making Sustainable Choices	Danny Interview
C with humans as king to unhealthy planet with dead humans at the top	Save the Earth! Humans as Priority	Annie Drawing
C CO2 production awareness	Ways of Thinking Making Sustainable Choices	Questionnaire Q. 1
C Creating a better environment for future generations	Equal Opportunities for Future Generations	Zoe Interview
C Caring about resource use (Chinese) vs. caring about the “big picture” (Western)	Ways of Thinking	Fiona Interview
C comparing northern China and southern and water use, “It’s not fair”	Ways of Thinking	Kristie Interview
C Changing perceptions based on travel experience	Making a Personal Connection	Jamie Interview
C Claiming the earth as “our” home	Save the Earth! Humans as Priority	Zoe Interview
C comparing sustainability vs. convenience	Thinking Locally	Focus Group Transcript
C Choosing a more wasteful life due to comfort	Making Sustainable Choices	Annie Interview

Thesis Code Book		
Focused Code	Category/Categories	Where to find it
C Considering the environment of offspring	Equal Opportunities for Future Generations	Jamie Interview
C Comparing paper waste in Chinese vs. Western schools	Ways of Thinking	Kristie Interview
C Comparing the ease of life now to the challenges of the past	Equal Opportunities for Future Generations	Kristie Interview
C Catching birds for Chinese medicine	Humans as Priority Making a Personal Connection	Zoe Interview
C concern about the imminence of environmental changes	Equal Opportunities for Future Generations Thinking Locally	Danny Interview
C Considering opportunities for future generations	Equal Opportunities for Future Generations	Vivien Interview

Appendix H: Table of Codes

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Making Sustainable Choices	“being aware of sustainability”	Questionnaire Q.1 x 4 Questionnaire Q.2 x1 Zoe interview Jamie interview Fiona interview Kristie interview Danny interview Reed Interview Focus Group Transcript Vanessa Interview	<p style="text-align: center;">in Vivo code</p> <ul style="list-style-type: none"> - awareness is an important place to start and is a reasonable expectation, although it does not necessarily lead to actions - environmental impacts leading us to be more sustainable - focusing on China’s pollution - lacking awareness you can still be sustainable - lacking education to make sustainable choices - motivating people with the severity of environmental problems - needing a purpose to be sustainable - problem-solving at the source - reminding us of the impacts of our choices - thinking about sustainability before making purchases and other choices
Making Sustainable Choices	“It’s complicated”	Reed Interview Danny Interview	<ul style="list-style-type: none"> - having trouble considering impacts on your life from your choices - feeling by surprised by the waste produced (buying a book online) - struggling to understand our choices
Making Sustainable Choices	Sustainability as a side benefit	Danny Interview Danny drawing Zoe Interview Reed Interview Annie Interview Vanessa Interview	<ul style="list-style-type: none"> - price of gasoline - buying low emission car due to incentives - focusing on other benefits like money or reducing waste - convince of reusing plastic bags - taking public transit for convenience rather than sustainability

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Making Sustainable Choices	Actions taken	Vanessa Interview Fiona Interview Jamie Interview Questionnaire Q.1 Focus Group Transcript	<ul style="list-style-type: none"> - avoiding burning fossil fuels by keeping heat turned off - borrowing someone's water bottle - focusing on consumption and sustainability (deliveries) - reduce my waste and consumption - reaching out to students about conservation
Making Sustainable Choices	Consumption: needs vs. wants	Zoe Interview Fiona Interview Questionnaire Q.1 Fiona drawing	<ul style="list-style-type: none"> - buying unnecessary things - minimizing personal needs - overconsumption drawing
Making Sustainable Choices	Influences of Others	Vanessa Interview Kristie Interview Zoe Interview Danny Interview Focus Group Transcript Jamie Interview	<ul style="list-style-type: none"> - copying others - mother's influence - reducing clothing waste in the family - forcing people to live sustainably - influences of society - passing along the inspiration to others
Making Sustainable Choices	Why we aren't sustainable	Focus Group Transcript Annie Interview Danny Interview Zoe Interview Fiona Interview Kristie Interview Questionnaire Q.1 Jamie Interview	<ul style="list-style-type: none"> - convenience vs. sustainability - choosing a more wasteful life due to comfort - describing unequal dedication in society - doing it "one more time" - waiting for others to "do it" - reflecting after the fact - struggling to change behaviours - requiring sacrifices in quality of life - separating big problems from individual actions - struggling to see the consequences of our choices - telling yourself not to do it again and then forgetting about your resolutions

