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**ENVIRONMENTAL AWARENESS, ATTITUDES, AND
BEHAVIOUR OF SECONDARY SCHOOL STUDENTS
AND TEACHERS IN TEHRAN, IRAN**

A thesis

submitted in fulfilment

of the requirements for the degree

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Abstract

Many human behaviours, including social, political, and economic actions, have an impact on the natural environment, and are responsible for causing many of the current environmental challenges and issues. This raises the importance of education, particularly environmental education (EE), as a necessary tool to equip people to address environmental issues and move towards environmental sustainability. International EE declarations such as the *Tbilisi Declaration* have highlighted that investigating peoples' environmental awareness, attitudes, and behaviour towards environmental issues could inform educational approaches geared towards a more sustainable future. The research presented in this thesis explored the environmental awareness, attitudes, and behaviour of secondary school students and teachers in Tehran, Iran. The aim was to investigate the current context of EE in Iranian secondary schools.

An interpretive approach was used to explore participants' perspectives through a mix of quantitative and qualitative data, including questionnaires, individual interviews, and focus group interviews. Data were collected in six secondary schools in Tehran, the capital city of Iran. Two populations were included: 337 secondary school students (9th grade) and 12 secondary school teachers. Two different computer software programmes (SPSS for quantitative and NVivo for qualitative data) were used for data analysis and coding.

The findings indicated that students had reasonably high levels of understanding about environmental issues, particularly about local issues that have a greater impact on their everyday lives, such as air pollution. This highlights the important issue of context. Students also expressed positive attitudes towards the environment, but indicated low levels of agency. Many researchers have shown that both awareness and attitudes are prerequisites of pro-environmental behaviour. However, they are not necessarily sufficient for action, as confirmed in this study. In this research, particular attention therefore focused on the complexities of Iranian students' environmental behaviour. A low level of intention to act, along with students' reported lack of locus of control to make changes for future of the environment, seemed to influence their relative absence of pro-environmental behaviour.

The findings also indicated that teachers' connection with nature, their life experiences, personal interests, and teaching areas are important aspects that can contribute to effective EE in Iran. However, significant barriers to the further delivery of EE in Iranian secondary schools include a relatively low level of in-depth environmental content in the curriculum, lack of outdoor education, teacher-centred approaches to classroom learning, and time pressures for teachers.

This research contributes to an understanding of current issues impacting on EE in Iran, providing insights into the contextual nature of the three key aspects of EE (awareness, attitudes, behaviour) for junior secondary students and teachers. This provides an important baseline from which to further develop understanding of how to improve EE programmes in the Iranian context. The research concludes that in order to address environmental problems in Iran, a substantial shift needs to occur with respect to students' environmental attitudes, their sense of agency, and their behaviours in order to work towards more sustainable approaches to living. Teachers need to be supported to better implement EE. This includes modifying their environmental education pedagogy towards a more student-centred approach of teaching. In order to do this, the internal and external obstacles described in this thesis will need to be addressed to help Iran develop more environmentally sustainable approaches to the future.

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Chapter 1 Introduction

1.1 Chapter outline

This study investigated the environmental awareness, attitudes, and behaviour of secondary school students and teachers in Tehran/Iran. The aim was to explore the current context for environmental education (EE) in Iranian secondary schools. The first section of this introduction chapter explains the background, role, and motivation of the researcher to do this study. This is followed by the context of the inquiry, which includes the history of EE in Iran, an overview of the education system in Iran, and the importance of environmental protection in Islam. It is followed by the rationale for this research which leads to the research questions guiding this study. Next, the significance of the research is presented, followed by the final section of this chapter, which provides a short overview of subsequent chapters.

1.2 Background and motivation of the researcher

I gained inspiration and environmental values through connecting with nature when I was very young, and this influence has remained with me. I have always enjoyed nature and out-door activities, such as planting trees, gardening, and just spending time in the environment. I have been involved in several tree planting projects and have also been a coordinator for some of them. As a child, my grandfather used to take me to his farmland and talked about different aspects of nature, helping me to understand different aspects of the environment. Hence, I think my interests in and concerns about the environment stem mainly from my environmental experiences as a child. However, my concerns have become stronger as an adult as I have obtained more information about the environment and its associated problems.

In addition, I was stimulated to do this research as a result of my master's study in environmental science and also my experience as a biology teacher in secondary school in Iran. While I was learning more about the environment, its associated problems, and the relationship that exists between humans and the environment, I wondered how I could use my deepening knowledge to protect the environment. My master's study was when I first became familiar with EE concepts. With my prior background in education, I came to the conclusion that the best way to

protect our environment was through educating people, especially students, and the teachers who teach these students.

As an Iranian who has lived in Tehran (the capital of Iran) for more than 30 years, I am aware of how environmental issues such as air pollution are threatening people's wellbeing. Each year during bad smog periods, there are days where school is cancelled and people who are elderly and have heart disease are strongly advised to stay at home, and the government prohibits people driving their cars on selected days of the week. Seeing these kinds of tangible issues made me realize as an Iranian that young people need to be more aware of these issues to understand how they are connected to the environment and their own behaviour.

Being a secondary school biology teacher also made me realize the essential need of EE for students. From my teaching experience, I was aware that the secondary school curriculum was not appropriately designed for students' environmental learning in Iran. Furthermore, because of lack of environmental training and awareness, many of my teacher colleagues were not engaged in EE, or had limited engagement. A teacher-centred approach of teaching still dominates in many Iranian schools. There are no field trips, or other outdoor education, where students can learn about environmental issues in depth. Most importantly, the lack of environmentally responsible behaviour amongst many Iranians, including teachers and students, means that many issues are not only unresolved, but likely to get worse. Observations about educational, social, and cultural influences, both my own and in the literature, also stimulated me to investigate what is happening in Iran to help educate school students about environmental issues.

The goal of EE is to produce citizens who are well-informed about environmental issues, aware of strategies that can be used to deal with these issues, and actively involved in working towards environmental solutions. Although EE has been ostensibly formally present in Iran for about a half-century (see Section 1.3.1), it is still in its infancy and systematic efforts are not being made to integrate EE into mainstream education, particularly for students and teachers. Knowing about this gap between EE policies and practices in secondary schools in Iran strongly inspired me to think of how I could make a contribution. Therefore, it seemed to me that the establishment of baseline data to be used to then plan, implement and evaluate an EE curriculum in Iran is an urgent need.

1.3 The context of the inquiry

1.3.1 A brief history of EE in Iran

EE in Iran has fluctuated since it was officially introduced in 1972 by the Department of the Environment (DOE) (Shobeiri, Meiboudi, & Kamali, 2014). At that time, EE in Iran originated from the outcomes of the *Stockholm Declaration*, which came from the first EE international forum in 1972 (for more information see Section 2.2). Iran's representative at this conference was Eskandar Firouz, the former Director of the DOE and Vice President of the IUCN (International Union for Conservation of Nature and Natural Resources) (UNESCO, 1972). In response to the conference, an Environmental Education Office was established in Iran and its initial mission was to introduce environmental concepts from foreign languages into Iranian textbooks (Shobeiri et al., 2014). This was the turning point for EE to be linked with the Ministry of Education (Sadough, 2003).

Three years later, in 1975, EE in Iran began to be offered in educational institutions such as the University of Tehran. This happened at the same time that the *Belgrade Charter* was written (see Section 2.2) and the aim of EE in Iran was focussed on conservation education (Shobeiri et al., 2014). In the same year, the *Ecological Guidelines to Use Natural Resources in South Western Asia and the Middle East Congress* was held in Persepolis, Iran. The purpose of this Congress was to enhance public environmental awareness and environmental improvement. The outcomes referred to the importance of EE from primary schooling to higher education, and promotion of environmental conservation for the public through mass media (Firouz & Harrington, 1976).

One year later, in 1976, the Iranian Council of Ministers announced the importance of environmental protection by approving new regulations (Firouz & Harrington, 1976). Article 23 of the announcement gave official authority to the DOE, with the cooperation of related authorities such as the Ministry of Education, to include EE into all formal schooling curricula in order to enhance the environmental awareness of Iranian students and support environmental protection (Shobeiri et al., 2014).

After the Iranian Revolution in 1979, Iran tried to keep a focus on the development of environmental quality by approving Article 50 in the Iranian constitution. This article states:

In the Islamic Republic, preservation of the natural environment, in which the present and future generations must lead an ever-improving community life, is a public obligation. Therefore, all activities, economic or otherwise, which may cause irreversible damage to the environment, are forbidden. (Foltz, 2001, p. 157)

However, in the 1980s, Iran faced many political challenges and was at war with Iraq for eight years, which caused a downward trend in the development of EE and educational activities (Parizanganeh, Lakhan, Yazdani, & Ahmad, 2011) as well as significant damage to the environment. The main focus of EE at this time was within science and religious training. The DOE played a major role promoting environmental awareness through mass media such as TV, radio, and publishing scientific magazines (DOE, 1996).

An upward trend in EE in Iran began again in 1995, with the country's rapid political, social, and economic developments. According to Massoumeh Ebtekar, Iran's former Vice President and Head of DOE, at this time key ideas about sustainable development were integrated with development policy (Ebtekar, 2009) and Iran's first Faculty of the Environment was established at the University of Tehran (Shobeiri et al., 2014). In 1998, a new Division of Planning and Education was formed within the DOE. This Division included three departments: the Bureau of Public Participation; the Bureau of Environmental Education and Training; and the Bureau of Planning and Information. These departments were responsible for all educational operations.

From 1998 to 2005, the DOE tried to establish new environmental departments in the provinces and even small cities via a decentralization policy (Shobeiri et al., 2014). A major improvement resulted from a significant increase in the DOE's annual budget in 2004 – 10 times more than before – to restructure institutions and improve services (Ebtekar, 2009). During this time, Iranian policies' attention to EE was high, as President Khatami highlighted during his budget proposal speech: "Environmental education of the public is one of the major priorities of 2004" (Shobeiri et al., 2014, p. 235). The dramatic budget increases produced more environmental research related to solving environmental problems. Many leaflets and brochures became available for different age groups, including people in rural areas, and students (DOE, 2006). According to the DOE (2001), mass media, including TV and radio, allocated 5% of their total time to environment-related programs. At the same time, there was a supportive atmosphere for non-

governmental organizations (NGOs) to cooperate with the DOE. There were also significant social and cultural changes at this time, as well as changing government policies which fundamentally improved EE in Iran (DOE, 2001). Building on national momentum, the first national EE conference in Iran was held at the University of Tehran in December 2003. One of the main purposes of this conference was to explore nationwide EE requirements in regards to major environmental problems (Shobeiri et al., 2014). Afterwards, efforts were made to analyse and update and/or revise the school curriculum.

From 2006 to today, EE scholars and experts have sought to bring the key principles of EE into alignment with Iranian cultural and social mores. However, these efforts have not yet led to whole-scale implementation of effective EE across Iran. For example, although dialogue on EE has been academically advanced, the lack of Persian publications in EE, particularly books, remains an issue for EE in Iran. It should be noted, however, that in recent years efforts have continued by policy makers to recognise EE in Iran as a way of attaining sustainable development. One example of these efforts was preparing the master plan in public EE in May 2009, which was organised by the DOE for the entire country in order to increase Iranians' environmental awareness (Shobeiri et al., 2014). Another effort was the establishment of EE in the Environment and Sustainable Development Headquarters of the Tehran Municipality, which is responsible for regulating activities related to environmental issues such as air pollution, water and wastewater, energy, and solid waste in Tehran (Madanipour, 2006).

Overall, although EE was formally initiated in Iran more than four decades ago, the major focus has been on developing people's environmental awareness, with less attention paid to enhancing environmental attitudes and behaviours. This could be because of a lack of understanding that awareness does not necessarily lead to behaviour change. In addition, as a developing country, Iran still faces many environmental, economic, and social problems due to the rush for national development. Therefore, environmental sustainability concerns have often given way to shorter-term economic and political goals.

The next section presents an overview of the school education system in Iran.

1.3.2 The education system in Iran

Article 30 of the Iranian constitution requires the government to facilitate free education for all up to the end of secondary school (Papan-Matin, 2014). However, there are also non-public schools (private schools) and universities which are able to charge tuition fees. The Iranian Supreme Council of Education in 2013 stated that the primary goal of education in Iran is national development in order to enhance productivity, develop social and spiritual values, environmental sustainability, and pursue economic development, with attention on establishing the faith of Islam (Ministry of Education, 2015).

The Iranian Ministry of Education (MoE) administers all schools at primary and secondary level (World Bank, 2011). The MoE does this largely through the Provincial Organizations and the District Offices. The District Offices are responsible for choosing the principals of each school (MoE, 2015b). The principal has full authority in governing all the educational, financial and administrative activities in the school. All Iranian schools are segregated by gender. In 2006, there were over 113,000 schools in Iran, with over 18 million children and around one million teachers (British Council Documents, 2006). More up-to-date figures have been difficult to access.

After the Iranian revolution in 1979, the education system of Iran changed many times. When the research presented in this thesis was carried out, school education in Iran was divided into the following cycles.

- | | |
|-------------------|-------------------------------------|
| 1) Pre-primary | (1 year cycle, children aged 5-6) |
| 2) Primary | (5 year cycle, children aged 7-11) |
| 3) Middle | (3 year cycle, children aged 12-14) |
| 4) Secondary | (3 year cycle, students aged 15-17) |
| 5) Pre-university | (1 year cycle, students aged 18) |

The first level of education in Iran is pre-primary, provided to children aged 5-6 and it is not compulsory. The next cycle is primary education, which is compulsory and considered as the initial phase of formal education and lasts five years (grades 1-5). Students sit a final examination at the end of their primary education to get into the next cycle. Middle school, which is also called lower secondary education, consists of three years (grades 6-8) and, similar to the primary level, it provides general/basic education (MoE, 2012). This cycle

encourages students to think carefully about their study options for secondary education. Students need to sit a regional examination at the end of the lower secondary level in order to proceed to the upper secondary education level. In upper secondary education (grades 9-12), three different options are available: academic, technical and vocational, and Kar-o-Danesh (work and knowledge, a flexible vocational branch) (note that in the first year of secondary education, all students study the same subjects at school). The last phase of Iranian school education is called pre-university education and it is only available for those students who have successfully completed the academic option in order to qualify to sit for the highly competitive National University Entrance Exam (Konkur) (World Bank, 2011). The students in the technical and vocational and Kar-o-Danesh education options, after completing their three years upper secondary cycle, can enrol in a two-year course leading to the associate degree of technician (MoE, 2012). There are qualifying examinations to pass from each grade to the next and national exams are conducted at the end of each educational cycle (World Bank, 2011).

In Iran, environmental issues in secondary schools are studied mainly in biology, geography, and chemistry. The National Curriculum dictates a detailed list of concepts to be taught. For instance, in biology in the first year of secondary schooling, environmental topics in the National Curriculum include the environment and pollution, degradable and biodegradable materials, destruction of natural habitats and animal extinction, pollution and food chains, depletion of natural resources (MoE, 2012). In chemistry, environmentally-related topics include acid rain, greenhouse gas effects, clean energy, and environmental responsibility when using different chemicals. In geography, topics such as global warming, ozone layer depletion, air pollution, and forest pollution are taught. It should be noted that EE has no separate place in the curriculum, apart from these inclusions in some secondary school subject curricula. There is also no requirement for teachers to engage students in outdoor environmental learning. This means that it is up to the teachers to make time and develop pedagogies for EE. The next section presents a general outline of Islamic views regarding the importance of environmental protection.

1.3.3

The importance of environmental protection in Islam

Iran is a Muslim country (about 99.4% are Muslims, see Shahidullah, 2012), and Islam is deeply embedded in the everyday lives of Iranian people. In order to understand the relationship between Islamic theories and practices in Muslim countries such as Iran, it is important to comprehend Islam's views about the relationships between humans and the natural environment, as well as maintaining environmental balance. This short section highlights the most important points emphasised by Islam about the importance of environmental protection, and particularly human responsibility for the Earth and the concept of environmental sustainability.

In reviewing Islamic literature, it is clear that Islam has much to say about human life principles and the environment. Islamic principles about the natural environment relate to ways of using natural sources, and human's perspectives about the world which affect the relationships between humans and the environment (Bagader, El-Sabbagh, Al-Glayand, & Samarrai, 1994). These principles (as a world view) act as guidelines for Islamic society to codify policy for the environment and society.

According to Islamic literature, such as the Quran and religious leader manuscripts, there are guidelines about the natural environment and leading a healthy lifestyle. These state that the Lord of the Universe has created humans from natural elements and has provided all facilities for their use (Bagader et al., 1994). For instance, according to the text of the Quran: "He (Allah) has created you (human) from the earth and asked you to develop it" (Surah Hud verse 61). In another part of the Quran (Surah Al-Baqarah verse 205), God states that: "if he [humans] sought to spoil the earth and destroy crops and cattle, and [practises] corruption" then this would be frowned upon.

Regarding sustainability and the importance of natural resources for all generations, God informs us that "he has created everything enough" (Surah Ra'd verse 8). This can be interpreted that everything has certain amounts and should be used responsibly (Bagader et al., 1994). This view is reinforced in Surah Al-Qamar verse 49, which indicates that God has created this world and he has provided all facilities and opportunities for all generations and all centuries and in sufficient quantities. According to Islamic culture, humans are prohibited from

exploiting these natural sources, because these resources are not limited to the current generation, and the availability of natural resources is important and should be considered for future generations. In addition, all humans have equal rights to resource benefits. Further, the Prophet Mohammad specified that awareness about this responsibility is not sufficient – this knowledge should convert to belief and faith (Bagader et al., 1994). This strongly suggests a call for environmentally friendly behaviour.

Overall, based on Islamic principles, it can be argued that one of the purposes of Islamic education is training people to have an appropriate relationship with the natural environment. However, it has also been argued that many of environmental problems have originated from “people’s ignorance of what their Creator requires of them” (Bagader et al., 1994, p. 10). Since the emphasis in Islamic culture on ways of thinking about the environment is similar to the general principles of EE, it was interesting in this research to see whether students and teachers were using or talking about their faith and how it connected with environmental issues.

1.4 Rationale for this study

The environment plays an immense role in maintaining and supporting the health of all people (United Nations Environment Programme (UNEP), 2014). However, the environment continues to suffer and our planet is facing serious and complex environmental issues such as climate change, air and water pollution, loss of biodiversity, desertification, deforestation, over population, depletion of natural resources, and many others. These issues have been increasingly recognised over the last twenty-five years (Orr, 1992; UNEP, 2014; United Nations, 2002). Although the health and protection of the natural environment is important for human beings, there is general acceptance that humans, through our social, political, and economic actions, are largely responsible for causing many current environmental problems (Brown, 2008; United Nations, 2012). These actions are severely affecting the ecological balance of the environment, with potentially devastating consequences for the life of current and future generations of all species (UNEP, 2013). Therefore, people need to consider their responsibility to protect and preserve the environment for these future generations.

Nonetheless, there is a consensus among EE researchers that, although the level of awareness about the environment and its associated problems has in general increased among the public, large groups of people have become less connected with the natural environment, leading to weaker understanding and empathy for these problems (Orr, 2004; Sterling, 2001). According to the objectives of EE, as outlined by the *Tbilisi Declaration* (see Section 2.2 for further information), investigating peoples' environmental awareness, attitudes, and behaviour towards the environmental issues could inform educational approaches for a more sustainable future.

It has been argued that one of the reasons that current environmental issues exist is due to people's lack of environmental awareness, the absence of a holistic view about the inter-relations between human and the environment, and lack of understanding for the natural world and its phenomena (Biswas & Agarwal, 2013). Awareness is widely used in order to encompass knowledge because it includes sensitivity, knowledge, and understanding of environmental issues (see Section 2.3.2.1 for further discussion). In addition, one-dimensional attitudes, which focus on only one way of looking at an issue, are mainly initiated from human-centred perspectives about the natural environment, leading to a neglect of the balance of nature (Hansla, 2011). This type of attitude about the environment might be grounded in cultural factors (Harris, 2004a). That is, the cultural context might influence the way that people perceive the environment, such as something to be exploited. More importantly, these attitudes can affect peoples' environmental actions, either productive or harmful, towards the resolution of environmental problems (Harris, 2004a). However, while researchers have worked to understand how awareness and attitudes could lead to environmentally responsible behaviour, a gap still exists in our understanding of why some people who are environmentally aware and have positive attitudes towards the environment do not show environmental actions (Kollmuss & Agyeman, 2002).

International literature has suggested that education, particularly EE, is an important and effective tool supporting people to address environmental issues (Orr, 1992; Sauvé, 1996; Sterling, 2001; United Nations, 2012; United Nations Education Scientific and Cultural Organization (UNESCO), 1992; Tilbury & Henderson, 2003). A successful EE programme should contribute to the development of people's ability to consciously take positive action for their

natural environment and also increase a sense of responsibility, which may encourage them to extend their environmentally responsible behaviours (Heimlich & Ardoin, 2008). Through EE, people can also learn to be sensitive to, and aware of, physical, economic, biological, social, and political changes, and the influence of these changes on the natural environment.

Importantly, EE is generally seen as a lifelong process that promotes people's critical thinking skills to recognise environmental issues, make decisions, and contribute to solutions to the problem. Such people are needed to bring innovative methods and tools to protect the natural environment and address environmental issues. Effective EE implemented world-wide is needed to enhance the environmental awareness and sensitivity, attitudes and motivations, and pro-environmental behaviour of people everywhere.

While EE is a life-long process, environmental educators have widely agreed that school students are an important group among whom EE needs to be implemented (e.g., Athman & Monroe, 2001; Bradley, Waliczek, & Zajicek, 1999; Loughland, Reid, & Petocz, 2002). Developing environmentally aware and sensitive students, along with positively changing their attitudes and behaviours towards the environment, through EE, is argued to be an effective strategy for taking care of the environment for the long term. Because of their age, changing school students' attitudes is often relatively easier than changing those of older people (Eagles & Demare, 1999). In addition, through intergenerational influences, students have the potential to influence younger siblings as well as adults, particularly changing their parents' attitudes and behaviour towards the environment (Ballantyne, Connell, & Fien, 1998). Furthermore, these young people will be the citizens, leaders, and policy makers in future societies. Finally, because teachers often act as role models for students, and what and how they teach in the classrooms is important for students' environmental learning, their personal and professional environmental awareness, attitudes, and behaviour play significant roles in an effective EE programme. These ideas form the basis for this study and led to the following research questions..

1.5 Research questions and significance of the study

1.5.1 Research questions

Based on the argument presented in Section 1.4 (see also Section 2.2) that awareness, attitudes, and behaviour are significant in EE, this research addressed the following question: What are the environmental awareness, attitudes, and behaviour of secondary students and teachers in Tehran/Iran? This was broken down into two sub-questions:

1. What are the environmental awareness, attitudes, and behaviour of secondary school students in Tehran?
2. What are the environmental awareness, attitudes, and behaviour of secondary school teachers in Tehran?

1.5.2 Significance of the study

As indicated above, Iran is faced with a litany of environmental problems, many of which the country is only beginning to tackle as the problems reach a crisis point (Hassanshahian, Ahmadinejad, Tebyanian, & Kariminik, 2013; Hosseini, Andwari, Wahid, & Bagheri, 2013; Larijani & Yeshodhara, 2008). Many of these challenges reflect changes in population growth, economic, social, cultural, and political influences. For example, increasing numbers of people are correlated with urban air pollution, massive contamination of ground and surface water, and loss of open spaces to urban development. Iran's population has almost quadrupled in the last 50 years, from approximately 22 million in 1960 to 77.8 million in 2014 (Trading Economics, 2015). Tehran, the largest city in Western Asia, has a population of around 8.4 million and 14 million in the wider metropolitan area (Tehran, 2015).

Of all the environmental problems, air pollution due to transportation is one of the most urgent problems in Tehran (Naddafi et al., 2012), and this has affected the planning and development of many major projects, including effective transportation projects. In this context, environmental issues are considerably affecting Iranian lives today. For instance, regarding air pollution, which causes cardiovascular and respiratory mortality, the effects of PM₁₀ (particulate matter of aerodynamic diameter $\leq 10 \mu\text{m}$), SO₂ (sulfur dioxide), NO₂ (nitrogen dioxide) and O₃ (ozone) on total mortality of 47,284 people (0.33% of 14 million) in Tehran in 2011 was respectively, 2194, 1458, 1050 and 819 cases (Naddafi et al., 2012).

These environmental issues will disturb the next generation's wellbeing as well if not addressed.

EE is particularly important for developing countries, such as Iran, because they face many environmental issues linked to their drive for development, and consequently they tend to suffer from more environmental problems. Additionally, in developing countries, people often pay less attention to the environment due to a stronger focus on development (Larijani & Yeshodhara, 2008). Specifically, in Iran, the lack of research in EE is significant. In order to address this gap, my research sought to investigate the environmental awareness, attitudes and behaviour of secondary school students and teachers in Tehran, Iran.

As discussed in Section 1.3.1, although EE in Iran officially started more than forty years ago, the inclusion of EE in the Iranian formal education is not extensive (Shobeiri et al., 2014). During this time, several efforts have been made to add environmental content to formal education plans. The focus for these efforts has been on introducing environmental topics into textbooks in experimental science, geography, chemistry, and biology – but there is no evidence of consistent inclusion of these topics in the curriculum or of systematic approaches in formal education to teach environmental aspects in Iran, indicating that there is some distance to go to enhance EE in Iran, according to the theoretical ideas based in the literature, in practice in other countries, and in Islam.

This research is significant because it explores the current context of EE in secondary schools in Iran, in particular to identify the “what” and “how” of current EE content and also to examine some barriers to EE in Iran. In addition, young people in Iran comprise the biggest part of the population, and their role and responsibility as future guardians of the environment is undeniable. Determining the current state of EE in Iran, particularly students' and teachers' environmental awareness, attitudes, and behaviour, is a first step which could contribute to the future development of EE planning, and consequently be a step forward towards environmentally sustainable development.

Ever since academic attention was drawn to environmental problems and the adoption of EE as a strategy to combat it, considerable research has been conducted and much written. However, the majority of the research carried out on EE in Iran has focused on curriculum analysis in order to investigate the

integration of EE into school subjects (Shobeiri, Prahallada, & Omidvar, 2007). Almost no literature has been published on studies directed at finding out the actual level of awareness and perceptions, attitudes, and behaviour regarding environmental issues amongst students and their teachers, which could inform EE in Iran. This research relates the current situation of EE in Iran to international literature in EE.

The outcomes of this research could be used to help educational and non-educational authorities in Iran, such as the Ministry of Education, the Department of Environment, secondary schools, natural environmental protection organizations, NGOs, and research institutes and executive systems, to identify some of the important requirements to develop appropriate goals for EE in the Iranian context, and to develop suitable implementation strategies. Moreover, the implications of the study may inform the development of EE in secondary schools of other countries, particularly Islamic and developing countries.

1.6 Overview of the thesis chapters

This thesis consists of six chapters. Chapter 2 contains the literature review, which discusses the key elements of this study (environmental awareness, attitudes, and behaviour) and how these aspects play a role in developing EE for students and teachers. Chapter 3 describes the methodology and methods that were applied in this study along with the research design, data collection, data analysis, and ethical considerations. Then follow Chapters 4 and 5, which present the findings related to the research questions. Based on the key findings of this study, Chapter 6 discusses Iranian students' and teachers' environmental awareness, attitudes, and behaviour and presents the conclusions, recommendations and implications, and limitations of the study.

Chapter 2 Literature review

2.1 Chapter outline

This chapter presents a review of literature relevant to the study, and which informed the development of the research questions and methodology. It begins with an overview of the historical introduction of environmental education (EE) in schools (Section 2.2), with a particular emphasis on the objectives of EE and how they are connected to this study. This is followed by a review of environmental awareness, attitudes, and behaviour of students (Section 2.3), discussing the characteristics of each of these three main aspects of this inquiry, the relationship that exists between them, and a number of aspects that influence their development. Section 2.4 follows with a review of environmental awareness, attitudes, and behaviour of teachers in two contexts: personal and professional. Finally, Section 2.5 summarizes the key ideas presented in this literature review. This chapter concludes by providing the theoretical framework underpinning this research.

2.2 History of EE in schools

EE is a learning process that seeks to increase people's knowledge and awareness about the environment and associated challenges, develop the necessary skills and expertise to address these challenges, and promote attitudes, motivation, and commitment to make informed decisions and take responsible action (UNESCO, 1978). In the literature, the term 'environmental education' began to be used amidst concerns about environmental degradation and decreasing quality of life in the 1960s, after publication of Rachel Carson's (1962) *Silent Spring*. It was an attempt "to produce citizens who are knowledgeable about the biophysical environment and its problems, aware of strategies that can be used to deal with those problems, and actively engaged in working toward their solution" (Stapp et al., 1969, p. 33). Over the next few years, the UNESCO and UNEP made three major declarations that structured the objectives of EE.

The first global declaration of EE, the *Stockholm Declaration*, was created in 1972. It was the result of the first international forum that was aimed at addressing global environmental challenges. This was the first time that any recorded documents formally suggested education about the environment should be

included in schools. Three years later, in 1975, UNESCO and UNEP, with representatives from 60 countries, released the *Belgrade Charter* in former Yugoslavia. According to this Charter, the goal of EE is to develop a world population that is aware of, and concerned about, the environment and its associated problems, so that the population will have the knowledge, skills, attitudes and motivation to work individually and collectively towards the solutions of current problems and prevention of new ones (UNESCO, 1976).

Following Belgrade, the world's first Intergovernmental Conference on EE was held in Tbilisi, Georgia. Building on the *Belgrade Charter*, representatives at the Tbilisi Conference adopted the *Tbilisi Declaration* in 1977, which challenged EE to create awareness and values among humankind in order to improve the qualities of life and the environment. The Tbilisi Conference set up recommendations for the broader application of EE in formal and non-formal education and this major occurrence, and the subsequent publications, continue to provide a fundamental framework for the development of EE around the world (Neal & Palmer, 1990). The *Tbilisi Declaration* also recognised that, in addition to proposing the development of critical thinking and problem-solving and decision-making skills in the context of environmental issues and improving the quality of life, students should “be actively involved at all levels in working toward resolution of environmental problems” (UNESCO, 1978, p. 18).

A major outcome of the *Tbilisi Declaration* was detailed descriptions of the objectives of EE. These objectives were:

- Awareness – to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
- Knowledge – to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
- Attitudes – to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.
- Skills – to help social groups and individuals acquire the skills for identifying and solving environmental problems.

- Participation – to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (UNESCO, 1978, p. 3)

These objectives are important in this study as they illustrate the importance of environmental awareness, attitudes, and participation (behaviour). In this study, awareness was taken to include knowledge (see Section 2.3.2), and skills were not specifically examined as the context of the research and the consequent nature of the data methods used were not appropriate for this examination. The *Tbilisi Declaration* was the first official document that specified so clearly that awareness, attitudes, and behaviour were all important aspects of EE. However, Hungerford and Volk (1990) highlighted that after the *Tbilisi Declaration*, the challenge for researchers, educators, and policy makers was to translate the objectives into constructional reality.

The next key development focusing on the objectives of EE came with the publication of the *Brundtland Report, Our Common Future* (World Commission on Environment and Development (WCED), 1987). This report shifted the focus of EE towards sustainable development, economic growth, environmental protection and social equality. The *Brundtland Report* provided much material for the publication of *Agenda 21* at the Earth Summit in 1992, which specifically focused on EE for sustainability.

Agenda 21 is generally viewed as one of the most important documents for EE. It was promulgated at the 1992 Earth Summit, which took place in Rio de Janeiro. The Summit, otherwise known as the UN Conference on Environment and Development (UNCED), emphasized the need to integrate the complementary disciplines of development education and EE (UNESCO, 1992). Most importantly, “*Agenda 21* of the Summit called for the re-orientation of EE towards sustainability” (Tilbury, 1995, p. 4). The reorientation of EE towards sustainability is seen as one of the United Nations’ highest priorities, along with improving the quality of EE (MacKenzie, 2006).

Agenda 21 also underlined the need for a holistic perspective to be reflected in the curricular approach to EE for sustainability (EEfS). It highlighted the essential need to integrate the concept of ‘sustainability’ into all learning areas. *Agenda 21* defined EEfS as a basis for environmental actions. Being involved with real

environmental issues was identified as the most effective approach for enhancing the action skills of students to participate in the resolution of environmental problems – EEfS recognises that “it is not sufficient to encourage students to make judgments; they must develop a variety of action skills to participate in the resolution of these problems” (Tilbury, 1995, p. 9).

It should be noted that there are a variety of different terms that are used to describe EE. These terms include Education for Sustainable Development (ESD), EEfS, and Education for sustainability (EfS). These latter terms have recently been introduced to reflect an increased emphasis on sustainability. However, in this thesis EE was used as the term of choice because it is the term which has historically been used in Iran. It is also considered that ideas of sustainability are encompassed in this term, and they were incorporated into this research. It should be also noted that it’s not the purpose of this thesis to debate which of the terms is more appropriate in the field of EE.

What is relevant is that the objectives of the *Tbilisi Declaration* and *Agenda 21* both emphasize education around awareness, attitudes, and behaviour. These particular requirements of EE have been described in different ways. One of these ways is Lucas’ (1979) classification, which separated the dimensions of EE into education *about/in/for* the environment. The *about/in/for* classification was Lucas’ attempt to categorize the different meanings that had been given to the term ‘environmental education’. Each of these approaches has distinct objectives. The purpose of education *about* the environment is to develop “awareness, knowledge and understanding about human-environment interactions” (Tilbury, 1995, p. 11). Eames et al. (2008) pointed out that education *about* the environment can be seen in the traditional teaching of environmental science, and echoes the idea that once students are educated about something, they can apply their knowledge. Tilbury noted that education *in* the environment usually takes the form of outdoor education (field work), which has a strong experiential orientation through contact with nature. Education *for* the environment is seen as a core goal of EE (Jickling & Spork, 1998; Tilbury, 1995). Although education *in* and *about* the environment aim to enhance awareness and understanding, education *for* the environment goes beyond awareness to students developing a sense of responsibility to be actively involved in the resolution of the environmental issues. It adopts a holistic approach to the study of environmental

problems, and is global and interdisciplinary. Education *for* the environment therefore acknowledges the socio-political dimensions of environmental issues (Jickling & Spork, 1998; Tilbury, 1995) and includes critical education objectives and an issue-based pedagogy.

A combination of these three approaches (in/about/for) in EE is considered an effective strategy for achieving the goals of EEFS (Jickling & Spork, 1998; Tilbury, 1995). The next section reviews the literature about EE in school curricula.

2.2.1 Environmental education in school curricula

Environmental education in formal education has been reported as initially coming into school curricula in the early 1970s through science education (Gough, 2002). The origins of EE can also be traced further back to the promotion of nature studies and later to the conservation movement (Stevenson, 2007). Here, it aimed at developing knowledge, awareness and skills about environmental issues and natural resources, and was broadly incorporated into primary school curricula and the science and geography curricula in secondary schools. Stevenson also argues that, although the aims of nature studies and conservation education can be moderately easily accommodated in the goals of the school system, improving environmental behaviour among students is a far more challenging mission for schools.

In the 1980s, the role of EE in school organisation was meaningfully developed by increasing public environmental concern, giving a stronger impetus to schools to implement EE (Tilbury, 1995). Chapter 36 of *Agenda 21* emphasized that “EE should be incorporated at primary and secondary schools and that it should be the responsibility of educational authorities to promote all kinds of programs for continuing education in environment in the move towards sustainable development” (UNESCO, 1992, p. 323).

Schools can provide the largest organised base for EE, and for students whose minds are still developing, schools may offer an effective instrument for embedding in them desirable environmental ethics (Nagra, 2010). EE in schools can provide students with a forum to voice their opinions, not only in regard to what they are learning about the environment and what they want to achieve, but also for them to offer insights into how they believe EE could be more effective in

empowering them to achieve change (Prabawa-Sear & Baudains, 2011). According to Loughland et al. (2003), EE in schools is seen as an important strategy for achieving environmental improvement.

In formal EE programs, school students are often considered to be the most appropriate targets because they are in a period of life which can significantly shape the way they approach and interact with the environment that surrounds them and develop a desire for lifelong learning (Mackey, 2012). EE in schools therefore tries to sensitize the young minds of students to environmental problems and concerns, and to develop environmental attitudes and behaviour towards the environment (Thapa, 1999). Additionally, secondary school students, especially 13-17 year olds, seem to be the most appropriate targets for fostering ethical and ecological appreciation of the natural world (Kellert, 1985). Bradley et al. (1999) stated that students' responsibilities in the future are clear – they are future leaders, policymakers, consumers, and voters. Therefore, they will be responsible for 'fixing' the environment (even though they haven't caused the problems), and they will be the ones who must be convinced to adopt and pay the costs of future environmental policies. Therefore, effective EE in schools is essential for making students aware of environmental aspects. In addition, the awareness which students develop about the environment at school can affect the habits of their family. For instance, students who learn about recycling can encourage their family members to do so (Ballantyne, 2010).

Researchers, policy-makers and teachers have debated how to implement EE inside school curricula. In the 1980s, two models dominated (Yueh, 2007). One was the multidisciplinary approach and the other was the interdisciplinary approach. The multidisciplinary model infuses EE into existing school subjects according to its relevance to the teaching content of each school subject. In contrast, the interdisciplinary model views EE as an independent teaching unit containing materials from every school subject. The multidisciplinary approach appears to have been the most frequently used approach to classroom-based EE programs, with EE concepts integrated into separate subject areas such as biology, chemistry, geology, and geography in secondary curricula (Hart & Nolan, 1999).

No matter the approach, it is important for EE in schools to include particular pedagogical practices to achieve the goals of EE. The *Tbilisi Declaration* (1978) established guidelines for teaching and learning strategies and pedagogical

approaches. Stevenson (2007) points out that these guidelines focus on learners working individually and co-operatively towards the resolution of current environmental problems. Additionally, teaching and learning are intended to be co-operative processes of inquiry into, and action on, real environmental issues. Stevenson argues that such an inquiry process demands that students actively engage in critical and complex thinking about real problems. The improvement of student knowledge, skills and values is not only directed towards action, but emerges in the context of preparing for and taking action. Consequently, curriculum and pedagogical planning need to be highly flexible. For example, the teacher should be open to students' decisions in relation to both their learning and their actions (Stevenson, 2007). As such, school curricula should be designed in ways that can help to generate students' environmental awareness as a whole, and also at the same time improve their critical thinking about environmental issues and consideration actions on these issues.

Loughland et al. (2002) state that a meaningful orientation to EE in schools would be one where a student's own experiences of the environment are explored and then challenged. However, for school children to meaningfully participate in environmental conservation activities, they need to possess particular qualities of thought, feeling and action that develop in the students through a process of learning in which understanding and action are key features (Toili, 2007).

Said et al. (2007) said that "if the fundamental aim of EE is to help students understand, appreciate and care for the environment, then educational authorities and policy makers should know the impact of schools' programs and identify the types of learning experiences that help to develop active and accurately informed minds" (p. 22). It appears that these authors were not considering anything beyond the cognitive idea as taking environmental action was not part of their argument. Tuncer et al. (2005) stated that schools play an important role in the formation of students' views on the environment. Their observations indicated that the composition of the student population (family background or prior achievement); the enthusiasm, experience and competence of the teachers; the curricular offering; the quality of instruction; and the social climate may all play a part.

EE is more likely to be effective if schools look beyond the accumulation of knowledge and try to promote the use of practical activities as a major tool for teaching and developing positive values and attitudes towards the environment.

As Madsen (1996) explained, environmental awareness, knowledge, and commitment are necessary to achieve environmental protection and restoration. To achieve this, students must have a basic grasp of environmental problems. In addition, teachers in the field of EE must not only have extensive knowledge and understanding of environmental problems, but must have environmental awareness, attitudes and pro-environmental behaviour to solve these problems. They must be committed “to initiate action, based upon knowledge and understanding” (Madsen, 1996, p. 73). Ultimately, EE rests in the hands of well-educated communities that can train their new generations to become environmentally-responsible citizens. Hence, this research investigates the environmental awareness, attitudes, and behaviour of secondary school students and teachers in Tehran. In order to understand how to improve EE in Iran, it is important to explore the views currently held by students and their teachers.

2.2.2 Section summary

This section presented a brief history of EE, beginning with an overview of key international declarations influencing EE, and moving to how EE might be implemented in schools. The objectives of EE were identified as being a major outcome of the Tbilisi Declaration. This highlights that awareness, attitudes, and behaviour are all important aspects of effective EE. Formal implementation of EE through school curricula was discussed as an important approach in achieving environmental protection. School students are considered one of a prime target for EE because they will be our next generation and policy makers in the future. Teachers, too, are recognised as key to effective EE, and they need to have extensive personal and professional awareness and understanding of environmental problems, positive attitudes towards the environment, and pro-environmental behaviour to solve environmental issues. The review now turns to the consideration of students’ environmental awareness, attitudes and behaviour, followed by a consideration of teachers’ environmental awareness, attitudes and behaviour.