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Making Sustainable Choices	Feeling Guilty	Jamie Interview Zoe Interview Martha Interview Danny Interview Danny drawing	<ul style="list-style-type: none"> - feeling guilty about waste - fighting between desire and guilt - refusing to forgive fellow students for wasting water - severity of guilt is not sufficient to last - trying to explain choices to future generations
Save the Earth!	“we are in the ecosystem”	Martha Interview Jamie Interview Questionnaire Q.2 Focus Group Transcript Danny Interview Questionnaire Q.1	<p style="text-align: center;">in Vivo code</p> <ul style="list-style-type: none"> - living on Earth is the only option right now - we rely on the ecosystem - equating human importance with that of other organisms - fighting against nature - understanding the importance of the environment
Save the Earth!	planet as a whole	Questionnaire Q.2 Reed Interview Focus Group Transcript Annie Interview Zoe Interview Jamie Interview	<ul style="list-style-type: none"> - adding pollution to the ecosystem through human involvement - admitting difficulties of reversing impacts - acknowledging our small role in the environment - describing the earth as a responsive system - balance of ecosystems - emphasizing interconnectedness - placing value on every organism - thinking locally in previous generations
Save the Earth!	Describing human impacts	Focus Group Transcript Zoe Interview	<ul style="list-style-type: none"> - blaming human actions for climate change - breaking the ecosystem - focusing on pollution caused by humans - impacting other species -

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Ways of Thinking	Comparing Sustainability	Kristie Interview Fiona Interview Danny Interview Annie Interview Vanessa Interview Zoe Interview Martha Interview	<ul style="list-style-type: none"> - Western vs. Chinese - Northern China vs. Southern China - priorities and resource availability - present vs. past - shifting priorities with time and between generations - uneven resource sharing between countries
Ways of Thinking	Money Changes Things	Kristie interview Annie Interview Zoe Interview Focus Group Transcript Jamie Interview	<ul style="list-style-type: none"> - becoming more affluent and wanting more things - equating money with hope - equating power and wealth with unsustainable behaviour - feeling safe enough to be wasteful - having the right to spend hard-earned money how you wish (rich people)
Ways of Thinking	Earth without humans	Danny Drawing Reed Interview Questionnaire Q.2	<ul style="list-style-type: none"> - spaceship to leave the planet - earth continuing without humans - environment does not need humans
Ways of Thinking	Personality and Human Nature	Danny Interview Reed Interview Annie Interview Kristie Interview Vanessa Interview Questionnaire Q. 1 Focus Group Transcript Fiona Interview Martha Interview	<ul style="list-style-type: none"> - admitting to being selfish - blaming fear - blaming human nature - becoming lazy - waste production by humans - selfishness and lack of courage - describing consumption as part of human nature - feeling happy with what you have - frame of mind - identifying human caring and effort as key to being sustainable - labelling people as selfish - unconsciously believing that humans are more advanced

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Ways of Thinking	The government's role	Danny Interview Questionnaire Q.1 Kristie Interview Annie Interview Vanessa Interview Fiona Interview	<ul style="list-style-type: none"> - cautioning the government from being too extreme - complaining about the gov while following the law - forced cooperation - looking to the government to make new policies and enforce them - government helping to clean the air by relocating factories outside of Beijing - feeling the government should protect the environment - looking to scientists and the government to solve environmental problems - looking to the government to bring awareness, but to people to protect the environment
Ways of Thinking	Lifestyle vs. Population Size	Kristie Interview Annie Interview Focus Group Transcript Martha Interview Fiona Interview	<ul style="list-style-type: none"> - lifestyle has more impact - considering impacts of population size - inevitability of using resources regardless of lifestyle - problematizing consumer culture - suggestion that increased population size has removed us from the ecosystem - prioritizing lifestyle
Ways of Thinking	Passing the buck	Fiona Interview Jamie Interview	<ul style="list-style-type: none"> - starting with small things and leaving big issues to older people - relying on other's to solve the problems
Humans as Priority	Earth as Resources	Questionnaire Q. 1 Questionnaire Q.2 Focus Group Transcript Martha Interview Fiona Drawing	<ul style="list-style-type: none"> - wasting resources through over-packaging - disappearing resources - running out of resources to match our demand - uneven resource sharing between countries

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Humans as Priority	Prioritizing Humans	Focus Group Transcript Vanessa Interview Danny Interview Annie Interview Questionnaire Q.2 Martha Interview Annie drawing Jamie Interview Zoe Interview Questionnaire Q.1	<ul style="list-style-type: none"> - humans at the top of the ecosystem - human consumption over species survival (eel) - protecting humans as the environment changes - protect humans from extinction - allowing the ecosystem to adapt to our changes - humans as king to unhealthy planet - emphasizing death of humans - environment is for human use - environmental benefits are secondary to human benefits - focused on humans - focusing on pollution caused by humans - losing our place as the dominant species
Humans as Priority	Devaluing non-human species	Questionnaire Q.2 Zoe Interview Focus Group Transcript Vanessa Interview	<ul style="list-style-type: none"> - animals as afterthought - catching birds for Chinese medicine - describing importance of species for human needs and diversity - focusing on loss of a wonderful experience for humans, but ignoring the loss of life for jellyfish
Humans as Priority	Claiming the Earth as “ours”	Questionnaire Q.1 Zoe Interview Questionnaire Q.2	<ul style="list-style-type: none"> - better for ‘our’ environment - “our home” - habitat loss for humans
Humans as Priority	Impacts on me	Danny Interview Focus Group transcript Kristie Interview	<ul style="list-style-type: none"> - concern about the imminence of environmental changes - identifying impacts on humans from light pollution - physically feeling the environmental impacts
Making a Personal Connection	Personal Choices	Questionnaire Q. 1 Martha Interview Zoe Interview Focus Group Transcript Annie Interview Kristie Interview Questionnaire Q. 2	<ul style="list-style-type: none"> - Constant reflection on personal choices - forgiving herself for food waste - focusing on small, local issues - individual actions - individual responsibility - making small changes in daily life - using strategies to reduce shower time and water waste

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Making a Personal Connection	I can make a difference..or can I?	Martha Interview Jamie Interview Fiona Interview Vanessa Interview Annie Interview Kristie Interview	<ul style="list-style-type: none"> - many small changes adding up to a big change - devaluing individual actions - emphasizing difference being made over time - feeling that her choices do make a difference - feeling alone in caring about the enviro - valuing small choices in making a small difference
Making a Personal Connection	Sharing a Story	Danny Interview Reed Interview Jamie Interview Focus Group Transcript Kristie Interview Zoe Interview	<ul style="list-style-type: none"> - wanting to try eel before it goes extinct - changing perceptions based on travel experiences - destroying beauty for profit - describing changes in the river - changes in Beijing's air quality between visits - Jenny visits the desert - noticing pollution for the first time - wanting to learn why the enviro changes
Making a Personal Connection	Connections to Family	Fiona Interview Kristie Interview Zoe Interview Fiona Interview Reed Interview	<ul style="list-style-type: none"> - considering mother's influence - children putting things into perspective - feeling uncomfortable about father's over consumption - looking to grandparents experiences as cause for sustainable choices - reusing plastic bags because Grandma says
Making a Personal Connection	Connection to Nature	Danny Interview Jamie Interview	<ul style="list-style-type: none"> - lacking experience with environmental phenomena - spending time inside impacting appreciation of nature