2.3 Environmental awareness, attitudes, and behaviour of students

2.3.1 Section overview

In this section, concepts and perspectives concerning the awareness, attitudes, and behaviour of secondary school students towards the environment are discussed. Section 2.3.2 explores the definition and importance of environmental awareness and knowledge of ecology for students in EE and then examines how awareness might be the first step towards environmentally responsible citizenship. Section 2.3.3 considers environmental attitudes as a prerequisite for environmental actions. Additionally, the key factors that can influence the environmental attitudes of students are examined. Following this, Section 2.3.4 reviews environmental behaviour of students and their potential to contribute to the resolution of environmental issues. It includes discussion about the different models of pro-environmental behaviour to help situate the understanding of different factors which influence and shape pro-environmental behaviour. The relationships between awareness, attitudes, and behaviour are discussed across the sections.

2.3.2 Environmental awareness of students

Over recent decades in Iran, environmental issues relating to over-exploitation of natural resources and pollution have increased dramatically. Environmental problems such as global warming, acid rain, fresh water scarcity, deforestation, desertification, loss of biodiversity, soil depletion and many others, have become a major concern (IranPolitik, 2015). Air and water pollution have reached such levels that they have already resulted in serious health problems, as well as negative impacts on the environment (Hassanshahian et al., 2013). From an environmental point of view, lack of environmental awareness and knowledge among people, especially students who are the future leaders and policymakers, will mean that environmental problems continue unresolved.

Bradley (1999) argued that when students acquired some level of environmental understanding of issues such as ecology, technology, and economics they can formulate their own views on how each of these aspects can influence environmental concerns and policy. This research sought to investigate the level of students' environmental awareness because awareness is an important

component of EE according to the objectives of EE in the *Tbilisi Declaration* and also it is a prerequisite to action. However, awareness is an extremely broad term. For instance, it may be interpreted to mean awareness of issues or, alternatively, awareness of amenities (Fisman, 2005). First, the interconnections between knowledge and awareness are considered, and then the importance of outdoor experiences, followed by environmental perceptions/conceptions of students.

2.3.2.1 Knowledge and awareness

While many people may think awareness and knowledge are terms with the same meaning, they are different. Awareness involves ascertaining what is happening in the moment, and based on how things currently relate to each other. However, knowledge implies a collection of facts and data. In the context of this study, awareness is used to include sensitivity, knowledge, and understanding of environmental issues. However, as Grob (1995) argued, environmental knowledge is a precondition of environmental awareness and the emotional involvement is what shapes environmental awareness and attitudes. This difficulty in distinguishing between the different aspects is due to the fact that most are broadly and unclearly defined, interrelated, and often do not have clear boundaries (Kollmuss & Agyeman, 2002).

In the literature, researchers have tried to define and conceptualize ‘environmental knowledge’. For instance, Hungerford and Volk (1990) defined the knowledge of ecology as an ecological conceptual basis (prerequisite) for resolving environmental issues. However, they added that knowledge of ecology does not necessarily produce environmental behaviour - but it is significant for decision making.

Hillcoat et al. (1995) argued that there are problems with the assumption that knowledge is objective, generalizable and predictable because different ontological and epistemological foundations need to be considered. They said:

The quantitative researcher's view of reality is radically different from the qualitative researcher's view of reality. The former views reality as objective and external to the individual, while the latter maintains that reality is internally constructed within the individual. These fundamentally different views have important implications for what is regarded as valid knowledge. Quantitative approaches see valid knowledge as generalizable and predictable, while qualitative approaches see valid knowledge as context-specific only. (p. 161)

Traditional EE used a scientific approach and was mostly concerned with knowledge of the effects of environmental problems. The focus was also on students obtaining knowledge about the environmental issues that might affect them (Jensen, 2002). Jensen argues that this type of knowledge does not necessarily lead to environmental behaviour and might be a reason for the lack of correlation that exists between awareness and behavioural change. Jensen suggested that this happens when “the environment as it is taught in school is not in essence action oriented ... and students have not been afforded the possibility of actively appropriating and internalizing that knowledge” (p. 329). Students get to know about the effects of environmental issues without necessarily gaining understanding about the root causes of these issues – or how these might be addressed. Indeed, as some researchers have indicated, such knowledge can create a great sense of worry, weakening commitment, and disempowering students by overwhelming them with too much information about the issues, without helping them to actively try to solve the issues (Hillcoat et al., 1995; Jensen, 2002; Jensen & Schnack, 1997; Sterling, 2001). These kinds of feelings can further lead to a sense of hopelessness about the world’s environmental situation (Fritze, Blashki, Burke, & Wiseman, 2008). Such a sense of hopelessness was clearly present among Australian 15 year old students when they indicated a high level of awareness of environmental issues, but low optimism about the issues in the Programme for International Student Assessment (PISA) 2006 study (Thomson & De Bortoli, 2008). Indeed, in general, PISA 2006 findings indicated a high level of environmental awareness among students but low optimism toward environmental issues (Organisation for Economic Cooperation and Development (OECD), 2009).

What type of knowledge might lead to students taking environmental action? Jensen (2002) argued for an action-oriented approach to EE that includes an interdisciplinary association between environment, people, culture and society. He argued:

If the main goal of environmental education is the development of the student’s ability to act and effect change, it follows that associated knowledge and insight should in essence be action oriented. This has significant consequences for the kind of knowledge that will be the focus of

planning, implementing and evaluating teaching and learning in environmental education. (Jensen, 2002, p. 329)

Therefore, knowledge to inform environmental awareness should be developed in order to change behaviour. For this purpose, Jensen (2002) proposed four different dimensions of action oriented knowledge, which show different viewpoints on how a given environmental issue could be viewed and analysed. These aspects are as follows: knowledge about effects, knowledge about root causes, knowledge about strategies for change, and knowledge about alternatives and visions. For example, knowing about the consequences of air pollution in cities can be considered as knowledge about effects of the issue. However, while this type of knowledge is mainly scientific in nature, it might not contribute to solving issues. The question ‘Why do we have the problems we have?’ can lead to knowledge gathering to develop awareness about root causes of issues which, according to Jensen, belongs mainly in the sociological, cultural and economic spheres. Awareness about strategies for change is then informed by knowledge to contribute to changing behaviours towards the environment. The last aspect of awareness refers to knowing about how people behave in other cultures and other countries, as awareness about other possibilities can be considered as an influential source of inspiration for developing one’s own visions.

The importance of developing environmental awareness has been emphasized in the literature on environmental stewardship (Fisman, 2005; Orr, 1992). This began with the *Tbilisi Declaration* in 1977, which described awareness of the local environment as a necessary precursor to environmental stewardship. Later, environmental awareness of students was defined by Gambro and Switzky (1996) as a student’s ability to understand and evaluate the impact of society on the ecosystem. Gambro and Switzky went on to suggest that environmental awareness is revealed by identifying environmental issues as well as understanding the origins, implications, and consequences of those issues. Nagra (2010) noted that environmental awareness involves creating knowledge and understanding among individuals and social groups about the environment and environmental protection. However, Sengupta and Maji (2010) specified that environmental awareness not only involves knowledge about the environment but also attitudes, values and necessary skills to solve environmental related issues. Sengupta and Maji added that environmental awareness is the first step of EE, which eventually

leads to environmental behaviour. In another categorization, Hines et al. (1987) described environmental knowledge as knowledge about the issue, knowledge about the action strategy, and action skill. According to Hwang et al. (2000) these types of knowledge introduced by Hines et al. can influence environmentally responsible behaviour in different ways. Both Jensen's (2002) and Hines et al.'s. (1987) categorizations of knowledge include action strategies, demonstrating the importance of this type of knowledge in developing awareness.

Environmental decisions and behaviours are influenced by environmental awareness and attitudes (Kollmuss & Agyeman, 2002). As such, from a theoretical standpoint, assessing students' environmental awareness and attitudes, and understanding the relationship between these aspects and environmental decisions and behaviours are necessary first steps in realizing the goals of effective EE (Makki, Abd-El-Khalick, & BouJaoude, 2003). However, according to Negev et al. (2008), there are large gaps between the level of environmental awareness and environmental behaviour of Israeli high school students. According to their study, socioeconomic factors and social interactions were the major factors influencing the large gaps between environmental knowledge and environmental behaviour. Nonetheless, many studies have demonstrated awareness as an effective variable for environmental responsible behaviour (Armstrong & Impara, 1991; Sivek & Hungerford, 1990).

It is suggested by some researchers that increasing students' awareness through EE in schools promotes positive environmental attitudes (Arcury, 1990; Kuhlemeier, Van Den Bergh, & Lagerweij, 1999). However, Yilmaz et al. (2004) observed that environmental attitudes are most likely formed as a result of life experiences rather than exposure to any specific course or programme. This is further examined next. .

2.3.2.2 Outdoor activities and other life experiences

Positive environmental experiences seem to be fundamental for improving long-term environmental awareness and concern. The influence of Significant Life Experiences (SLE) (e.g., recreation activities such as jogging or biking, day hiking, camping, mountain-biking, etc.) on pro-environmental behaviour has been noted by a number of researchers (Palmer, 1993; Palmer, Suggate, Robottom, & Hart, 1999; Tanner, 1998). For instance, Palmer et al. (1999), in their international

research project which involved researchers from 12 countries, found that experiences in nature were significant for the development of environmental awareness among students and adults. The results of their study suggest the importance of providing opportunities for students to have positive experiences in nature for inspiring a valuing of nature and developing environmental awareness and attitudes through outdoor learning or outdoor education. This can be mediated through teachers and family.

Outdoor learning usually refers to organised learning that takes place in the outdoors (Nicol, 2002). Learning in the outdoors has significant educational advantages for students, and the need to connect with nature is becoming increasingly prominent in research worldwide (Palmer, 1993, 1999; Lindemann-Matthies and Knecht 2011; Pointon, 2014). However, it should be noted that although outdoor education, or education in the environment, has strong connections with positive environmental attitudes.

Outdoor learning promotes a relationship with the natural environment and can lead to deep environmental knowledge and understanding of the world that surrounds learners (Palmer, 1993). In other words, showing connections between students' everyday lives and the environment helps them develop a more in-depth understanding of the relevance of their own actions in addressing environmental issues (Tilbury, 1995). In addition, embedding local environmental issues and knowledge into outdoor learning within schooling programs may help students to be familiar with their local heritage, cultures, landscapes, and environmental issues, opportunities and experiences, and they could then use these as a foundation for better environmental learning. This type of outdoor learning connects to place-based education in that "it can help overcome the disjuncture between school and children's lives that is found in too many classrooms" (Smith, 2002, p. 584).

Recent studies, Lindemann-Matthies and Knecht (2011) and Pointon (2014) have also highlighted that direct experience of the environment is significantly important for human physical health, mental health, emotional well-being, and it can influence students' perceptions of nature. It is generally reported that students who are in direct contact with nature are more likely to appreciate the natural surroundings and espouse a pro-environmental orientation (Lindemann-Matthies & Knecht, 2011; Thapa, 2010). Many researchers have found that among students,

outdoor activities and direct life experience with nature foster pro-environmental attitudes and intentions towards pro-environmental behaviours (e.g., Arnocky & Stroink, 2011; Cheng & Monroe, 2012; Liddicoat & Krasny, 2014; Pointon, 2014). On the other hand, having fewer outdoor activities negatively affected children's environmental awareness (Lindemann-Matthies & Knecht, 2011). Outdoor experiences, therefore, may be important, especially at secondary schooling, as this period is one of the best opportunities for increasing students' awareness (see Section 2.2.1).

However, Stevenson et al. (2014) suggested in their study that SLE-related variables may not necessarily lead to pro-environmental behaviour because the impact is mostly limited to environmental attitudes. Additionally, as Thapa (2010) found, indirect contact or experience with nature (e.g., via television, reading books, etc.) also increases levels of environmental awareness and understanding. For instance, a study by Eagles and Demare (1999) showed that watching television programmes with environmental-related messages could develop environmental awareness and improve pro-environmental attitudes. But, as the review of these studies demonstrates, there is a lack of behavioural predictability. In other words, direct and indirect environmental experiences do not necessarily lead to engaging in environmentally responsible behaviours.

Living in urban versus rural areas also may affect the environmental awareness and attitudes of students. For example, Kant and Sharma (2013) in their empirical study found that students from rural areas had higher levels of environmental awareness than students from urban areas. However, Worsley (1998) found that Australian (rural and urban) teenagers have strong interests in environmental issues and there were no significant differences in the environmental awareness of students from urban and rural areas.

Apart from experiences in nature, other factors such as teachers, type of school and family background may influence the environmental awareness of students. For example, Barraza and Walford (2002) in their empirical research found that:

Students' environmental knowledge varies according to the school ethos, the teacher, and their access to information through books, media such as television, computer games, and other social activities. Thus, when children are exposed to situations that involve environmental dilemmas, their reactions vary according to four major factors: culture, experience, affiliation for a particular animal, and school ethos. (p. 182)

Shobeiri et al. (2007) argued that the type of school management, private or public, and cultural differences also have impact on environmental awareness of students. They found that the students from public schools in Iran had higher levels of awareness than students from private schools. However, they did not identify reasons for why public schools may have better supported students' environmental awareness. Kuhlemeier (1999) also found that the average environmental awareness of students differed in different schools in Netherlands. Kuhlemeier stated that these differences could be for a number of reasons, such as the "composition of the student population (prior achievement, family background); the enthusiasm, experience, and competence of the team of teachers; the curricular offering; the quality of instruction; and the school climate" (p. 11). Shobeiri et al. found cultural differences between Indian and Iranian students' perceptions of environmental problems in their countries. In their study, Iranian students' environmental awareness was reported to be more about the causes of pollution and conservation of human health, while Indian students tended to be more aware of conservation of wildlife and animal husbandry.

Gender difference is another factor that could influence the environmental awareness of students. However, the literature is not conclusive. For instance, in a study on environmental awareness and environmental attitudes of secondary and higher secondary teachers and students in Rajasthan, Shahnawaj (1990) found that female students possessed significantly more awareness than males. However, opposite results were reported by Tripathi (2000), where boys had better awareness than girls in Uttar Pradesh, India. Shabina Jinarajan (1999) did not find any gender differences in the environmental awareness of student teachers in India.

Students' environmental awareness can be viewed as resulting from their perceptions and conceptions about the environment (Sauvé, 1996). In other words, the ways students define the environment can demonstrate their awareness. To explore this, the next section addresses the literature on environmental perceptions' of students.

2.3.2.3 Environmental perceptions/conceptions of students

Environmental perceptions and conceptions are often used interchangeably in the literature and can be considered to portray a person's environmental awareness. Environmental perceptions "refer to an underlying belief or value system through

which an individual understands the natural world and the ways in which humans are related to, or separate from it” (Liu & Lin, 2014, p. 413) and are often considered as potential predictors of environmental behaviours (Fishbein & Ajzen, 1975; Loughland et al., 2002). Therefore, examination of students’ perceptions and understandings about nature and the environment might show their level of environmental awareness and lead to more effective and meaningful EE programs (Loughland et al., 2002). For example, Yavetz et al. (2014) argued that understanding how students conceptualize ‘environment’ may lead to more effective EE. In part, this is because the way students perceive and understand the environment affects their pro-environmental behaviour (Loughland et al., 2002; Palmer, 1998). Sauvé (1996) argued that environmental views of students are significantly important to expose and confront the underlying conceptions shaping their environmental learning, including whether the perspective of sustainable development is fully understood or not. Some researchers have highlighted the importance of students’ views about the environment, specifically their ideologies concerning relationships between humans and the environment (Liu & Lin, 2014; Palmer, 1998; Sauvé, 1996).

Two main ideas about the position of humans in nature can be argued. One is the idea that humans are ethically superior to the rest of nature, and permitted to control, manipulate, and modify the environment. The other view refers to the fundamental interdependence of all living things, including humans. Regarding this, Liu and Lin (2014) argued for a:

... variation of environmental worldviews, including: anthropocentrism (which assumes humans to be superior to the nature and its beings); utilitarianism (which values nature in terms of what it can provide to human societies); stewardship view (where humans are seen as partners in the natural process rather than masters); biocentrism (where biodiversity is considered the highest ethical value in nature); ecocentrism (where nature as a whole is valued above any of its individual parts); and ecofeminism (where the oppression of women and the degradation of nature are intimately connected). (p. 414)

Sauvé (1996) also proposed that there are six paradigmatic perceptions of the environment in discourse and practice in EE. According to her study, these perceptions/conceptions are: environment as nature, environment as a resource, environment as a problem, environment as a place to live, environment as the biosphere, and environment as a community project. She also suggested that the

influence of these different perceptions can be observed in pedagogical approaches and strategies adopted in EE. These six perceptions are overlapping and can be combined in many ways and can be identified in different EE practices. Regarding this, Sauvé said:

... we know that certain roots of environmental education can be found, for example, in the nature education movement of the 1920's and also in the conservation education movement which arose in the middle of this century ... in the early '70's, the environment came to be perceived mainly as a problem. Around this same time, the notion of the environment as a "place to live" was becoming more popular, while certain European educators were moving towards renewal of the pedagogical approach of the study as an investigation process about, from and for the milieu ... in the '80's the environment as a biosphere view was triggered by the globalization of information and markets and by the growing awareness of the interrelationship between global and local environmental phenomena (p. 14)

Loughland et al. (2002) have offered another framework for analysing students' environmental views. In their study, primary and secondary students were observed to have six different environmental perceptions: environment as a place, environment as a place that contains living things, environment as a place that contains living things and human beings, the environment as something that does something for people, people are part of the environment and are responsible for it, and people and the environment are in a mutually sustaining relationship. These categories reflect a meaning of 'environment' either as an object, or different relationships between people and the environment (Yavetz et al., 2014). For instance, the studies by Loughland et al. (2002) and Loughland et al. (2003) indicated that Australian students intended to have 'object' perception for the environment, whereas the 'relationships' views of nature and people were less common. Loughland et al. (2002) further argued that students who understand the environment as an object may not necessarily realize the need to take personal responsibility for it.

It is important to note that different perceptions of the environment may co-exist and these perceptions affect the individuals' environmental behaviour. EE programs may consider these perceptions of the environment in an integrated pedagogical approach, although Sauvé (1996) indicated that EE programs often limit themselves to one or other of these possible perceptions, which means the environment is not perceived globally.

The above frameworks were considered in this study for interpreting and analysing students' perceptions toward the meanings of the environment. Table 2.1 shows the key points regarding different perceptions for the environment in EE, as proposed by Sauvé (1996). This theoretical framework was considered a useful typology to explore students' and teachers' meanings about the environment.

Table 2.1 *A Typology of Perceptions of the Environment in Environmental Education (Sauvé, 1996, p. 13)*

Environment...	Type of relationship	Principal characteristics	Examples of teaching/learning strategies
as nature	to be appreciated, respected, preserved	the original, "pure" environment; nature-as-a-cathedral; nature-as-a-uterus	<ul style="list-style-type: none"> • nature exhibitions; • immersion in nature
as a resource	to be managed	our collective biophysical heritage, sustaining quality of life	<ul style="list-style-type: none"> • 3Rs [Reduce, Reuse and Recycle] campaigns; • audit of energy consumption
as a problem	to be solved	the biophysical environment, supporter of life, threatened by pollution, deterioration	<ul style="list-style-type: none"> • problem-solving strategies • case study
as a place to live	to know and learn about, to plan for, to take care of	our daily living environment with its sociocultural, technological and historical components	<ul style="list-style-type: none"> • environmental story of our place • eco-gardening project
as the biosphere	in which we all live together, into the future	the spaceship Earth, object of planetary consciousness, a world of interdependence between beings and things	<ul style="list-style-type: none"> • case study on a global issue; • storytelling illustrating different cosmologies
as a community project	in which to get involved	a shared living milieu; the focus of socially critical analysis; a political concern for the community	<ul style="list-style-type: none"> • integral action-research (participatory process aimed at transformation); • environmental issue forums

As with knowledge and awareness (see Section 2.3.2.1), there seem to be many factors that influence students' perceptions and consequent pro-environmental behaviour. Hines et al. (1987) called these 'situational factors', which include economic constraints, culture, social pressures and interests, and opportunities to choose different actions. Barraza and Walford (2002) found that students had different perceptions about environmental issues in Mexico and England. For

example, students in Mexico ranked population growth as the biggest environmental issue whereas students in England ranked nuclear waste highest. Students' familiarity and understanding of environmental issues was thought to be in most cases related to their experience or exposure (see Section 2.3.2.2) to such issues and that this, consequently, might lead to different environmental behaviour.

If environmental perceptions of students can influence their fundamental orientations to and understanding of the environment, then educators need to understand students' level of awareness in order to develop worthwhile and useful environmental education pedagogies. Loughland et al. (2002) argue that through increasing environmental awareness and experiences, students will find a connection between an activity and a way of thinking about the environment. Furthermore, if students are to be capable of acting on their choices and influence environmental decision-making, then EE must incorporate understanding students' environmental perceptions and development of knowledge of the political-legal process and skills in political advocacy (Tilbury, 1995). As well as examining the formal and informal processes of decision making in the political-legal system, students should be encouraged to analyse the various forms of political participation so that they can rationally justify the strategies for action which will employ their advocacy skills (Stevenson, 2007).

The most logical approach to seeking a broader understanding of political-legal issues is to ask students about their level of awareness of environmental issues, which may in turn promote their positive environmental behaviour. This may not only lead to an understanding of their perceptions, it may also engage them in a reflective educational process (Prabawa-Sear & Baudains, 2011). As mentioned in Section 2.3.2.1, environmental awareness has both a cognitive, knowledge-based component, and perception-based component. The combination of these components is what makes an environmentally aware person (see Figure 2.1). For example, there would be many people in Tehran who have a perception that air pollution is an issue, but not all of them have knowledge about that, or there would be many people who have the knowledge about air pollution without perceiving it to be a problem in Tehran. Awareness about air pollution also can contribute to the development of knowledge and perception of this issue.

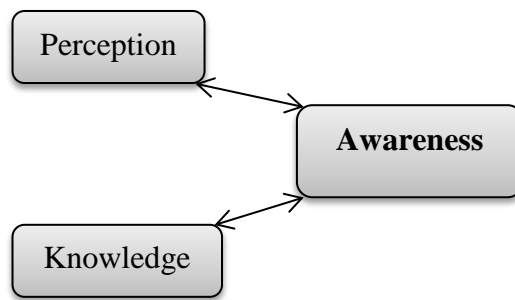


Figure 2.1 Factors influencing environmental awareness

Awareness about the environment has often been assumed to have a link to the development of positive attitudes toward the environment, and schools can play an important role in the formation of these attitudes (Barraza & Walford, 2002). It is also assumed that increased awareness can be a precondition for changing attitudes (Heimlich & Ardoin, 2008). Both awareness and attitudes are assumed to be important for changing student actions toward the environment and for sensible environmental policy making (Hines et al., 1987). However, awareness may be only one of many preconditions of attitude. Therefore, this study sought to investigate the level of students' environmental awareness as a first step for suggesting an effective EE program in secondary schools in Iran. Environmental awareness is important, but we should consider that this is only a part of EE. The next section, reviews the literature on environmental attitudes of students and how they connect with environmental awareness and behaviour.

2.3.3 Environmental attitudes of students

'Attitude' has been defined as a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour (Eagly & Chaiken, 1993). If EE is to be able to change behaviour towards a better future, environmental learning must go beyond awareness (Hungerford & Volk, 1990) to also foster environmental attitudes. Redclift (1992), for example, suggested that there is the need to study environmental attitudes at deeper levels, to find out environmental perceptions of human agency. Commonly, environmental attitudes refer to general feelings toward ecology and the environment, feelings and concern for specific environmental issues, and feelings towards acting to solve environmental problems (Pe'er, Goldman, & Yavetz, 2007). Having these feelings is affected by personal opinion, which can be developed through personal life

experiences and education (Yilmaz et al., 2004). Corraliza and Berenguer (2000) defined pro-environmental attitudes as “people’s predispositions, relatively durable and relatively organised, to pay attention to, be concerned about, and, ultimately, to act in the name of environmental protection” (p. 833). This study therefore uses ‘pro-environmental attitudes’ to mean those attitudes which may lead to pro-environmental actions.

Environmental attitude is an organization of beliefs, including an overall evaluation, liking or disliking for some aspect of the environment, the environment as a whole, or of some object that has clear and direct effects on the environment, such as power plants (Heberlein, 1981; Milfont & Duckitt, 2004). One of the objectives of the *Tbilisi Declaration* specifically focused on helping students and individuals to acquire favourable attitudes to protect and improve the environment (UNESCO, 1978; see Section 2.2). Since then, social psychologists have attempted to understand the forces that might lead students to be concerned about environmental issues (Wesley Schultz & Zelezny, 1999).

2.3.3.1 Environmental concern

Awareness about what environmental issues actually are, how they arose and what possibilities there are to address these issues, is necessary for students to move towards solving the problems. However, while numerous studies have investigated students’ awareness about a range of environmental issues, fewer studies have examined students’ environmental concern and feelings towards these issues. Environmental concern in this study is defined as students’ expression of emotions they feel about environmental issues. Rickinson (2001) noted that environmental concerns include fear, worry, and a sense of caring for the environment. Jensen and Schnack (1997) considered feelings of worry and anxiety that might result from knowing about environmental problems, and expressed the need for a new way of teaching that encourages students to get involved in the social interests concerning environmental issues. Some researchers have highlighted that environmental concerns, especially fear and anxiety, relate to feelings of powerlessness and helplessness, which may influence students’ willingness to engage in environmental action (e.g., Barratt & Hacking, 2003; Connell, Fien, Lee, Sykes, & Yencken, 1999b; Strife, 2012).

It seems in many countries and cultures students express anxiety and are fearful, cynical, and pessimistic about environmental issues. For example, Strife (2012) in the US, Barraza (1999) in England and Mexico, Hutchinson (1997) in Australia, and Hicks and Holden (2007) in UK found sadness, fear, anger and pessimism about environmental problems among students. It is therefore a big task for EE to create different kinds of coherence, as giving too much information about environmental crises and telling students how bad things actually are can engender a feeling of disempowerment among them (Hillcoat et al., 1995) by inducing awareness informed by low levels of understanding. There has even been debate among researchers about whether raising students' awareness about environmental issues and creating anxiety and worry in students is wise or useful. Jensen and Schnack (2006) indicated that there is not so much a question of creating anxiety during EE, but the challenge is more how to address the anxiety and worry that students may have.

Although environmental issues may cause students to feel overwhelmed, expression of environmental concerns by students may inspire policy makers and educators to design effective strategies to address the future environmental challenges that students will face. Fielding and Head (2012) have thus suggested that students who are more concerned about environmental issues should engage in more pro-environmental actions.

Studies of attitudes toward environmental issues have begun to move away from an examination of general environmental concern and toward a more differentiated conceptualization of environmental attitude formations. Therefore, in order to more fully understand environmental attitudes, it is necessary to go beyond environmental concern and examine the underlying bases for environmental feelings.

According to Wesley Schultz and Zelezny (1999), there are three different bases for environmental attitudes: the individual (egoistic), all people (social-altruistic), and all living things (biospheric). Individual, or egoistic environmental attitudes, are based on beliefs about the effects that environmental destruction may have on the individual. For example, the environment should be protected because I don't want to breathe polluted air, or I don't want to drink dirty water. Social-altruistic environmental attitudes are based on human benefits or human goals. For instance, protecting the environment is important because of the long term consequences it

may have on other people. Finally, biospheric attitudes centre on the inherent value of the natural environment. Humans should not harm nature because we are a part of nature, species have a right to continue, and nature has intrinsic rights broader than mere species survival. Thus, two students could be equally concerned about environmental issues, but have fundamentally different attitudes.

In another view, Kaiser et al. (1999) categorise two basic types of environmental attitudes that influence environmental behaviour: attitudes towards the environment and attitudes towards environmental behaviour. In general, attitudes towards the environment refer to environmental concern. Environmental concern can be seen as taking either a multiple or a single component approach, that is, concern for either the environment in general or particular aspects of environment. Attitudes towards environmental behaviour is highly linked with intention to act (Ajzen & Fishbein, 1980) (see Section 2.3.4.1 for further information). In the research presented in this thesis, the types of environmental attitudes shown by both Kaiser et al. and Wesley Schultz and Zelezny's (1999) classification of environmental attitudes are considered, which include attitudes towards the environment, attitudes towards environmental behaviour, and "values" as major parts of attitudes' assessment.

2.3.3.2 Environmental values

A value is a particular kind of attitude; like an attitude, it has both cognitive and affective elements (Heberlein, 1981) and it can serve as a guiding principle in a person's life (Wesley Schultz, 2001). The relationship that exists, either positive or negative, between students and the environment, is important for understanding how environmental concern is reflected in students' attitudes and values. Researchers agree that attitudes of concern about environmental issues are based on a person's more general set of values, and that different value orientations lead to different attitudes (Stern & Dietz, 1994). For example, attitudes about environmental issues are based on the relative importance that a person places on themselves, other people, or plants and animals. In addition, the link between values and environmental concern is moderated by an awareness of the harmful consequences to the valued object or objects (Wesley Schultz, 2001). Thus, environmental attitudes can be viewed as resulting from a person's system of values. Additionally, Corraliza (2000) has stated that the study of values has

situated environmental behaviour as an expression of the forms of relationship between the environment and the cultural context.

2.3.3.3 Measuring environmental attitudes

To better understand students' attitudes toward the environment requires consideration of how students obtain their beliefs and attitudes about the environment. In the 1980s, the most commonly used scale to measure environmental attitudes was the New Environmental Paradigm (NEP) scale, which was developed by Dunlap and Van Liere (1978). They argued that a new view of the relationship between humans and the natural environment was beginning to develop in Western nations, called the *dominant social paradigm*. Within the existing *dominant social paradigm*, humans are viewed as separate from nature, while the emerging NEP views humans as an integral part of nature. The NEP is also referred to as a pro-environmental orientation, pro-environmental concern (Liefländer & Bogner, 2014). The significant concepts embedded in the NEP are “balance of nature,” “limits to growth,” and “anti-anthropocentrism,” each varying from unconcerned to concerned about nature. In these concepts, people who have pro-environmental attitudes recognise nature as fundamentally valuable and humans as an integral part of human-nature networks (Wu, 2012).

The NEP scale has been widely used in different cultural settings over the last two decades in order to classify the different perspectives that people have about the natural environment (Dunlap, 2008; Harraway, Broughton-Ansin, Deaker, Jowett, & Shephard, 2012; Wu, 2012). It has been shown to have reliability and validity (Dunlap, 2008; Dunlap, Van Liere, Mertig, & Jones, 2000), and it has been considered worthwhile for EE researchers “to continue using the NEP scale as a standardised measure of environmental attitudes” (Jowett et al., 2014, p. 2). However, it has not been without criticism. Wu (2012) and Lalonde and Jackson (2002) identified issues in terms of the theoretical foundations of the NEP scale. Wu noted that the NEP scale is presumed to assess “shallow ecological beliefs, in the sense that the items cannot discriminate ecocentric orientation from anthropocentric orientation” (p. 109). In addition, Lalonde and Jackson (2002) argued that the scale is limited by issues “in its wording and a shift in orientation and an increasingly sophisticated understanding of nature” (p. 28). They added that many of their participants had clear objections to the wording of many items on the NEP scale. For instance, their participants had bipolar responses to the item

“The balance of nature is very delicate and easily upset” and had editorial comments regarding the item “Earth is like a spaceship with only limited room and resources”. Lalonde and Jackson suggested that if the aim of the NEP scale is to assess environmental attitudes regarding the widely accepted current knowledge base in EE, it needs clear revision. Based on the above arguments, the research in this thesis modified the NEP Scale in order to explore students’ environmental attitudes in the Iranian context (see Section 3.5.4.1 for further information).

The research reported here investigated the environmental attitudes of students, with regard to the value of nature as well as the responsibilities and duties that humans have in respect to the environment and to future generations. As discussed in Section 2.3.3.1, researchers have developed different viewpoints from which to evaluate environmental attitudes, such as the ecocentric (concern for all living things) and anthropocentric (concern for humans) categories introduced by Thompson and Barton (1994), or egotistic concern (concern for self), altruistic concern (concern for other people), and biospheric concern (concern for the biosphere) developed by Stern and Dietz (1994) (see also. Wesley Schultz & Zelezny, 1999). These viewpoints are used in this study to determine Iranian students’ environmental attitudes.

Some studies have indicated that environmental values, like environmental awareness, may vary depending on gender. A study by Uitto et al. (2011) in Finland among 3,626 ninth grade (15-16 year old) students revealed that girls’ environmental attitudes were significantly more positive and their biocentric values stronger than those of the boys, while in terms of interest in environmental issues, the gender difference was small. However, Arcury et al. (1987) found that information and concerns about environmental problems among adults over the age of eighteen were more developed among men than women. Recently, a study by Liefländer and Bogner (2014) among German students (9–13 years of age) indicated no differences in environmental attitudes between female and male students.

In several national surveys, researchers have assessed the environmental attitudes of students in primary and secondary schools (e.g., Barraza & Walford, 2002; Makki et al., 2003; Negev et al., 2008; Tuncer et al., 2005). These studies indicate that environmental attitudes of students are one of the significant components of

EE and they can be influenced by factors such as educational background and student age. For instance, the relationship between knowledge about science (as a referent for educational background) and environmental attitudes has been considered in the literature (see e.g., Barraza & Walford, 2002; Ma & Bateson, 1999; Tikka, Kuitunen, & Tynys, 2000; Yilmaz et al., 2004). The effect of completing science courses upon students' attitudes towards the environment, was investigated by Tikka et al. (2000). Results revealed that students who completed biology courses exhibited more positive attitudes toward environmental issues than did students who enrolled in courses related to technology and economics. However, Tikka et al. (2000) suggested that even though educational background is important in developing positive attitudes, students' participation in environmental activities and their personal knowledge level are other important parameters shaping environmental attitudes.

In a similar study, Ma and Bateson (1999) found a strong relationship between secondary students' general positive attitude toward science and a positive attitude toward the environment. The authors suggested that this relationship indicates that attitudes toward the environment and attitudes toward science influence one other. In other words, if students know more about scientific concepts, their concern and positive attitudes toward environmental issues are likely to increase. In addition to scientific knowledge impacting on environmental attitudes, Yilmaz et al. (2004) found effects of family income and residential areas on students' environmental attitudes. Their study indicated that students with high family income, and students living in urban areas in Turkey, displayed more positive attitudes toward environmental issues than did students with low family income, and those living in suburban areas.

Student age may be also an important factor in developing positive attitudes towards the environment. Some studies have shown that younger students in general have stronger connectedness to the environment and stronger pro-environmental attitudes than older students (Dijkstra & Goedhart, 2012; Liefländer, 2015; Liefländer & Bogner, 2014; Osborne, Driver, & Simon, 1998). Liefländer and Bogner (2014) argued that the beginning of adolescence and the accompanying psychological development of older students might be the possible reason for less favourable connectedness to the environment. They suggested that this might be because "younger children are oriented toward role models like

parents or teachers” (p. 113) they have more positive attitudes towards the environment than older student.

Development of environmentally sensitive attitudes in students at schools is seen as vital for a sustainable future (Tuncer et al., 2005). Likewise, students’ attitudes about the environment are likely to be relevant to such matters as eco-friendly policies, sustainability, and the well-being of future generations. According to Uitto et al. (2011), students’ attitudes towards environmental responsibility may be influenced by biocentrism. At school, the development of positive biocentric values can be easily linked, for instance, to outdoor education such as residential field courses in biology, in which the opportunity to observe and take care of animals, plants and nature enhances environmental sensitivity and biocentric values.

However, as Makki et al. (2003) observed, while it is widely recognised that attitudes and values are important in determining behaviour toward the environment, the relationship between such attitudes and values, and knowledge and understanding of environmental issues, is less well understood. For instance, high school students can hold relatively uniform and favourable attitudes toward the environment, but have inadequate knowledge of basic environmental concepts and issues (Makki et al., 2003). Having positive attitudes towards environmental aspects, without having enough knowledge about them, can be brought about by influences like family background, religion and culture. As Barraza and Walford (2002) noted, society and culture play a vital role in the students’ environmental perceptions towards specific environmental issues. Similarly, Eames et al. (2008) found a cultural impact on choice of EE topic by New Zealand teachers, influenced through their experiences in outdoor activities like gardening and interest in nature.

To summarise, this section has argued that students’ environmental attitudes are an important part of EE and highly linked to people’s concerns and values (see Sections 2.3.3.1, 2.3.2.2, and Figure 2.2). As indicated by the literature in this section, concern and values are considered as major parts of attitudes’ assessment.

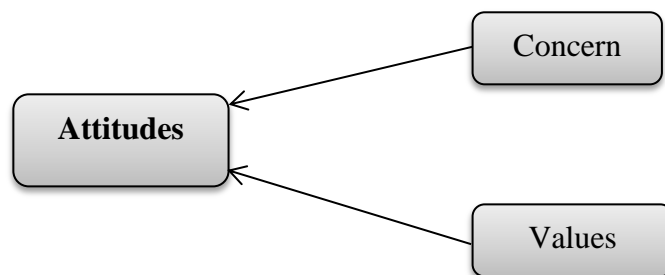


Figure 2.2 Factors influencing environmental attitudes

Because of this, the more that is known about students' attitudes, enthusiasm, dislikes, beliefs, and interests, the more feasible it will be to develop effective programmes of EE (Jenkins & Pell, 2006). Understanding students' environmental attitudes may give insights into strategies to improve EE programmes in secondary schools in Iran. However, attitudes towards the environment do not necessarily correlate with environmental behaviours, as behaviours are influenced by variables including resources, opportunity and perceived social approval (Prabawa-Sear & Baudains, 2011). The next section, reviews the literature on environmental behaviour of students.

2.3.4 Environmental behaviour of students

A large number of problems threaten the environment, among which global warming, urban air pollution, water shortages, and loss of biodiversity are well-documented (Orr, 1992; UNEP, 2013; United Nations, 2002). Many of these problems are rooted in human behaviour (Steg & Vlek, 2009), and will need to be managed, in part, by changing the relevant behaviours so as to reduce environmental impacts. Jensen and Schnack (2006) stated:

This assumption about the root causes of environmental problems has many consequences for the objectives, content and processes of environmental education ... therefore, the aim of environmental education is to make students capable of envisioning alternative ways of development *and to be able to participate in acting* according to these objectives. (p. 472, emphasis added)

For over 40 years, researchers in EE, regional planning, psychology, sociology, and related fields have been engaged in a journey to understand and map the factors that lead people to engage in pro-environmental behaviour. A large part of this journey has been the mission to explain the apparent gap between environmental knowledge, awareness and attitudes, and pro-environmental behaviour (Courtenay-Hall & Rogers, 2002; Kollmuss & Agyeman, 2002). Before

addressing this gap, it is necessary to first define and understand pro-environmental behaviour.

Kollmuss and Agyman (2002) defined pro-environmental behaviour as “behaviour that consciously seeks to minimize the negative impact of one’s actions on the natural and built world” (p. 240) (e.g., to minimize the destruction of natural resources, energy consumption, use of non-toxic substances, and waste production). In a similar definition, by Steg and Vlek (2009), pro-environmental behaviour refers to behaviour that harms the environment as little as possible, or even benefits the environment. Pro-environmental behaviour depends on various factors, such as attitudes, personal capabilities, contextual factors, and habits and routines (Stern, 2000). However, it is often difficult to articulate clearly what behaviour is taught in conservation education and EE focusing on environmental behaviour change. It can be equally challenging to describe the behaviours that are sought, identified broadly in the *Tbilisi Declaration* as “new patterns of behaviour” (UNESCO, 1978, p. 26).

Jensen and Schnack (1997) argue that what is considered as pro-environmental behaviour is often misunderstood. They suggest, for example, that the characteristic feature of pro-environmental behaviour is not just performing a physical action, but that there is an intention in the actor as well – only then can it be called pro-environmental behaviour. In addition, pro-environmental behaviour often requires sacrifice. In other words, protecting long-term interests requires the sacrifice of short-term ones (Carmi, 2013). To illustrate this sense of sacrifice, Carmi provided the following fairly simple example:

... when a person decides whether to turn on a heater or put on another piece of clothing. Turning on the heater will provide immediate relief and benefit the individual in the short run, but it may incur major damage in the future and be detrimental to long-term interests. By the same token, refraining from using the heater offers a major benefit in the long run, at the price of immediate discomfort. (p. 431)

There are many debates about the purpose of education in directing students’ environmental behaviour and these debates can be seen very clearly within the larger field of EE. Hines et al. (1987) argued that the ultimate purpose of EE is to affect students’ behaviours towards the environment and that conservation education, among other areas, specifically calls for behavioural change. However,

others argue for the view that the primary role of education is to facilitate students' intellectual capability and not to impose on students how they should live. For example, Heimlich and Ardoin (2008) say that EE can represent a process for intellectual growth using the environment as the context. Naturally, there are extreme positions around this idea, and numerous positions between. It is not the purpose of this study to contribute to this important debate in EE. Rather, the behaviour of students is investigated because of what base-line insights might contribute to the future development of EE in Iran.

Heimlich and Ardoin (2008) argue that the challenge for educators seeking behaviour change is to change the routines (sequences of habits) that exist around that behaviour. In other words, changing behaviour is not about changing one act, it is about altering the routines in which the acts are embedded. Incentives, rewards, and punishments for exhibiting environmental behaviour (or not) might be one strategy for change. However, research has indicated that rewards and punishments have not been successful in inducing long-lasting change in behaviour (Darner, 2009; Pelletier, 2002). Rather, Pelletier (2002) argued that when such incentives are cancelled, related behaviour/habits sustain behaviour change only for those who are self-determined to perform the pro-environmental behaviour. In other words, when students hold a self-determined motivation for acting environmentally, their actions do not significantly vary depending on difficulties associated performing the behaviours (Darner, 2009). From this perspective, EE should focus on students' development of self-determined motivation toward pro-environmental behaviours for long-term results.

To fully understand the mechanisms behind behaviours and, by extension, to more effectively move students toward environmentally friendly behaviour, it is critical to explore the interactions among the cognitive and affective components around environmental behaviour. Within this, attitudes towards both the environment and environmental behaviour seem instrumental in influencing environmental behaviours, and environmental attitudes are frequently studied (Kaiser et al., 1999). Not surprisingly, knowledge about environmental behaviour is complex. Frick et al. (2004) note that behavioural cognition as it relates to environmental knowledge relies not only on knowledge or understanding of the environmental issue, but also action-related knowledge (what can be done) and effectiveness knowledge (comparative benefits of different actions) (see Section 2.3.2.1).

Hines et al. (1987) introduced and defined the three factors affecting environmental behaviour as being cognitive, affective, and situational. Cognitive factors are related to environmental awareness, including awareness of action skills and strategies. Affective factors, or personality, factors refer to people's feelings or emotions towards the environment (e.g., attitudes, locus of control, responsibility). Third, Hines et al. highlights that "situational factors, such as economic constraints, social pressures and opportunities to choose different actions, may enter the picture and serve to either counteract or to strengthen the other variables" (p. 7). For instance, if a student has the cognitive ability and interest to recycle paper, but does not have the opportunities or facilities to do so, the student may not engage in actions relating to recycling paper.

There are different models used by researchers in order to explain the relationship between cognitive and affective components. The traditional thinking in the field of EE has been that behaviour can be changed by making people more aware of the environment and its associated problems (Hungerford & Volk, 1990). In another traditional view, knowledge is linked to attitudes and attitudes to behaviour. This is known as the linear model (Kollmuss & Agyeman, 2002) (see Figure 2.3).

These models suggest that educating students about environmental issues will automatically result in more pro-environmental behaviour, but it seems these models do not have validity for changing behaviour (Hungerford & Volk, 1990; Kollmuss & Agyeman, 2002). Kollmuss and Agyeman (2002), for example, noted that from the early 1970s, the linear model was shown to be inadequate, research showing that increases in knowledge and awareness did not lead to pro-environmental behaviour. However, Kollmuss and Agyeman stated that most environmental Non-Governmental Organizations (NGOs) still based their communication campaigns and strategies on the simplistic assumption that more knowledge will lead to more enlightened behaviour.

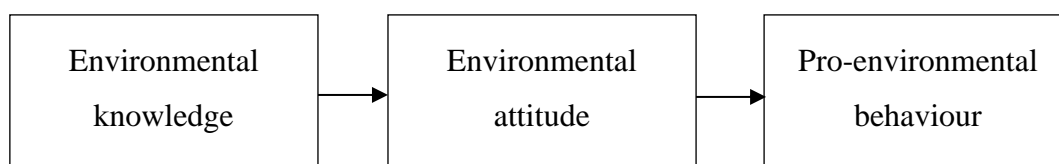


Figure 2.3 Early model of pro-environmental behaviour (from Kollmuss and Agyeman, 2002)

Numerous theoretical frameworks have been developed to explain the gap between environmental knowledge or awareness, and displaying pro-environmental behaviour. According to Kollmuss and Agyman (2002), no definitive answers have been found despite the many hundreds of studies that have been done to explain this gap.

In 1987, Hines et al. published an important meta-analysis of the environmental behaviour research literature in EE. They analysed 128 studies and identified a number of inter-related variables (knowledge of environmental issues, knowledge of action strategies combined with actions skills, locus of control, attitudes, personal responsibility, intention to act, and situational factors) that are associated with pro-environmental behaviour. From this analysis, a model of environmental behaviour emerged that many researchers have applied in their discussions over the past two decades. In brief, and consistent with the literature reviewed above (Section 2.3.4), the model indicates that an individual's intention to act environmentally relies on a combination of the cognitive and personality variables. The intention will then lead to pro-environmental behaviour if certain factors (situational factors) do not inhibit the individual to act environmentally (Chao, 2012). This model is displayed in Figure 2.4.

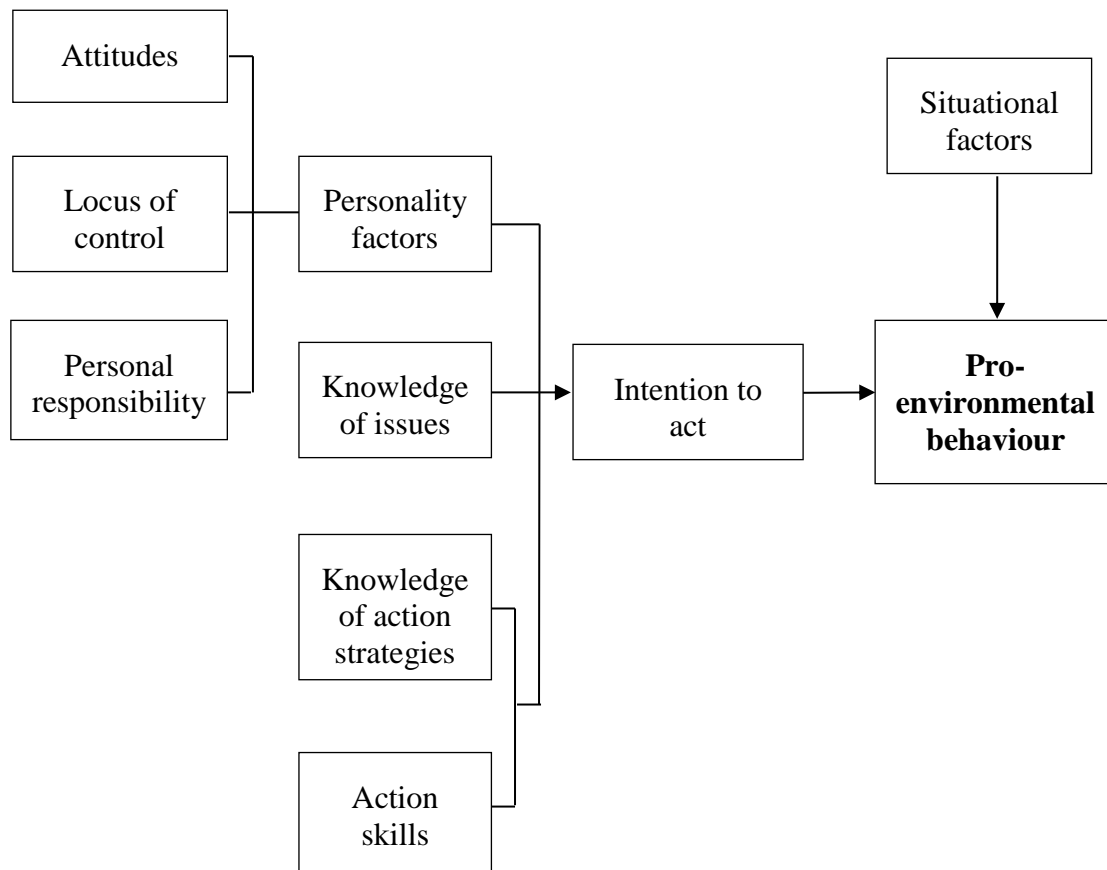


Figure 2.4 Model of predictors of environmental behaviour (Hines et al., 1987)

These two models of predictors of environmental behaviour, and many others which have not been discussed in this study, indicate that environmental behaviour is a complex phenomenon and it's difficult to be accurately visualized. Kollmuss and Agyeman (2002) stated that a single diagram with all the factors that shape and influence behaviour towards the environment would be so complicated that it would lose its practicality and probably even its meaning. However, one may argue that multiple diagrams would be less practical. Kollmuss and Agyeman note that the distinctions and hierarchy between the different influential factors are to some extent arbitrary. For example, distinguishing between demographic factors, external factors (e.g., institutional, economic, social, and cultural factors) and internal factors (e.g., motivation, environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities, and priorities) is problematic.

Although a gap between knowledge about environmental problems and action to support the environment commonly exists (Kollmuss & Agyeman, 2002), explicit education for knowledge and appropriate affective pedagogies that enhance

environmental awareness can potentially support EE, thus fostering the conditions for pro-environmental behaviour. Kollmuss and Agyeman pointed out that in order to find a high correlation between attitude and behaviour, the researcher has to evaluate the attitude for that particular behaviour. For instance, comparing attitudes toward climate change and driving behaviour usually shows no correlation. Even people who are very concerned about climate change tend to drive motor vehicles. This is because a concerned attitude toward climate change is not easily related to driving behaviour.

The literature shows that there are concerns about transferring knowledge into action, as highlighted above. For instance, Tuohino (2003) found that students were aware of environmental aspects but were not prepared to transfer their environmental beliefs into environmental behaviour. A similar finding was reported by Barraza and Walford (2002) in Mexico and England where students were aware of environmental issues and had a high level of knowledge of environmental issues, but they were not willing to transfer this knowledge into action. According to Negev et al. (2008), there are large gaps between the level of environmental awareness and environmental behaviour of Israeli high school students. They found that socioeconomic factors and social interactions were the major factors associated with large gaps between environmental knowledge and environmental behaviour. Said et al. (2007) argued that formal and non-formal EE can raise environmental consciousness of the students, but are not necessarily effective in changing their action and behaviour patterns.

Stevenson (2007) stated that teaching and learning in EE are intended to be co-operative processes of inquiry into, and action on, real environmental issues. Such an inquiry process demands that students actively engage in critical and complex thinking about real problems. The development of knowledge, skills and values is not only directed towards action, but emerges in the context of preparing for (i.e., the inquiry) and taking action. Consequently, curriculum and pedagogical planning need to be highly flexible.

As can be seen, the relationship between EE and positive environmental behaviour of students is complex and requires a deeper understanding of the contributing factors. However, to measure environmental behaviour of the participants, many studies in EE rely on self-reported behaviour in response to questionnaire items, and responses might not be adequate indicators of actual

behaviour. Unfortunately, the measurement of students' actual environmental behaviour may not always be feasible (Steg & Vlek, 2009), as is the case in the study reported in this thesis, which therefore relies on self-reports of students' environmental behaviour. In addition, as Hines et al. (1987) indicated, pro-environmental behaviour relies on some cognitive and personality variables. These variables are discussed in the following sub-sections.

2.3.4.1 Intention to act

Students' attitudes towards environmental behaviours are commonly known as 'intention to act', which stems from Ajzen and Fishbein's (1980) model of reasoned action and assumes that the individual's intention to act has a direct effect on behaviour. In other words, behavioural intention is seen as the best determinant of actual behaviour. Put another way, a person who expresses an intention to take environmental action (verbal commitment) will be more likely to participate in the action than a person who expresses no such intention (Hines et al., 1987).

The importance of EE to stimulate willingness for students to act in more environmentally sustainable ways has been highlighted by a large number of researchers (e.g., Ajzen & Fishbein, 1980; Boyes, Skamp, & Stanisstreet, 2009; Darner, 2009; Eames, Barker, Wilson-Hill, & Law, 2010; Hines et al., 1987; Hungerford & Volk, 1990). These researchers all suggest that changing students' intention to act more environmentally favourably would more likely result in more environmental responsible behaviours, and can be predicted by attitude. As Darner (2009) suggested, environmental behaviours arise from particular types of motivations, and fostering these motivations is a critical part of EE. However, having a positive intention to act environmentally is a complex issue, with multiple reasons for taking, or failing to take, pro-environmental actions. For instance, students need to feel empowered that their environmental actions will have an effect (Boyes et al., 2009).

Darner (2009) argued that when EE in schools is successful in fostering students' intention to act towards the environment, instruction involves several factors: students are involved as active, rather than passive, participants in learning processes; formal EE is generally more effective than informal EE; longer EE programs are more successful than short EE programs; and the incorporation of

community-wide efforts into classroom efforts, and EE that incorporates action training, is most successful with encouraging intention to act. According to Darner, intention to act in environmentally friendly ways can be considered as a satisfying outcome of EE in the classroom because pro-environmental behaviours are self-determined, even when they are not particularly pleasurable. Furthermore, she stated that:

Two people may have the same intentions to act but very different reasons for acting. For instance, one person may intend to recycle a plastic bottle to get a cash refund, whereas another person may intend to recycle a plastic bottle because of his or her concern about the consumption of fossil fuels in the production of plastics. (p. 42)

In other words, as Darner highlighted, social situations can either support or weaken motivation and gravitation toward environmental behaviour. These motivations and intentions might lead people to be able to take environmental action or not. Ability to take environmental action is called agency.

2.3.4.2 Agency

Caiman and Lundegård (2014) defined agency as an entity or internal ability which has a close bond with individual action. They added that measuring students' agency toward solving environmental issues can help us to understand to what extent students are in charge of the meaning-making activities, how they act as agents in solving environmental issues, and how care and anticipation appears in different ways along the transactional process. Blanchet-Cohen (2008) identified six dimensions of environmental agency: connectedness, engaging with the environment, questioning, belief in capacity, taking a stance, and strategic action. In EE, students' agency has been mainly considered as individual aims that guide action (intentions to act), such as strategies to create influence and make changes in day-to-day practices (Caiman & Lundegård, 2014). Agency can also be considered as students' anticipations towards environmental issues and their course of actions, which sometimes end up as pro-environmental behaviour. Therefore, "agency is tackled not as a kind of 'power' but rather as an 'engagement with particular temporal-relational-contexts-for action'" (Caiman & Lundegård, 2014, p. 441). Agency is strongly linked with a person's locus of control and has also been recognised as a prerequisite for environmental action.

Nonetheless, in the literature, researchers tend to use the term locus of control more than agency.

2.3.4.3 Locus of control

Environmentally responsible behaviour is often connected in literature with a social psychological concept called the locus of control. The links between locus of control, as an attitudinal factor, and environmental behaviour have been demonstrated by many researchers (Alp, Ertepinar, Tekkaya, & Yilmaz, 2008; Fielding & Head, 2012; Hines et al., 1987; Hwang et al., 2000). ‘Locus of control’ has been defined by Hines et al. (1987) as an individual’s perception about whether or not they have the capability to make a change for the future of the environment through their own behaviour. Hines et al. identified two types of locus of control: internal and external. An external locus of control is based on the belief that changes happen by themselves or through the power of others, such as God or the government. Hence, people with an external locus of control do not believe that they will be able to make a difference and probably will not take action (Fielding & Head, 2012; Hungerford & Volk, 1990). In contrast, an internal locus of control is based on the belief that individual behaviours are likely to have an impact. Therefore, those with a strong internal locus of control are more likely to participate in particular environmental activities (Hines et al., 1987; Hungerford & Volk, 1990). There are two additional types of locus of control: individual and group. An individual locus of control refers to an individual’s perception of his or her ability to perform an environmental action, while group locus of control refers to perceptions related to group actions (Hwang et al., 2000).

There are often barriers to students forming pro-environmental attitudes and therefore a sense of agency and positive locus of control. Mackey (2012) has suggested that if students are underestimated, over controlled, or viewed as ignorant and not having yet reached the status of citizen in their society, there is little likelihood of them seeing themselves as active participants in environmental change. Another important barrier to participation in environmental change, illustrated by Carmi (2013), is the time gap between the behaviour and its consequences. This is one of the most challenging aspects in motivating students to adopt pro-environmental behaviour. Mackey (2012) determined that if we want to bring about long-term behaviour change, it is essential to consider the motivations and barriers that influence participants and try to overcome these

types of barriers. To identify the motivations of the students, it is vital to first understand how their experiences, their sense of themselves and their social location are represented and constructed. One way to do this is through an action competence approach.

2.3.4.4 Action competence

A traditional teaching approach to environmental issues has been criticized by many environmental educators for leading students to awareness about the existence of environmental problems, but not leading to action competence (e.g., Jensen & Schnack, 1997; Tilbury, 1995). The need to take an action perspective or, as it is often labeled, to work in an action-oriented way, is becoming increasingly important since focusing only on increasing environmental awareness has not addressed the root causes of environmental issues or targeted the resolution of problems or behaviour change. It also has potential to cause undue worry among students (see Section 2.3.3.1).

An action orientation is considered by many to be a key component that defines EE (Eames et al., 2006; Tilbury, 1995) and is often linked to education *for* the environment (see Section 2.2). Action competence recognises this orientation (Breiting & Mogensen, 1999; Eames et al., 2006; Jensen & Schnack, 1997), and can help support student learning in EfS (Almers, 2013; Bolstad, Eames, Cowie, Edwards, & Rogers, 2004; Eames et al., 2006). The concept of action competence refers to students' abilities to act with regard to environmental concerns, now and in the future, and the focus must be a change perspective (Jensen & Schnack, 1997). In other words, as Eames et al. (2006) indicated, it includes the ability to identify environmental issues, make decisions about solutions, and take actions that are targeted towards solutions at a societal as well as a personal level. This is achievable when students create their own visions for the future, make choices based on these visions, and get their hands dirty and learn how to take action.

To do this, actions need to be consciously taken, and targeted. For example, litter collection cannot be necessarily characterized as an environmental action because it does not focus on the root cause of the issue, nor address how to prevent littering. According to Jensen and Schnack (1997), activities that are not geared toward solving a specific environmental problem cannot be described as environmental actions. If this is not the case, Jensen and Schnack argued, "we run

the risk of teaching pupils a simplistic and individualistic approach to environmental problems and their causes” (p. 172). They continued that EE is not about simple behaviour modification without understanding, but about creating a democratic approach in which students decide for themselves to take specific environmental actions that they choose. Therefore, there is conscious decision making regarding the action (pro-environmental behaviour); this is not necessarily true with a simple behavioural change, which could be caused by pressure from others, such as a teacher. This is a challenging task for teachers: to not only encourage their students to take action but also to ensure that they understand why they are taking that action (Eames et al., 2006; Palmer, 1995; Silo, 2013).

Jensen and Schnack (1997) illustrated that direct and indirect actions can both be considered as types of environmental actions. Direct actions are those that contribute directly to solving environmental issues, such as constructing compost heaps. In other words, direct actions refer to a direct relationship between those taking the action and their environment. However, the aim of indirect actions is to solve environmental problems through influencing others to take action, such as writing letters to politicians and companies. Jensen and Schnack interpreted indirect actions as those dealing with ‘people to people’ relations. They also reported that in Danish schools the most common actions appeared to be indirect actions. However, they recognised that these two types of actions can be combined. For instance, direct actions may also influence other people to act. Jensen (2002) agreed that an adequate concept of action must involve both direct and indirect action.

To sum up, effective EE involved engaging students in making decisions regarding ways to address environmental problems and sustainability issues that affect their lives, leading to purposeful action (Mackey, 2012). Thus, environmental actions, or pro-environmental behaviour, of students should target environmental issues “at a change: a change in one’s own lifestyle, in the school, in the local or in global society” (Jensen, 2002, p. 326). As discussed throughout this section, there are important factors that influence environmental behaviour of students. These factors are summarised and presented in Figure 2.5. Some of these factors might be more important than the others and this varies in different research due to different context. EE that primarily provides students with understanding or knowledge of environmental issues can nurture feelings of

hopelessness and futility when students are not provided with practical skills enabling them to contribute to solutions (Prabawa-Sear & Baudains, 2011) (see also Section 2.3.3.1). Therefore, it was important in the study presented in this thesis to investigate students' behaviour towards the environment, which might indicate the success of EE in Iran in changing students' behaviour.

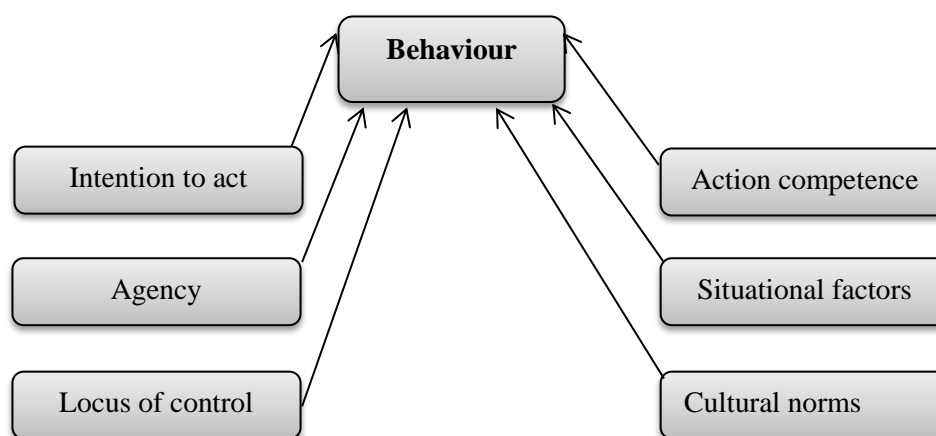


Figure 2.5 Factors influencing environmental behaviour

2.3.5 Section summary

This section has discussed students' environmental awareness, attitudes, and behaviour, and the interactions between these. It was argued that environmental awareness is extremely significant if school students are to take action to protect the environment. The importance of awareness as being more broad than knowledge was also discussed. Taking into consideration that prior to any action there should be a conscious making up of one's mind, this study defines awareness as a deep understanding about environmental issues, rather than just simply knowing about the issues.

This section also examined environmental attitudes of the students, along with some key principles influencing attitudes such as environmental concerns and values. These include a sense of caring for the environment by students which may stimulate policy makers and educators to focus on effective plans to solve the environmental issues that young generations will face in the future. In addition, this section discussed that environmental attitudes and concern are strongly linked with a set of values that students have about themselves, other people, or plants and animals.

Both awareness and attitudes have been recognised as prerequisites of pro-environmental behaviour. However, these two aspects do not necessarily result in students taking action. This section further illustrated the complexities in students' behaviour (Kollmuss & Agyeman, 2002), discussing different theoretical models of environmental behaviour (e.g., Hines et al., 1987) and some of the factors influencing pro-environmental behaviour, such as intention to act, agency, and locus of control. Finally, an action competence approach was identified as a valuable pedagogy for motivating students to take actions that target solutions to environmental issues. To apply this approach, and since teachers have a strong influence on student learning, the teachers' awareness, attitudes, and behaviour are important to explore. In the next section, the literature about environmental awareness, attitudes, and behaviour of teachers is therefore reviewed.

2.4 Environmental awareness, attitudes, and behaviour of teachers

2.4.1 Section overview

This section of the literature review discusses the research evidence related to teachers' personal and professional environmental characteristics. First, Section 2.4.2 considers teachers' environmental awareness, which is necessary if they are to educate students about the complexity of environmental issues and to increase environmental behaviour sensitivity among them. Section 2.4.3 then reviews the significance of environmental attitudes of teachers, to help situate their motivation to teach about environmental issues as well as to take environmental actions in their personal life. Factors such as teachers' life experiences and their sense of personal responsibility, both of which affect teachers' attitudes towards the environment, are further discussed. The next section (Section 2.4.4) reviews the environmental behaviour of teachers that might take place inside (professionally), or outside of the classrooms in their daily life (personally). Different barriers that inhibit teachers from implementing EE programs in schools are discussed. Finally, teachers' self-efficacy is considered as a key influence on pro-environmental behaviour.

2.4.2 Environmental awareness of teachers

Teachers play a key role in the environmental literacy of students (WCED, 1987), but to do this with authenticity, they themselves need to be environmentally aware,

and have a personal and professional concern for the environment. This level of concern and awareness consists of engagement with knowledge, attention, interest, or care about environmental problems (Tuncer Teksoz, Boone, Tuzun, & Oztekin, 2013). As mentioned earlier (Section 2.3.2), environmental awareness is associated with both being able to identify environmental issues, and understanding the origins, implications, and consequences of those issues (Gambro & Switzky, 1996). Given the variety of contexts in which EE may take place in schools, including in schools in Iran, and the differences in environmental awareness which may exist among teachers, there is a need investigate the level of environmental awareness of teachers in Iran in order to see how it is connected to EE (Gayford & Dillon, 1995).

Students tend to develop awareness and positive attitudes toward the environment in school mostly through general school curricula and not through specialized EE projects (Ruskey, Wilke, & Beasley, 2001). Hence, all teachers could play an important role in educating their students about the environment, its related problems and solutions. For this, the teachers themselves need to have the necessary level of environmental awareness; only then they can help the future generation become aware of the environmental problems and possible solutions. Some studies have indicated that teachers do not possess the desired personal environmental awareness and have misconceptions about the complexity of environmental issues such as the greenhouse effect, ozone layer depletion and acid rain (Boubonari, Markos, & Kevrekidis, 2013; Boyes, Chambers, & Stanisstreet, 1995; Van Petegem, Blicq, & Pauw, 2007). Van Petegem et al. (2007) went so far as to say that most teachers lack insight into complexities of environmental issues and the concept of sustainable development, which may affect how their teaching might contribute to productive EE. Borg et al. (2014) also argue that teachers' lack of awareness is a significant constraining factor for student environmental learning. For instance, if teachers have a poor understanding of environmental issues, they will likely perpetuate this misinformation in their classrooms.

The increased attention on EE within school organizations has underlined the lack of professional environmental awareness of teachers to effectively implement EE. Pe'er et al. (2007) found that this lack of environmental awareness might be due to the lack of teachers being adequately trained. In line with this, several EE

international conferences and reports have highlighted the importance of teacher education and teacher training as a key factor for better implementation of EE. Among these conferences, the UNESCO-UNEP (1990) described teacher education in EE as ‘the priority of priorities’ (Corney, 1998). *Agenda 21* also emphasized teacher training programmes, which were described as a great help for the development of EE among teachers (UNESCO, 1992).

If teachers are to influence the environmental awareness of students, they need to be equipped with appropriate teaching materials to develop environmental awareness. Their abilities to teach and their own level of environmental awareness about the quality of the environment are also factors. Educating teachers about the environmental curriculum so that they can raise the awareness among students is important (Bharambe, 2013). This suggests the need for introducing and enriching training EE programs for both in-service and pre-service teachers, which is a prerequisite for their ability to design and implement effective EE for the students (Goldman, Yavetz, & Pe'er, 2006; Mosothwane & Ndwapi, 2012; Nagra, 2010).

Many researchers argue that this teacher education for EE, whether pre-service or in-service, should include both subject matter knowledge and pedagogical content knowledge (PCK), because both are central to teaching (Corney, 1998; Kim & Fortner, 2006; Mosothwane & Ndwapi, 2012). Hence, one of the main challenges for formal EE is to support the professional development of teachers. Teachers need to know what to teach, as well as how to teach their subjects (Birdsall, 2014; Kim & Fortner, 2006). However, in some cases environmental training and academic studies may not be very effective. For instance, the study conducted by Yavetz et al. (2009) indicated that academic studies did not have an influential role in pre-service teachers’ environmental learning level. Yavetz et al. also found that the relevance of personal qualifications and different background variables were more important than academic studies in teacher environmental knowledge.

Teachers’ environmental awareness therefore plays an important role in potentially increasing pro-environmental behaviour among students. However, to achieve this, specific professional development is required to help teachers to obtain pedagogical knowledge to support student action taking (Eames et al., 2006; Said et al., 2007). In addition, Prabawa-Sear and Baudains (2011) found that greater teacher involvement and support for environmental initiatives was

identified by the students as important for increasing pro-environmental behaviour in schools.

Stevenson (2007) argued that examining teachers' pedagogical knowledge and the structural organization of schools (i.e., the curriculum) are important for ultimately achieving the goals of EE. However, Makki et al. (2003) suggest that while a curriculum may provide teachers and students with lots of information and awareness, it may not "foster creativity, interest, teacher and student involvement, resulting in lack of motivation and little meaningful learning" (p. 31). In other words, as Larijani and Yeshodhara (2008) point out, EE in schools cannot depend only on curriculum, but also relies on teachers' awareness, attitude and behaviour relating to EE.

In summary, teachers' environmental awareness – both in terms of their own awareness about environmental issues (personal awareness) and their awareness of issues associated with teaching about environmental issues (professional awareness) – is a the key aspect for better implementation of EE in schools. Pe'er et al. (2007) have argued that a low level of personal awareness about the environment can mean that teachers ignore the implications of their daily behaviour on the environment. This may be particularly important when they are teaching environmental issues to their students. To fulfil their role as environmental educators, teachers need to develop in their students greater awareness (Yavetz et al., 2014), which requires teachers' to themselves be aware of environmental issues (personal awareness) and have the knowledge about how to effectively teach about these, including to support the development of students' action competence (professional awareness). Attitudes, both personal (about the environment) and professional (about teaching about the environment) are also important.

2.4.3 Environmental attitudes of teachers

Along with teacher personal and professional awareness about environmental issues and how to teach about these, the attitudes of the teachers regarding the environment (personal) and EE (professional) are another key component influencing the implementation of EE in schools. As Gayford and Dillon (1995) comment, "teachers are not simply teachers, they are also people with their own beliefs, values and attitudes" (p. 176). For example, teachers who have a concern

for the environment appear to try to recognise it as an important part of their professional work. This is mainly due to their unique and privileged position with regard to their attitudes and the way they use these attitudes professionally. As Gayford and Dillon stated, “the privileged position arises out of their own awareness of what they are doing, their environmental awareness and attitudes towards the environmental issues and their knowledge of policies and initiatives that have been set up to support them” (p. 176). Many researchers from different countries have investigated the environmental awareness of teachers, along with their environmental attitudes. They include Stir (2006) in Australia, Hsu and Roth (1998) in Taiwan, Esa (2010) in Malaysia, Boubonari et al. (2013) in Greece, and Goldman et al. (2006) and Pe'er et al. (2007) in Israel. The majority of these studies found a moderate level of environmental awareness along with positive attitudes among teachers, but reported rather low levels of environmental behaviour. Again, these findings show the complexity of what determines environmental behaviour.

For decades, environmental issues have been an important theme in EE. However, addressing environmental issues in the classroom has never been easy for teachers. Karpudewan et al. (2012) suggest that helping teachers change their own attitudes towards the environment might have an impact on students’ environmental attitudes when they are in the classrooms. Teachers who change their own attitudes may lead them to investigating actual environmental issues with their students and this motivates students by shaping students’ worldviews, making learning relevant to their daily lives, and helps to develop skills such as participation in community decision making, critical thinking, and problem solving (Kim & Fortner, 2006).

To investigate why teachers may not teach environmental issues, despite the benefits of teaching such issues, Kim and Fortner (2006) asserted that, besides external and logistical barriers such as lack of time, teachers may have internal, personal barriers. These can include attitudes toward teaching environmental issues, and this can determine how often the teachers integrate environmental issues into their teaching. The study conducted by Ko and Lee (2003) indicated that teachers tended to teach more EE if they held more favourable attitudes toward EE and there were fewer constraints for them.

In addition, there are difficulties with the affective domain of EE. In a study by Gayford and Dillon (1995) into the attitudes of teachers to EE, a series of concerns were identified that affected teachers' attitudes and their ability to engage in EE:

1. The breadth of EE and the fact that compared to many other areas of the curriculum it can seem unfocused, particularly since it includes much that relates to beliefs, values and attitudes;
2. The methodologies and approaches suited to EE are generally not well developed in comparison with other subject areas and there is lack of consensus about what might be considered good practice;
3. The possibility of EE being a form of indoctrination. Given the importance placed on values and attitudes in relation to the environment, this problem is compounded, since a good deal of discussion about environmental issues has obvious political implications; and
4. The use of traditional methods of assessment, which are seen as inappropriate, given the nature of the area of education, and the absence of suitable alternative approaches. (p. 175)

If EE is to influence teachers' attitudes towards teaching about the environment, then it is important to consider how this is done. For example, as Jickling and Wals (2012) stated, to avoid a false consciousness, "environmental education should exclude actions that smack of indoctrination" (p. 51). As Jickling (1992) had earlier written "the task is not to educate for sustainable development, ... we must enable students to debate, evaluate, and judge for themselves the relative merits of contesting positions" (p. 8). In addition, there seems to remain a lack of understanding of how to effectively assess student learning through EE.

As with students, personal history and previous experiences can influence teachers' environmental attitudes and values toward the environment. According to Goldman et al. (2006), interactions with the environment, for instance being originally from rural areas, can contribute to shaping an individual's ideas. They suggested that family background, social and cultural interactions, religious traditions, political situations, and other factors also influence the environmental perspectives of teachers. For example, they stated that the ethnic environment in which a person grows up and lives is a cultural factor which can influence

teachers' environmental values and behaviour. These factors affect the context in which teachers work, and need to be considered (Goldman et al., 2006).

Importantly, teachers who are more committed to teach EE may be more determined to overcome the barriers they face in implementing EE. A study by Kennelly et al. (2008) showed that significant life experiences such as connecting to the land and family orientations towards the environment play an important role in a teacher's commitment to teach environmental aspects. These life experiences serve to inculcate values that are retained and reinforced during the teachers' life. As Kennelly et al. found, when teachers are concerned about particular issues, they tend to teach about such issues. For instance, living in a residential district seems to affect the environmental attitudes of teachers. Regarding this, Özden (2008) found that Turkish teachers living in urban areas had more positive attitudes towards environmental problems than those living in rural areas. Özden specified that the significance of environmental issues in big cities may affect the environmental attitudes of teachers in a positive way. However, Esa (2010) found that Malaysian teachers who were originally from rural areas had greater interest in and more positive attitudes towards teaching about the environment than those from urban areas.

The literature also highlights other factors that can influence the environmental attitudes of teachers. These include the teachers' academic major, their socio economic status (income level) and their highest level of education (Özden, 2008). For instance, regarding the academic major, teachers who have a biology, chemistry or geography background might have more interaction with environmental topics and environmental problems and consequently have more positive environmental attitudes. This greater interest may lead teachers to have more responsibility towards the environment and environmental teaching.

2.4.3.1 Personal responsibility

Although environmental attitudes of teachers have generally been widely reported in the literature, teachers' sense of environmental responsibilities have received less attention. The sense of personal responsibility has been defined by Hines et al. (1987) as an individual's feelings of duty or obligation, where "obligation is expressed in reference to the environment as a whole or in reference to only one facet of the environment (e.g., personal responsibility felt for reducing air

pollution, for buying lead-free gasoline, for recycling)” (p. 5). In a similar description, Hungerford and Volk (1990) considered personal responsibility as a function of personal investment in the way that an individual who has more personal interest in a particular environmental issue is more likely to invest resources in it and, therefore, have a higher environmental responsibility. However, Hwang et al. (2000) categorized the obligation or sense of responsibility about the environment into personal and social responsibility. Personal responsibility refers more to individual-oriented responsibility, in contrast to social responsibility, and the self is perceived to be a responsible agent compared with other social agents. In other words, personal responsibility considers environmentally responsible behaviour not from a social perspective, but as each individual’s responsibility. However, Tuncer (2013) recently argued that it is important for teachers to have the sense of responsibility for individual, governmental and environmental actions as well as a belief in their ability, both individually and collectively, to have a positive impact on solving environmental issues.

Additionally, environmental responsibility is associated with the individual trusting in the efficacy of their pro-environmental behaviour (Eden, 1993). However, Eden indicated that the conversion of this environmental responsibility into pro-environmental behaviour is complex and relies on an individual’s social context. Eden added that inconsistency happens between verbal expression and pro-environmental behaviour because of different values operating in different contexts. For example, reduced population growth for some individuals may not be the same goal as that which they feel to be good for themselves and their families (i.e. they may have several children), resulting in inconsistency between values, beliefs and behaviour. Therefore, it is important to consider the context and constraints which limit the transformation of environmental responsibility to behaviour.

Environmental behaviour is also subject to a number of factors like economic, social and cultural constraints (Eden, 1993), where:

economic constraints focus on income and operate directly but also indirectly because they affect other social factors such as mobility and level of education ... culturally shared perceptions place much pro-environmental behaviour on the 'fringe' of society as an eccentric minority interest and even as a source of ridicule. (pp. 1752-3)

Eden also proposed two aspects of environmental responsibility: first, awareness of the consequences of environmentally-related behaviour influences perceptions of responsibility; second, the self can be perceived to be the main agent of pro-environmental behaviour and responsibility is attributed to the self.

According to Eden's (1993) study, the sense of responsibility was frequently implicit in respondents' reports of particular pro-environmental behaviour which they "ought", "should", and even "must" do. However, Eden indicated that the source of motivation for these perceived obligations was poorly expressed. She argued that there are certain moral senses among the people who express responsibility toward the environment, but, even for these more committed people, it is difficult for them to explain verbally. Therefore, although people may understand what is defined as environmentally acceptable, they may not be able to explain why they behave environmentally. Eden continued that these moral obligations appear rooted in practical consciousness or taken-for-granted knowledge, which is learned, mainly through practical ways of living in the social reality.

Teaching environmental issues and increasing the level of environmental awareness of students without reference to attitudes and values can limit the degree to which such awareness is translated into action. In fact, Ballantyne and Packer (1996), Corney (1998), Hart (2003) and many other researchers argue that teaching positive environmental attitudes and values is more important in changing environmental behaviour of students than the teaching of environmental knowledge. Regarding this, Corney (1998) said that "teaching about environmental issues specifically involves making decisions about a teacher's aims for students' values education, and the teacher's own role in handling controversial issues with students" (p. 93).

In a nutshell, non-environmental attitudes of the teacher or a lack of personal responsibility for the environment can act as a barrier for achieving the goals of EE. But often it is noted that there is a significant difference between teachers' attitudes and their pro-environmental behaviour. As such, for teachers who are role models for students, having only positive attitudes towards the environment may not be sufficient and they should also be involved in taking action. This would also help in developing positive, or pro-environmental attitudes and actions

in students (Nagra, 2010). For better understanding of action-taking by teachers, the next section addresses the environmental behaviour of teachers.

2.4.4 Environmental behaviour of teachers

In this study, the environmental behaviour of teachers is investigated in two different ways: firstly, their commitment to implementing EE in the classroom (professional environmental behaviour); and secondly, their commitment to pro-environmental behaviour in their personal life (personal environmental behaviour).

Hungerford and Volk (1990) identified that in general there are three variables that contribute to environmental behaviour, identified as entry-level, ownership and empowerment variables. According to their study, entry-level variables appear to be prerequisite to decision making for environmental actions and involve environmental sensitivity, knowledge of ecology, and attitudes toward pollution (and other environmental issues). Next, ownership variables “appear to be critical to responsible environmental behaviour ... and make environmental issues very personal” (p. 261). They identified ownership variables as in-depth knowledge of issues and personal investment. To explain the concept of personal investment, Hungerford and Volk stated:

... an individual who thoroughly understands the economics of recycling and who uses a substantial amount of recyclable materials might feel a substantial personal economic investment in recycling, however, the motivation might not necessarily have to be economic. It could be environmental in nature if the person has good ecological concepts about waste disposal, biodegradability and nutrient cycles and understands the broad human involvement in these things. Recycling might, then, become a strong personal need which could be translated as personal investment. (p. 261)

Empowerment variables can give a feeling to people that they can make a difference for the future of the environment by solving environmental issues. These variables involve: perceived skill in using environmental action, knowledge of environmental action strategies, intention to act, and locus of control (see Sections 2.3.4.1 and 2.3.4.3). To investigate the environmental behaviour of teachers, this study considered both entry-level variables and ownership variables, with special emphasis on teachers’ intention to act and their locus of control.

As already indicated, a number of barriers inhibit teachers from implementing EE programs professionally in schools – even if they are committed to personal pro-environmental behaviour. According to Ham and Sewing (1988), these barriers can be categorized into four broad groups: conceptual barriers, logistical barriers, educational barriers and attitudinal barriers. Conceptual barriers refer to misconceptions about the scope and content of EE. For instance, many teachers think that EE is relevant only to science curricula (Hungerford, Peyton, & Wilke, 1980). Logistical, or external barriers, include lack of time, funding, resources, suitable class sizes. In particular, lack of time appears to be a major barrier for teachers. It is considered to be an important factor because teachers are required to cover all the materials in the text books and curriculum, leaving limited time for EE if it is not a mandatory curriculum component. Time is also required for teachers to prepare for teaching EE.

Lack of professional environmental awareness can be considered to be an educational barrier and can be rooted in teachers' misgivings about their own awareness and competence to implement EE (see Section 2.4.2). For instance, a study conducted by Mirka (1973) indicated that the main reason teachers did not take students for outdoor activities was their lack of awareness about how to handle these activities. Kim and Fortner (2006) also found barriers such as lack of pedagogical content knowledge and an absence of teachers' skills in taking students for outdoor activities. A study conducted by Rickinson et al. (2004) indicated that safety concerns, time and financial constraints, and lack of support by the education system were the barriers for teachers not to take students for outdoor activities.