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Opportunities for Future Generations	Focusing on Profit and Development	Fiona Interview Focus Group Transcript Questionnaire Q.1 Questionnaire Q.2 Kristie Interview Reed Interview Danny Drawing Annie Interview Reed Interview	<ul style="list-style-type: none"> - businessmen and economists focusing on profits rather than the environment - blaming corporations and their focus on profits - development is key - fines are too low to motivate factory owners - factories are still going despite lack of people - increasing consumption for economic benefits - propaganda from corporations - requiring supervision of factories to make it work - strengthening China in a global context
Opportunities for Future Generations	Quality of Life	Kristie Interview Zoe Interview Jamie Interview Vanessa Interview Focus Group Transcript Fiona Interview Annie Interview Questionnaire Q.2 Reed Interview	<ul style="list-style-type: none"> - children putting things into perspective - creating a better environment for future generations - considering the enviro of offspring - considering opportunities for future generations - current and potential air pollution - knowing what it feels like to have little makes you consume less and save more - living in the countryside in poverty - money can't buy a good environment - seeing/talking about pollution reminds him of the future

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
Opportunities for Future Generations	Preparing for the Future	Reed Interview Kristie Interview Jamie Interview Zoe Interview Focus Group Transcript Q. 1 Questionnaire Q.2 Questionnaire Vanessa Interview Reed Interview Fiona Interview	<ul style="list-style-type: none"> - educating a new generation about the environment - education impacting a child for life - fearing severe environmental degradation in the future - relying on technology to fix things - struggling to think too far into the future - considering children and grandchildren - tasking humans to solve the problems - taking responsibility for environmental impacts and fixing the planet - teaching the next generation to be sustainable - taking real action
It's Inevitable	Unavoidable Pollution	Reed Interview Focus Group Transcript Martha Interview Kristie Interview	<ul style="list-style-type: none"> - creating air pollution in unavoidable - inevitability of waste production - lacking control over packaging or other choices that affect sustainability - requiring cars for lifestyle - releasing pollution is inevitable for China's success
It's Inevitable	Unstoppable Consumption	Annie Interview Fiona Interview Reed Interview Martha Interview Focus Group Transcript	<ul style="list-style-type: none"> - describing consumption as part of human nature - feeling that it's impossible to stop online shopping - inevitability of using resources regardless of lifestyle - needing plastic bags in daily life - needing resources to live - validating the need for purchases

Table of Codes			
Category	Major Code	Source(s)	Examples/early codes
It's Inevitable	"It's too late"	Annie interview Danny Interview Focus Group Transcript Vanessa Interview	<ul style="list-style-type: none"> - feeling that if one person acts more sustainable then other's unsustainable choices will replace theirs - feeling its too late to make a difference - difficulty of recreating complex ecosystems - inevitably of being destroyed - lacking the ability to change our behaviour

Appendix I: Sample Category Organization Table - 'It's Inevitable'

It's Inevitable Codes and Quotes			
Category	Major Codes	Source(s)	Examples/early codes
It's Inevitable	Unavoidable Pollution	Reed Interview Focus Group Transcript Martha Interview Kristie Interview	<ul style="list-style-type: none"> - creating air pollution in unavoidable - inevitability of waste production - lacking control over packaging or other choices that affect sustainability - requiring cars for lifestyle - releasing pollution is inevitable for China's success
			<p>Interviewer: Okay, um, do you think population size has an impact on future sustainability? #00:01:19-3#</p> <p>Kristie: Yes I think so cause like there is like 1.4 billion of people in China, yeah. Yes, and the area of China is like American, right? Yes, it's almost the same, but America only have 0.4 billion? Yeah, kind of like that. And so I think it's impact a lot, like we can only live in the apartment and uh, if there is 1.4 billion of people, um, when people become, like, <u>they earn more money right now so they want to buy their car in order to like to go to the school, go to the work, the company so they have to buy cars and they release a lot of carbon dioxide and they order delivery</u>, especially the delivery I think is the really important problem in China. Like, in the company there is maybe a 1000 of people in here, in uh, in the company and they have to order the delivery every afternoon, like lunch, for lunch or for dinner. Yes, because they are lazy to go out to, to, to get food or search for food, yeah, they can just call delivery. #00:02:38-0#</p>
			<p>interviewer: Why do you think when we feel guilty about something, um, like ordering um, what was it, uh, Kristie was talking about a lipstick she ordered on Tao Bao and the box was this big and all of the packaging and she was saying how she felt guilty for all the waste, but she says she still buys lipsticks because she still wants them. So why do you think when we feel guilty about things, we, it doesn't stop us from doing them again? #00:21:35-1#</p> <p>Martha: Um, because, (laughing) um, ah, I think there is two reason one is because like me, ourselves cannot stop that wasting like, uh, for that person you are like uh, you are stating like <u>she cannot control the packaging</u>. She, like she feels guilty about wasting that's true, but uh, but <u>she cannot control the person that is packaging her lipstick to like, to be more sustainable</u>. And for the second reason is that, um, its our nature or its our habit to like sometimes waste some food and every, everyone and everyone does this, everyone wastes food daily. Like the wolves only eat part of the animal they killed and uh, they just leave it right there, that's I mean that's kind of nature of, like our organisms. #00:22:42-5#</p>
			<p>interviewer: Okay, um, do you think humans are separate from the rest of the ecosystem? #00:01:00-7#</p> <p>Reed: I, I don't think so because, um, humans are involved in the ecosystem actually and we, we contribute to the ecosystem in some way and pollution is kind of an example. #00:01:19-2#</p>