Finally, attitudinal barriers are those which stem from teachers' environmental attitudes (Ham & Sewing, 1988), and it is likely that teachers who do not have personal positive attitudes toward the environment will offer little instruction towards the environment in the classroom (see also Section 2.4.3). In addition, Ham and Sewing found that even though teachers generally had positive attitudes toward EE, most lacked the commitment to actually teach EE. This could be due to lack of practice and skills in teaching of environmental issues (professional awareness and behaviour) among teachers. Ko and Lee (2003) found that teachers tended to teach more EE if they had more skills in teaching EE.

Besides improving teachers' ability to effectively implement EE, one of the challenges ahead is to remove barriers or limiting conditions to behaviour change, so that adoption of sustainable lifestyles can be facilitated. Kennelly et al. (2008) suggest that in EE, relevant pedagogical content knowledge is important in reinforcing the teacher's determination to implement the teaching of environmental issues in school. They suggest that the development of pedagogical content knowledge in EE during pre-service teacher education is an important support for implementation of EE by these teachers when they serve in schools. In addition, different pedagogical strategies may have an impact on how students develop positive attitudes related to the environment, and affect how engaged students feel and how enjoyable they find the construction of new knowledge.

Personal and professional intentions to act are another powerful predictor of teachers' willingness and determination to implement EE (see also Section 2.3.4.1). Intention to act is closely related to both cognitive and affective variables. According to Hsu and Roth (1998), teachers are more likely to express an intention to take environmental action (whether personal, professional, or both) if they have knowledge of environmental action strategies, accept environmental responsibility (i.e. have a sense of obligation toward alleviating environmental problems) and have positive environmental attitudes. In other words, there appears to be a strong relationship between the environmental awareness, attitudes and behaviour of teachers, and this is influenced by multiple other factors.

2.4.4.1 Teachers' self-efficacy and other factors influencing teachers' environmental behaviour

Closely linked to the professional environmental behaviour of teachers is their self-efficacy, or a teacher's perception that he or she can teach environmental aspects effectively (Bandura, 1997). Efficacy is recognised as a key influence on pro-environmental behaviour (Eden, 1993), as is recognising some agency to undertake that behaviour. For example, the recognition of moral obligation (see Section 2.4.3.1) or ascription of responsibility of teachers to implement EE can create agency to act responsibly. Many researchers have used self-efficacy as an indicator of teacher effectiveness and preparedness to implement EE (Moseley, Reinke, & Bookout, 2002). Darner (2009) argues that many pro-environmental behaviours correlate most highly with self-determined motivation, which derives from self-efficacy.

Besides pro-environmental attitudes and positive self-efficacy, teachers in general need a supportive school context to make use of the knowledge and skills they have acquired. This includes time and space for their environmental teaching, and having opportunities to address environmental values and perspectives and act on curriculum decisions related to EE rather than just relying on textbooks (Ko & Lee, 2003). However, having a positive attitude and even self-efficacy does not necessarily lead to environmental behaviour in teaching. This was found in a study in Israel involving first year pre-service teachers trained for preschool to 10th grade, who demonstrated positive attitudes towards the environment – but there was low responsible environmental behaviour among these teachers (Pe'er et al., 2007). The authors assumed that this lack of action among teachers could be a result of the non-mandatory status of the subject in the school curriculum.

The privileged position of teachers, especially in terms of income, status, and education level, can also be an important factor leading to professional environmental behaviour (i.e., effective teaching of EE). For instance, Eden (1993) found that being a member of environmental groups and other forms of pro-environmental behaviour is positively correlated with higher incomes, higher socioeconomic status and higher education levels. Hence, a privileged position can facilitate the options for pro-environmental behaviour. However, these positions, like many other factors, are not sufficient predictors of pro-environmental behaviour and do not explain why pro-environmental behaviour is adopted. This is because “some environmental behaviours are because of personal habits and routines and some are influenced by other external or contextual factors, such as technology, laws and regulations, social policies, social values, and norms within the society” (Said et al., 2007, p. 29). Additionally, teachers’ environmental behaviour in schools might be influenced by a combination of the above factors, which lead to (or inhibit) the development of teaching in EE. Again, this indicates the complexity of environmental behaviour, including effective EE implementation.

This section was premised on the assumption that the effective implementation of EE in schools requires the commitment of teachers. To be effective, teachers need to have sufficient awareness about the environment to ensure authentic and relevant delivery. They also need pro-environmental attitudes and behaviours, both personally and professionally, if they are to encourage in their students

similar attitudes and behaviours both directly (through EE) and indirectly (Bradley et al., 1999). Many teachers may not have sufficient environmental awareness, even though they demonstrate positive attitudes towards the environment. According to Esa (2010), identification of the status of secondary teachers' awareness, attitudes, and behaviour about the environment is necessary to understand their level of willingness to integrate EE in their teaching. This section indicated that a lack of environmental awareness and attitudes among teachers can contribute to a lack of professional pro-environmental behaviours, such as teaching students about the environmental issues, scaffolding opportunities for outdoor education, and helping students develop the attitudes and skills to take pro-environmental action. Hence, understanding the environmental awareness, attitudes, and behaviour of teachers is important to understand their preparedness for teaching EE.

2.5 Chapter summary

Major declarations and Intergovernmental Conferences in EE have stressed that awareness, attitudes, and behaviour are important components of EE. In addition, school-based EE is an important approach for achieving environmental protection. The literature reviewed in this chapter establishes the theoretical basis for this thesis, highlighting that the development of students' and teachers' awareness, attitudes and behaviour regarding the environment are all important for students to develop the skills to contribute to decision-making, and participate in problem-solving strategies and take positive action in response to environmental problems.

Different aspects and approaches to integrating EE in schools were examined. Importantly, awareness and positive attitudes precede but do not necessarily lead to action. Many motivations and barriers influence awareness, attitudes and behaviour, including factors such as outdoor activities and other life experiences; environmental concern, perceptions and values; intention to act, agency, locus of control, action competence; personal responsibility; and self-efficacy. Barriers that might restrict students and teachers from engaging in EE include the lack of outdoor activities; lack of teachers' pedagogical knowledge; external barriers such as lack of time; and internal and personal barriers related to awareness and attitudes. However, while awareness and attitudes are prerequisites of pro-environmental behaviour, they do not necessarily lead students and teachers to take action. This is because environmental behaviour of people is complex.

2.6

Theoretical framework

Iran is facing significant environmental problems, and theorizing about how to deal with environmental problems needs to include the role of EE in schools. As discussed in Section 2.2, a holistic approach to EE includes a focus on environmental awareness, attitudes, and behaviour, as these three aspects are all important in considering how students might learn or think about a sustainable future (see Figure 2.6). While the literature review identifies some linkages between these aspects, the precise relationships remain unclear. For example, the ways that students and teachers think and conceptualize about the environment may or may not affect their attitudes and behaviour. Although this research has explored the awareness, attitudes, and behaviour of students and teachers towards the environmental issues, correlations between these three aspects were not explicitly examined.

This chapter discussed different theoretical propositions (see e.g., Loughland et al., 2002; Sauvé, 1996) that researchers have proposed to explain views about the different meanings of the environment. But what leads someone to enact environmentally responsible behaviour is very complex (Kollmuss & Agyeman, 2002) and depends on many factors, like financial, social and cultural issues. As Hines et al. (1987) proposed in their theoretical structure, pro-environmental behaviour is influenced by a number of specific variables such as knowledge of environmental issues, knowledge of action strategies, attitudes, action skills, locus of control, intention to act, personal responsibility and situational factors. For instance, a person who has a strong connection with nature probably assumes more responsibility for the environment. However, people in a privileged position, especially in terms of education level or socioeconomic status, may have more options for taking pro-environmental behaviour, for example, buying recyclable or biodegradable products, which are often more expensive.

From a pedagogical point of view, teachers need to provide students with the best opportunities to develop their awareness, attitudes, and behaviour. One of the effective ways that the literature has suggested is through education *in/about/for* the environment (see Figure 2.6). For instance, education *in* the environment is critically important for helping students to develop positive attitudes towards the environment. However, EE in Iran in secondary schools does not offer a comprehensive structure that incorporates different concepts and approaches for

students to learn *in/about/for* the environment, in pursuit of sustainable development. In particular, the lack of outdoor education in the Iranian secondary school curriculum may impact on the environmental attitudes of the students. If students have never been to the particular environmental places, or don't have experiences related to the environment, they are unlikely to develop a strong attitude towards protecting or saving the environment. In addition, teacher-centred approaches may lead students to a more individualistic approach in their life and not help them to develop their critical thinking skills to be actively involved in solving environmental issues.

The principal theoretical framework of this study is based on the proposition that through education, we can improve students' and teachers' awareness and attitudes, but this won't necessarily lead them to take environmental action or to contribute to pro-environmental changes. Part of this failure might be due to the factors associated with social and cultural norms (see Figure 2.6) of people which are difficult to be modified. For example, by having an ego-centric attitude or following an individualistic approach, which may arise from social and cultural practices, one may not conceptualise the environment as a community project which needs the collaboration of all people to protect it.

A series of theoretical structures have been discussed in this chapter to explain the relationships between students' and teachers' environmental awareness, attitudes, and behaviour. The following model (Figure 2.6) has been designed to illustrate these theoretical relationships within the Iranian secondary school context.

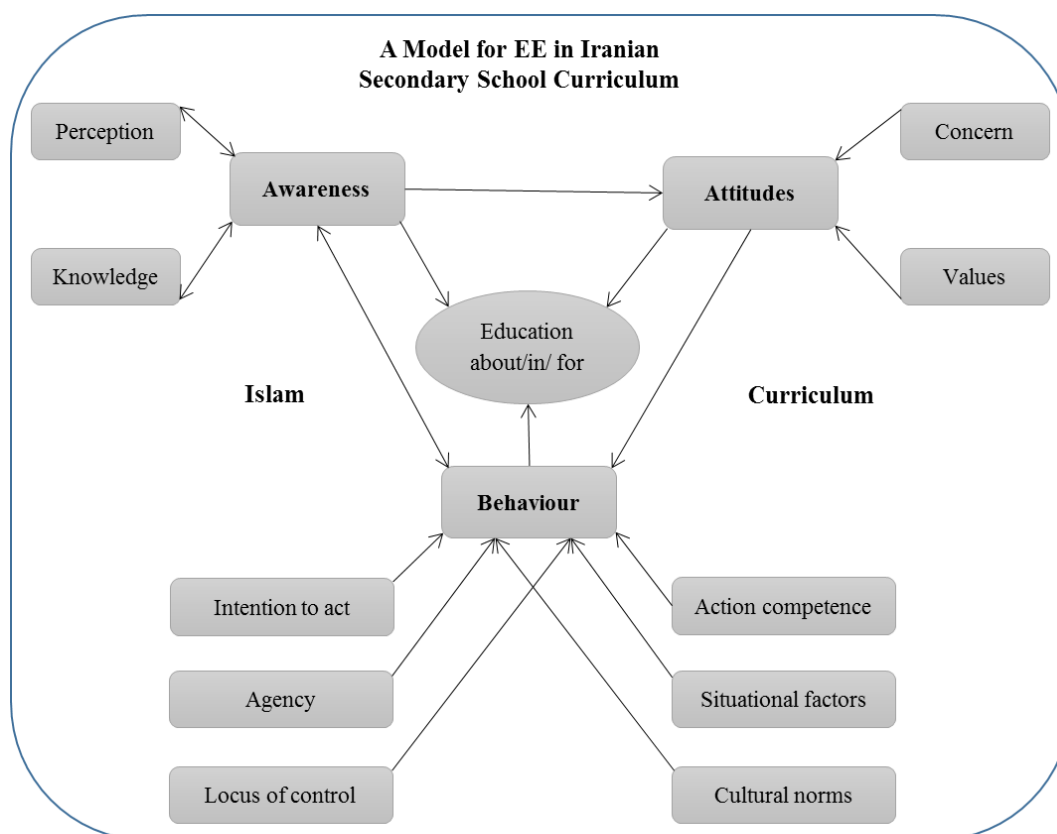


Figure 2.6 Representation of the theoretical model of this study

Understanding the current status of students' and teachers' environmental awareness, attitudes, and behaviour could inform future developments in EE in Iran. Accordingly, the objectives of this study are to determine the level of environmental awareness, attitudes, and behaviour of secondary school students and teachers towards environmental issues in Iran. For this purpose, different research methods were applied. The next chapter presents the methodology and methods of data collection which employed in this inquiry.

Chapter 3 Methodology

3.1 Chapter outline

This chapter describes the methodology and the methods applied for collecting and analysing data in this inquiry. It begins with the research questions guiding this study (Section 3.2), followed by the definition of methodology and an overview of different methodologies commonly used in education research (Section 3.3). Next, the methodological paradigm that underpins this research is discussed (Section 3.3.4). This is followed by an explanation of the methods and protocols used in this study (Section 3.4), which comprise questionnaires, individual interviews, focus group interviews, and the mixed methods approach. This is followed by a description of the research design (Section 3.5), which includes the context of the study, population sampling, and study participants, and data analysis in section 3.6. Next, issues of trustworthiness are discussed (Section 3.7), and ethical considerations are addressed (Section 3.8). Finally, the chapter concludes with a summary.

3.2 Research questions

Research can be defined as a disciplined search to understand a situation or phenomenon. It is a systematic, programmed, process to create new concepts, methodologies, and understandings (Babbie, 1998). The first stage in undertaking research is to decide on the research questions, as this leads the researcher for the rest of the process. Research questions remind the researcher of the central task and dictate the choice of research strategies. In order to answer research questions, researchers can apply different research methods to explore, describe, classify, and look for concomitant relationships that exist among data (Kirk, 1995). The research questions are particularly important for informing the choice of methodology for the research, data collection methods, and the research design. The main research question in this inquiry, and the related sub-questions are:

Research question:

What is the environmental awareness, attitudes, and behaviour of secondary school students and teachers in Tehran/Iran?

Sub-questions:

1. What is the environmental awareness, attitudes, and behaviour of secondary school students in Tehran?
2. What is the environmental awareness, attitudes, and behaviour of secondary school teachers in Tehran?

The main aim of the research in this thesis is to explore the current context for EE in Iran, in order to inform future developments EE practices in Iran. The next section examines the methodologies considered and the one that was adopted in this study.

3.3 Methodology

A methodology is a collection of principles and theories that represent the practical component of a research paradigm, and that help researchers to understand the process of inquiry (Cohen, Manion, & Morrison, 2011; Gray, 2014; Guba & Lincoln, 1989). This definition suggests that methodology differs from method, providing the underlying basis by which to collect, analyse, and interpret data and assess the validity of the conclusions. As such, a discussion of methodology must consider all these factors.

Methodology's focal point is to make a link between the research and an appropriate research paradigm. A research paradigm is often considered as a worldview or a collection of philosophical assumptions that guide the researcher (Creswell & Plano Clark, 2011; Guba & Lincoln, 1989). It is important that the research is consistent with the ontological and epistemological views of the selected paradigm (Cohen et al., 2011; Mertens, 2010). Thus, by selecting a particular paradigm for a research project, the researcher acknowledges that his/her beliefs and assumptions inform the research (Creswell & Plano Clark, 2011). In others words, the way an individual sees the world affects the way he or she makes sense of it. This recognition takes into account both ontological and epistemological standpoints.

An ontological view can be determined using questions such as, "Is reality of an objective nature, or the result of individual cognition?" (Cohen et al., 2011, p. 7). For instance, regarding questions of ontology, Guba and Lincoln (1994) stated that:

If a real world is assumed, then what can be known about it is how things really are and how things really work. Then only those questions that relate to matters of real existence and real action are admissible; other questions, such as those concerning matters of aesthetic or moral significance, fall outside the realm of legitimate scientific inquiry. (p. 108)

In other words, in this ontological view, the world exists without depending on human practices, and is based on the natural and physical sciences. In this view, knowledge refers to the subject of existence and is completely value free. However, other ontological views exist which consider that reality is not objective, but that it is subjective and people have different ways of perceiving the world and these are influenced by their values and their experiences.

Epistemology concerns the very basis of knowledge, how it can be acquired, and how it can be communicated to other human beings (Cohen et al., 2011). Scotland (2012) argued that this type of knowledge can be either objective and tangible (objectivism) or subjective (subjectivism). Guba and Lincoln (1994) stated that epistemological consideration of paradigms concerns the question, “How can the inquirer go about finding out whatever he/she believes can be known?” (p. 108).

There are two general types of views about how humans understand the social world. One is the natural world as an external and objective reality. Objectivists argue that human behaviour can be described by world laws, and the researcher is directed at analysing the relationships and regularities between selected factors in that world (Cohen et al., 2011). Important for education research, objectivists treat the social world like the world of natural phenomena, that is, as being hard, real and external. The ontology of objectivists is realism, the epistemology is positivist, and methodology is nomothetic (Cohen et al., 2011). The second viewpoint understands the world as subjective. Subjectivists rely on experiences in the social world. Cohen et al. argue that in this approach, researchers “view the social world as being of a much softer, personal and humanly-created kind [and] will select from a comparable range of recent and emerging techniques – accounts, participant observation and personal constructs” (p. 8). In other words, subjectivists seek to investigate how individuals or groups make sense of the world, rather than emphasising only an absolutist, external reality and understanding the general and the universal (Burrell & Morgan, 1979). Cohen et al. called the subjective approach, which tries to understand individuals’ behaviour, idiographic. The ontology of subjectivists is nominalist, the

epistemology is anti-positivist, and methodology is idiographic (Cohen et al., 2011).

The views discussed above have direct implications for the methodological concerns of researchers. Indeed, different ontologies and epistemologies require different methodologies and research methods. In the subsequent sub-sections, the main paradigms of positivism, anti-positivism (interpretivism), and critical theory are discussed.

3.3.1 Positivism

The positivist paradigm derives from an objectivist perspective and asserts that ‘truth’ can be found only through observation and experiment. From this viewpoint, all knowledge is based on sensory experience and consists of observable and verifiable data, or facts (Cohen et al., 2011). Positivistic methodology relies heavily on quantitative and value-free data, and not internal conditions, such as personal tendencies (Denzin, Lincoln, & Giardina, 2006). Positivists use research methods that are based on evaluating propositional hypotheses to formulate the results. The results that are formulated are then compared with the original hypotheses in order to determine consistency. In this approach, the same methodological procedures of natural science (objectivism) tend to be directly applied to the social sciences, and the social scientist is considered as an observer of social reality (Cohen et al., 2011). Therefore, positivism disregards the perspectives within social realities, and avoids explaining human behaviour which is complex and intangible (Denzin et al., 2006). From a social science point of view, this deficiency is clearer in the contexts of classrooms and schools, where complex issues relating to teaching, learning and interactions between students and teachers present the positivistic researcher with significant challenges.

3.3.2 Interpretivism

Interpretivists, or anti-positivists, argue that people’s behaviour can only be understood by considering their interpretations of the world around them, which come from the inside, not the outside. The aim of research conducted within the interpretive paradigm is to gain a better understanding of the subjective nature of the human behaviour within the research context (Cohen et al., 2011). Research using an interpretive approach is richly descriptive and typically refers to the field

of behavioural sciences. Social science is considered to be a subjective rather than an objective undertaking, and involves direct experience and social interactions of individuals in specific contexts (Cohen et al., 2011). For instance, the interpretive paradigm can underpin research about how students and teachers conceptualise the environment, or investigations into their experiences related to the environment (Palmer & Birch, 2005). The purpose, from an interpretivist view, is to get ‘inside the person’ to understand that person’s actions. But these actions are meaningful to researchers only when they are able to identify the intentions behind them (Cohen et al., 2011). From an interpretive perspective, therefore, theory is emergent and is often grounded in data generated by the research act (Cohen et al., 2011; Glaser & Strauss, 1967). Cohen et al. (2011) continue that this emergent theory also must make sense to those to whom it applies, which leads to sets of meanings that yield insights and understandings into people’s behaviour. Furthermore, it should be noted that interpretivists and positivists have different standpoints on how the findings of their research may be evaluated. This is discussed further in Section 3.7.

3.3.3 Critical perspectives

Both the positivist and interpretive paradigms are fundamentally concerned with understanding phenomena, but from different perspectives. However, these two paradigms have both been critiqued as missing the political, ideological, and value-determined contexts of educational research (Cohen et al., 2011; Lincoln & Guba, 1985). In this sense, the critical paradigm is intended “not merely to give an account of society and behaviour but to realize a society that is based on equality and democracy for all its members” (Cohen et al., 2011, p. 31). Therefore, the purpose of using critical theory in research is to change situations, not merely to understand them. It refers to that type of research that deals with emancipation of the disempowered, and democratic society that provides freedom for individuals (Cohen et al., 2011; Mackenzie & Knipe, 2006). Critical theory is principally transformative, so the research in this area is intensely practical, to bring about change towards an egalitarian society (Mackenzie & Knipe, 2006). Critical theorists therefore may argue that the other two paradigms (positivist and interpretive) “are essentially technicist, seeking to understand and render more efficient an existing situation, rather than to question or transform it” (Cohen et al.,

2011, p. 27). Additionally, critical researchers cannot claim neutrality and ideological or political innocence.

3.3.4 Choice of methodology in this study

The choice of methodology for any research must be based on the objectives and the questions central to the inquiry, as argued above. The aim of this inquiry was to investigate the level of environmental awareness, attitudes, and behaviour of students and teachers, with an overall aim of contributing to an understanding of the current EE context in Iranian secondary schooling. Having reviewed the aforementioned paradigms, the interpretive paradigm was selected as an appropriate approach since this inquiry emphasises participants' perspectives and seeks meaning, rather than looking for objectivity. Additionally, the ontological and epistemological viewpoints of interpretivism discussed earlier align with the purposes of the inquiry. For example, interpretivism provides a basis for exploring the participants' perspectives (and inner realities) about environmental education, rather than assuming one single external reality. In particular, the interpretive paradigm values the 'big picture' of what is in students' and teachers' minds about the environment, and their responsibility towards it, including, for teachers, their responsibility to implement EE. Although a significant proportion of the data in this study were from the student questionnaire, these questions tended to be more subjective rather than knowledge based (out of 92 items, only 7 were objective) and so there was a considerable weighting towards an interpretivist approach rather than a positivist approach.

The interpretive approach can incorporate different research methods, such as individual interviews, focus group interviews, and questionnaires (Cohen, Manion, & Morrison, 2000; Palmer & Birch, 2005; Patton, 2002). The research methods and research design, intended to obtain and appropriately analyse relevant data to address the research questions and to fulfil the research objective, are discussed below.

3.4 Methods

This section introduces the different research methods used in this research. In any research, the choice of methods to collect information must be based on the aims of the study. The challenge for researchers is to consider what type of information is required and usable, and then to choose the best methods for collecting that

information (Patton, 1990). Required information, which is called data, can be collected in many ways. In this study three different research methods were selected to collect the data. These included: questionnaires, individual interviews, and focus group interviews.

The combination of three different methods of data collection in this study helped “to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one stand point” (Cohen et al., 2011, p. 141). Using different methods of data collection is an important approach that enables rich data to be gathered and triangulated, which results in a better understanding of the meaning and implications of the findings and a given context (Gogolin & Swartz, 1992). Triangulation of data refers to the use of different sources of data, which can increase the validity of research (Cohen et al., 2011; Guba & Lincoln, 1989; Mertens, 2010). In other words, the purpose of triangulation is to increase the understanding of complex phenomena, with agreement among different data sources supporting validity (Malterud, 2001), or trustworthiness (Somekh & Lewin, 2005).

Data for this study were collected using individual interviews with the teachers, and focus group interviews and questionnaires with the students, which allowed for the generation of both qualitative and quantitative data. Although there are many advantages in triangulation, it is not always practical. For example, by combining qualitative and quantitative data, researchers should be more prepared (compared to just qualitative or quantitative research) to interrogate contradictory findings (Malterud, 2001). On the other hand, triangulation supports better understanding of the context of the research, and reduces the effect of the insufficiencies of a single method on the research. Both qualitative and quantitative approaches have inherent strengths and weaknesses. For instance, in quantitative methods a proportion of the target population is typically sampled to draw conclusions about the whole population. On the other hand, qualitative data are more detailed and nuanced, and generally gathered from fewer members of the population (Cohen et al., 2011). In order to illustrate the suitability of these methods for this inquiry, the following subsections discuss the characteristics, strengths, and weaknesses of these methods.

3.4.1

Questionnaires

The questionnaire is one of the most common techniques for collecting quantitative data in social research. However, developing questionnaires is a difficult task, requiring the researcher to focus closely on the scope and purpose of research. Questionnaires can facilitate the data collection process by posing structured, closed questions, which makes data analysis easier. Questionnaires can also have open-ended questions, where the data can be far more difficult to analyse. Advantages of questionnaires are that they are generally easier to administer than interviews, less time consuming, processing costs are lower, the ability to include many participants, and they are often more straightforward to analyse (Cohen et al., 2011; Mutch, 2005). Furthermore, questionnaires are normally anonymous, which can encourage greater honesty. On the other hand, there are some weaknesses for using the questionnaire, such as the lack of in-depth understanding of data, generally low response rates, and no opportunity to correct misunderstandings that could arise for respondents (Oppenheim, 1992).

There can be several kinds of question and response modes in questionnaires, such as multiple choice questions, rating scales, dichotomous questions, closed-ended and open-ended questions. Closed-ended questions, which are highly structured, lead participants to respond to questions in a limited number of ways. The advantages of closed-ended questions are that they generate frequencies of responses, which can be statistically analysed; they result in faster coding and analysis, and they are deliberately more focused than open-ended questions (Cohen et al., 2011). On the other hand, if researchers seek information that is difficult to gain through closed-ended questions, open-ended questions that are less structured and typically word-based, may be more appropriate (Bailey, 1994). Additionally, open-ended questions allow participants to answer in any way they like. This research used mainly closed questions in the questionnaire, with only one open-ended question. The open-ended question related to the main sources of air pollution in Tehran, which allowed the respondents to write whatever was on their mind regarding this question.

Dichotomous questions are a type of close-ended question that are highly structured and have several forms, all requiring one of two possible responses. Commonly, this is a 'yes' or 'no' response. Coding responses in this method is very quick. Rating scales are another type of close-ended question, measuring the

strength and intensity of responses as well as degree of responses (Cohen et al., 2011; Oppenheim, 1992). One of the most widely used rating scales is the Likert scale, which provides respondents with a range of possible responses to a given statement. Likert scales are sometimes called agreement scales, indicating respondents' views about a particular phenomenon. Likert scales can provide flexible responses while still enabling the determination of frequencies, correlations, percentages, standard deviation (SD) and other forms of quantitative analysis. However, researchers need to be aware of limitations of the scale, such as whether respondents are telling the truth or whether "they might have wished to add any other comments about the issue under investigation" (Cohen et al., 2011, p. 327). Overall, by providing more sensitive and responsive items to respondents, the Likert scale is recognised as one of the most useful methods for collecting data, particularly about attitudes, perceptions and opinions (Cohen et al., 2011).

Questionnaires can provide both qualitative and quantitative data, both of which can contribute to a qualitative interpretation. This characteristic of questionnaires can justify how, similar to interviews, their use is consistent with the interpretive paradigm. Questionnaires in this study were used to gather information about the environmental awareness, attitudes and behaviour of a large group of students and their involvement and participation in EE (see Section 3.5.4.1 for more information). In this study, a five-point Likert scale was used to get insights into students' environmental awareness, attitudes, and behaviour, and the students had options to respond strongly disagree, disagree, unsure, agree, or strongly agree with the items. In this way qualitative opinions were converted into quantitative data for the sample. In this study, the questionnaire was used to gain an overall picture of many boys and girls secondary school students within six schools in Tehran. In addition, Iranian students are used to responding to tests and filling forms, so using a questionnaire was culturally appropriate as a research method. The questionnaire was also used in order to obtain lots of data in a short period of time and it was easy to administer.

3.4.2 Interviews

The interview is a flexible, useful technique for collecting qualitative and quantitative information (Cohen et al., 2011; Kitwood, 1977). It is a particularly effective method "in terms of a theory of motivation which recognises a range of non-rational factors governing human behaviour, like emotions, unconscious

needs and interpersonal influences” (Cohen et al., 2011, p. 350). This is because it allows multi-sensory channels such as verbal, non-verbal, spoken and heard to be used (Cohen et al., 2011). Patton (2002) argues that the aim of interviews is to find out participants’ perspectives, attitudes, and values, and they therefore provide useful information from inside a person’s head. Interviews include questions or discussions about issues with participants, which gives opportunities for the sharing of many aspects. Participants who are selected for interview should be able to offer general and specific perspectives on requirements. Interviews can be used to triangulate other data from other methods (Hulme, Lewin, Lowden, Elliot, & Menter, 2011).

Interviews have some advantages over questionnaires in that they offer opportunities to correct misunderstandings in responses, and also provide detailed and in-depth information for better understanding participants’ responses (Patton, 2002). Further, Oppenheim (1992) points out that the rate of response in interviews is generally higher than for questionnaires, because in this method participants are more motivated to talk rather than filling out a questionnaire. However, interviews also have some weaknesses: they are time consuming, reducing the possible sample size, they take a longer time to process, and face-to-face individual interviews might be intimidating for some people, particularly when exploring sensitive topics.

Like questionnaires, there are a number of types of interview, such as structured, semi-structured, unstructured, standardized open-ended, the interview guide approach, closed quantitative, and informal conversational interviews (Cohen et al., 2011). Each of these types of interview has advantages and disadvantages. Kvale (1996) argues that these interviews also differ in their purpose, and even whether they seek description or interpretation. The major difference lies in the degree of their structure, which reflects the purposes of the interview (Cohen et al., 2011). In this study, semi-structured interviews were used to explore teachers’ awareness, attitudes and behaviour toward the environment, their involvement and roles in environmental education, and their views on collaboration in implementing and developing environmental education.

The framing of questions for semi-structured interviews allows open questions to be asked but needs to consider prompts and probes. Morrison (1993) described that prompts allow the interviewer to explain the main questions, whereas the aim

of probes is to seek additional information from respondents by extending, elaborating, providing detail, and clarifying or qualifying their responses. Another advantage of using this method is to provide comprehensive data because of the level of consistency when questioning all respondents (Patton, 2002). Using semi-structured interviews with secondary school teachers in this study allowed the researcher to probe their attitudes, beliefs, desires, and collect more in-depth information about EE in secondary schools in Iran. Because of these advantages of interviews, this method was also used to collect data from students' in a special type of interview called a focus group.

3.4.3 Focus groups interviews

The use of focus group interviews in educational research has increased considerably over the last two decades (Ritchie, Lewis, Nicholls, & Ormston, 2013). Focus groups rely on the interactions within a group of participants, who discuss a particular topic offered to them by the researcher (Cohen et al., 2011; Hulme et al., 2011; Wilkinson & Birmingham, 2003). In this method, participants interact with each other as much as with the interviewer, "yielding a collective rather than an individual view" (Cohen et al., 2011, p. 376). From the interaction among the members of the focus group, the data and outcomes emerge without the researcher overly controlling the situation.

Focus group interviews are particularly useful for involving groups rather than individuals, providing data quicker and at lower cost than individual interviews; gathering data on attitudes, values and beliefs; being very focused on a specific topic; and producing a large amount of data (Morgan, 1988). Because of the nature of focus group interviews, they do not necessarily need to contain many questions, and normally the number of questions is fewer than for individual interviews (Wilkinson & Birmingham, 2003). Where face-to-face individual interviews might be intimidating for some people, using focus group interviews can help address the problem. Further, bringing together a group of people with common characteristics to discuss and explain their comments on particular issues may yield insights that might not be available in an individual interview or questionnaire (Morgan, 1988). For these reasons, the focus group method was used to collect and further explore ideas examined in the questionnaire, while also providing opportunities for triangulation. Using focus group interviews was also culturally appropriate in secondary schools in Iran and helped the students to

share their ideas. The next section outlines the design of this research in more detail, describing the context of the study, population and sampling, and how the instruments were designed and applied for the purpose of the study.

3.5 Research design

This section describes how this research was operationalized by translating the research questions into a practical research design. According to Cohen et al. (2011), research design includes: deciding on an appropriate methodology, deciding which instruments to use for data collection, deciding on the sample for the investigation, addressing trustworthiness in the investigation and instrumentation, addressing ethical issues, deciding on data analysis techniques, and deciding on how to interpret and report findings. Many factors influence such decisions, including the depth and breadth of information that is required, the ontological and epistemological perspectives underpinning the research (see Section 3.3), as well as practical matters, such as the availability of time and money. As discussed in Section 3.4, this research applied different methods (both qualitative and quantitative) for data collection. For research sub-question 1 addressing students' awareness, attitudes, and behaviour towards the environment, which is addressed in Chapter 4, a questionnaire and focus group interviews were used. For research sub-question 2, addressing teachers' awareness, attitudes, and behaviour towards the environment, which is addressed in chapter 5, individual interviews were used.

3.5.1 Context of the research

The study was conducted in six secondary schools in Tehran. There were a number of reasons for conducting research in this city. First, the researcher is from this city and was familiar with the social and cultural context of the area. Second, it is where the Ministry of Education and Department of the Environment are located, which could potentially help the researcher to easily access these government officials for getting permission, and collecting extra information to conduct the research. In addition, Tehran is faced with a number of environmental problems, so provided an appropriate context for the researcher to examine the current situation of environmental education for school students in this city.

3.5.2 The population and sampling method

The population of a study refers to the group of people, objects or generally those to which the findings of the study can be applied. The researcher, then, is concerned with gathering information from the population and drawing conclusions (Cohen et al., 2011; Mertens, 2010). A sample for data collection is drawn from that population and clearly the sampling strategy needs to be appropriate to meet the requirements of the study. Validity depends on defining the statistical population on which the study is focused (Morrison, 1993).

A statistical population has common characteristics or experiences that make them distinctive from other populations. These common features of the statistical population are representative of the whole population (Lodico, Spaulding, & Voegtle, 2010). Two statistical populations were included in the current study: secondary school students (9th grade) and secondary school teachers in Tehran. Since practical considerations, such as expense and time, limit researchers from gathering information from the whole population, they often need to gather data from a smaller group in the population, called the target population, in such a way that the information obtained may be seen to represent the total population of the research (Cohen et al., 2011; Mertens, 2010). In this case, the research participants were considered to be representative of other students and teachers in Tehran. While it is assumed that these participants are likely representative of the wider population of students and teachers in Iran, additional research would be needed to verify this.

3.5.3 The sample size

Appropriate sample size is an important factor in any research and it should fulfil the requirements of the study (Cohen et al., 2011). In general, a large sample size is more reliable than a smaller one because it is more likely to represent the population well, the results are likely to be replicable, it can limit the influence of exceptions, and enable more sophisticated statistics to be used. A large sample size can also enable comparison of variables that are significantly different (Patel, Doku, & Tennakoon, 2003). The sample for this study comprised 6 secondary schools, including 337 students and 12 teachers. Table 3.1 shows participants and the nature of their involvement in the study.

Table 3.1 *Participants and the Nature of Their Involvement in the Study*

Participants	Number of participants	Interviews	Focus group interviews	Questionnaires
Students	337			√
Students	30		√	
Teachers	12	√		

First, six secondary schools were randomly selected from district two among 19 areas of the Tehran education department area. District two was selected for two reasons. First, usually the students in this district are from middle-class families, a sample from which was considered to represent a balance between their financial capacity and their environmental activities. This balance could help the researcher to obtain more unbiased data, compared with, for example, very poor students or very wealthy students who would likely have more limited/unlimited opportunities. Second, the researcher grew up in this district and deeply familiar with the context of the area. Among the six secondary schools, there were three boys and three girls schools (note that all the schools in Iran are single sex). During data collection, students were in the second year of their secondary schooling and their ages were between 15 and 16 years. There were two reasons for choosing this particular age group. The first was because up to this age, all Iranian students study the same subjects. The second reason was to compare the students' data in this study with PISA's findings related to the environmental awareness, attitudes, and behaviour of 15-year-old students globally (see e.g., OECD, 2009). It should be noted that with reference to their area of study, selected students were majoring in the fields of mathematics, humanistic and experimental sciences which are the main academic fields for secondary school students in Iran.

3.5.4 Data collection

Since this research involved school students and teachers, permission for data collection was first needed from the Ministry of Education in Iran (see Appendix E). Second, permission was needed from the State Education Department (see Appendix F). After both of these permissions were granted, further permission

was needed from the school principals (see Appendices G, H). Six schools were invited to participate, three girls' and three boys' schools. It is a normal practice that school principals in Iran determine which groups of students and teachers are available and might be interested to contribute to data collection. Therefore, schools' principals played an important role during data collection in this research. Prior to administering the questionnaire, the student participants and the teachers were thoroughly informed about the use of the data, confidentiality issues and their right to not complete the questionnaire (see Section 3.8 for further information). In Iran, the researcher did not need to get permission from students' parents to collect data from the students as this was not required.

To access the student and teacher participants, the schools instructed their personnel, such as the teacher and head of programs, to introduce the researcher to the teacher and student participants, either individually (for the teacher interviews) or to a group of student participants in their classroom (for the questionnaires and focus group interviews). After the introduction, the student participants were informed about the questionnaire. They were provided with information in the participants' form (Appendices I, J), which detailed the consent. The questionnaire was also included with this information.

For the student focus group interviews and teacher individual interviews, the prospective participants were told about the interview procedures and confidentiality issues, and their rights. If the students and teachers agreed to participate in the interview, they were asked to sign the research information form (Appendices K, L) without being coerced into participating. All the students and teachers signed consent forms approved by the Ethics Committee of the Technology, Environmental, Mathematics and Science (TEMS) Education Research Centre at the University of Waikato. To ensure anonymity, interview transcriptions did not include participants' names but were coded with a numerical code, and pseudonyms are used in all reporting of data. No personal information such as ethnicity or origin or home location was collected. All data collection (interviews and questionnaire instrument) was conducted by the researcher.

3.5.4.1 Questionnaire

The questionnaire was administered during lessons, with the teacher's permission, to collect data about students' awareness, attitudes, and behaviour towards

environmental issues (research sub-question 1). Since no equivalent research has been done in Iran, and there has been no specific questionnaire that addresses the various aspects of this inquiry in its entirety, it was necessary to design a suitable questionnaire for addressing the research sub-question. In July 2013, the process of designing the questionnaire started with literature searches in the field of EE to get a better understanding of published questionnaires and their content validity. After several re-writes and validation testing by experienced researchers at the University of Waikato (New Zealand), Payame Noor University (Iran), Shahid Beheshti University (Iran), an un-named school (Iran), and also piloting the questionnaire at one school with 13 students, the questionnaire was administered in October-November 2013.

The questionnaire contained four major sections: background information, attitude items, awareness items, and behaviour items (see Appendix A). Background questions asked for students' gender and their age. In the second section, 25 attitude questions consisted of five-point Likert scale items. The items were drawn from three scales that had been previously validated: the NEP (New Ecological Paradigm, see Section 2.3.3.3) (Dunlap & Van Liere, 1978), AC (Awareness of Consequences) (Stern, Dietz, & Kalof, 1993), and EC (Environmental Concern) (Antil & Bennett, 1979). Table 3.2 shows the purpose and references of the questions in the questionnaire. Of these attitude measures, the NEP scale stands out as being the most widely accepted with documented validity and reliability (Dunlap et al., 2000). Selected items from the scales were slightly modified to suit this study context. For example, to make it more relevant to the Iranian context, the NEP item "The so-called 'ecological crisis' facing human kind has been greatly exaggerated", was modified to "The environmental problems facing Iran have been exaggerated". The questionnaire was also designed to include some reverse coded items. It is common for scale designers to include reverse scored items as an approach to making participants think carefully about their responses.

Table 3.2 *Purpose and References of the Questions in the Questionnaire*

Questions	Purpose	References
Section B Attitudes Questions 1-25	Subjective	NEP, AC, EC, http://www.surveymonkey.com , Bradley 1999, Rider 2005, De Lavega 2004
Section C Awareness Question 1-4, 7, 10, 14 Knowledge Questions 5, 6, 8, 9, 11-13	Subjective Objective	PISA 2006, self- administered question 1999 NEETF/Roper Report Card, Kaiser et al. 1999
Section D Behaviour Questions 1a-q, 2a-h	Subjective	1999 NEETF/Roper Report Card, http://www.surveymonkey.com , De Lavega 2004, Said 2003, Kuhlemeier et al. 1999

In designing the questionnaire, particular consideration was given to the six main categories that were considered to shape environmental attitudes: human relationship to the environment, concern for biodiversity, concern for interdependence, belief in consequences for self, and concern for intergenerational equity and attitudes towards economic sustainability (see Section 2.3.3.3). These categories broadly correlate with the above scales. For instance, attitude items related to human relationship to the environment, concern for biodiversity, and concern for interdependence were adopted from the NEP scale. Items regarding belief in consequences for self, concern for intergenerational equity, and economic sustainability were adopted from the AC and EC instruments respectively. In addition to the six categories mentioned above, four items were included in the questionnaire regarding agency, in order to evaluate students' attitudes towards environmental behaviours. The agency statements were designed to measure environmental attitudes in terms of the need to share resources between individuals, societies, and generations.