It's Inevitable Codes and Quotes			
Category	Major Codes	Source(s)	Examples/early codes
			<p>interviewer: Okay, um, so we see things like air pollution in China, we see deforestation in other parts of the world, why do you think we don't change our habits after we see those things? #00:05:35-9#</p> <p>Reed: Um, for air pollution, uh, I think people can know avoid this happen because they have to go outstairs and they have to drive cars or take, at least take some transportations like buses or taxis. And to keep this country or the industry going they have to have industry so <u>the air pollution cannot be avoid</u>. #00:06:14-6#</p>
			<p>Danny: But actually like consider what we are using to make those tablets like we are using heavy metals and we are using plastic, mostly plastic and uh...consider how many gasoline we have to, like they use in the power to assemble this machines and ok #00:30:37-0#</p> <p>Kristie: Also the electronic devices (laughing) for example also I change the car, I change the phone, like every two years and my older phone was just live in my work drawer and uh, let it die. And my mother #00:30:53-6#</p> <p>Danny: Leave it forever? #00:30:53-6#</p> <p>Kristie: And I have no idea how to deal with it and I have a lots of wasting phones (laughing) and nobody and when I call Apple they say "Oh, ok, oh, I'm sorry you just, just leave it there...like they don't really care about how to recycle those phones. #00:31:09-7#</p> <p>Danny: Yeah, the companies they only care about their profit they are just trying to sell as much like, as many product as they can to you and they don't care what you do with those product. #00:31:20-7#</p>
			<p>Kristie (in Focus group): So its kind of like if we are going to live on this planet we are going to have some, like waste. Because the technology is really advanced right now so. #00:27:50-8#</p>
It's Inevitable	Unstoppable Consumption	Annie Interview Fiona Interview Reed Interview Martha Interview Focus Group Transcript	<ul style="list-style-type: none"> - describing consumption as part of human nature - feeling that it's impossible to stop online shopping - inevitability of using resources regardless of lifestyle - needing plastic bags in daily life - needing resources to live - validating the need for purchases

It's Inevitable Codes and Quotes			
Category	Major Codes	Source(s)	Examples/early codes
			<p>Interviewer: Okay, um. Thank you. Okay, some students said that consumption, waste and making unsustainable choices are part of human nature. What do you think about that? #00:05:11-7#</p> <p>Fiona: I think so. (laughing) Because I think human are all, like, they only care about themselves in some instance, like they are buying, ah, like our industrial about online shopping is very, like, um, very hot. So we, like, girls like me always buy things from internet, like make-ups and stuff like that and over-packaging is a huge topic on, on this industry I think. So it provide a lot of garbage on this, in this industrial so <u>I think it is very, but we cannot change it, right, we cannot like, to stop buying from the internet. It is not possible.</u> #00:06:00-6#</p>
			<p>Annie: Um, I still believe that population is more important,(incomprehensible) than environment. #00:02:54-0#</p> <p>Interviewer: Why do you think so? #00:02:56-2#</p> <p>Annie: Cause even if you want to try to live in a sustainable life you still need to consume something and make, uh, and make like carbon dioxide and still pollute environment but if you have a lower populations then it will decrease the ways human make, so you can protect the environment. #00:03:26-7#</p>
			<p>interviewer: Okay. Do you think that the choices you make make a difference? #00:10:51-8#</p> <p>Reed: Make what difference? #00:10:55-0#</p> <p>interviewer: A difference in terms of the earth being less polluted, less bad. #00:11:01-2#</p> <p>Reed: I don't know because I think other bag production is very large people keep using them even though the government try to raise the price of the bag and that cannot avoid having. #00:11:19-3#</p>

It's Inevitable Codes and Quotes			
Category	Major Codes	Source(s)	Examples/early codes
			<p>Martha: Um, uh, I think its not that we don't want to be sustainable but it just our demands are too much. We have like a very large population compared to any other organisms in the planet but uh, but due to that our supplies do not very much, uh, match our demand. #00:09:33-3#</p> <p>interviewer: What kind of demands do you mean? #00:09:35-0#</p> <p>Martha: Resources, um, to by them, I mean like, to raise a child or <u>to like make yourself, make yourself survive in this world you may need, um, many resources to, either to trade, to consume or to like to generate energy for everybody else's daily needed. I think its a large, very large demand.</u> Um, I think the governments all the governments thought about like sustainability and how we can do to regenerate the energy, but uh, I think they take many actions, but that. But it didn't solve the problems because the energy is less and less because like oil and coal, some energy just can't be regenerate in a short time so our demand is very large, larger than our, uh, larger than our daily supplies. That, uh, our sustainable supplies so that, <u>I think thats why we can't, like stop consuming energy because we need it.</u> #00:10:54-8#</p>
			<p>Annie: If you buy food from the store we also lose the environment because we have to take the transportation and also release the carbon dioxide. #00:25:57-2#</p> <p>Danny: But most of this transportation are public transportation for example metros and buses. #00:26:02-5#</p> <p>Annie: Yeah, but some people, some people have a car and drive to this place and just release the carbon dioxide also people, uh, take the plastic bag for the food. #00:26:14-9#</p> <p>Kristie: <u>You can't just stay home and buy nothing, you can't just stay in your home you have to go out and buy something.</u> #00:26:23-0#</p>
			<p>Jamie (in focus group): ...And also, uh, air pollution as mentioned before and also, like nowadays we buy many things, but we don't actually like, need them, we just, they just, they are what we want. And so, uh, for example the clothes or some like, uh, things that are not our necessities we always want to buy them and then, at the end we just waste them. And it costs a lot of waste, which cause a serious problem with like, landfill or there is no space on Earth that people, that we can put our waste, uh, in. So, seeing the mountains with all waste make me want to be more sustainable....</p>

It's Inevitable Codes and Quotes			
Category	Major Codes	Source(s)	Examples/early codes
It's Inevitable	"It's too late"	Annie interview Danny Interview Focus Group Transcript Vanessa Interview Reed Interview	<ul style="list-style-type: none"> - feeling that if one person acts more sustainable then other's unsustainable choices will replace theirs - feeling its too late to make a difference - difficulty of recreating complex ecosystems - lacking the ability to change our behaviour - it's hard to repair the environment
			<p>Interviewer: Um, like we see the air pollution or other problems and we know they are happening, but it doesn't make us change our behaviour, we still do the same things. Do you have any idea why that might be? #00:07:27-4#</p> <p>Vanessa: Uh, because we don't have the ability. #00:07:33-0#</p> <p>Interviewer: Um, okay, can you give me an example of that? #00:07:40-7#</p> <p>Vanessa: Um, um, like we are still students learning and I think this problems may be can solved by the um, scientists or the people in government so we don't need to change anything. #00:08:01-5#</p>
			<p>Interviewer: The choices that you make, do you think they make a difference in terms of the environment? #00:16:11-8#</p> <p>Annie: (Sigh) No. #00:16:10-2#</p> <p>Interviewer: Because? #00:16:12-0#</p> <p>Annie: Cause, even if I don't take the taxis and don't pollute that much, and don't pollute the air condition, the air atmosphere, but besides me somebody is in this world will still take the taxis and release the carbon dioxide so it doesn't make any difference. #00:16:36-8#</p>
			<p>interviewer: That's ok. Um, do you think your choices make a difference? #00:13:26-8#</p> <p>Danny: I think some degree, yes because um, well for example, like the public transportation and the buying a car with less carbon emission will help the environment in some degree yet we have to be careful because sometimes something else we do like for example like turning on the lights or something for all day is also waste of energy. Maybe, all our efforts putting on this being sustainable just wasted because we forgot. #00:13:59-2#</p>