The awareness questions (Section C, Appendix A) included four questions drawn from PISA 2006 (OECD, 2009), eight multiple choice questions, mainly from the National Environmental Education and Training Foundation (NEETF)/Roper Report Card (NEETF, 1999) regarding particular environmental issues, one open

ended question, and one concept mapping exercise about food webs. Together, these questions were designed to evaluate students' environmental awareness.

The behaviour items (Section D, Appendix A) were mainly adopted from the NEETF/Roper Report Card (NEETF, 1999) and examined the frequency of specific environmental actions that students reported they had undertaken at home, school, and in other places. There were 17 items with a three-point scale (frequently, sometimes, never) that probed what students felt they were currently doing. There were also 8 items related to students' intention to act in the future, which used a five-point scale (very likely, likely, not sure, unlikely, never).

Once the questions had been drafted, they were translated from English into Persian and the translation accuracy was checked by three experts. The total length of the questionnaire was nine pages, with questions and items spaced to help the participants to clearly read the questions. The questionnaire was piloted with 13 students in a secondary school in Tehran who were not involved in the study, in order to test the practicality of questions (Oppenheim, 1992) as well as the coherence and clarity of the questions. All the students in the pilot were enrolled in the second year of secondary school and they were randomly selected. The pilot questionnaire took about 35 minutes to be completed. At the end of the pilot, the participants reported that the questionnaire was understandable and that the majority of the items were clear. Using students' feedback, the translation of a few items into Persian was slightly modified in order to make the items more clear.

To collect the data for this study, the questionnaire was administered in the presence of the researcher and the teacher in each of the six classrooms. Student numbers in each class varied between 16 and 30. Before administration of the questionnaire, the students were given oral instructions on how to fill out the questionnaire, particularly for question number nine in the awareness section, which involved a concept mapping exercise. Students were given 45 minutes to complete the questionnaire and they felt the time was enough to answer the questions. Regarding the completion rate of the questionnaire, all the questionnaires were returned by the students to their teachers, and those that were not completed fully were not considered for further analysis by the researcher. The total sample size of students for the questionnaire was 350 and the completed sample size was 337 (96.3% of total).

3.5.4.2 Interviews

For the teacher and student interviews (see Appendices B and C), interview questions were carefully developed based on the purpose of the study and focused on the environmental awareness, attitudes, and behaviour of the participants. For example, questions regarding students' and teachers' perceptions about the natural environment were asked. The individual and focus group interviews in this research were designed to be semi-structured, with suitable probes to further explore participants' opinions. This also allowed the interviewer to explore the participants' contributions in more depth. Furthermore, some interview questions were deliberately selected to triangulate data collected from the student questionnaire.

Six focus group interviews were conducted, one in each of the participating schools. Five students who had completed took part. The principals of the schools helped the researcher to randomly invite the students to participate in the focus group interviews. The aim was to collect and further explore additional views from students based on the interactions and discussions within the groups and also to ask questions that would have been hard to ask in a questionnaire such as students' experiences in the environment. In addition, the focus group interviews provided the opportunities to probe the questions which were not possible to do in the questionnaire. Data from the focus groups interviews would also help triangulate the data from the questionnaire. It took up to 45 minutes for each focus group discussion. Each discussion was audio-recorded, face-to-face, semi-structured, and partially transcribed in Persian. The purpose of partial transcription was to select important contextual parts of the focus group interviews. The researcher used the Persian transcriptions but coded them with English codes and then translated the relevant quotes as evidence for the particular codes. The researcher grouped the responses from all students to each question in the focus group interviews, and organised and classified responses into categories then selected samples of the quotes to illustrate important points from these categories (see Section 3.6.1).

Twelve teachers, two from each study school, were also interviewed individually about their awareness, attitudes and behaviour towards the environment. Teachers' interviews lasted between 60 and 100 minutes and each interview was audio-recorded, face-to-face, semi-structured, and transcribed as above. The teacher

interview began with asking background information questions, such as qualifications and the years of teaching experience. Participants were then asked a set of questions regarding their meaning for the natural environment, their personal and professional environmental awareness, attitudes and concerns, and reported environmental behaviour.

All interviews (individual and focus group interviews) took place in the relevant school, in places such as the classroom, library, and main office as permitted by the school, except one, which was held at the private office of a male teacher, outside of the school.

3.6 Data analysis

Data analysis is one of the most important parts of research. Through data analysis the collected raw data is given meaning that is consistent with the methodological framework of the study. Therefore, it is critical that the researcher chooses suitable strategies to analyse the data. The analytical method therefore needs to be consistent with the purpose of the research in order to answer the research questions. As discussed in Section 3.4, this research used mixed methods, collecting both qualitative and quantitative data, so appropriate data analysis was used with an emphasis on interpreting the meaning expressed by the students and teachers.

3.6.1 Qualitative analysis

Cohen et al. (2011) defined qualitative data analysis as a process that “involves organizing, accounting for and explaining the data; in short, making sense of data in terms of the participants’ definitions of the situation, noting patterns, themes, categories and regularities” (p. 537). There are many different approaches to analysing qualitative data, because of its interpretive nature (Patton, 2002; Welsh, 2002). One of the main challenges for researchers is reducing huge amounts of data to manageable and comprehensible portions. A common approach for achieving this is content analysis, which tries to maintain the quality of the data by keeping a holistic perspective (Patton, 1990). In this study, qualitative data were obtained through individual and focus group interviews. Interpretation and presentation of the data obtained from interviews was guided by the research questions.

The first step in analysing the interview data was transcription of interviews, described above, which is a common but time consuming process. However, the transcript of the interview provides important detailed data that can be iteratively considered. Initial analysis of interview data also involved reading all transcripts multiple times in order to familiarize with the content. All interview transcripts were then imported into the qualitative data analysis software NVivo 10 (QSR International). NVivo is a computer software package that has been designed to analyse qualitative data. This software was particularly useful for organizing data, as well as computing the data quickly to obtain a holistic picture. NVivo is a relatively simple tool to operate, connects directly with word and pdf documents, and all coded data can be made visible in the margins of documents. This function makes it easier for the researcher to observe, at a glance, which codes have been used where (Welsh, 2002).

The next stage was to create codes (nodes) with respect to the research questions, identifying themes, developing codes related to these themes, and merging codes into larger themes which were significant to the study. A code refers to a name or label that the researcher allocates to a piece of text holding a piece of information (Cohen et al., 2011) and allows the researcher to find similar data across the data set. In order to make sense of the codes and emerging themes, they were checked carefully by the researcher and a supervisor, who has expertise in the environmental education field. By doing so, it was possible to confirm the validity of the themes that were identified, as well as see important new codes emerge by developing the coding process (Strife, 2012).

In order to get insights into how the emerging themes knitted together as whole, individual themes were first carefully conceptualised and inductively developed using the words of the participants. For instance, when considering the different perspectives given by the students and teachers about their meaning(s) of the environment, some initial ideas were coded as “the place we live in” or “wherever we can breathe”. These codes were then merged into broader themes, such as a “human-centred view” (see Section 4.2.1) which were deductively derived from the literature, and then the frequencies of occurrence were counted. This method of coding and analysing qualitative data led to final themes presenting a holistic picture of the interview data. In addition, for triangulation of data (see Section 3.3.2.1), both qualitative and quantitative findings were analysed alongside each

other to identify complementary (and contradictory) findings, which helps increase the trustworthiness of the data.

3.6.2 Quantitative analysis

Quantitative data analysis is often associated with large scale, statistical, and correlational research (Cohen et al., 2011). Statistical analysis can be implemented using computer software such as the Statistical Package for Social Sciences (SPSS) (IBM). In this study, SPSS 22 was used for the analysis of quantitative data. Quantitative data collected in this research were derived from the students' questionnaire.

The first stage of statistical analysis was to input all the questionnaire data into SPSS. Responses to scale items were coded as 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. Then, descriptive statistics were used to identify the percentages, summary frequencies, means, and standard deviations of data. Further analysis, using Pearson's Correlation test, was applied to identify statistically significant values, indicating meaningful/not meaningful correlation coefficients. Pearson's Correlation test is a parametric test evaluating the relationship between two dependent items or groups in a questionnaire (Gibbons & Chakraborti, 2003). In this study, strong and weak relationships between two variables were considered. If the significance value is more than 5%, there is no meaningful correlation coefficient (no relationship between the two variables), but if it is less than 5%, there is a meaningful correlation. For example, through this test, the correlation of students' responses supporting the idea that all plants and animals play an important role in the environment was found to be positively correlated with not supporting the elimination of those animals which prey on farmer's grain crops and poultry.

3.7 Trustworthiness: Issues of validity and reliability of the study

There may be some errors (getting something 'wrong') and biases (leading to one type of response over another) in data collection processes and data analysis. Hence, measurement instruments used for assessing variables must have two features: validity and reliability. These two features are necessary for any type of research (Cohen et al., 2011). However, validity and reliability are concepts that traditionally were applied to the positivist (and often quantitative) paradigm. In

qualitative research, validity takes into account the honesty, depth, richness of data, the participants approached, and the extent of triangulation (Cohen et al., 2011). Because of this, many researchers indicate that validity and reliability are inappropriate terms in qualitative research, and instead suggest terms such as ‘trustworthiness’, ‘rigorousness’, or ‘quality’ of the data (Lincoln & Guba, 1985). Whatever term is used, it is important that qualitative and quantitative research and data analysis are implemented in a systematic and transparent way (Cohen et al., 2011; Kirk & Miller, 1986; Lincoln & Guba, 1985; Welsh, 2002). Researchers have introduced various approaches to enhance the trustworthiness of the research. In this study, content validity and peer review, credibility (member checks and triangulation), and comparability and transferability (external validity) have been selected.

3.7.1 Validity and reliability of quantitative data

Regarding statistical analysis, quantitative data can be considered as worthless without validity (Lincoln & Guba, 1985). The level of validity can be improved by careful sampling, use of appropriate instruments, and suitable statistical treatments of data (Cohen et al., 2011). On the other hand, reliability in quantitative research refers to degree of consistency for the measurement of data (Patton, 2002).

Content validity requires that the research instruments fairly and comprehensively address the aim and research questions of the study (Cohen et al., 2011). As discussed in Section 3.5.4.1, peer review and experts’ judgment concerning the relevance of the questionnaire items were used to ensure the content validity of the instrument. The questionnaire was also piloted with a small group of students. Further, the three main scales (NEP, AC, and EC) used for designing the questionnaire, along with the questions adopted from PISA 2006, have widely accepted and documented validity and reliability.

3.7.2 Trustworthiness of qualitative data

Comparability and transferability tend to be used instead of ‘reliability’ in qualitative research (Guba & Lincoln, 1989). Comparability and transferability refer to the degree that the findings of the study can be generalized (Lincoln & Guba, 1985). Cohen et al. (2011) called this ‘external validity’, and it involves identifying possible comparison groups. In this type of validity, consideration is

given to how data might translate into different settings and cultures, or the wider population or situations (Cohen et al., 2011). By considering comparability and transferability, this research could provide insights that may apply to other settings. For example, as the data was collected in Tehran (urban area), it may transfer to other Iranian urban areas but not necessarily rural zones, for example, where air pollution is less of an issue. On the other hand, due to the sample selection and size, there are possibilities of the transferability of students' and teachers' data to other Iranian and other countries' urban areas.

Similar to the questionnaire, peer review was used to check the content validity of the interview questions (see Section 3.5.4). Second, to ensure the trustworthiness of the interviews, member checking was used, which is considered as one of the aspects of credibility. Generally, member checking happens informally with the participants, checking for the accuracy of their responses (Gray, 2014). Lincoln and Guba (1985) noted that the member check method involves "respondent validation, to assess intentionality, to correct factual errors, to offer respondents the opportunity to add further information or to put information on record; to provide summaries and to check the adequacy of the analysis" (p. 314). As the researcher had only one opportunity to clarify with the students about their responses in the focus group interviews, member checking was applied simultaneously during the interviews. The researcher in this study restated or summarised the information that was given by the students and checked with the participants if this interpretation was correct. The students either agreed or disagreed that the summaries reflected their perspectives, feelings, and experiences. Through the process of member checking with the teachers, the researcher presented the transcript draft of the interviews to the participants for confirmation and further illumination.

Another element to check participants' constructions of data is triangulation (Lincoln & Guba, 1985). As discussed in Section 3.4, triangulation of data refers to the use of different sources of data, which increases the trustworthiness of research (Cohen et al., 2011; Guba & Lincoln, 1989; Mertens, 2010). Through triangulation of data, findings of the research may have greater credibility in the eyes of the reader, as well as ensuring dependability and confirmability of research. Dependability is based on the assumption of repeatability which means whether it would be possible to obtain the same results if the same research is

carried out again. Confirmability refers to the degree to which the results could be confirmed or verified by others. Triangulation was applied in this study to explore students' environmental awareness, attitudes and behaviour, using (and comparing) data from both the questionnaire and focus group interview. For example, students' attitudes about human relationships to the environment in the questionnaire were examined against their views regarding the natural environment in the focus group interviews. Another example was comparing the data regarding students' hopes and fears about the future of the natural environment in the questionnaire with data from the focus group interviews. However, there were some contradictions between the qualitative and quantitative data. For instance, a contradiction appeared in the qualitative and quantitative responses regarding students' perceived self-efficacy to change or make a difference for a better environment in the future.

3.8 Ethical considerations

Ethical considerations affect the quality of the research approach (Mertens, 2010). To avoid ethical issues, researchers need to come to a "balance between the demands placed on them as professional scientists in pursuit of truth, and their subjects' rights and values potentially threatened by the research" (Cohen et al., 2011, p. 51). This research closely followed all ethical protocols within educational research, and followed the ethical guidelines of the Technology, Environmental, Mathematics and Science (TEMS) Education Research Centre at the University of Waikato. The ethical proposal was fully written and approved by the University of Waikato Human Research Ethics Committee (see Appendix D). In particular, the researcher was well informed about cultural sensitivity during data collection in Iran, having grown up in Iran. In the process of data collection, the researcher tried to ensure that the participants did not experience any adverse psychological impact due to participating in the interview or completing the questionnaire, offering assurance of non-judgmental acceptance of direct or indirect responses. This meant that the researcher also had a high level of responsibility to protect the anonymity of the participants. Participants' identity remained anonymous through application of numerical codes in the analysis phase, and pseudonyms when reporting on the data. Participants' data also remained confidential to the researcher and supervisors. In addition, participants had the right to decline to participate or to withdraw from the data collection process in

specified ways. The participants were also given the researcher's and chief supervisor's contact details (email and phone number) for any more details about the study, or if issues arose during the research. The teachers had the option to withdraw permission to use data from their interviews up to two weeks after the interviews were conducted. Because the questionnaires were anonymous, students did not have the option to later withdraw permission to use the data collected. Samples of letters addressing these ethical issues are presented in Appendices H and I. The letters were provided to the participants to obtain their informed consent for participation.

3.9 Chapter summary

This chapter presented the research methodology and different methods used in this study. It began by describing different methodological frameworks or paradigms in education research. An interpretive paradigm was selected for this study because the emphasis was on participants' perspectives and seeking meaning, rather than on identifying an external reality, or critique and emancipation. Following the choice of methodology, the methods used for data collection were outlined. Mixed methods, both qualitative and quantitative, included: questionnaires and focus group interviews with students, and individual interviews with teachers. The triangulation of student data increased the trustworthiness of the findings, leading to better understanding of their awareness, attitudes and behaviour. Next, the chapter addressed the research design, or a detailed outline of the research. This included describing the context of the research, the population and sampling method, sample size, and data collection procedures. Following this, the instrument design, including selection of specific question items, was presented. Then, data analysis of the research, which involved qualitative and quantitative analysis, was discussed. This included using two different computer software packages (SPSS and NVivo) for data coding and analysis, and explaining how themes were identified. The next section of this chapter considered the trustworthiness, validity, and reliability of the instruments, data collection process, and data analysis. The last part of this chapter discussed the ethical considerations of this study.

Having reviewed the methodology and methods of data collection in this research, the next chapter presents the first findings chapter, which presents data related to students' environmental awareness, attitudes, and behaviour.

Chapter 4 Environmental awareness, attitudes, and behaviour of students

4.1 Chapter outline

This is the first of two findings chapters. This chapter presents the findings related to secondary school students in Tehran and explores three broad categories: environmental awareness, environmental attitudes, and environmental behaviour, using quantitative and qualitative data. Data comes from the focus group interviews ($n = 30$) and the survey responses ($n = 337$) from students at six high schools in Tehran city. Focus group quoted data is attributed only when identifiable to a single respondent in the following two chapters. This chapter focuses on research sub-question 1: What are the environmental awareness, attitudes, and behaviour of secondary school students in Tehran/Iran?

Findings from the students' data are presented in the following sections. The first section considers data about the environmental perceptions of students (Section 4.2), followed by data on student perceptions of their environmental learning at schools (Section 4.3). Data in these two sections come largely from the focus group interviews. The next section examines the environmental attitudes of students (Section 4.4), and includes eight subsections that explore students' attitudes toward different dimensions of the environment, and attitudes towards their own environmental behaviour (agency). Finally, an exploration of environmental awareness of students about a range of environmental issues is presented (Section 4.5), which is followed by a consideration of the self-reported environmental behaviour of students (Section 4.6). A summary of the chapter forms the last section.

4.2 Students' perceptions about the environment

This section presents data about students' perceptions about the environment. Data are presented from focus group interviews with 30 secondary school students from six schools. Interviews began with participants explaining their meanings for the natural environment (Section 4.2.1) and then they were asked to talk about their experiences in it (Section 4.2.2).

4.2.1 Students' meanings for the natural environment

In order to gain an understanding of how students conceptualise the environment, participants were asked “What does the natural environment mean to you?” Students had a wide variety of meanings for the natural environment. Their ideas could be categorised as: a human-centred view; human relationship to the environment; a holistic view and the state of the environment. Table 4.1 indicates the categories and the frequencies of the students' responses (note that some students' responses were placed in more than one category).

Table 4.1 *The Frequencies of Students' Responses to Their Meaning of the Natural Environment by Category (n=30).*

Category	Number
Human-centred view	25
Human relationship to the environment	13
Holistic view	13
State of the environment	2

According to the students' responses, the main emerging theme for this question was a “human-centred view”, which was reported by 25 students (83% of the students who participated). Among these, 13 students had responses coded only to this category, with statements such as the environment is “the place we live in” or “wherever we can breathe”. They gave examples that the environment can be everywhere, like home, school, street, park, sea, forest and so on. It seemed that when the students used the word “we”, they were just referring to humans.

The other students who reported a human-centred view had more complex responses. In this group, four participants (out of 25) indicated that the environment is a “healthy place for us”, which combines ideas of place and health. For example, one student perceived the environment as an “unpolluted place for us” (Focus Group 1). Ideas of place and peace can be seen in one response from the student who interpreted the environment as “the only peaceful place for us” (Focus Group 1). The idea that the environment is “the area which has the necessary living conditions for our needs” was perceived by one student (Focus Group 5). There were other perspectives among students that more indirectly indicated a human-centred view. For example, from an economic point of view, two students stated that the environment is good for tourism, and one student

perceived the environment as a place for leisure activities. As can be seen from these students' responses, they mainly understood that the environment was something for "us", which relates to a human-centred view.

The human relationship to the natural environment was another common perception students held about the natural environment. Thirteen (almost half) of the students included responses about how humans related to the environment, as well as the need for environmental protection. One student said that "environmental pollution can affect the behaviours of people" (Focus Group 1), and another saw humans as the ones who cause environmental pollution. Two participants out of the 13 believed that having a good environment can affect everything in their country, and another two highlighted that "we should always try to keep it clean" and that "it's too selfish if people make the environment polluted". As can be seen from the students' responses, there were widespread perceptions about the relationship of human and environment and how these two can affect each other.

A holistic view was another prominent perception of the students. As with the previous category, 13 students (almost half) expressed ideas indicating a holistic view. From these students' point of view, the environment is "wherever that all the organisms can live", which was reported by seven students. Four students reported that the "environment has an interaction with other things in it, as an example, forest and human (humans have effects on trees, and trees affect humans)". A different response arose from one student, who felt that "the environment is a place which belongs to specific organisms, like the city for humans and the forest for animals" (Focus Group 6). However, other student responses in this category appeared to imply a key relationship between organisms.

Finally, among the respondents, there were two responses for the meaning of the natural environment that were categorised as "state of the environment". One student said the environment is an "unpolluted place" (Focus Group 4) and another one said it is a "peaceful place" (Focus Group 1). Similar expressions were made by students grouped as holding a human-centred view, but in human-centred view, students referred to the environment as an "unpolluted place for us" or "peaceful place for us", indicating that use of the word 'us' appeared to mean something different for these students.

Overall, students' meanings for the natural environment revealed that there were widespread views. In addition, although a holistic view, human relationship to the environment, and state of the environment were identified, a human-centred view was most commonly expressed. It was important to explore students' understandings about the environment because this is a first step in assessing their environmental learning and their thinking. Next, the kinds of environmental experiences these students had participated in.

4.2.2 Students' experiences in the natural environment

Students were asked in the focus group interviews to talk about the experiences they had had in the natural environment. All 30 students from the 6 schools responded to this question. In order to broaden the question, the researcher added a prompt: "for instance, your experiences in the environment could be positive or negative". Interestingly, all the participants either described negative experiences that they had had in the environment (26 students) or they said they had not had any good experiences (four students). It is not clear why the responses were generally so negative, however possible reasons for this are discussed in Section 6.2.1.1.1.

Students described environmental experiences that they had had in forests, or at beaches, rivers and lakes. Around 30% (9 participants) shared experiences that they had had in the forests. Predominantly, they mentioned that in the forests, people make fires and leave their rubbish. Eight students (27%) described their experiences at beaches. Their statements also focused on pollution, for example, "Whenever we go to the beach, there is lots of rubbish around". One student expressed a belief that "the selfishness that we do to the seas and lakes, no one [else] does in the world" (Focus Group 2).

Students' environmental experiences visiting lakes and rivers were also not positive. Five students talked about the different types of pollution that they observed during their trips to these places. One student said:

I don't think that we had a good (positive) experience...In a trip, we stopped near a river to have lunch but there was too much rubbish around, it was so disappointing, people do not care about the environment. (Focus Group 5)

One participant shared his experience about the side effects of the drying of Lake Urmia in Iran and its consequences on the environment near the lake. He stated:

Last year we went to a township near the Lake Urmia... due to human activities, the lake's water level has reduced and it's drying... Because it is a hyper saline lake the surrounding area, particularly the trees, have been affected considerably by salt. (Focus Group 5)

Another student said that she had visited some other countries and when she compares them with Iran, she concluded from her experiences that “we don't have the culture of environmental protection” (Focus Group 2).

Students' responses focussed on unwelcome experiences in the environment, often because of pollution created by people in Iran. These undesirable environmental experiences largely had occurred in forests, beaches, rivers and lakes. It is possible that the students had some good experiences and perceptions as well, but they did not mention any at this stage. Rather, the view of the state of the environment was a negative one. In order to understand the link between students' perceptions of the environment and their environmental learning at schools, the next section explores the EE programme that students reported that they had experienced at their school and how this programme had impacted on their environmental learning.

4.3 Environmental learning at school

This section explores the students' perceptions of the importance of environmental learning for school students as well as their environmental learning at school. Data are presented from the questionnaire and students' focus group interviews.

4.3.1 Students' views about the importance of environmental learning for school students

In the questionnaire, students were given an idea regarding the importance of environmental learning for school students and asked whether they agreed or disagreed with this idea. The idea was “I think it is important that school students learn about environmental problems”. The results showed a high level of positive agreement among the respondents: More than 75% of the respondents either strongly agreed or agreed with the item, 16% were unsure about that and only 9% either disagreed or strongly disagreed.

To get more insights into these attitudes and to triangulate the data, a similar question was asked in the students' focus group interviews. The students were

asked, “Is it important for students to have the opportunity to learn about the natural environment at school?” and also to give their reasons for their answer. In total, 43 responses were obtained from the 30 participants. All confirmed that it’s important for students to learn about the environment at schools. However, two of them had some reservations. As one said, “I think it’s important but not at high school level because we have to be ready for university entrance exam” (Focus Group 1). These two female students had the feeling that learning about the environment would take up their time, and that they wouldn’t then have enough time to study other subjects like math or physics, which they saw as more important in the university entrance exam.

The other 41 responses revealed positive attitudes towards environmental learning at school. The most common reason students gave as to why they thought it’s important was related to passing the information on to others (reported by 13 students), as these examples of students’ replies show: “Yes it’s important, because we can transfer the information to our parents and maybe they tell to others too” (Focus Group 2); and “Yes it’s important, because we will transfer the information to our next generation” (Focus Group 3).

According to the students’ responses, other reasons for the importance of environmental learning for school students were related to “awareness” (reported by 12 students), as one student said “Yes it’s important, because when we know more about the environment, we will care more about that” (Focus Group 1); and relevance: “Yes, because the environment is related to our life” (Focus Group 2). This latter student meant that the environment was part of her life and so it should be considered within her school education.

Another reason for learning about the environment was related to students’ development at school: eight students felt that most of their development happened at school, so it was significant for them to learn about the environment at schools. Other responses (three students) included the feeling that “students are the ones who will make the future” (Focus group 1). Overall, the students’ views about the need for environmental learning at school were very positive.

4.3.2 Environmental learning at secondary school

To identify students’ ideas about EE programmes at school, the focus groups were asked to describe the environmental learning they experienced had at school, and

when, what and how it may have occurred. In order to understand what is actually taught about the environment in schools, and importantly, what the students actually learned, students' responses were categorised according to their school level, school subjects and how EE had happened (when, what, how). In total, 72 responses were obtained. The largest proportion of the views (34 responses) related to environmental learning at secondary school, followed by 19 responses, which connected to students' middle schooling, and just one response that was related to primary school level. A further 18 responses indicated that there had been very little environmental learning at school.

As discussed earlier in Chapter 3, the student participants had all completed their first year of secondary schooling, and all the students at this level study the same subjects, with data collection occurring early in the students' second year (14 years of age). Document analysis indicated that in Iran environmental issues in secondary schooling are studied in biology, geography, physics and chemistry (see Section 1.3.2). For instance, in biology, topics in the National Curriculum include environment and pollution, degradable and biodegradable materials, destruction of natural habitat and animal extinction, pollution and food chains, and depletion of natural resources (MoE, 2012). Environmental concepts in chemistry book 1 (first year of secondary schooling) addressed the environment in four chapters: 1) The frequency of the rare liquid, 2) Search for clean air, acid rain, 3) Reuse is the only way to continue, clean energy, environmental responsibility when using different chemicals, and 4) Black gold (oil) will run out. In physics, the environmental focus is mostly on providing capabilities for making everyday choices in matters related to environmental protection, for example, the use of energy resources and how to save energy. Most of the geography book in the second year of secondary schooling is dedicated to teaching environmental concepts. In this subject, environmental topics include water and taking advantage of water resources, deserts, humans and deserts, air pollution, pollution of seas and rivers, global warming and ozone layer depletion, distribution and population growth, population and migration, and population and natural resources. As can be seen, the National Curriculum provides opportunities for students to learn about a range of environmental issues and conceptions in their secondary schooling. The following paragraphs indicate what they felt they actually learnt through the environmental learning designed by the National Curriculum.

From the data provided by the students, it was clear that their main recollection of environmental learning at school was linked to their secondary schooling. About half of the respondents (47%) from the six schools described what they had been taught in EE at their secondary schools. According to the respondents, the main school subject in the first year of secondary school that contained environmental topics was chemistry. In chemistry, the topics that they mentioned were: water pollution, air pollution, acid rain, how to destroy rubbish, greenhouse gas effects and oil pollution. For the same level of secondary school (first year), students indicated they had had some environmental learning in their biology subject but they did not highlight the topics they had learned about. However, one student did say that they had two or three sentences about biodegradable and non-biodegradable things.

Environmental learning in the second year of secondary schooling was also reported, particularly for geography. Environmental topics like “how we can keep our environment clean, air pollution in cities, forest pollution” were the main areas that students talked about. Interestingly, students in Focus Group 5 (a boys’ school) indicated more environmental learning than the other focus groups, which can possibly be explained by the level and commitment of their teachers (see Section 5.3.6). The data collection phase was carried out when participants had recently begun their second year of secondary school, therefore, it’s not possible to fully assess their environmental learning in the second year of secondary school, because they had not finished this academic year.

4.3.3 Environmental learning at middle school

According to the students, environmental education at middle school (11-13 years of age) occurred predominantly in their third year of middle school. Subjects like food webs, water pollution in oceans, and destruction of the ozone layer were examples of environmental topics which students remembered they had in their science book. Furthermore, doing an assignment on acid rain (cited by three students), participating in a national tree planting day, and bringing plants and flowers to the class were the kinds of practical and outdoor experiences that students participated in in this particular year of middle school. Just one student referred to learning about global warming and the melting of glaciers in her second year of middle school (Focus Group 1). Collecting rubbish and recycling

were also highlighted by one student as being environmental activities at middle school.

4.3.4 School does not have much effect

The focus group interview data indicated that school does not have much impact on the students' environmental learning – this was raised by 21 students, many of whom were from four schools including the three girls' schools. The main reason given by seven (out of the 21) students was “there is no outdoor education at all”. These students seemed to equate environmental learning with outdoor learning. When asked about what they would change about their environmental learning, six students said they would prefer to have a specific book or subject for the environment at school and five of them would like to get more leaflets about the environment.

Interestingly, students mentioned about the specific parts in their school books which are called “knowing more”. One said:

Generally these parts contain information about the environment or environmental pollution, but because there is no assessment for these parts, and, it won't come in the exams, therefore, teachers ignore these parts, and we don't read them, either. (Focus Group 2)

When a female student was asked what she had learned about the environment at school, she said, “If they ask us what is pollution we just say air pollution and water pollution because we don't know about other things” (Focus Group 2). This indicates that the main focus of formal environmental education programmes in Iran is likely to be on air pollution and water pollution. This is discussed again later in Section 4.5. However, it is worth noting that the students in Focus Group 5, who indicated the highest environmental learning among all the participating students, did not comment about the ineffectiveness of their school for their environmental learning.

From the students' interpretations and also by considering the percentage of students (70%) in the focus group interviews who reported that their environmental learning at schools was not significant, it seems that the environmental education programmes were not very successful in developing students' awareness about environmental aspects or environmental issues beyond the fact that these exist. Although it appeared the National Curriculum contained

various environmental topics, students generally reported they had not learned much about these. Possible explanations for this could be a lack of detail in subject content in the text books, a lack of teachers' commitment to implement EE effectively – or it could reflect a misjudgement or under-reporting of the impact by the students. Part of this failure may be related to students' environmental attitudes. The next section explores the environmental attitudes of Tehran students towards the environment.

4.4 Environmental attitudes of students

This section presents data on students' attitudes about the environment and about their own environmental behaviour. In order to gain an understanding of students' environmental attitudes, they were asked questions about different environmental aspects. Data in this section are presented from the questionnaire and students' focus group interviews. Various aspects were considered, including humankind's relationship to the environment (Section 4.4.1), biodiversity (Section 4.4.2), interdependence (Section 4.4.3), belief in consequences for self (Section 4.4.4), intergenerational equity (Section 4.4.5) and economic sustainability (Section 4.4.6). Attitudes towards environmental behaviour (intention to act) were also examined and the findings are presented in section 4.4.7.

4.4.1 Humankind's relationship to the environment

Environmental attitudes about humankind's relationship to the environment were assessed in the questionnaire using five items from the NEP scale, as described in Section 3.5.4.1. Data also come from the focus group interviews. In the questionnaire, respondents were asked whether they strongly agreed, agreed, were unsure, disagreed or strongly disagreed with each item (Likert scale). All 337 participants gave responses to each of these items and the findings are shown in Figure 5.1, which presents the distribution and the percentages of the responses for the five items (see Questions 1, 2, 3, 4 and 23 in Appendix A).

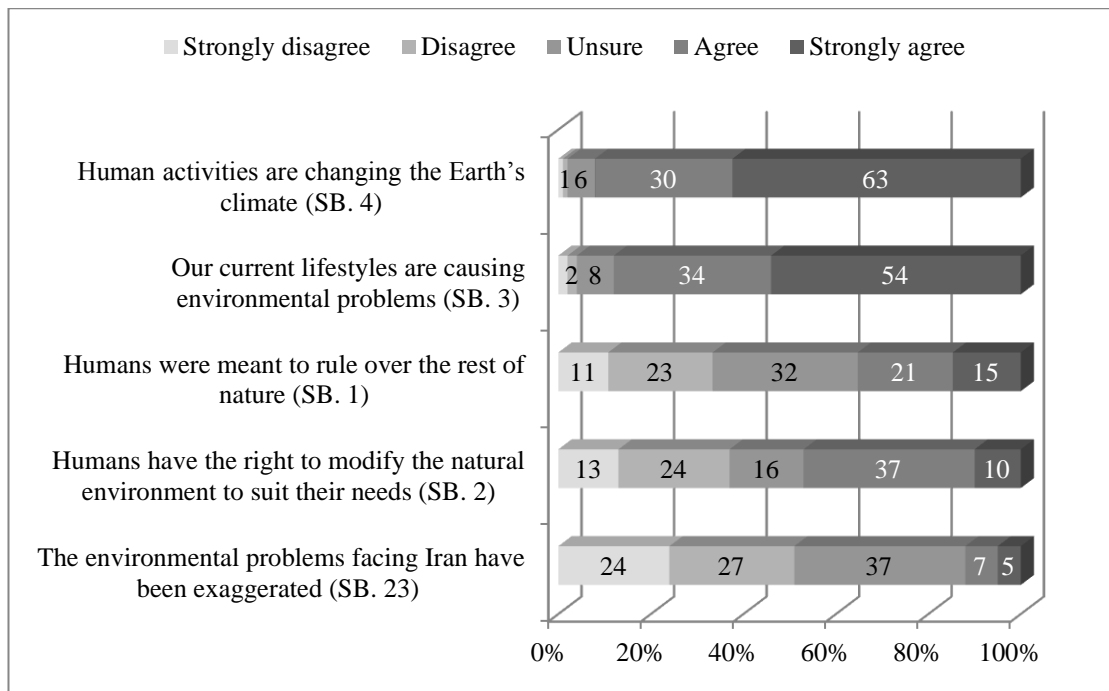


Figure 4.1 Percentage and distribution of students' responses about the items related to human relationship to the environment (n=337).

Note: SB (4, 3, 1, 2, 23) in the Figure represent Section B in the questionnaire and the question numbers.

To explore students' feelings towards human activities in the world, they were given an item in the survey which gave the view around "human activities are changing the Earth's climate". The results presented show the strong feeling of the students by 63% strongly agreed and 30% agreed (totally 93%) about the item (Figure 4.1), and the low standard deviation of 0.720 shows this agreement among the participants (see Table 4.2 below).

Table 4.2 Means and Standard Deviations of Students' Responses about the Items Related to Human Relationship to the Environment (n=337).

	Mean	Std. Deviation
Human activities are changing the Earth's climate (SB. 4)	4.53	0.72
Our current lifestyles are causing environmental problems (SB. 3)	4.36	0.87
Humans were meant to rule over the rest of nature (SB. 1)	3.05	1.21
Humans have the right to modify the natural environment to suit their needs (SB. 2)	3.07	1.23
The environmental problems facing Iran have been exaggerated (SB. 23)	2.42	1.09

Relatively similar results to the previous survey item were given by the students when they were asked whether or not "our current lifestyles are causing

environmental problems”. Fifty four per cent of the respondents strongly agreed with the item and 34% agreed (Figure 4.1). The low standard deviation of 0.866 (see Table 4.2) in this item also reveals the consistently held agreement on this item.

The first two items indicated that students felt humans were having a significant effect on the environment. Similar findings were obtained from the students’ focus group interviews. For example, when students were asked in the interviews, “What do you think causes environmental problems in general?” 27/30 of them stated that humans cause environmental issues. Additionally, they identified some reasons why people are causing environmental problems. They stated that environmental issues are because of the “culture of people”, “irresponsibility of all of us”, “lack of awareness” and “selfishness of some people”. Even the other remaining participants (3/30) indirectly indicated humans as the main cause of environmental issues, stating, for example, that “factories, technology development and the carelessness of government officials are the causes of environmental problems”. Therefore, a belief that we are causing serious problems to the environment when we modify it by our lifestyle was supported by almost all the respondents in the survey and the focus group interviews.

However, students appeared less consistent in their feelings about the position of humans in the natural environment (Question SB.1). Almost one third (32%) of the respondents were unsure that “humans were meant to rule over the rest of nature”, 23% disagreed with the idea, and slightly less (21%) agreed with the statement (see Figure 4.1). The high standard deviation of the responses for this item (1.205) reflects this diversity of responses (see Table 4.2). The frequencies of the students’ responses were distributed in an approximately normal curve, which further indicates the diversity of views about this item.

Similarly, students showed mixed environmental attitudes towards a less environmentally-friendly statement that “humans have the right to modify the natural environment to suit their needs”. Nearly one half of the respondents (47%) strongly agreed or agreed with the idea, which was in conflict with 37% who disagreed or strongly disagreed, indicating a more pro-environmental stance (see Figure 4.1). The mean score and standard deviation of the responses (3.07 ± 1.23 , see Table 4.2) demonstrates the range of the answers, including those with less pro-environmental and more humanistic attitudes.

An examination of the frequency distributions of the first four items indicated there was a broad shift from students' views that humans are having a profound impact on the environment and causing environmental issues, to the view that humans are meant to regulate nature, or that we have the right to change the environment for our benefit. This conflict is reflected in their agreement that we have a lot of impact on the environment, but they are not sure we should. There was also a large proportion (30%) who were "unsure" that humans were meant to rule over the rest of the nature. This shift could reflect a human centered attitude, or uncertainty about the balance between human needs and the environment.

The findings of the last item related to humankind's relationship to the environment indicated that the majority of the participants (51%) disagreed or strongly disagreed that environmental problems facing Iran have been exaggerated. However, 37% of the students were not sure (see Figure 4.1). Data from the focus group interviews showed that almost all the 30 students who participated in the interviews felt that environmental issues in Iran were very serious. This is discussed further in Section 4.5.2 below.

4.4.2 Biodiversity

Environmental attitudes of the students towards biodiversity were examined using two questionnaire items, one from the NEP scale and the second one from the EC scale (see Section 3.5.4.1). The NEP item was very well supported by the respondents: 87 per cent of respondents either strongly agreed or agreed that "Plants and animals have as much right as humans to exist". About 7% were unsure about this idea and just 6% either disagreed or strongly disagreed (see Figure 4.2). This indicates the positive environmental attitude of students towards biodiversity.

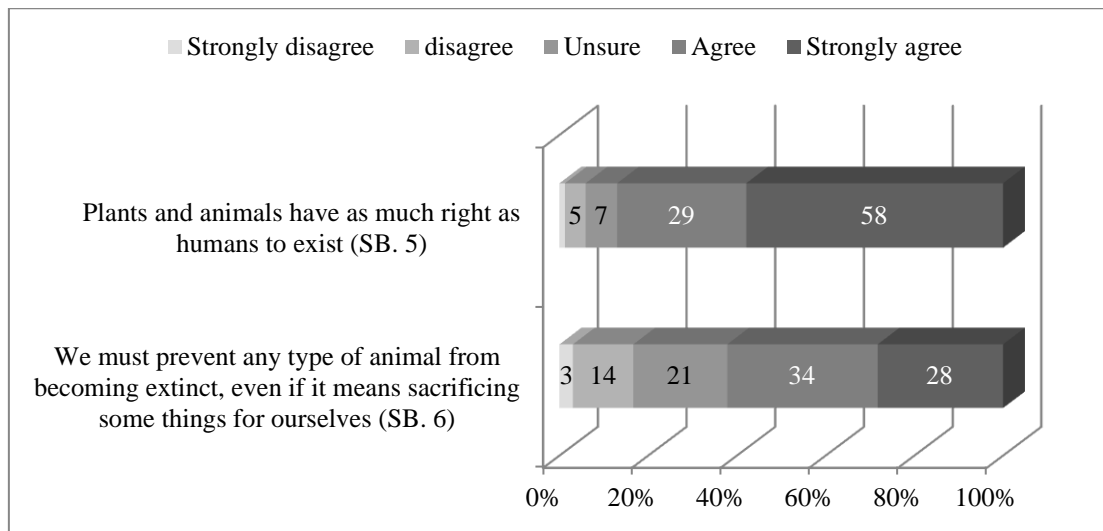


Figure 4.2 Percentage and distribution of students' responses about biodiversity, $n_{SB.5}=337$, $n_{SB.6}=336$.

The responses' mean score and standard deviation for biodiversity items are presented in Table 4.3. As it is shown in the table, the mean score of 4.38 represents strong support for this item.

Table 4.3 Means and Standard Deviations of Students' Responses about Biodiversity Items ($n_{SB.5}=337$, $n_{SB.6}=336$).

	Mean	Std. Deviation
Plants and animals have as much right as humans to exist (SB. 5)	4.38	0.89
We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves (SB. 6)	3.71	1.10

However, in the second item, the attitudes of the respondents to biodiversity was not as strong as in the previous item. There was a comparative lack of support within students, and only 62% of the students were either agreed or strongly agreed with the idea that "We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves". More than 20% were uncertain about this view and 17% either disagreed or strongly disagreed (see Figure 4.2). The lower commitment to a pro-environmental attitude compared with the previous item could be explained by the presence of the phrase "sacrificing some things for ourselves" in this item, which could have influenced students' responses. Perhaps when it comes to sacrificing something, students demonstrate less pro-environmental attitudes. Pearson's Correlation analysis showed a statistically significant but weak positive relationship between these two biodiversity items ($r = 0.293$, two-tailed p -level <0.01). This weak positive

relationship shows that in general students who strongly supported the rights of other animals and plants to live tended to slightly support the prevention of extinction, perhaps because the students were not willing to sacrifice some things themselves for this purpose. Overall, the students' attitudes towards biodiversity were positive, although fewer students were willing to make personal sacrifices to protect it.

4.4.3 Interdependence

Two items were designed to examine the environmental attitudes of the students regarding the concept of interdependence. One was the belief that "All plants and animals play an important role in the environment", with which 92% of all the respondents either agreed or strongly agreed. Only about 3% of the respondents (9 students) disagreed with this idea and none of the participants strongly disagreed (see Figure 4.3). The mean score and standard deviation of the responses clearly shows the very high positive attitudes of the students towards this item (see Table 4.4).

Table 4.4 *Means and Standard Deviations of Students' Responses about Interdependence Items (n=337).*

	Mean	Std. Deviation
All plants and animals play an important role in the environment (SB. 7)	4.41	0.71
Predators such as crows, Persian leopards and coyotes which prey on farmer's grain crops and poultry should be eliminated (SB. 24)	1.74	0.95

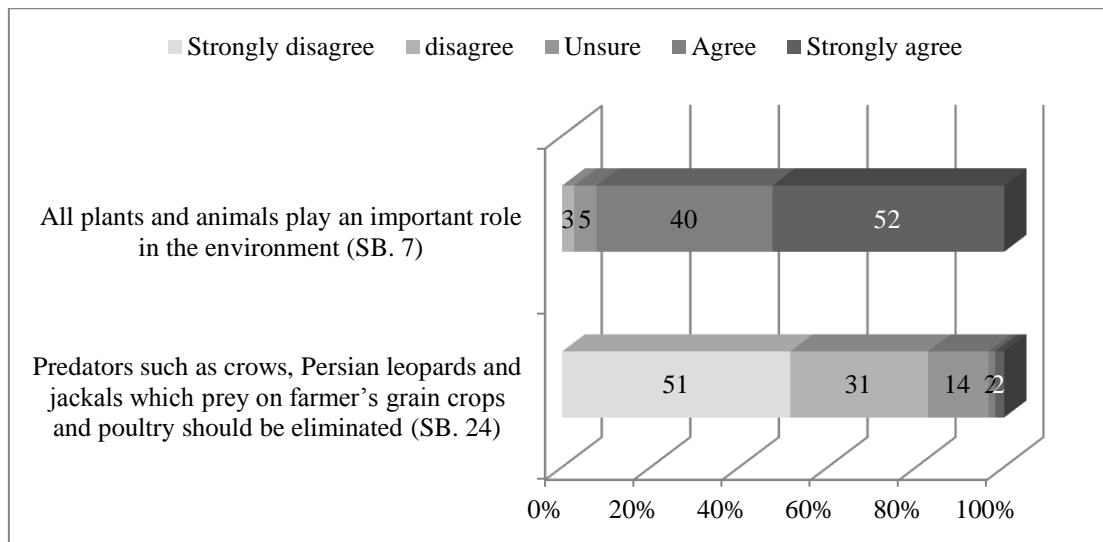


Figure 4.3 Percentage and distribution of students' responses about interdependence items (n=337).

The second item, "Predators such as crows, Persian leopards and jackals which prey on farmer's grain crops and poultry should be eliminated", was not supported by 82% of the students, who either strongly disagreed or disagreed with the statement (see Figure 4.3). This was a less environmentally friendly statement, and the mean score of the responses is low (1.74), which indicates the positive environmental attitude of the students to this item (see Table 4.4). The Pearson's Correlation analysis indicates a statistically significant and weak negative relationship between these two interdependence items ($r = -0.206$, two-tailed p -level <0.01). This weak negative relationship shows that students who strongly supported the idea that all plants and animals play an important role in the environment tended to disagree with the elimination of those animals which prey on farmer's grain crops and poultry. In other words when thinking specifically about interdependence, human centeredness appeared to be less important to the students, who showed a very positive environmental attitude towards the self-governance of all living organisms. It would be interesting to determine whether students living in rural areas, where predators can impact on their daily life, have more negative attitudes about this.

4.4.4 Belief in consequences for self

Four items were used from the AC (Awareness of Consequences) scale to explore students' attitudes about the consequences of pro-environmental behaviour. Of the four items, two were presented as less environmentally-friendly items. Figure 4.4 shows the percentages and distribution of the students' responses.

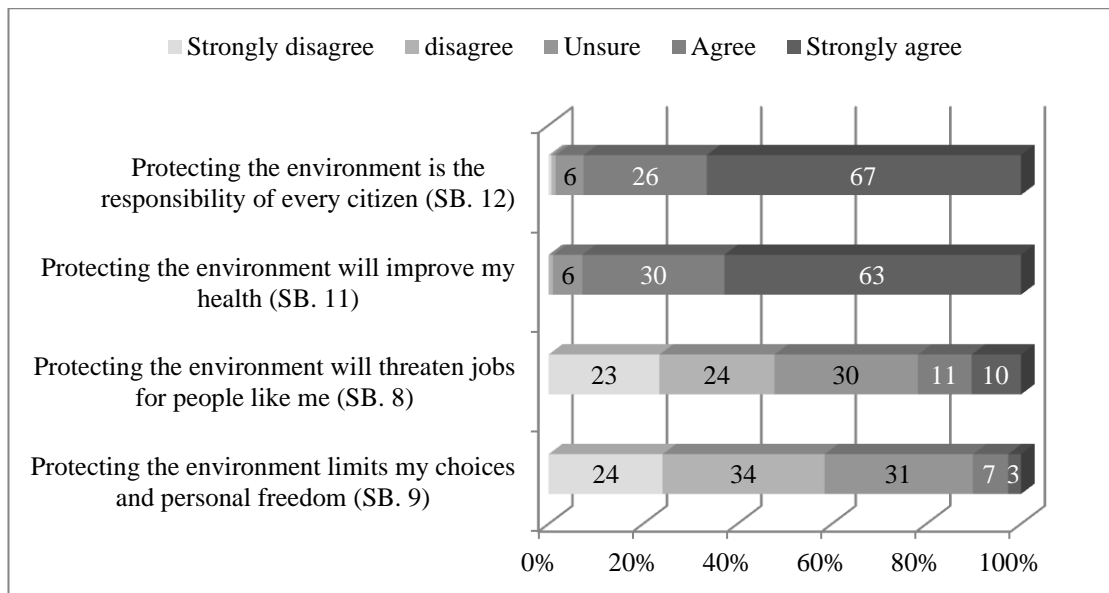


Figure 4.4 Percentage and distribution of students' responses towards belief in consequences for self (n SB. 12=337, n SB. 8,11=336, n SB. 9=335).

The first item (SB. 12) was the idea about the responsibility of every citizen towards environmental protection. Data are presented from the questionnaire and the focus group interviews. Of 337 students, 224 students (67%) reported in the survey that they strongly agreed with the idea, followed by more than 26% who agreed. In other words, 93% of the students supported the opinion and showed positive environmental attitudes. Comparable findings were found in the interviews, where 23 out of 30 students emphasized that it's the responsibility of every person to protect the environment. To support this, one student said, "If any person modifies [the environment] him or herself, then the community will gradually be modified" (Focus Group 1). The other focus group participants who did not agree with the idea expressed the view that "first it's the responsibility of government" to do so. Overall, there was a tendency for participants to endorse pro-environmental attitudes.

When students' beliefs about the consequences for self extended to their health, strong views were also expressed. Similar to the previous item, the item "Protecting the environment will improve my health" was supported by 93% of the respondents, who either strongly agreed (63%) or agreed (30%). Only 6% were not sure about that and fewer than 1% disagreed (see Figure 5.4). Of the 336 students, there were none who strongly disagreed with this item. The students' beliefs regarding their health clearly shows a very high level of positive environmental attitudes, however, these results could be very positive because of the perceived consequences for the students themselves.

The third item examined the idea that “Protecting the environment will threaten jobs for people like me”. Almost half of the respondents (47%) did not agree or strongly agree, but a significant proportion (30%) were unsure. Fewer participants agreed that protecting the environment would threaten jobs. It appears that when the idea of environmental protection is linked to the students’ futures, particularly their job opportunities, their environmental attitudes were not as positive – although they may also have been unsure as to how it might affect them in their future.

Similar results were obtained for the statement, “Protecting the environment limits my choices and personal freedom”. Although the proportion who disagreed was slightly higher [disagreed (34%) and strongly disagreed (24%)] than for the previous item, the frequencies of the “unsure” respondents were almost the same (31%). There were just nine out of 335 students (3%) who strongly agreed with the item, and 25 students (7%) agreed. Comparing the results with the item regarding environmental protection and health indicates some difference in students’ attitudes towards their health consideration, and limiting their personal freedom: one third of the students were not sure protecting the environment would limit their choices and personal freedom. In other words, the students could see a closer connection between protecting the environment and consequences for their health, than between protecting the environment and the impact this might have on job opportunities and personal choices and freedom.

Table 4.5 *Means and Standard Deviations of Students’ Responses about Belief in Consequences for Self-items* ($n_{SB, 12}=337$, $n_{SB, 8,11}=336$, $n_{SB, 9}=335$).

	Mean	Std. Deviation
Protecting the environment will threaten jobs for people like me (SB. 8)	2.61	1.25
Protecting the environment limits my choices and personal freedom(SB. 9)	2.30	1.00
Protecting the environment will improve my health (SB. 11)	4.55	0.65
Protecting the environment is the responsibility of every citizen (SB. 12)	4.57	0.70

Overall, as the results show, students’ environmental attitudes relating to the last two items cannot be considered to be very positive. When it comes to future job consideration, students showed some uncertainty in supporting environmental protection. Additionally, the number of students who either agreed or strongly agreed (21%) with this item should not be ignored – they considered that

environmental protection would have a negative impact on their job prospects. Likewise, in the last item, almost half of the respondents considered, and a further third were uncertain, that environmental protection would impact negatively on their choices and personal freedoms.

4.4.5 Intergenerational equity

Intergenerational issues arise due to the fact that our present decisions and actions regulate the economic and ecological capacity that the future generations will inherit (Anand & Sen, 2000; Padilla, 2002). In order to investigate the students' attitudes towards intergenerational equity, participants in the questionnaire were given two statements to consider, including one that was asked as a less environmentally-friendly item. Figure 4.5 shows the percentages and distribution of the students' responses to the two items.

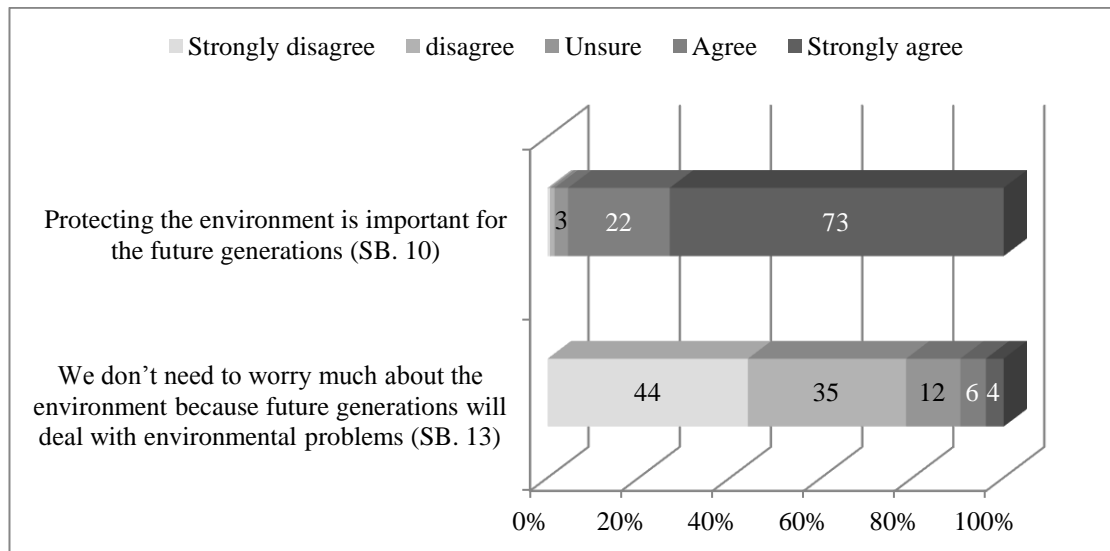


Figure 4.5 Percentage and distribution of students' attitudes regarding intergenerational equity (n= 337).

In responding to the first item, "Protecting the environment is important for the future generations", students showed strong pro-environmental attitudes by either strongly agreeing or agreeing (95%) with the statement. Only 1% (5 respondents) either disagreed or strongly disagreed with the statement (see Figure 4.5). The results of this item indicated that the majority of the respondents were concerned about the importance of intergenerational equity and had positive attitudes towards it. The low standard deviation and the high mean score of the responses indicate overall pro-environmental attitudes towards intergenerational equity (see Table 4.6).

Table 4.6 Means and Standard Deviations of Students' Responses about Intergenerational Equity Items (n=337).

	Mean	Std. Deviation
Protecting the environment is important for the future generations (SB. 10)	4.67	0.63
We don't need to worry much about the environment because future generations will deal with environmental problems (SB. 13)	1.91	1.06

The idea that “We don't need to worry much about the environment because future generations will deal with environmental problems” was a less environmentally-friendly item. Similar findings to the previous item were found, but not as strongly defined. In this item, 79% of the students either strongly disagreed or disagreed, however, 10% either agreed or strongly agreed with the idea and the rest (12%) were unsure (Figure 4.5). Pearson's Correlation analysis indicated a statistically significant and moderate negative relationship between these two intergenerational equity items ($r = -0.349$, two-tailed p -level <0.01). This moderate negative relationship shows that students who significantly supported the idea that environmental protection is important for future generations tended to moderately disagree with the idea that we don't need to worry much because future generations will deal with environmental problems. Nevertheless, students' responses to the second item were not as positive as for the first item, which could reflect uncertainty as to what the future might hold. In general, students' attitudes towards intergenerational equity as a whole were considered to be high.

4.4.6 Economic sustainability

Sustainability is a broad concept and involves environmental sustainability, social sustainability and economic sustainability. Economic sustainability in respect to the environment is not only about attaining economic growth, but also understanding that economic growth is only sustainable if it simultaneously maintains the quality of the environment. Data are presented from the questionnaire and focus group interviews.

To examine the students' attitudes towards economic sustainability in relation to the environment, three items in the questionnaire addressed different perspectives about economic sustainability. Figure 4.6 indicates the percentages and distribution of the responses to these items.

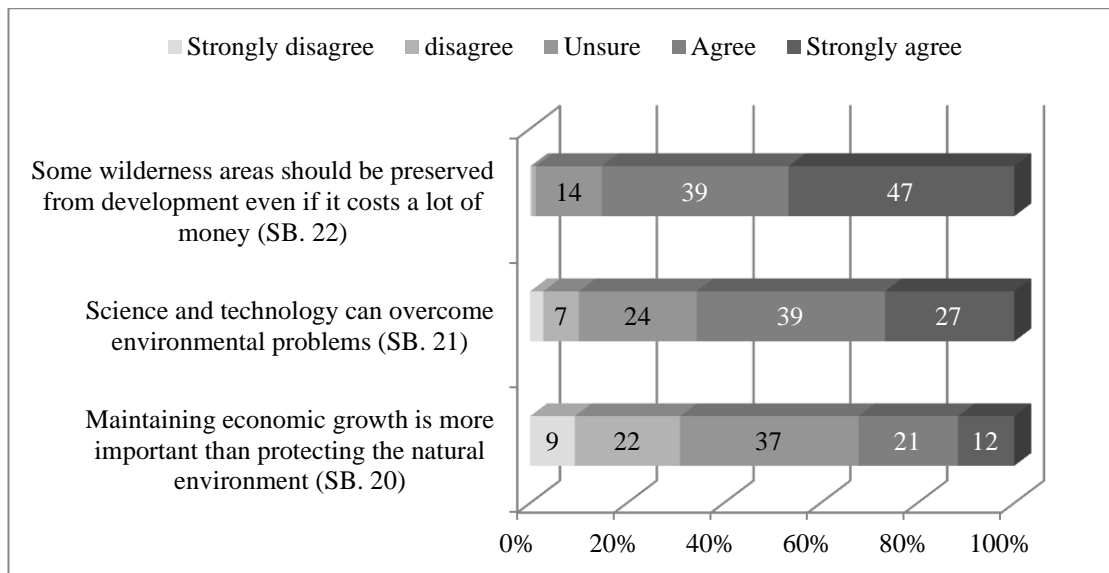


Figure 4.6 Percentage and distribution of students' responses towards economic sustainability (n (SB. 22,21)=337, n SB. 20=336).

The highest positive environmental attitudes were obtained for the idea that “some wilderness areas should be preserved from development even if it costs a lot of money”. More than 85% of respondents either strongly agreed or agreed with the item (see Figure 4.6), with 14% unsure. Only about one percent of the respondents did not have positive attitudes about this item.

In the second item, dealing with the idea that science and technology can overcome environmental problems, 39% of the respondents agreed, 27% strongly agreed, 24% were unsure and 10 percent either disagreed or strongly disagreed (see Figure 4.6). The findings show that many students felt that science and technology could be a solution to address environmental issues, also possibly indicating that forces beyond an individual's control may act to mitigate risks to the environment.

The third item exploring attitudes towards economic sustainability was based on the statement, “Maintaining economic growth is more important than protecting the natural environment”. There was a degree of uncertainty about this, with 124 students (37%) indicating that they were not sure about the item, while the proportions of agreed and disagreed respondents were quite similar (see Figure 4.6). The standard deviation of 1.12 (see Table 4.7) shows the high diversity of the responses and the frequencies of the students' responses were distributed in a normal curve, also revealing the spread of the responses. Correlation analysis between items one and three (SB.22 and SB.20) indicated that there was virtually

no statistically significant correlation between these two items. This means that these two ideas are either not correlated, or correlated so weakly that the correlation is negligible for the items ($r = -0.072$, two-tailed $p\text{-level} > 0.01$). Although students greatly supported the idea that some wilderness areas should be preserved from development, they were less certain when asked directly about the balance between economic growth and environmental protection.

Table 4.7 Means and Standard Deviations of Students' Responses about Economic Sustainability Items ($n_{(SB. 22,21)}=337$, $n_{SB. 20}=336$).

	Mean	Std. Deviation
Some wilderness areas should be preserved from development even it costs a lot of money (SB. 22)	4.3	0.75
Science and technology can overcome environmental problems (SB. 21)	3.8	1.00
Maintaining economic growth is more important than protecting the natural environment (SB. 20)	3.04	1.12

A relatively similar question was asked in the students' focus group interviews: "Is looking after the environment as important as developing the economy? Or which one do you think is more important?" In total, 28 students responded to this question. Among them, 17 students (61%) said that the environment is more important. A number of reasons were given to justify their responses. For example, five students across three different focus groups linked environmental harm with economic harm, as one stated: "Yes, environment is more important because if the environment is destroyed (does not exist), the economy also will be destroyed" (Focus Group 3).

One focus group student indicated his thinking in response to this question by referring to air pollution as an example that can affect the economy. He said, "The government declares some days as public holidays just because of air pollution, when people don't go to work, it can highly affect the economy" (Focus Group 5). Another participant supported his view by saying, "If we have a good environment, it's good for tourism and economy" (Focus Group 6). From his point of view, the environment can enable the economy. A further participant revealed her strong feeling about the influence of the economy on the environment by saying: "I think even technology is destroying the environment" (Focus Group 2).

However, one quarter of the focus group students (7 students) had the opposite attitude regarding economic sustainability. For example, three students across three different focus groups linked developing the economy with environmental protection, as one stated: “Developing the economy can help people to take care of the environment” (Focus Group 3). These students appeared to mean that if the economic circumstances of the people were stable, then they can help by investing more money to protect the environment. In another view, perhaps they thought that if the economy of the country is good enough, Iran could stop development activities which were causing damage to the environment.

Finally, four students in the focus group interviews who said neither protecting the environment or the economy had the priority over another one. Like the 37% of questionnaire respondents who were unsure about whether the economy or the environment should be prioritized, these students similarly could not decide whether looking after the environment is more important or developing the economy. They mentioned that both have to be equal in terms of importance.

Overall, as the above data from the questionnaire and focus group interviews indicate, the participants seemed generally willing to pay for wilderness areas, but were less certain about their views regarding the importance of economic development, and how this interacted with potential impacts on environment.

4.4.7 Agency

This section presents data on students’ attitudes towards environmental behaviour, commonly known as intentions to act. According to Hines et al. (1987), a person who expresses an intention to take environmental action will be more likely to be involved in the action than a person who expresses no such intention (see Section 2.3.4.1). Students’ environmental attitudes were investigated in the questionnaire using items related to specific actions, some of which were based in the future, others in the present. Figure 4.7 shows the percentage and distribution of the responses to the agency items.

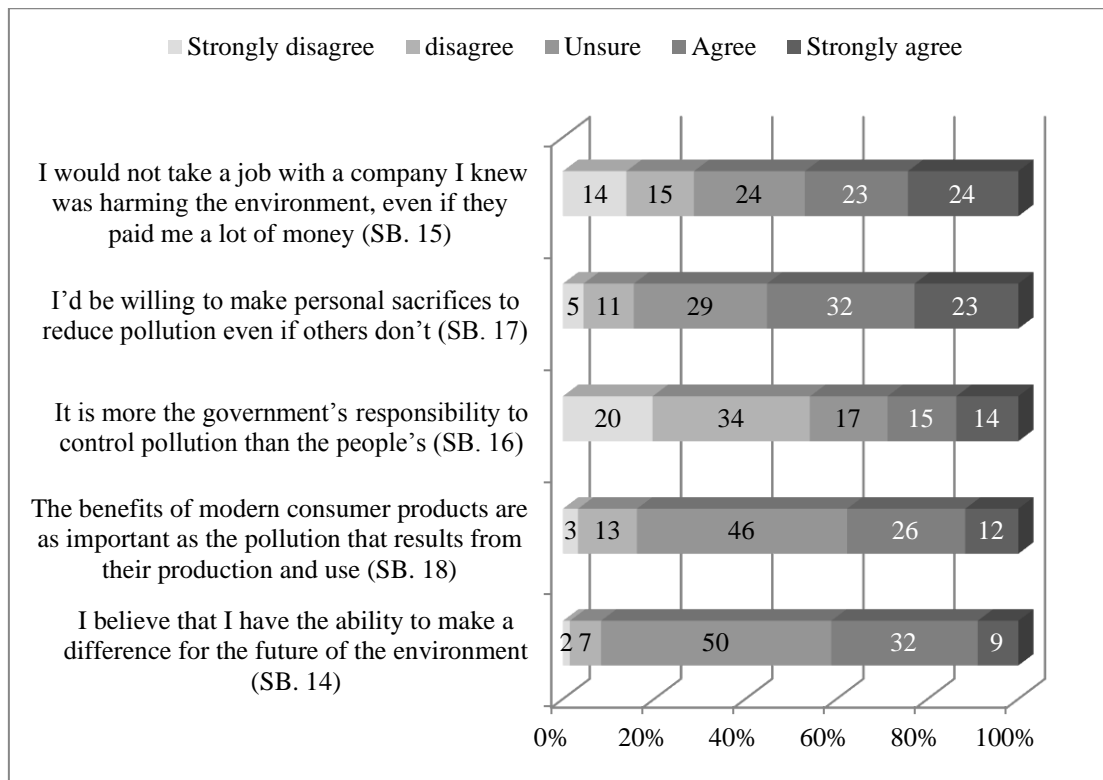


Figure 4.7 Percentages and distribution of students' attitudes towards environmental behaviour (n SB. 15=337, n SB. 17=336, n SB. 16=336, n SB. 18=334, n SB. 14=335).

When students were given the statement, “I would not take a job with a company I knew was harming the environment even if they paid me a lot of money”, the responses were spread out across all the five scale categories. Of 337 students, 82 (24%) were not sure about the idea, 82 students (24%) strongly agreed and 76 students (23%) agreed, whereas 97 students (29%) either disagreed or strongly disagreed. The proportions agreeing were therefore slightly higher than the other categories (Figure 4.7). The high standard deviation (1.35) of the responses (Table 4.8) demonstrates the high diversity of the responses, which reflects varied attitudes across all of the participants. That these findings indicate uncertainty for many students in terms of intention to act is interesting because, in previous items, they indicated positive attitudes towards the environment – but when the questionnaire item challenged their future job opportunities in order to protect the environment, they indicated less commitment to pro-environmental attitudes (see Section 4.4.4).

Relatively similar findings were found when students were given the statement, “I'd be willing to make personal sacrifices to reduce pollution even if others don't”. About one-third of the students were not sure about the idea, 32% agreed, 23% strongly agreed and 16% either disagreed or strongly disagreed. The

proportion of the respondents who selected either strongly agreed or agreed (totally 55%) for this item was slightly higher than the previous item, but some students' unwillingness to make personal sacrifices was again clear. The results of this item are comparable with the results of a biodiversity item (see Section 4.4.2), which also referred to making sacrifices for the environment. In both items, some students did not show willingness to make personal sacrifices.

Table 4.8 *Means and Standard Deviations of Students' Responses about Agency Items* ($n_{SB.15}=337$, $n_{SB.17}=336$, $n_{SB.16}=336$, $n_{SB.18}=334$, $n_{SB.14}=335$).

	Mean	Std. Deviation
I would not take a job with a company I knew was harming the environment, even if they paid me a lot of money (SB. 15)	3.28	1.35
I'd be willing to make personal sacrifices to reduce pollution even if others don't (SB. 17)	3.58	1.09
It is more the government's responsibility to control pollution than the people's (SB. 16)	2.69	1.32
The benefits of modern consumer products are as important as the pollution that results from their production and use (SB. 18)	3.3	0.95
I believe that I have the ability to make a difference for the future of the environment (SB. 14)	3.4	0.81

The next item asked in the questionnaire was: "It is more the government's responsibility to control pollution than the people's". Of 336 students (one response was missing for this item), 116 students (34%) disagreed with the item and the remaining students almost equally selected the other choices (see Figure 4.7). In total, 54% of the respondents either disagreed or strongly disagreed with the idea, indicating that they saw the locus of control residing with themselves. The high standard deviation of the responses (1.32) for this item shows the diversity of responses (Table 4.8). Comparing this finding with the finding of a similar item (SB. 12) in "belief in consequences for self" (Section 4.4.4) shows a shift in students' attitudes about who should be responsible to protect the environment. In fact, in that item, 93% of the students supported the idea that it's the responsibility of every citizen to protect the environment, while here only 54% supported this idea by disagreeing with the item.

A similar question about responsibility for protecting the environment was asked in the focus group interviews. Twenty-three students (out of 30, 77%) stated that it's the responsibility of people or every person to protect the environment. The other seven participants felt that it's the government's responsibility to protect the environment – and that this would happen by raising awareness among the people.

Of these seven students, two particularly emphasized that it's the department of the environment's responsibility to protect the environment. This perhaps reflects the work that the Department of the Environment was doing in using public media to raise awareness of environmental issues (see Section 1.3.1).

Many students (46%) indicated that they were unsure about the statement, "The benefits of modern consumer products are as important as the pollution that results from their production and use". Of 336 students who responded, 38% either agreed or strongly agreed with the item, which indicates some level of pro-environmental attitude. The frequencies of the participants' responses were distributed in an approximately normal curve, indicating a wide range of views and lack of agreement among students. The low level of environmental attitude indicated for this item might be because the students' generation is closely tied into modern consumer products; therefore, it might have been a difficult decision for them to choose between the environment or modern products.

Given responses to the questionnaire and interviews questions, it may be considered that participants were largely unsure about their intentions to act, or uncommitted to taking action. Students' self-efficacy might be important to predict their environmental behaviour in the future because of its close relationship to locus of control. Interestingly, like the other agency items, more than half of the respondents were unsure about their belief that they have the ability to make a difference for the future of the environment. However, more than 30% (108 students) of the respondents agreed and about 9% (30 students) strongly agreed that they can do something for the environment in the future (Figure 4.7). In other words, while just over a third were positive about their ability to make a positive difference, many of the students revealed low level of confidence, or low self-efficacy.

A similar question was asked in the students' focus group interviews: "Do you think you will be able to do anything in the future to help the environment?" Of 29 students who replied to this question, 27 students said that they would be able to, however, there was one student who said, "No, I will not" and another student who was not sure. Of the 27 students who thought they could do something for the environment, one said "Yes, by giving information to the children who are younger than us" (Focus Group 5), another male student said "Yes, for example by planting trees or by influencing others" (Focus Group 5), and a further student

explained “Yes, definitely I can, by influencing my family and friends” (Focus Group 4). In other words, many of the responses appeared to relate to helping to raise awareness of others. However, when the the focus group students were also asked, “Do you think you will be able to influence others?” only 14 of the 27 students who replied to this question said yes, six said no and the rest (seven students) were not sure they if they could or not. As one of them said, “Maybe I will only be able to influence my children” (Focus Group 4).

As the data indicate, there were therefore some differences between students’ reported attitudes in the questionnaire and focus group interviews. However, such differences are hard to interpret, it could be because of students were not sure about their ability to make a difference for the environment in the future. In addition, these contradictions could also be due to different methodological differences of data gathering by questionnaire and focus group.

4.4.8 Section summary

This section presented findings related to students’ attitudes towards the environment. Students’ responses were categorised in different themes (human relationship to the environment, biodiversity, interdependence, belief in consequences for self, intergenerational equity, economic sustainability, and agency). Data from the questionnaires and focus group interviews appear to indicate a lot of dilemmas, for example, students’ thinking that humans are causing environmental issues but not being sure about committing to pro-environmental behaviour, especially when personal costs or sacrifice may be involved. For example, while students’ attitudes towards biodiversity can be considered quite positive, fewer students were willing to make personal sacrifices towards improving it. Students’ responses showed a valuing of the importance of interdependence in ecosystems. Among all the attitudes items, the most pro-environmental attitudes of the students were seen in two items relating to consequences for self (93% agreed that the environment will improve their health, and support the responsibility of every citizen towards environmental protection), and one item in intergenerational equity, where 95% of the students strongly supported the ideas. In considering items related to economic sustainability, two items showed a positive environmental attitude of the students towards protecting wilderness areas from development and the role of science and technology to solve environmental problems; however, for many students, there was significant

uncertainty for the last item: “Maintaining economic growth is more important than protecting the natural environment”.

While, in general, students showed moderate positive attitudes towards the environment, their attitudes towards environmental behaviour, did not appear to be as positive, and students were mostly “unsure” about whether they would act environmentally in the future. In addition, there was some discrepancy between students’ responses to the questionnaire and focus group interviews in their reporting about their ability to make a difference for the future of the environment, fewer students reporting self-efficacy in the questionnaire than in the focus groups.

The next section examines the environmental awareness of the students.

4.5 Environmental awareness of students

This section presents data on perceived and actual environmental awareness of the students. It describes how aware students believe they are of environmental issues, from which sources did they feel they learnt about these issues, how concerned and how optimistic students are regarding these issues, and the actual awareness demonstrated by the students on a range of environmental issues. The findings are drawn from the questionnaire and the focus group interviews.

To get insights into what students think about their general local environmental awareness, they were given an item, “I am informed about environmental issues in Iran/Tehran”. The results showed diverse replies of the participants. Of 337 students, 114 students (34%) agreed that they are informed about environmental issues in Iran, and a similar number, 106 students (32%) were unsure. Smaller numbers chose other responses, 19% of the participants disagreed, 9% strongly agreed and just 6% strongly disagreed with the item. Although the frequencies of the agreed and strongly agreed (totally 43%) responses were higher than the other replies, there were also high levels of uncertainty and disagreement. This might reflect the students’ level of environmental awareness – or their confidence about their environmental knowledge in Iran. The standard deviation of 1.056 also shows the high diversity of the responses.

Section C of the questionnaire (see Appendix A), particularly questions 1, 2, 3 and 4, focussed on seven selected environmental issues: a) air pollution, b) energy shortages, c) extinction of plants and animals, d) clearing of forests for other land

use, e) water pollution, f) over population, and g) climate change. These questions in the questionnaire were predominantly drawn from the Programme for International Student Assessment (PISA 2006), with a change in the last two environmental issue items: Instead of water shortages and nuclear waste as used in the PISA survey “water pollution” and “climate change” were used. In addition, the item around “over population” was added in consideration of the context of the research.

Following these self-report questions on students’ perceptions of their environmental awareness, the students’ actual environmental awareness was investigated by asking them to respond to questions about environmental issues facing Iran specifically, and the world in general. These questions were a mix of multiple choice, scales and open questions.

4.5.1 Sources for learning about environmental issues

In order to examine from which information sources students believed they had mainly learned about seven selected environmental issues, they were given five sources (school, media, friends, family, internet or books) and were asked to select as many as applied for each of the environmental issues. The question also allowed participants to indicate that they were not sure what these issues are.

Media (TV, radio, newspaper or magazines) appeared to perform a central role as a source for learning about environmental issues. This data may reflect the attention on media communication about environmental issues indicated by the Iranian Department of the Environment (see Section 1.3.1). As indicated in Figure 4.8, the students reported they mainly learned about these environmental issues from media, followed by school, then the internet and books, and lastly, family and friends. This trend was generally present across all of the seven environmental issues. The average proportion of the students answering that they mainly learned from media ranged from 47% (159 students) for “energy shortages” to 81% (273 students) for “air pollution” (Figure 4.8). After air pollution, the next environmental issue that students learned most from media was extinction of plants and animals (213 students).

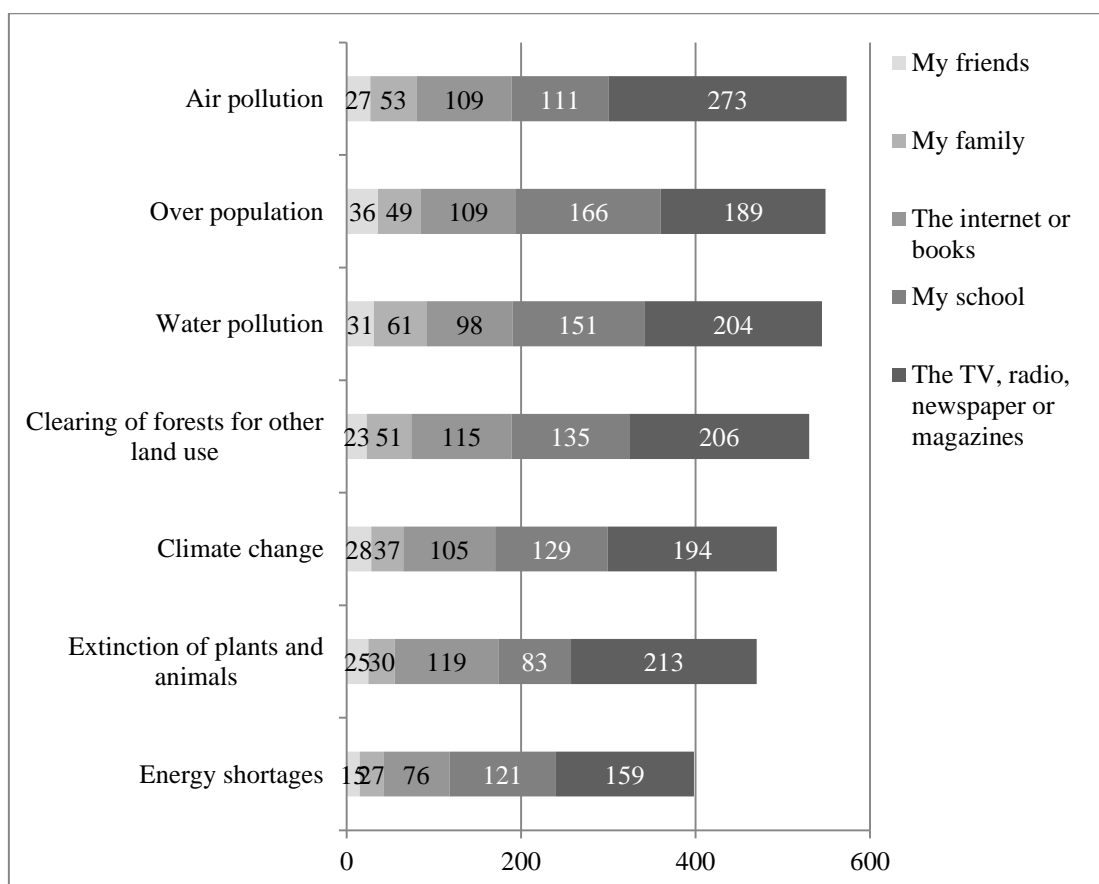


Figure 4.8 Main sources from which students reported learning about specific environmental issues.

Note: The numbers in the figure represent the frequency of the responses, as the students were allowed to tick as many as those sources which applied to them

Media was again highlighted as an important source of information in the students' focus group interviews. When students were asked, "Through your life, how have you learnt about the natural environment?" one in four of the respondents reported that the main source of environmental learning for them was "media". TV was the most popular response among those who highlighted media as the main source. After media, the second most prevalent source of environmental learning reported by respondents was their "parents", which differs from the questionnaire data, in which students indicated "schools" as a second important source of environmental information – although this may reflect the different wording in the question, which focused on learning about the natural environment in the focus group interviews, and learning about environmental issues in the questionnaire. Importantly for this study, only one-eighth of the students highlighted school as a source of learning about the natural environment.

Furthermore, students in the interviews were asked, "How adequate do you think these sources are for you?" All the students stated that these sources were not

adequate, as the following examples of students' views suggest: "Not adequate at all because these sources just inform simple things and cannot transfer much information" (Focus Group 2); "Not adequate because TV just says about air pollution, not anything else" (Focus Group 1); and "If these sources were adequate, we would not face a number of environmental problems" (Focus Group 6).

Overall, data from the questionnaires and focus group interviews appear to some extent to supported the students' views in Section 4.3.4 where they indicated that school, in general, had little impact on their environmental learning.

4.5.2 Students' reported awareness of seven environmental issues

As indicated earlier, students were asked "how informed", "how optimistic about the future" and "how concerned" they were about seven selected environmental issues. The following subsections explore students' awareness related to each of these environmental problems.

4.5.2.1 Air pollution

To gauge students' perceived awareness about air pollution, they were asked how informed they felt they were and their perception of their ability to explain the issue. Air pollution was widely recognised as an environmental issue by the respondents. The majority of the students (79%) reported that they were either familiar with air pollution as an issue or they knew enough about it to be able to explain the general issue (see Figure 4.9). However, one-fifth of the respondents reported that they were just aware of the issue. This generally high level of awareness might be because air pollution is often seen as the major environmental issue in Tehran and it is tangible for the students.

Likewise, most of the participants (93%) reported in the questionnaire that air pollution is a serious concern for them personally as well as for other people (see Figure 4.9). In the focus group interviews, when students were asked "Do you have concerns about the environment?" eight out of 30 students (27%) identified air pollution as their main concern in Iran, particularly in Tehran. Regarding this, one male student said, "Air pollution is my serious concern because it causes many health issues such as cancer. People in Tehran are suffering from its side effects" (Focus Group 6).

When the participants were asked “Do you think problems associated with the air pollution will improve or get worse over the next 20 years?” only 15% of the students were optimistic that air quality will improve over the next two decades. More than two thirds (72%) of the students were not hopeful at all, reporting “it will get worse” (see Figure 4.9).

To triangulate the quantitative data, students were asked in the focus group interviews about their main hopes and fears for the future of the natural environment. Comparatively similar findings to the questionnaire were found in the interviews, where 12 students out of 30 revealed their main fears were regarding air pollution. One of them showed his feeling by saying: “I fear that we are not going to have clean air anymore” (Focus Group 4).