It's Inevitable Codes and Quotes			
Category	Major Codes	Source(s)	Examples/early codes
			<p>interviewer: How do Americans think what sustainable is? Well, I'm not American, I'm Canadian. #00:00:04-7#</p> <p>Danny: I know. #00:00:07-1#</p> <p>interviewer: But I think a lot of westerners think of sustainable as very direct acts they can do, like they can recycle, they can buy things, but they don't think about it as their whole life. They think of it as like separate little things that they can do. I think that a lot of people feel like we've gone, we're too far gone, the environment is already messed up, so why bother trying. #00:00:30-1#</p> <p>Danny: It's kind of, I agree to that. (laughing) #00:00:32-2#</p> <p>interviewer: Yeah? #00:00:33-4#</p> <p>Danny: I agree. #00:00:33-4#</p> <p>interviewer: It's so sad though, cause then... #00:00:36-1#</p> <p>Danny: I think its too late, you know. (laughing) #00:00:36-9#</p>
			<p>Reed: Well, I think in China they don't care about environment in the past years because the government just focus on economic growth and expansion industry. They want to save a poor country to make it more stronger, to send out in the world, so they don't pay much attention to the environment. #00:03:57-4#</p> <p>interviewer: So do you think because the government chooses a focus the rest of the people follow? #00:04:02-8#</p> <p>Reed: Yeah, and they try to reverse the effect now, but thats very hard. #00:04:09-8#</p> <p>interviewer: So now they care more about the environment? #00:04:11-2#</p> <p>Reed: Yeah. #00:04:12-7#</p>

Appendix J: Sequencing of Categories and Major Codes

Original Sequence of Categories and Major Codes	Final Sequence of Categories and Major Codes -> Forming a Narrative
<p>Humans as Priority</p> <ul style="list-style-type: none"> - Earth as Resources - Prioritizing Humans - Devaluing Non-Human Species <p>Protect our Mother Earth</p> <ul style="list-style-type: none"> - Planet as a Whole - “We are in the ecosystem” - Describing Human Impacts <p>Ways of Thinking</p> <ul style="list-style-type: none"> - Comparing Sustainability - Table 2. ANOVA - The Government’s Role - Money Changes Things - “Frame of Mind” - Table 3. Pearson’s R - “We don’t have the ability” <p>It’s Inevitable</p> <ul style="list-style-type: none"> - Unavoidable Pollution - Unstoppable Consumption <p>Opportunities for Future Generations</p> <ul style="list-style-type: none"> - Quality of Life - Focusing on Profit and Development - Preparing for the Future <p>Making a Personal Connection</p> <ul style="list-style-type: none"> - Connections to Nature - Connections to Family - I can make a difference....or can I? - Personal Choices <p>Making Sustainable Choices</p> <ul style="list-style-type: none"> - “Being aware of sustainability” - Influences of Others - “Sustainability as a Side Effect” - Why we aren’t sustainable 	<p>Making Sustainable Choices (Making a Personal Connection)</p> <ul style="list-style-type: none"> - Connections to Nature and - “Being aware of sustainability” - Connections to Family and - Influences of Others - Personal Choices - I can make a difference....or can I? and - Why we aren’t sustainable - “Sustainability as a Side Effect” <p>Ways of Thinking (Humans as Priority and Protect our Mother Earth)</p> <ul style="list-style-type: none"> - “Frame of Mind” and - Table 3. Pearson’s R - Describing Human Impacts and - Planet as a Whole - Prioritizing Humans and - Devaluing Non-Human Species - Earth as Resources and - “We are in the ecosystem” - Comparing Sustainability and - Table 2. ANOVA and - Money Changes Things - The Government’s Role and - “We don’t have the ability” <p>Opportunities for Future Generations (It’s Inevitable)</p> <ul style="list-style-type: none"> - Focusing on Profit and Development and - Unstoppable Consumption - Quality of Life and - Unavoidable Pollution - Preparing for the Future