The majority of the students in the focus group interviews (26/30) expressed their fears about the future of the environment. After air pollution, the next two most common fears of the students related to “depletion of natural resources” and “water shortages”. Although 11 students out of 30 (37%) emphasized that “they don’t have any hope for the future of the environment”, there were some students (4/30, 13%) who had some hopes. For example, one male student said, “I hope science and technology development will help us to deal with environmental issue in the future” (Focus Group 4). However, on the other hand it should be noted that science and technology can cause the environmental issues. As indicated earlier (see Section 4.4.6), it appears that many students in this study felt that there is a strong link between the environment and science and technology in a way that science and technology could be a solution to address environmental issues. One female student said “I hope the culture of environmental protection will be set” (Focus Group 2). This comment suggests the importance of social and collective environmental behaviour change among people.

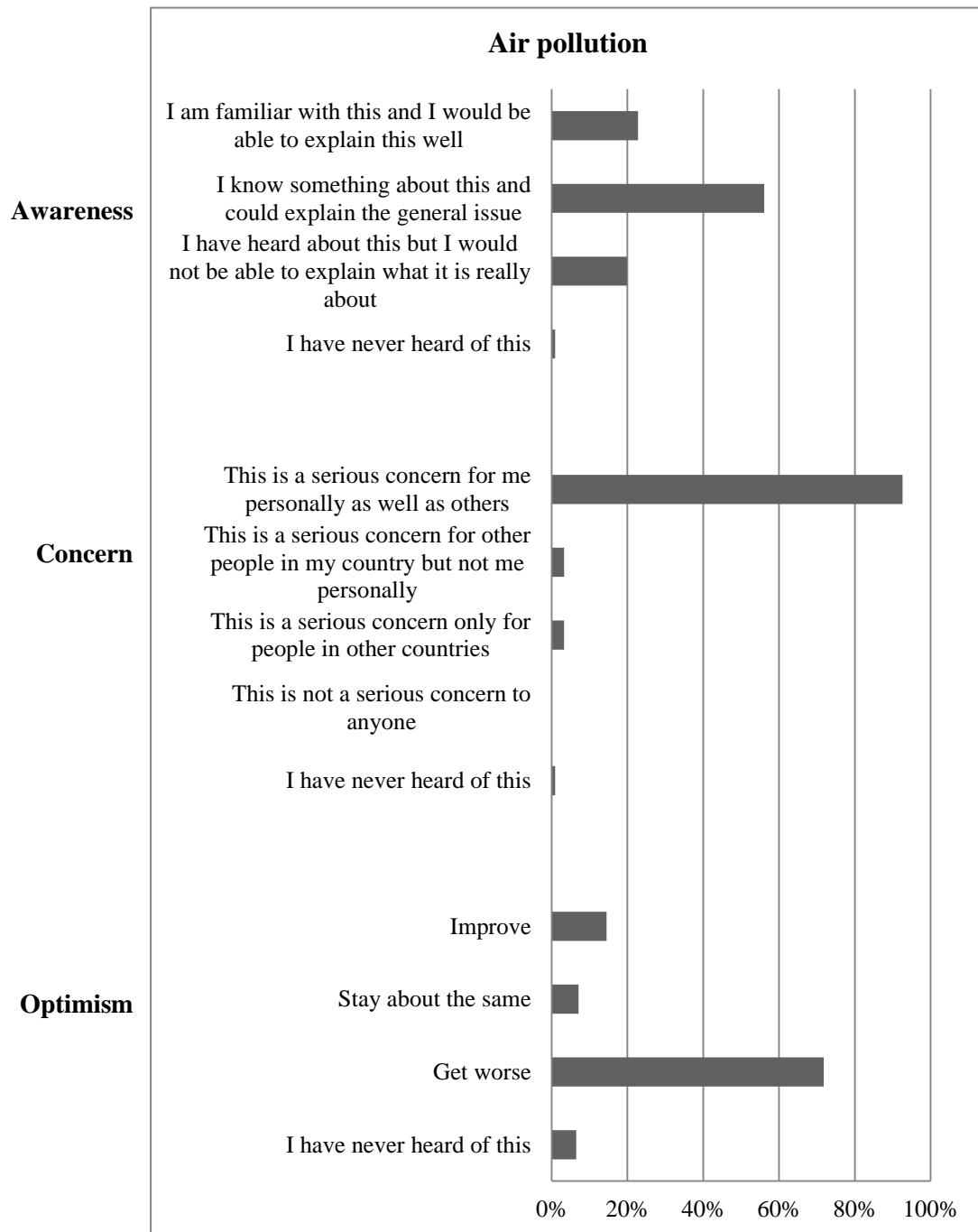


Figure 4.9 Students' awareness, concern, and optimism about air pollution (n=337).

Regarding the seriousness of the environmental issues, the focus group students were asked "How serious do you think these concerns are?" and "How does this make you feel?" All the respondents felt that the environmental issues were serious. As one said "They are so serious, because they are related to our lives" (Focus Group 2). Students also were asked "What feelings do you have when you think of environmental problems?" Their main feeling about the environmental

issues was “fear”, which was revealed by 15 responses (out of 37 total responses about feelings). Feelings like “regret” and “hopelessness” were expressed by 10 and four respondents respectively. These types of negative feelings reported by students may impact their participation to make a difference for the future of the environment. These kinds of negative feelings about environmental issues have also been reported before by other EE researchers (see e.g., Hicks & Holden, 2007; Strife, 2012) (see also Section 2.3.3.1).

4.5.2.2 Energy shortages

More than half the students (53%) reported that they felt they were informed about the energy shortages issue. However, more than one third (122/330, 36%) reported that they had heard about the issue but they would not be able to explain what it is really about, and 11% of the respondents revealed that they never heard of the issue (see Figure 4.10). In other words, they reported lower awareness of this issue compared to air pollution.

Energy shortages were, however, a serious concern for nearly two thirds of students (64%), as is shown in Figure 4.10. Furthermore, almost 20% of the students demonstrated that this is a serious concern for other people in Iran but not themselves personally, which may reflect that they had not been personally affected by energy shortages. Perhaps the lower concern about this issue overall is also influenced by the (current) abundance of fossil fuel energy resources in Iran.

Compared to the air pollution issue, a slightly higher proportion (19%) of students were hopeful that the energy shortage problem will improve over the next 20 years. Nevertheless, 53% reported that they thought problems associated with energy supplies will get worse and less than 10% revealed it will stay about the same (see Figure 4.10). Overall, like the air pollution issue, students were not optimistic about the future of this issue. There were also some inconsistent responses regarding the category of ‘never heard of this’, which ranged between 7 and 16% for the three questions, perhaps reflecting lack of certainty on this issue.

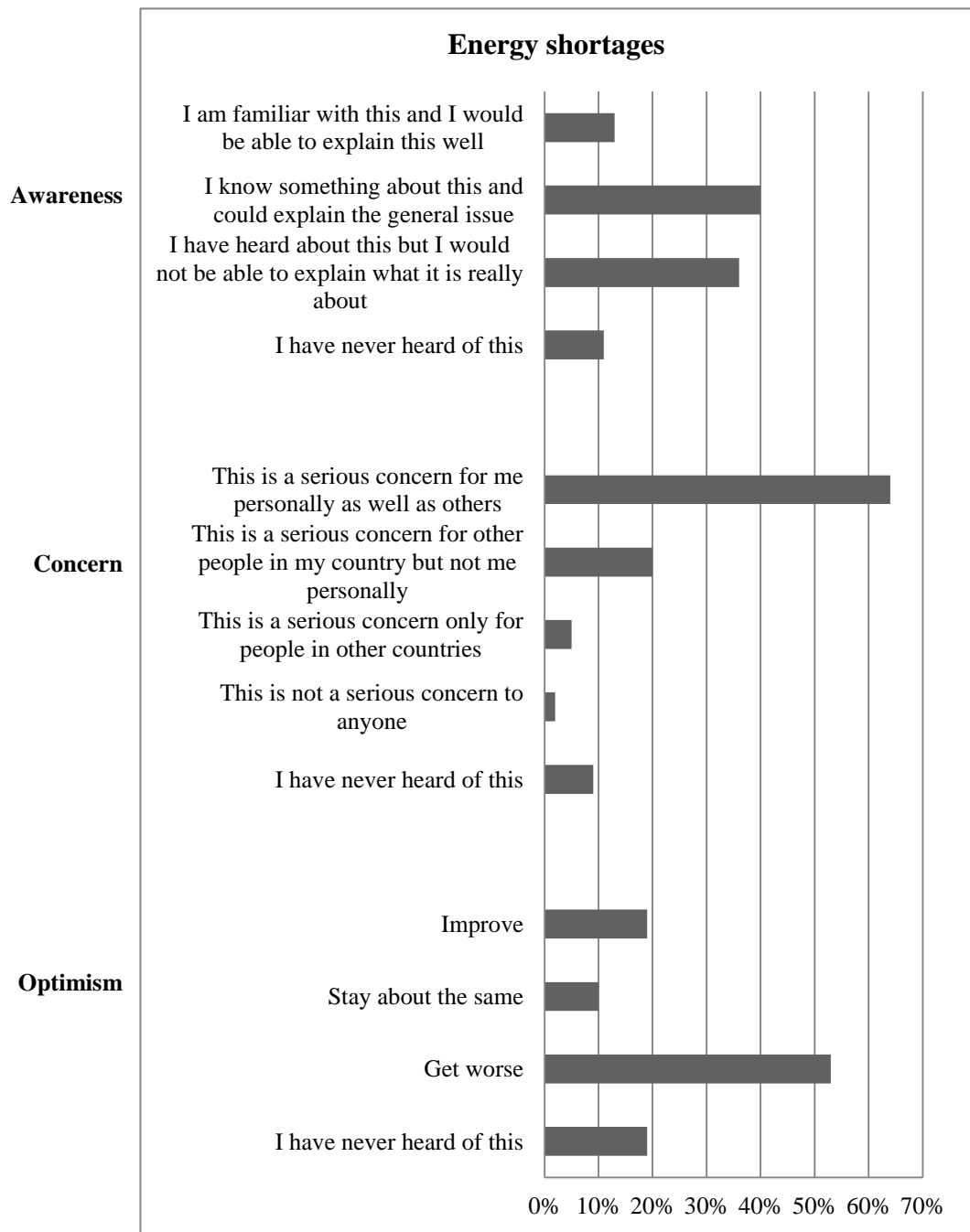


Figure 4.10 Students' awareness, concern, and optimism about energy shortages (n=337).

4.5.2.3 Extinction of plants and animals

More than 60% of the students claimed either to be familiar or know something about the extinction of plants and animals. However 34% reported that they had less understanding of the issue, and 5% expressed that they never heard of this environmental issue (see Figure 4.11).

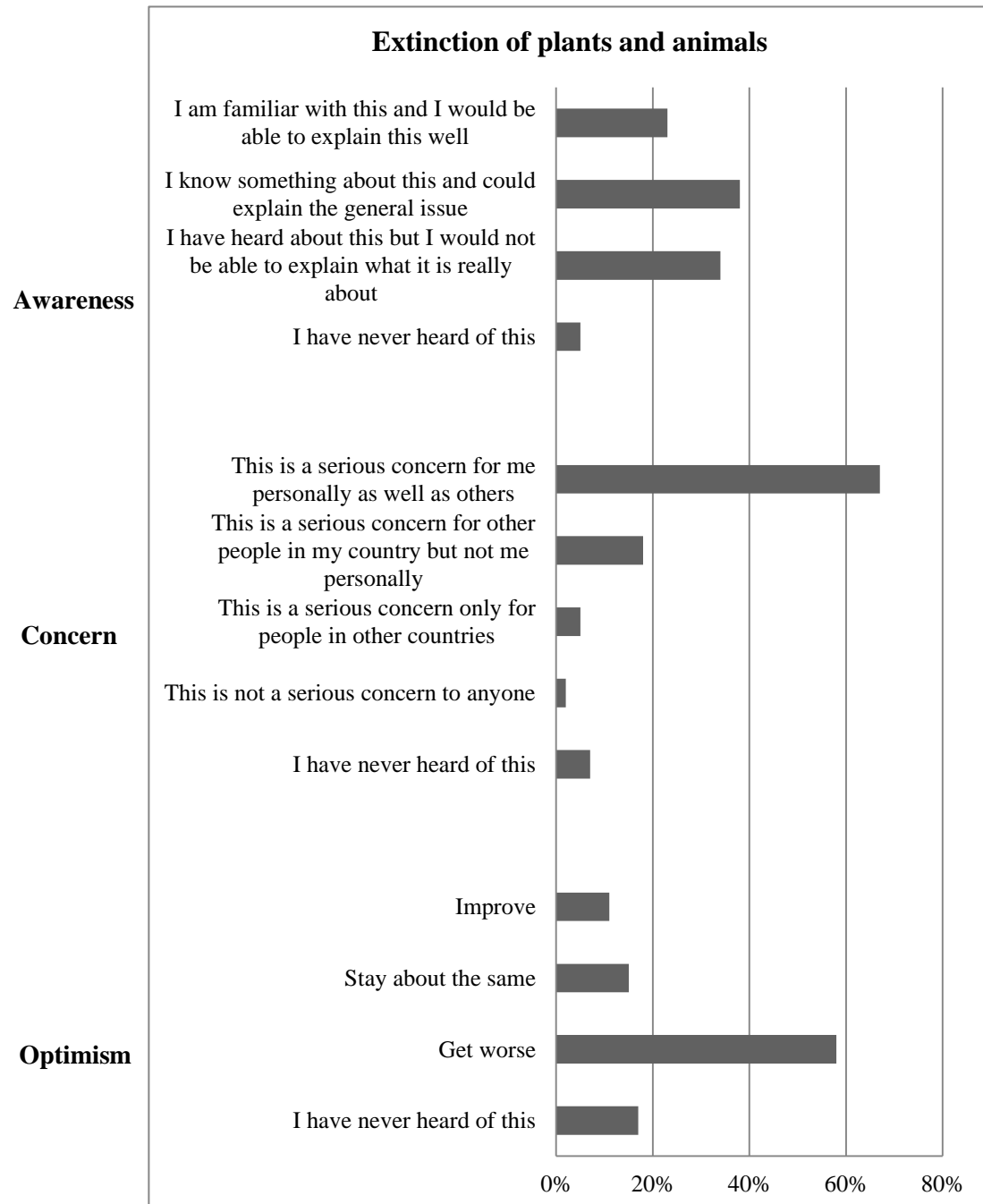


Figure 4.11 Students' awareness, concern, and optimism about extinction of plants and animals (n=337).

Similar to the previous issue, a slightly higher proportion of students reported concern than reported awareness and understanding, with 67% of participants expressing that extinction of species is a serious concern for them and others. A

further 18% understood it as a serious concern for other people in Iran, rather than themselves (see Figure 4.11), which may reflect the lack of personal connection to endangered species in the wild for students who live in the big city of Tehran.

Only 11% of the students were optimistic that extinction of species will improve over the next two decades, although the proportions of responses to “get worse” (58%) and “stay about the same” (15%) were considerable (see Figure 4.11). There were also some inconsistent responses regarding the category of “never heard of this”, which ranged between 5 and 12% for the three questions, again perhaps reflecting a lack of certainty about this issue.

4.5.2.4 Clearing of forests for other land use

As the findings show (see Figure 4.12), the majority of students (78%) felt they were aware of clearing of forests for other land use.

A similar proportion of the respondents (74%) expressed that clearing of forests for other land use is a serious concern for them and others. A smaller proportion (14%) understood it as a serious concern just for other people in Iran (see Figure 4.12), which again may reflect a lack of personal connection with the impact of this issue on the daily lives for these city students.

Relatively similar findings to those of air pollution were found regarding students not being optimistic about the future of deforestation and its associated problems. 233 students (69%) reported that they thought that the deforestation issue will get worse over the next 20 years. A low 9% of the students were optimistic about improvements on this issue (see Figure 4.12).

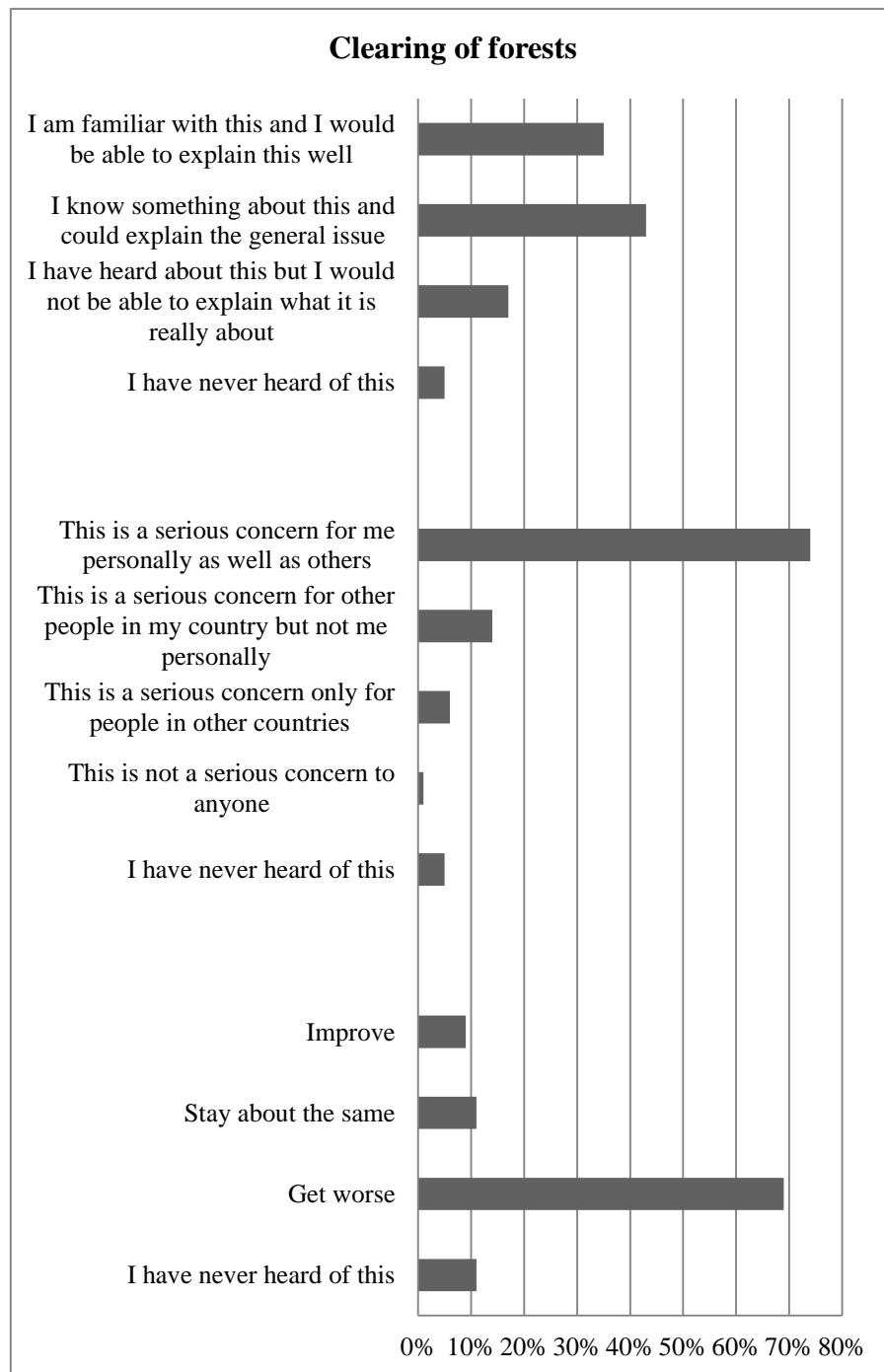


Figure 4.12 Students' awareness, concern, and optimism about clearing of forests (n=337).

4.5.2.5 Water pollution

Compared to air pollution (79%) and clearing of forests (78%), a slightly lower proportion of students (72%) felt they had at least some awareness and understanding about water pollution and could explain the general issue. However, 82 students (24%) indicated that they had little awareness of the issue (see Figure 4.13). Among all the seven environmental issues presented to the students, students' awareness about water pollution ranked third highest (after air pollution and clearing of forests).

Apart from air pollution, water pollution was the issue that students reported being most concerned about. Of 337 students, 292 students (87%) confirmed that "this is a serious concern for me personally as well as others" (see Figure 4.13).

Unlike other issues, where reported concern for the future was reasonably closely matched with present concern, in this issue only just over half of the respondents (54%) were not optimistic about the future of water pollution over the next two decades by confirming it will get worse, compared to the 87% who expressed concern for the present. In fact, almost 20% were optimistic about the improvements in the future (see Figure 4.13), and it is unclear where this optimism may come from.

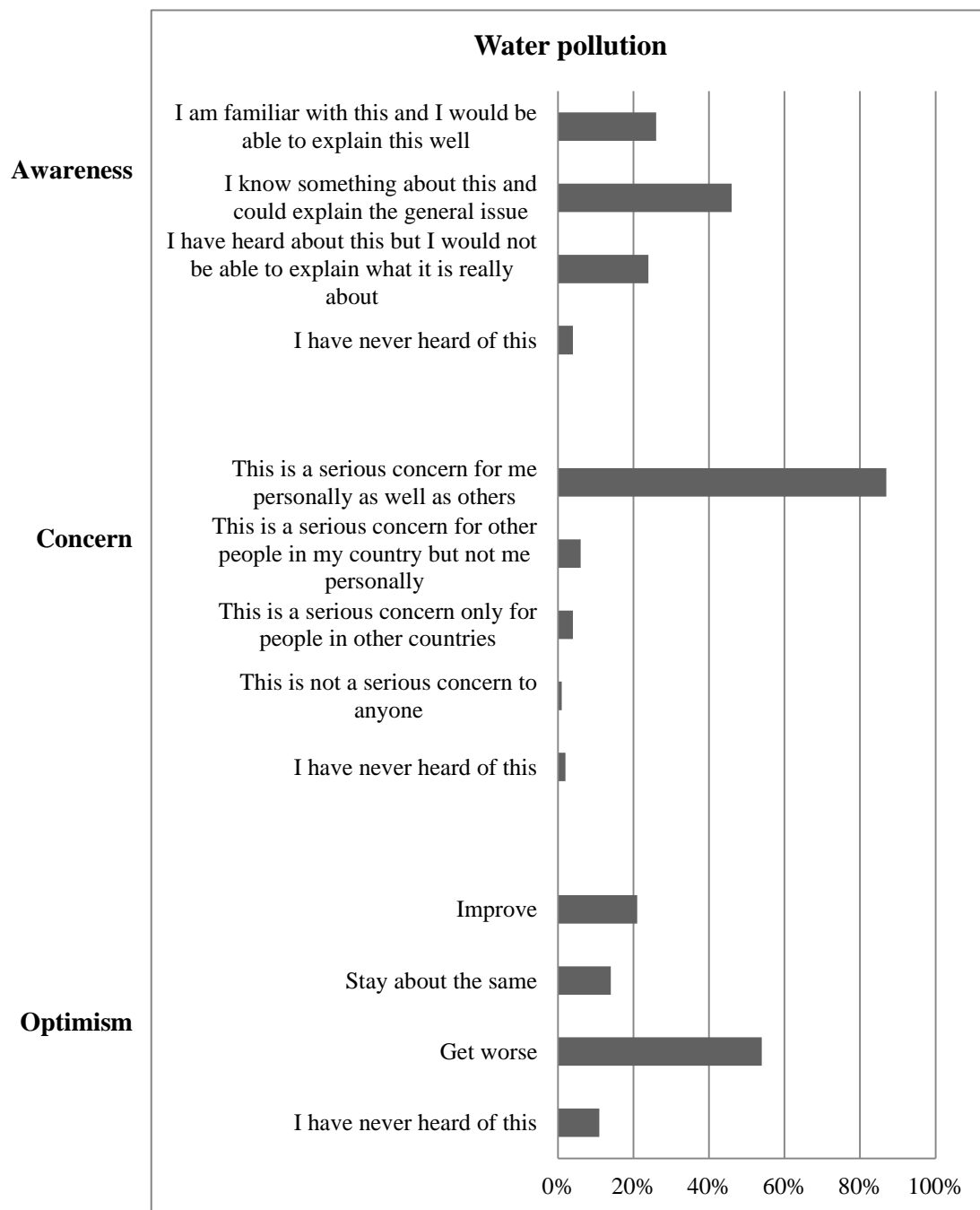


Figure 4.13 Students' awareness, concern, and optimism about water pollution (n=337).

4.5.2.6 Overpopulation

Out of the seven selected environmental issues, overpopulation is the issue that the students reported to be most familiar with. A proportion of 83% of the students revealed that either they were familiar with or knew something about the issue (see Figure 4.14). Among these students, the proportion of the students who felt that they were familiar with this issue and they would be able to explain it well was also the highest for any of the seven issues.

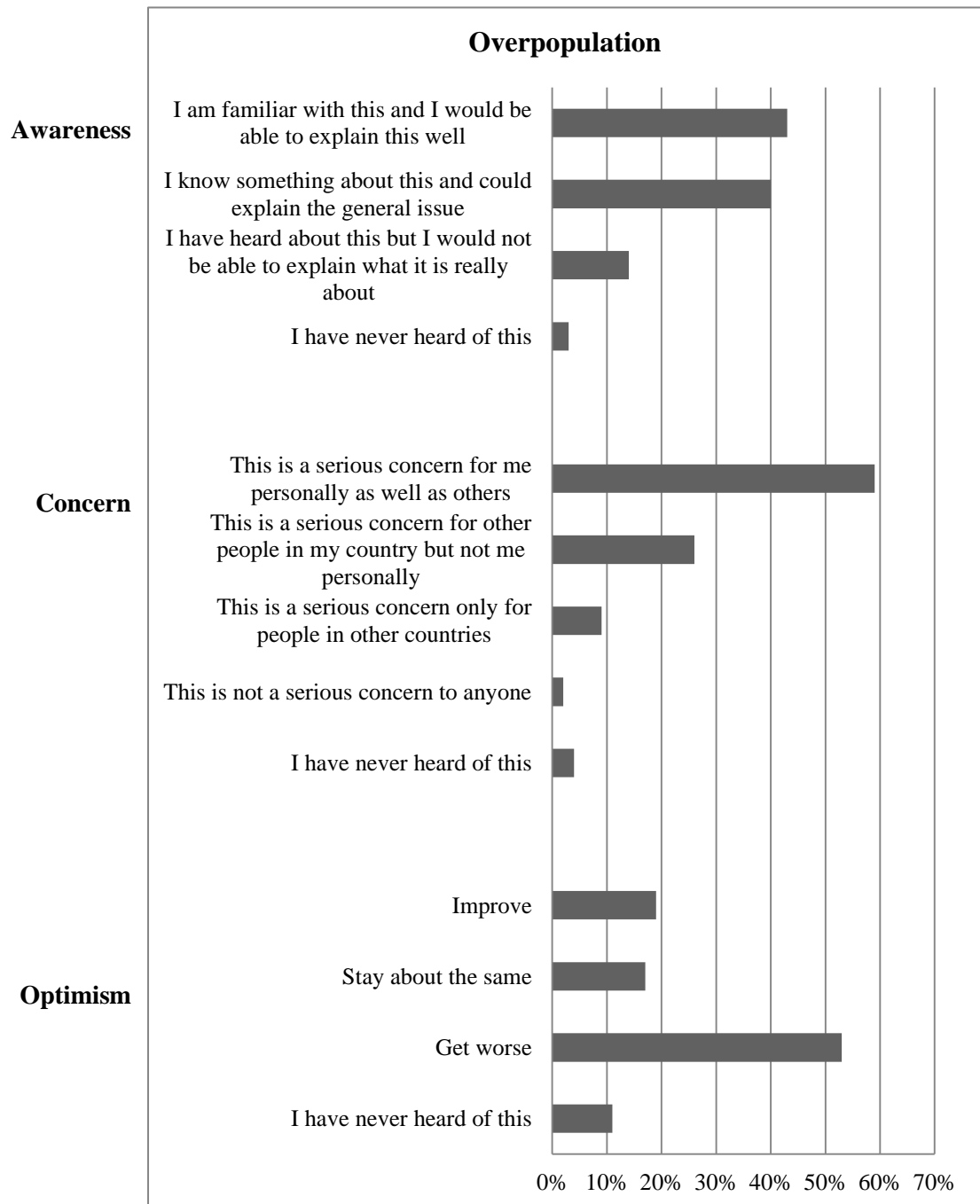


Figure 4.14 Students' awareness, concern, and optimism about overpopulation (n=337).

Interestingly, as the findings show, it seems out of the seven selected environmental issues, overpopulation is the one that the students were least likely to be concerned about. Only 59% of the students reported that “this is a serious concern for me personally as well as others”. More than one quarter of the participants (26%) felt that this was only a serious concern for other people in Iran (see Figure 4.14). A reason for this might be the influence of the Iranian government in encouraging people to have more children in recent years, therefore, many of the students may not consider this problem as a serious concern. Another possibility is that as the students are yet to be involved in child-rearing themselves, they may see the issue as outside their control. However, awareness of overpopulation may differ among students in lower socio-economic areas, where over-crowding may be more of an immediate problem.

The students’ views about future changes in overpopulation were similar to those for the water pollution issue. Approximately 53% of the students were not optimistic about the future of this issue. However, like with water pollution, about 20% of the students felt that the issue will improve over the next 20 years and 17% reported it will stay about the same (see Figure 4.14).

4.5.2.7 Climate change

Out of the seven selected environmental issues, climate change was the one that the students reported to be least familiar with. Less than 40% of the students indicated that they knew something about this and could explain the general issue, and only 18% reported that they were familiar enough with the issue to be able to explain it well. Almost half of students did not feel confident in their understanding, or claimed to know nothing about it (see Figure 4.15).

Despite this expressed lack of awareness and understanding amongst the students, 69% of them felt that this issue was a serious concern for them (see Figure 4.15).

About half of the students felt that climate change will get worse over the next two decades (see Figure 4.15). Only 8% of the students were optimistic about the future of climate change (Figure 4.15). One quarter of the students indicated that they had never heard of climate change, which is more than double the number of students who reported unfamiliarity with this issue when asked about their concerns (see Figure 4.15 above). This difference might be because students who could not guess about the future of climate change may have selected this option.

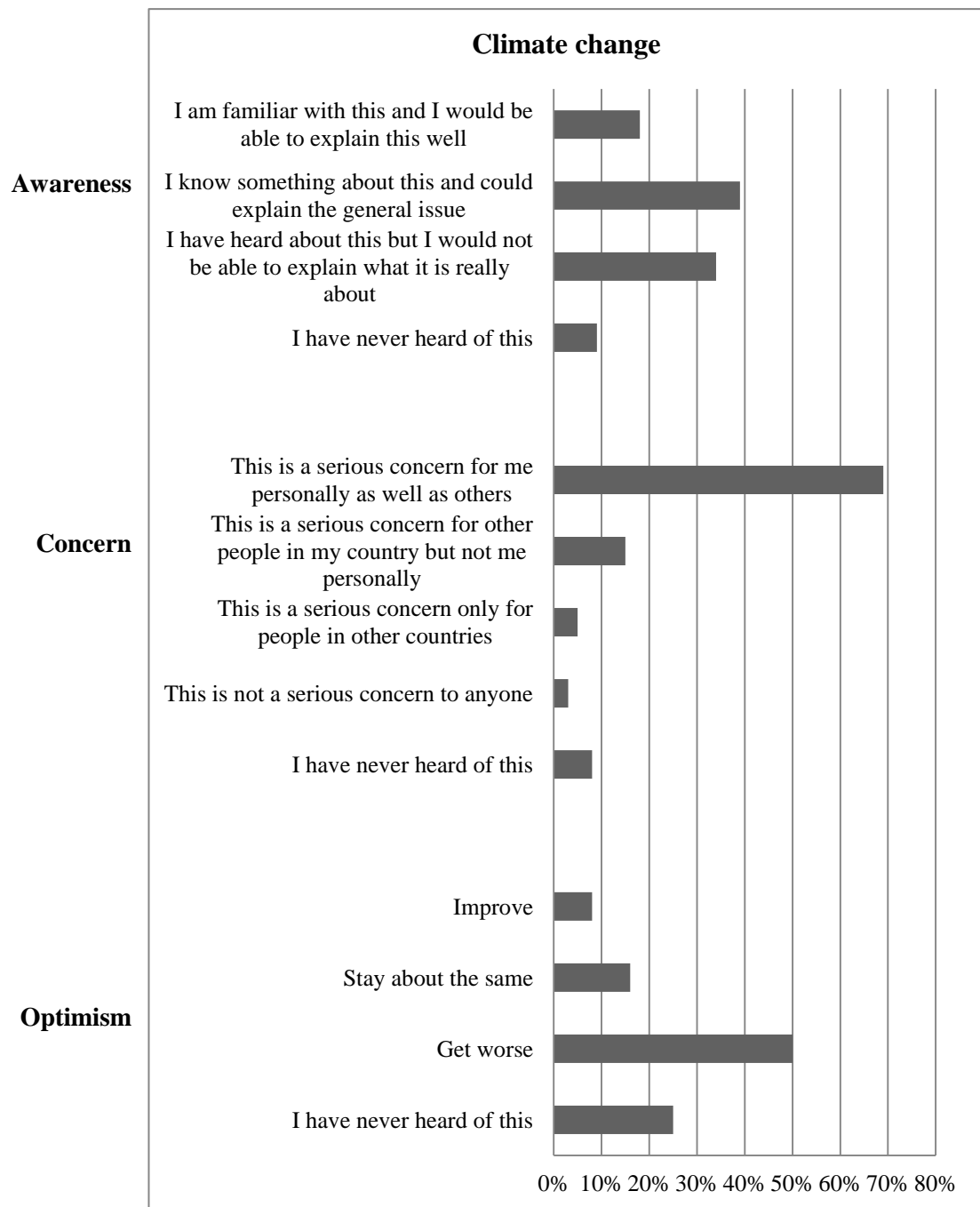


Figure 4.15 Students' awareness, concern, and optimism about climate change (n=337).

4.5.2.8 Summary of data and comparison with PISA 2006 findings

Overall, findings indicated that the majority of the students felt they were aware of and knew something about the seven selected environmental issues. Issues that students felt most aware of were overpopulation (83%), air pollution (79%), and clearing of forests (78%). They felt less aware of energy shortages. The majority of the students reported that they are most concerned about air pollution (93%), followed by water pollution (87%) and clearing of forests for other land use (74%). All students in the focus groups revealed that their concerns about these environmental issues are serious, and the main feeling that was expressed was “fear”. Most of the students were also not optimistic about improvements in any of these issues occurring over the next two decades, being least optimistic about improvements in air pollution (72%), followed by clearing of forests for other land use (69%), and extinction of species (58%). Only a minority of students (between 8 and 21% depending on the issue) believed that problems associated with these environmental issues will improve in the next 20 years.

A comparison of the Iranian secondary school students’ responses with the PISA 2006 data among more than 400,000 15-year-olds students in 57 countries, indicates that similar to the PISA data, the vast majority of the Iranian students reported that they were familiar with or at least aware of environmental issues. The comparison also indicated that Iranian students, like other students around the world, had a strong sense of responsibility by being concerned about environmental issues. An example was that 93% of the Iranian students reported their concern towards air pollution and this compared closely to an average 92% among students in the PISA study. Also, similar to the current study (between 8 and 21%), only a minority of the students (between 13 and 21%) in the PISA research reported being optimistic about the improvements of environmental issues in the next 20 years. However, the Iranian students reported to be more concerned about local environmental problems than the global ones.

4.5.3 Students’ actual environmental awareness about general and specific environmental issues

Further analysis of the environmental awareness of the students was done by examining their responses to additional local and global environmental awareness questions in the questionnaire. The subsections that follow present students’ awareness regarding these key questions in the questionnaire.

4.5.3.1 Main reason the Persian leopard is endangered

Students were asked what they thought was the main reason why the Persian leopard is endangered in a multi-choice question (see Appendix A, Section C question 5). Two-thirds (67%, see Table 4.9) of the students chose the option that “their habitats are being destroyed by humans”, which is the reason commonly given by leopard researchers (Farhadinia, Jafarzadeh, & Sharbafiand, 2011). However, this high level of awareness does not appear to be connected with attitudes towards environmental behaviour. For instance, as indicated earlier, when it came to sacrificing something to prevent the extinction of animals, the students revealed less pro-environmental attitudes (nearly 40% were unsure or disagreed about that, see section 4.4.2). Additionally, 23% of the respondents reported that they did not know the main reason for the leopard being endangered. Eight of the 337 students had missed this item in the survey.

Table 4.9 *The Frequency and Percentage of Students’ Responses Regarding the Main Reason that the Persian Leopard is Endangered (n=329).*

	Frequency	%
Their habitats are being destroyed by humans	219	67
Competition from an introduced species	15	4
Climate change is affecting them	21	6
Don’t know	74	23
Total	329	100

4.5.3.2 Main contribution to the greenhouse gas effect

Students were asked “What mainly contributes to the greenhouse effect”? Of 323 students who responded, 232 students (72%, see Table 4.10) replied that the carbon emissions from cars, homes and factories are the main contributors to the greenhouse gas effect compared to the other response options, and this is in agreement with current scientific thinking (Peng, Lu, & Yang, 2013; Smith et al., 2010). However, the remaining 28% of the respondents chose options that either contribute little to the greenhouse effect or not at all. A significant proportion of students (21%) conflated the hole in the ozone layer with the greenhouse effect, which is a common misconception. Fourteen of the 337 students had missed this item in the questionnaire.

Table 4.10 *The Frequency and Percentage of Students' Responses Regarding Contribution to the Greenhouse Effect (n=323).*

	Frequency	%
An increase in oxygen in the atmosphere	17	5
Sunlight radiating more strongly through a hole in the upper ozone layer	68	21
Carbon emissions from cars, homes and factories	232	72
Increased activity from volcanoes worldwide	6	2
Total	323	100

4.5.3.3 Global warming

Students were given four statements reflecting views related to global warming. Just under 70% thought that “humans could reduce global warming, but people aren't willing to change their behaviour to reduce it”. A further 13% were not optimistic at all as they indicated that “humans can't reduce global warming, even if it is happening”, and a small percentage (4%) denied that global warming happening (Table 4.11). Only 14% were more positive, agreeing with the idea that “humans could reduce global warming, and people are making changes to reduce it”. Four of the 337 students had missed this item in the survey. These data support the findings of an agency item (see Section 4.4.7) and one biodiversity item (see Section 4.4.2) which indicated some uncertainty amongst the students about sacrificing some things for the environment. In general, it appears that in all three items students may have seen themselves as not willing to make personal sacrifices or change their attitudes to help for resolution of environmental issues.

Table 4.11 *The Frequency and Percentage of Students' Responses Regarding to Global Warming Issue (n=333).*

	Frequency	%
Global warming isn't happening	13	4
Humans can't reduce global warming, even if it is happening	44	13
Humans could reduce global warming, but people aren't willing to change their behaviour to reduce it	230	69
Humans could reduce global warming, and people are making changes to reduce it	46	14
Total	333	100

4.5.3.4 Main source of water pollution in Iran

When asked about the main source of water pollution in Iran, more than two thirds of the students (71%, see Table 4.12) believed that the main source is industrial

effluents, which is in agreement with reports over the last several decades (Charkhabi, Sakizadeh, & Rafiee, 2005; Diagonmanolin, Farhang, Ghazi-Khansari, & Jafarzadeh, 2004). Another 9% of the students believed that domestic sewage is the main source of water pollution in Iran. About one fifth (19%) reported that they didn't know the answer. 12 of the 337 students had missed this item in the survey. The lack of understanding of the source of water pollution among one fifth of the students is important to consider.

Table 4.12 *The Frequency and Percentage of Students' Responses Regarding the Main Source of Water Pollution in Iran (n=325).*

	Frequency	%
Domestic sewage	30	9
Industrial effluents	229	71
Agricultural run off	4	1
I don't know	62	19
Total	325	100

4.5.3.5 Food webs

In the questionnaire, students were given a question that included a diagram of a food web that they needed to complete (see Figure 4.16). Students were asked to place the names of the animals and plants that they were given on the diagram. To gauge students' understanding of this food web, those who correctly placed all the five options (Primary producer = grass, Primary consumer = grasshopper, Secondary consumer = birds, Tertiary consumer = Persian leopard, and Decomposers = soil organisms) were considered as "very good understanding". Those who gave four correct answers were considered to have "some understanding". The students who supplied three correct answers were considered to have "poor understanding" and finally, the students who gave just one correct answer or did not answer at all were considered to have "very poor understanding" about the concept of food webs. Eight of the 337 students had missed this item in the survey.

The majority of the students (66%) showed a very good understanding of the path of energy from one living organism to another by placing correctly the names of the animals and plants that were given in the question. However, 26% of the respondents had very poor understanding about this food web, and a further 4% had poor understanding (see Table 4.13).

Options: Persian leopard, grass, grasshopper, birds, soil organisms

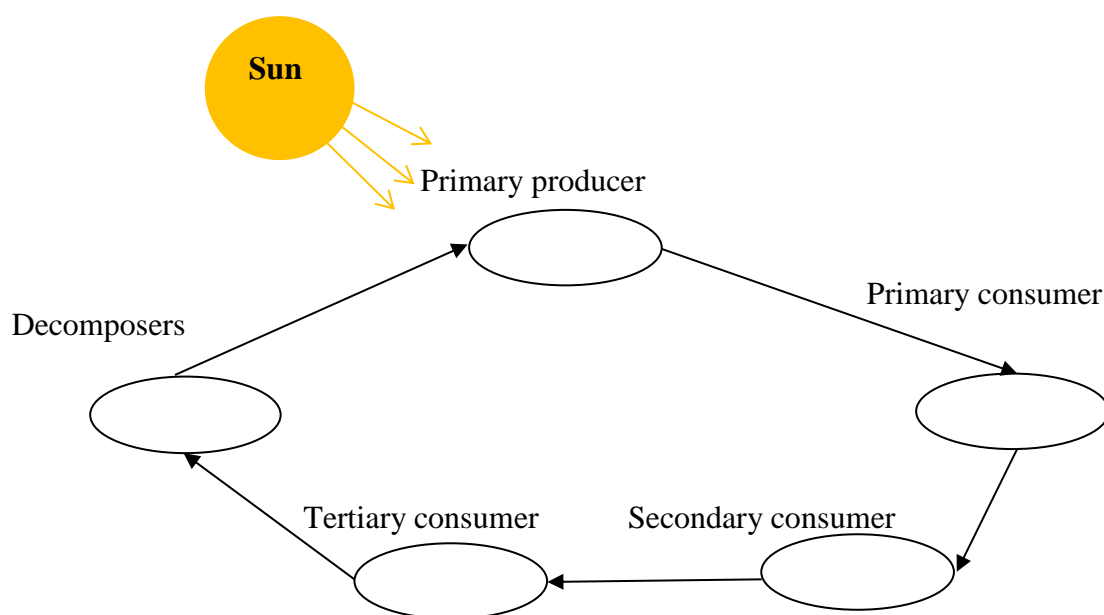


Figure 4.16 The food web which was given to the students.

Table 4.13 *The Frequency and Percentage of Students' Responses for the Food Chain Item (n=329).*

	Frequency	%
Very poor understanding	85	26
Poor understanding	12	3.5
Some understanding	15	4.5
Very good understanding	217	66
Total	329	100

4.5.3.6 Natural resources

Students were given four statements reflecting views related to natural resources. The majority of the students (78%) selected the idea that “many resources on earth are finite and we will run out of them”. Of those students who were more optimistic about availability of resources, 37 (11%) believed that the Earth has plenty of resources for all the people that live here now, 7% indicated that we can recycle everything so we will never run out of resources, and 4% of the students thought we can always get resources from other planets if we run out on Earth (see Table 4.14). Seven of the 337 students had missed this item in the questionnaire. As the results indicate, most of the students were concerned about the availability of natural resources in the future. As discussed in Section 4.5.2.2,

for 64% of them energy shortages was a serious concern. They also thought that recycling alone will not help to ensure the availability of resources in the future.

Table 4.14 *The Frequency and Percentage of Students' Responses about Natural Resources (n=330).*

	Frequency	%
The Earth has plenty of resources for all the people that live here now	37	11
We can always get resources from other planets if we run out on Earth	14	4
Many resources on earth are finite and we will run out of them	258	78
We can recycle everything so we will never run out of resources	21	7
Total	330	100

4.5.3.7 Impacts of generating electricity using different energy sources

The different methods of generating electricity can have variable impacts on the environment, depending on whether they use renewable sources (such as solar energy, wind, etc.), or fossil fuels (such as oil or coal), which contribute to air pollution and global warming. It should be noted that according to a recent update, a total of 224 billion kilowatt hours of electricity was generated in Iran in 2013, 92% of which was produced by fossil-fuel sources [natural gas (67%), oil (25%)] (Business Monitor International (BMI), 2015). Hydropower (5%), nuclear (3%), coal (less than 1%) and non-hydro renewables such as wind make up less than 1% used to generate electricity in Iran (BMI Research, 2015). Students' knowledge about environmental impacts of generating electricity using the different sources was investigated in the questionnaire. The students had three choices for each energy source (very little impact, some impact, and great impact). Table 4.15 presents the data.

Relatively similar results were obtained for the two non-renewable sources (oil and coal), with 54% of the respondents indicating that they believed that oil has great impact on the environment, and 44% indicating the same for coal. The proportions of the students who thought these fossil fuels have some impact on the environment were 35% and 42% for oil and coal respectively. Only a small proportion of students (11% for oil and 14% for coal) believed that these sources have very little impact on the environment (see Table 4.15).

Compared to these non-renewable sources, students indicated that they believed that renewable energy sources had less impact on the environment. For solar

energy, 68% believed it had very little impact on the environment (Table 4.15), and 67% of the students thought the same about wind energy. On average, just 16% of all the students believed that solar energy and wind have either some impact or great impact on the environment.

The impact of generating electricity using nuclear energy was the last item. The responses were similar to those found for oil and coal, indicating that over 80% of students thought nuclear energy had at least some impact on the environment (Table 4.15).

In general, these findings indicate that the students had some awareness about the renewable and non-renewable energy sources, however, for them to be able to contribute to informed decision-making about electricity generation would require greater awareness of these sources at a very basic level at least.

Table 4.15 *The Percentage of Students' Responses for the Impact of Generating Electricity Using Four Energy Sources on the Environment (n=335).*

	Oil	Coal	Solar energy	Wind	Nuclear energy
	%	%	%	%	%
Very little impact	11	14	68	67	19
Some impact	35	42	17	21	31
great impact	54	44	15	12	50

4.5.3.8 World population

In order to investigate students' understanding of the global environment, they were asked about the current world population. Approximately 63% of the students reported 7-8 billion, which was the correct answer for the year of data collection (World Bank, 2015). On the other hand, a third of the students over-estimated the world population, as 70 students (21%) selected 10-12 billion, and 43 (13%) selected 25-36 billion (see Table 4.16). As the world population is strongly linked with some major environmental issues such as availability of resources, climate change, and poverty, it is significant for students to have at least basic knowledge about population size.

Table 4.16 *The Frequency and Percentage of Students' Responses for World Population (n=337).*

	Frequency	%
1-2 billion	11	3
7-8 billion	213	63
10-12 billion	70	21
25-36 billion	43	13
Total	337	100.0

4.5.3.9 Main consequence of deforestation in Iran

With the purpose of investigating students' understanding of deforestation, they were asked "What is the main consequence of deforestation in Iran?" The question was multiple choice and four options were given, all of which are possible consequences of deforestation. More than half of the respondents (56%, see Table 4.17) chose the option of the "destruction of natural habitats", with approximately one fifth supporting soil degradation and erosion, and changes in climatic conditions. 16 of the 337 students did not complete this item in the questionnaire. Destruction of natural habitats is the most directly observable consequence of deforestation (Hajabbasi, Jalalian, & Karimzadeh, 1997), so it is perhaps not surprising that most students chose this option.

Table 4.17 *The Frequency and Percentage of Students' Responses for the Main Consequence of Deforestation in Iran (n=321).*

	Frequency	%
Soil degradation and erosion	56	17
Changes in climatic conditions	66	21
Destruction of natural habitats	178	56
Reduction in carbon dioxide (CO ₂) production	21	6
Total	321	100

4.5.3.10 Two main sources of air pollution

Finally, understanding about sources of air pollution was investigated. As reported earlier, air pollution was an issue that students were most aware of (see Sections 4.5.2.1). Students were asked to write down what they thought were the two main sources of air pollution in Tehran city. Since this question was open-ended, the responses were categorised in three different themes that emerged from the data: "cars", "factories" and "others". The majority of the students (91%, see Table 4.18) mentioned "cars" as one of the main sources of air pollution in Tehran. A

large group of students (75%) mentioned factories as the other source. A quarter of the students (24%) mentioned other sources, like sewage, diesel trucks, etc. Other responses which mentioned by small number of students seemed irrelevant. It is generally regarded in Tehran that most air pollution is caused by cars and factories (Bayat, Torkian, Najafi, Askariyeh, & Arhami, 2012), so these findings appear to reflect commonly held perceptions.

Table 4.18 *The Frequency and Percentage of Students' Responses for Two Main Sources of Air Pollution in Tehran (n=337).*

Sources	Frequency	%
Cars	274	91
Factories	227	75
Others	71	24

4.5.4 Section summary

This section presented findings related to the students' reported and actual environmental awareness. It started by exploring the main sources for learning about environmental issues. Data from the questionnaires and focus group interviews appear to suggest that students mainly learned about environmental problems through the media, followed by their schools, internet, family, and friends respectively. This data correlated with the attention on media for communication about environmental issues by the government, particularly by the Department of the Environment (see Section 1.3.1).

In general, students indicated that they were aware of air pollution as an environmental issue, were very concerned about it, and were not optimistic about the improvement of this issue over the next two decades. After air pollution, water pollution appeared to be the next most important issue of concern. Amongst the seven environmental issues, the highest proportion of hopefulness was given to improvements in water pollution. They showed least awareness about issues regarding energy shortages, which was perhaps not surprising because of the abundance of energy sources in Iran. Although, overpopulation appeared to have the highest awareness among the students, it had the lowest level of concern among all seven environmental issues. It is possible that this reflects their own social status. Although students indicated lack of awareness about climate change, they revealed high level of concern about this issue.

When students' actual environmental awareness about a range of specific and general issues was examined, a range was seen. The students were most aware of the two main sources of air pollution in Tehran, a total of 83% of them correctly identifying cars and factories. The lowest level of awareness appeared in the question regarding generating electricity using different sources, where on average only 53% of the students replied correctly. In order to get further insights into the way students reacted towards environmental issues, their perception of their environmental behaviour was investigated, and is presented in the following section.

4.6 Environmental behaviour of students

As mentioned in Chapter 2, the ultimate goal of EE in the context of environmental issues and improving the quality of all life can only be achieved when students are actively involved at all levels in working toward the resolution of environmental problems (UNESCO, 1978). In order to gain an understanding of students' environmental behaviour in this study, students were questioned about a range of possible environmental actions regarding different environmental aspects. This section reports on findings about students' self-reported behaviour (Section 4.6.1), followed findings related to their intention to act in environmentally friendly ways in the future (Section 4.6.2).

4.6.1 Students' self-reported behaviour

There are many actions that students can perform which directly or indirectly benefit the environment. In the questionnaire, the students were given a list of some environmentally-friendly actions they may do in their day-to-day lives. Three options were given to the students (never do it, sometimes do it and frequently do it) to find out whether and how often they did these actions. The data represent students' self-reported behaviour (see Figure 4.17). The students' responses are presented in order from the most commonly practised environmentally responsible behaviours to the least commonly practised.

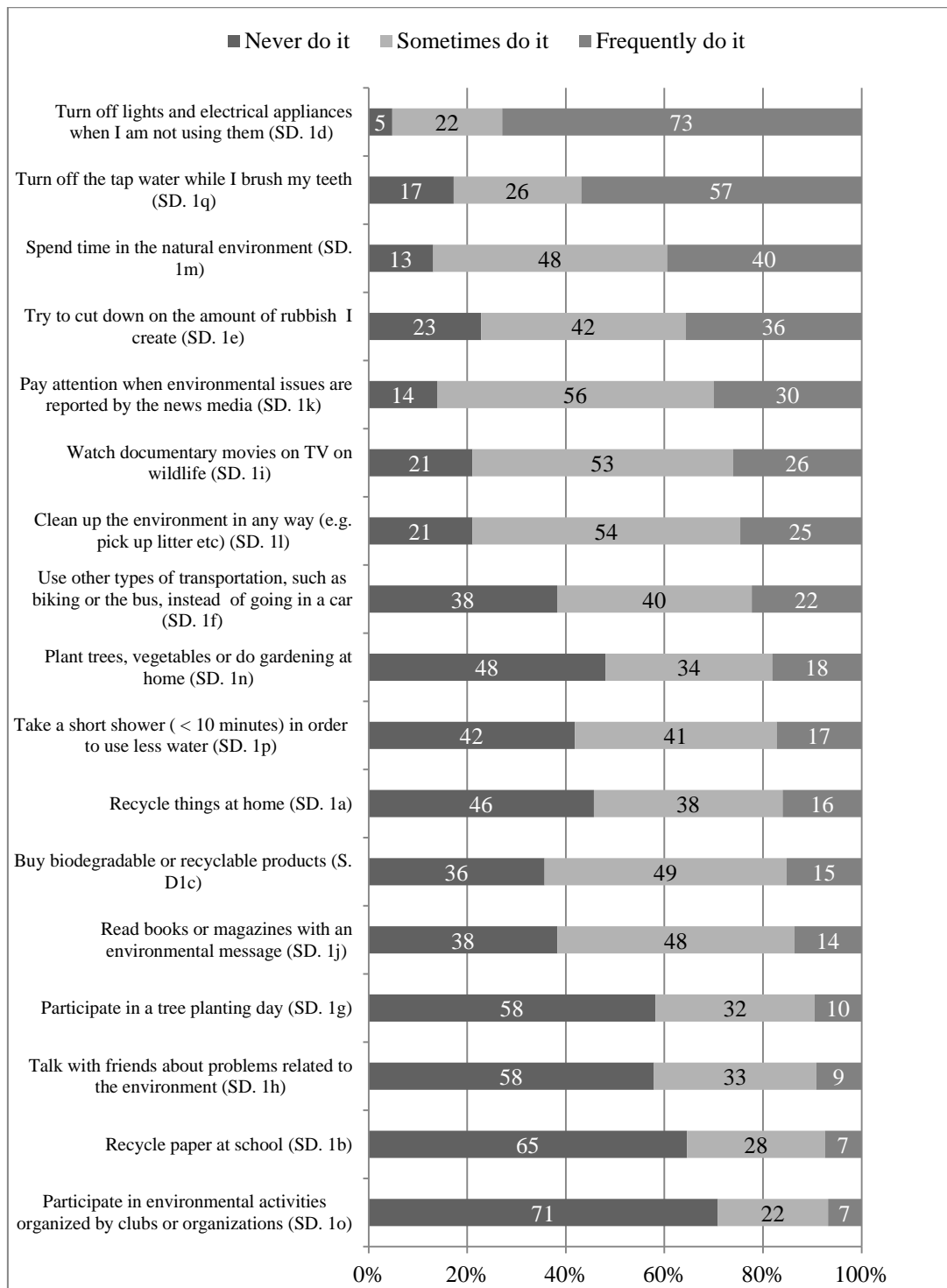


Figure 4.17 The frequency, as percentages, of students' self-reported environmental behaviours.

Note: Phases SD. 1(a-q) represent the question numbers in the questionnaire, n (SD. 1 b,c,d,o,q) = 336 whereas n for other items = 337.

The pro-environmental behaviour most reported by the students was turning off lights and electrical appliances when they were not using them, with 95% of students reporting doing this at least sometimes. The reason for this action is not clear from the data. It is possible that the students were encouraged by their parents or public media to do so, but it is not possible to know whether saving

electricity or money or both was the reason for doing so. Whatever the reason for the behaviour, it is easy to perform, so does not represent a necessarily strong commitment to the environment. On the other hand, students were less committed to saving energy in the context of transport – just less than a quarter of respondents (22%) reported frequently using other types of transportation, such as biking or the bus, instead of going in a car. However, 38% of the respondents indicated they never use other transportation and therefore, this proportion must have used only private cars for their transport. Likewise, 40% of the respondents reported they sometimes use other transportation (Figure 4.17). Some possible reasons for not often using public transport such as a bus might be either the inefficient public transportation system in Tehran or students' lack of concern about saving fossil fuels and reducing environmental pollution. Students therefore had a mix of actions toward energy saving at different scales.

In response to the water conservation item regarding turning off the tap water while brushing their teeth, 57% of the students indicated they frequently do this (see Figure 4.17). With more than a quarter (26%) of the students reporting they sometimes do it, the response was similar to turning off lights and this easy environmental behaviour was relatively common among the students. One possible reason that influenced many of the students to report they turn off the tap water when it's not in use might be the attention to saving freshwater given by public media in Iran (Osooli, Hosseini, Hosseini, & Abi, 2011), which could lead to students' awareness which leads to the environmental action. However, in another related item, many of the students (42%) reported they never engaged in taking a short shower (< 10 minutes) in order to use less water. On the other hand, 41% of the student revealed they sometimes do and 17% claimed they frequently do this action (see Figure 4.17). Interestingly, as the data indicates, there is a notable difference in students' behaviour in saving water while they brushed their teeth compared to when they took a shower. Although no data were collected to explain this difference, a possible reason could be because saving water while they brush their teeth is much easier to perform than taking a short shower. Therefore, in general, students did not appear to act to deliberately conserve water, as a long shower will use a lot more water than turning the tap off while teeth brushing will save.

In response to the item regarding learning about environmental problems, the majority of the students (56%) indicated that they sometimes pay attention when environmental issues are reported by the news media (including radio, TV, newspapers, and magazines), and this represented the highest incidence of “sometimes” reported behaviour. A further 30% of the respondents revealed they frequently pay attention to environmental news, while just 14% of the students confirmed they never do this (Figure 4.17). Relatively similar findings were found for the item regarding learning about nature, where 53% of the respondents reported they sometimes watch documentary movies on TV on wildlife. Pearson’s Correlation analysis indicates a statistically significant and weak positive relationship between these two behavioural items ($r = 0.265$, two-tailed p -level <0.01). This weak positive relationship shows that the students who paid attention to environmental issues which were reported by the news media were also likely to watch documentary movies on TV on wildlife.

In addition, the students were asked how often they read books or magazines with an environmental message. Almost half the students (48%) indicated they sometimes read books or magazines with environmental information and 14% claimed they frequently do this. However, 38% reported that they never do this (see Figure 4.17). Again, Pearson’s Correlation analysis indicated a statistically significant and moderate positive relationship between this item and attention to environmental news on media ($r = 0.363$, two-tailed p -level <0.01). This moderate positive relationship shows that the students who read books with an environmental message were more likely to pay attention when environmental issues were reported by the news media. An even stronger positive correlation was found between reading books or magazines and watching documentary movies on wildlife ($r = 0.455$, two-tailed p -level <0.01). This strong correlation is interesting because, for example, when a student reads something about extinction of a species in a book or magazine, it could become more tangible when he or she watches a similar issue on TV. Or when a student sees something about nature on the media, they may be more inclined to follow that up with reading. It should be noted that the connection between reading and watching may work in either direction. Overall, these students appeared interested in engaging with information about the natural world.

When it came to their physical connection with the natural environment, students indicated more pro-environmental behaviour, with 40% of them reported they frequently spend time in the natural environment (e.g., go camping/picnicking/hiking). Although the behaviours regarding connection to and learning about nature could be considered easy to perform, there still appears to be a lack of widespread participation in these behaviours.

Environmentally responsible behaviours of the students regarding cleaning up the environment and also dealing with their waste were investigated in two items (SD. 1l and SD. 1e). Similar percentages of students who reported that they watch documentary movies on TV on wildlife were found among the students who reported cleaning up the environment in some way. Whilst 54% of the respondents reported they sometimes clean up the environment, for example, picking up litter (see Figure 4.17), 25% indicated they frequently do this and 21% confirmed they never do it. Pearson's Correlation analysis indicated a statistically significant but negligible relationship between these two behavioural items ($r = 0.169$, two-tailed $p\text{-level} < 0.01$). In other words, the students who watched documentary movies did not necessarily try to clean up the environment, or the other way around.

In another item, more than one third of the respondents (36%) reported that they frequently try to cut down on the amount of rubbish they create (see Figure 4.17) and the proportion of the students who sometimes do this was even higher (42%). From the data in Figure 4.17, it is apparent that the responses were diverse, which does not show strong commitment of the students overall towards cleaning up the environment or trying to create less rubbish. In general, their environmentally responsible behaviour could be characterized as neutral, in the sense that environmentally friendly behaviour and environmentally unfriendly behaviour were nearly balanced.

Almost half of the students (46%) reported they never do recycling at their home whilst 38% of the students revealed they sometimes do this and only 16% showed they frequently do it (see Figure 4.17). Recycling behaviour was therefore an infrequent action among the students, which indicates that perhaps environmental awareness or attitudes towards waste problems had not had much impact on students' recycling behaviour. These data are in alignment with an item reported in Section 4.5.3.6, where students showed a low level of awareness and intention

towards recycling. Similarly to the recycling action, about one third of the respondents (36%) reported they never buy biodegradable or recyclable products. On the other hand, almost half of the respondents (49%) revealed they sometimes do this and 15% of the respondents confirmed they frequently do it (see Figure 4.17). Purchasing products which are recyclable or made from recycled materials was therefore not a common behaviour among the students. Possible reasons that many of the students never engaged in this type of environmental action might be because of the high price of such products or not having the culture of this type of environmental behaviour. Pearson's Correlation analysis indicates a statistically significant and weak positive relationship between recycling at home and buying recyclable products ($r = 0.266$, two-tailed $p\text{-level} < 0.01$). This weak positive relationship indicates that students who recycled at their home may also tend to buy recyclable products, or the other way around.

Recycling paper at school was also an uncommon environmental behaviour among the students, with the majority of students (65%) indicating they never recycle paper at their school, 28% that they sometimes tried to recycle paper, and only 25 students (7%) claimed they frequently do so (Figure 4.17). Therefore, recycling paper at school, which is an easy action to perform if the recycling facilities are provided, is not well practiced by the students. Comparing this result with responses to the item about recycling things at home shows that the students reported practicing recycling at their home more than their schools. The reason for this is uncertain but possible explanations might be either the poor recycling facilities at their schools or their lack of motivation to do so.

When the participants were given an item regarding planting trees, over half (58%) indicated that they had never done it (see Figure 4.17). Similarly, almost half (48%) reported they never engaged in planting trees, vegetables or doing gardening at home. The number of students who reported that they never performed this type of action at their home is relatively high which may reflect a low level of environmentally responsible behaviour. One possible reason might be that in Tehran city most of the people live in apartments with no gardens or open spaces, so students may not have been able to commit to these actions even if they had wanted to. The proportion of the students who reported that they had not been involved in a tree planting day could be due to other reasons, as possibly the students had more opportunities to participate in such activities compared with

gardening at their home – tree planting events do take place, but perhaps the students were not willing to participate in these

A similarly uncommon behaviour was talking with their friends about problems related to the environment – 58% said that they did not do this. The most uncommon environmental behaviour reported by the students was participation in environmental activities organised by clubs or organizations – 71% reported not having done this. However, 22% of the students reported they sometimes participated in this type of activity and only 7% revealed they frequently did so (see Figure 4.17). Together, these findings indicated a lack of involvement in communicating and working with others on environmental issues. However, it is possible that participating in these kinds of activities is emotionally and socially challenging for 15 year old students.

4.6.2 Students' intention to act environmentally in the future

As was mentioned earlier in Section 4.4.7, an individual's feelings of duty or obligation have a direct effect on their behaviour. Section 4.4.7 discussed the questionnaire's "agency" items, which were related to the students' attitudes regarding whether they felt they could make a difference. This section reports on students' stated intentions to act in the future, that is, whether students believed they would/would not do particular environmental actions in the future. In the questionnaire, students were given eight items related to actions that can impact on the environment. Five options were given to the students (very likely, likely, not sure, unlikely and never) to indicate how likely they were to take particular environmental actions in the future. Figure 4.18 presents the data as percentages of students' responses for each of the eight environmental behaviour items. The students' responses are presented in order from an intention to act more environmentally responsibly to less responsibly.

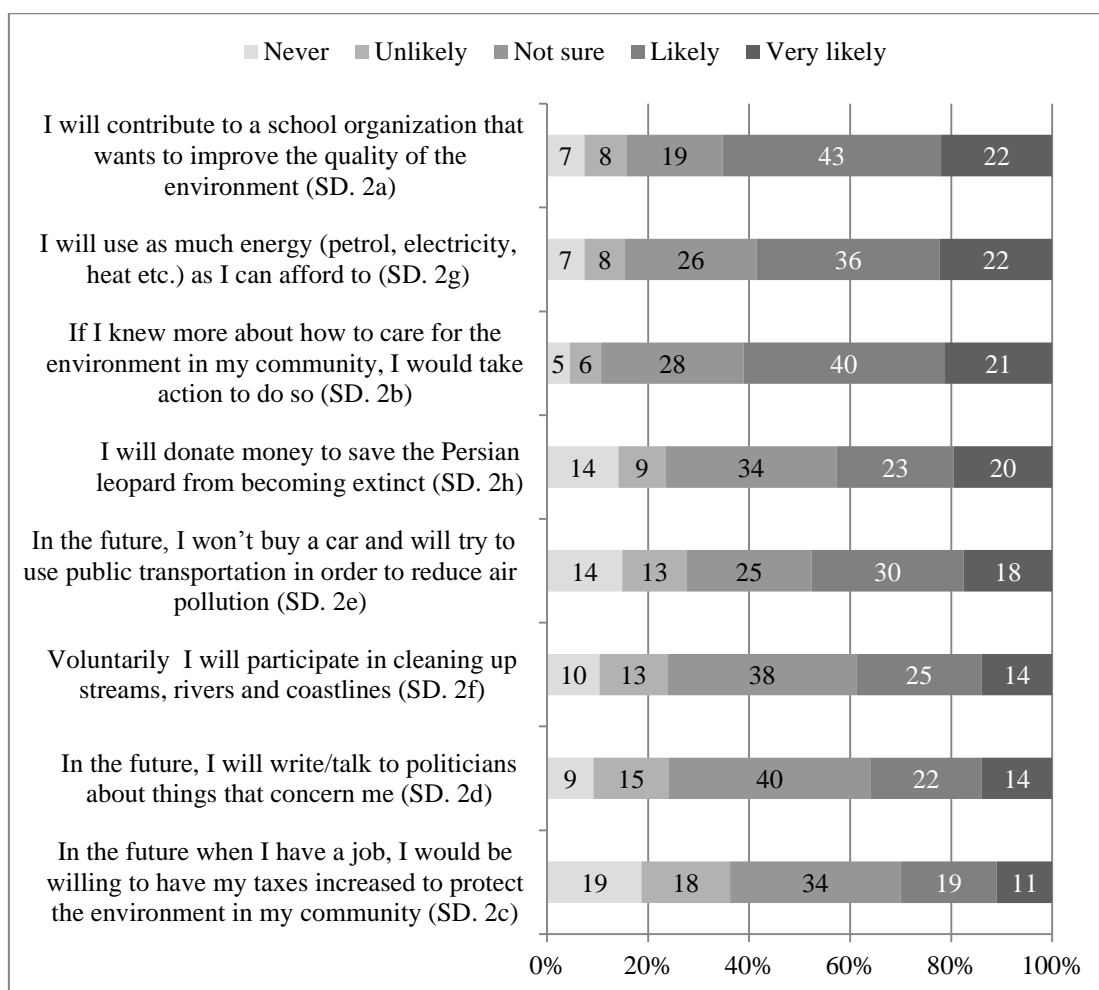


Figure 4.18 Students' responses, as percentages, about their intentions to act environmentally responsibly in the future.

Note that phases SD. 2(a-h) represent the question numbers in the questionnaire, n (SD. 2 h) = 333, n (SD. 2 d,e,f) = 336 whereas n for other items = 337.

The most popular action that students intended to take appeared to be contributing to a school organization that wants to improve the quality of the environment, with 65% indicating they will either likely or very likely contribute to that sort of action in the future (see Figure 4.18). Considering that the lowest reported behaviour was participation in group organization such as clubs (see Section 4.6.1), this finding shows that if students have more opportunities to be involved in group work such as participation in school organization, which is more real to them to solve the environmental issues, they may be more likely to engage in collective environmental activities. It seems they see their schools as spaces which have the potential to help them put into action environmental commitment.

Similarly, two thirds (61%) of the participants revealed they would take action if they knew more about how to care for the environment in their community. It appears they felt that more environmental awareness would give more

opportunities for ecological experiences to help the environment. Furthermore, the data suggested that actions which are easy to perform were more likely to be completed (see also Section 4.6.1). A less notable commitment was observed in students' intention to voluntarily participate in cleaning up streams, rivers and coastlines in the future, where only 39% of them confirmed they would be either likely or very likely to do this. A similar proportion of the students (38%) were not sure about their behaviour regarding this action in the future, and nearly a quarter (23%) claimed that they were either unlikely or never intended to do that (see Figure 4.18). It appears that students were less consistent in their commitment or apparent agency to voluntarily clean up the environment in the future, or possibly they did not think it effective to clean up the environment in this way.

Interestingly, data regarding energy saving appeared to show intentions towards less environmentally friendly action, where 58% of the students revealed that they will either very likely or likely use as much energy (petrol, electricity, heat etc.) as they can afford (see Figure 4.18). This item was designed as a reverse coded item to help participants think deeply about their responses, and it is possible that some students mis-read it. The findings of this item are in contradiction with item SD. 1d in Section 4.6.1, where the majority of the students reported they frequently turned off lights and electrical appliances when they were not using them.

In a second item that probed energy use, but connected it to air pollution, almost half of the participants (47%) indicated that in the future they would either likely or very likely use public transportation instead of buying a car in order to reduce air pollution (see Figure 4.18). However, one quarter of the students (25%) revealed that they were not sure about doing this and more than one quarter (27%) claimed that they will either be unlikely or never to do this. Comparing the data with a related item (SD. 1f) in Section 4.6.1 on the self-reported behaviour shows a similarity between students' reported behaviour and their intention to act in the future in relation to using more public transport to reduce air pollution. In both items, moderate positive environmental responsible behaviours were observed. In general, having positive intentions and reported environmental responsible behaviour for saving energy was supported by at least half of the students.

Comparing the data with previously discussed items, a lower level of intention to act was reported when the students were asked about donating money to save the

Persian leopard from becoming extinct. One third (34%) of the participants were not sure if they would/would not donate money for this purpose in the future (see Figure 4.18), while 43% of the students confirmed they will either likely or very likely do this to save this endangered species. It appears that when it comes to financial considerations, like donating money to protect the environment, students were less committed to taking action. This could be due to uncertainty about whether donating money would make a difference, whether the Persian leopard was important to save, or whether they would be able to afford to donate money. A related item, investigating whether students would be willing to pay increased taxes to protect their local environment, showed the lowest commitment to intention to act, to which many of them (37%) reported that in the future when they have a job they would never be or would be unlikely to be willing to do this. The extent of uncertainty among the students regarding this item also is notable, with 34% of them unsure about having their taxes being increased to protect the environment. Just 30% reported they would either likely or very likely be willing to have their taxes increased (see Figure 4.18). It could be considered a bit challenging for 15 year old students to think of this type of intention, but, as can be seen from the data, their intentions towards financially supporting the environment were moderately low.

The greatest uncertainty amongst the students (40%) related to whether in the future they would write/talk to politicians about things that concern them, although 36% confirmed their intention to do this behaviour. It is quite possible that students in Iran at their age had not previously engaged in this behaviour and this may reflect their thoughts about their ability or willingness to make a difference by lobbying officials in the future. Furthermore, perhaps they felt it would be hard for them to have the opportunity to write or talk to officials or they thought it ineffective, which indicates a lack of indirect environmental actions among Iranian students (see Section 2.3.4.4).

4.6.3 Section summary

This section presented findings related to the students' actual environmental behaviours and contained two subsections: self-reported behaviours, and intention to act environmentally in the future. Interpretation of the data suggested that actions which were easy to perform and have an economic benefit were more likely to be completed than those that required higher levels of involvement. For

example, saving electrical energy and saving water were reported as being common. On the other hand, the two activities that were performed by smallest proportions of students – participating in environmental activities organised by clubs or organizations and recycling paper at school – would need higher levels of involvement and facilities, and to be clearly perceived as benefitting the environment.

Section 4.6.2 discussed findings related to students' intention to act environmentally in the future. As with the reported behaviour, the results suggest that activities demanding lower levels of effort or commitment would more likely be completed than those which required higher levels of commitment. However, the students intended to be involved in those actions which were perhaps more real to them at the time of their schooling. For example, 65% of students revealed their willingness to contribute to a school organization to help the environment. For many of the items, there was a large degree of uncertainty (19 – 34%). In addition, students' intention to act for the future of the environment was not positive for a sizeable proportion of students (15 – 37%, with even as much as 58% indicating they would use as much energy as they could afford in the future). This may reflect a lack of education about visioning for the future.

Overall, it could be argued that those environmental behaviours which need more personal sacrifice, effort, and have a sense of collective/group action were less practiced by the students. A similar low level of commitment was seen in students' intention to act in the future, with the exception of their willingness to collaborate with any school organization of environmental actions, which is a collective type of action.

4.7 Chapter summary

This chapter explored students' environmental awareness, attitudes, and reported behaviours toward environmental issues. It started with students' perceptions about the environment (Section 4.2), which presented students' meanings for the environment followed by their experiences in it. A human-centred view was dominant and students' discussion focused on undesirable experiences in the environment, mainly pollution that had been created by people. Section 4.3 reported a great level of interest of the students in the significance of environmental learning. Next, students' environmental learning at school, which

appeared to be primarily linked to their secondary schooling, was considered. Subjects like chemistry, geography and biology seemed to include some learning about environmental problems. In addition, students pointed out some examples of the topics they had studied at middle school related to their environmental education. The focus group interview data highlighted that students had experienced no outdoor education.

Students' attitudes toward environmental issues (Section 4.4) were reported for different themes (humankind's relationship to the environment, biodiversity, interdependence, belief in consequences for self, intergenerational equity, economic sustainability and agency). Data from the questionnaires and focus group interviews suggest that most students recognised humans as a chief cause of environmental problems. Many students also appeared to believe that humans were meant to rule over the rest of nature. This consideration could be interpreted by the human centeredness belief of many of the participants, or ideas about the balance between economic growth and the environment, and who should be responsible for environmental protection. Students' views that humans were meant to rule over the rest of nature could be influenced by an Islamic view that the Lord of the Universe has provided all facilities for humans' use (see Section 1.3.3).

Data indicated positive attitudes towards biodiversity overall; however, there were some students (28%) who were not ready to make personal sacrifices to prevent animal extinction. Students' attitudes toward interdependence appeared to be very positive. Regarding attitudes when environmental protection potentially had economic consequences for themselves, for example, losing job opportunities in the future and limiting choices and personal freedom, students showed less support for the environment. However, when it came to health improvement and the responsibility of every citizen to protect the environment they tended to report pro-environmental attitudes. Findings related to intergenerational equity suggest that the majority of students cared about the importance of environmental protection for future generations. However, students' attitudes toward economic sustainability could not be considered environmentally friendly. While most of them believed that science and technology can solve environmental problems, when asked whether protecting the environment should be given priority over economic growth, students showed a high level of uncertainty. A low level of

agency was reported in Section 4.4.7, where the participants in general did not express positive attitudes towards taking environmental action. Most importantly, the highest level of uncertainty appeared in the belief in their ability to change or make a difference for a better environment in the future. This is something that, according to international declarations, EE is intended to address (see Sections 2.3.4.2 and 2.3.4.3).

Section 4.5 examined the environmental awareness of the students, both self-reported, and in terms of their actual understanding of selected issues. Data from the questionnaires and focus group interviews show that media was the main source for the students to learn about environmental issues, which was reported as being more important than school, internet and family and friends. About four fifths of the students (79%) indicated that they were broadly familiar with air pollution, which was not surprising because air pollution is a major issue in Tehran. Overpopulation appeared the most familiar issue among the students (83%). Data also indicated that out of seven selected environmental issues, students were least optimistic that air pollution will improve over the next two decades, and the majority of them recognised this as a serious concern for them as well as other people. Water pollution was another issue that most students were more concerned about. Overpopulation was the issue that students were least likely to be concerned about. This may reflect the fact that the participants came from middle class families. Overall, students' appeared to demonstrate a high level of actual environmental awareness regarding general and specific environmental issues, such as air pollution and associated issues. This may be because this issue has more direct effects on their lives. Among the given environmental problems, the lowest level of actual awareness was related to the effect of different energy sources for generating electricity – something which has less direct impact on their lives.

Section 4.6 reported on the environmental behaviour of the students according to their self-reported behaviours and their intention to act environmentally in the future. Data from the questionnaires indicated that simple actions such as turning off lights were well practiced among the students, but as they are easy to perform, they may not represent a strong commitment to pro-environmental behaviour. Further, no data were collected about the motivation that students had for this behaviour – which could have been economically driven, or something that their

parents promoted. Students' self-reported behaviour also indicated similar outcomes for water conservation items: many students never took short showers, although the majority reported the 'easy-to-perform' turning off the tap water while brushing their teeth. Some students reported watching documentary movies on TV on wildlife or reading books or magazines with environmental messages. Again, these are simple tasks to perform, but many students did not report doing them. Similarly, students appeared to exhibit moderate environmental commitment to cleaning up the environment and also dealing with their waste. Recycling in general was not a practiced behaviour among the students. This was particularly true for recycling at school, which may reflect that students did not have opportunities or facilities to do so. The most infrequent environmental behaviours related to communicating and working with others on environmental issues.

Overall, students indicated that they have positive attitudes and relatively high level of awareness about the environment, but this needs to be extended towards a commitment to taking action. Part of this could be helping them to acknowledge the contradictions that they themselves have between their environmental awareness, attitudes, and behaviours.

Because teachers can have a considerable influence on students' environmental learning, their own awareness, attitudes, and behaviour were also important to explore in order to get a more broad understanding of EE in Iran. The next Chapter addresses the second research sub-question regarding the environmental awareness, attitudes, and behaviour of teachers.

Chapter 5 Environmental awareness, attitudes, and behaviour of teachers

5.1 Chapter outline

This chapter presents the findings across three broad categories: environmental awareness, environmental attitudes, and environmental behaviour of secondary school teachers. Data come from individual interviews ($n = 12$) with teachers at six secondary schools in Tehran city. This chapter focuses predominantly on research sub-question 2: What are the environmental awareness, attitudes and behaviour of secondary school teachers in Tehran/Iran? Findings from teachers' data are presented in two main sections: teacher personal characteristics (Section 5.2) and teacher professional characteristics (Section 5.3), including a case story of one teacher's experience and ideas about environmental education to give a more holistic view (Section 5.3.6). Section 5.2 begins with teachers' personal backgrounds and their environmental perceptions by focusing on their meanings for the natural environment, and their views about the importance of environmental issues for people in Iran. Next, teachers' personal environmental awareness, attitudes and behaviours are discussed. Section 5.3 discusses the findings related to teachers' professional awareness, attitudes and behaviour as they see them reflected in their teaching. Finally, a summary of the chapter is presented in Section 5.4. Where applicable, comparisons are made between the teachers' data and students' data (Chapter 4) to explore the similarities and inconsistencies between teachers' and students' responses.

5.2 Teachers' personal characteristics

This section reports on teachers' personal characteristics with regard to their own environmental awareness, attitudes, and behaviour. These factors could affect their teaching beliefs and practice, their interactions they have with students every day in and/or outside the classroom, and students' environmental learning. The teachers who participated in this study included six males and six females. One quarter (3 teachers) had the age range of 31-40 years, half of them (6 teachers) were between 41-50 years, and another quarter (3 teachers) were more than 51 years old. Two thirds of the participants were geography teachers and one third were biology teachers. They were moderately to very experienced, and they

mostly held a Bachelor's degree. Table 5.1 summarises the personal and professional background of the teachers.

Table 5.1 *Teachers' Personal and Professional Background Information.*

Number	Teachers' pseudonyms	Gender	Age	Teaching subject	Teaching experience	Qualifications
1	Mohammad	Male	41-50	Geography	21-30	PhD
2	Kiyanoosh	Male	51-60	Geography	31-40	Master's degree
3	Sajad	Male	41-50	Biology	10-20	Bachelor's degree
4	Hoseyn	Male	51-60	Geography	21-30	Bachelor's degree
5	Farhad	Male	41-50	Geography	10-20	Master's degree
6	Reza	Male	51-60	Geography	10-20	Bachelor's degree
7	Leyla	Female	41-50	Geography	21-30	Bachelor's degree
8	Maryam	Female	41-50	Biology	21-30	Bachelor's degree
9	Fatemeh	Female	31-40	Biology	10-20	Bachelor's degree
10	Mona	Female	31-40	Geography	10-20	Master's degree
11	Zahra	Female	41-50	Biology	21-30	Bachelor's degree
12	Atefeh	Female	31-40	Chemistry	10-20	Bachelor's degree

5.2.1 Teachers' perceptions of the natural environment

In order to gain an understanding of what teachers think about the natural environment, they were asked "What does the natural environment mean to you?" Similar to the students' meanings reported in Section 4.2.1, teachers had a wide variety of meanings for the natural environment. Their ideas could be categorised as: human-centred, ecosystem, holistic, and natural habitat. Table 5.2 indicates the categories and the number of teachers (note that some teachers' responses were placed in more than one category).

Table 5.2 *Teachers' Responses to the Meaning of the Environment.*

Category	Number of teachers
Human-centred view	6
Ecosystem view	5
Holistic view	3
Natural habitat view	1

Similar to responses observed in students' views, the main theme that emerged for this question was a "human-centred view" which was indicated by six respondents

(half of the teachers). Within this view, teachers had simple as well as complex responses. Three of them reported that the environment is “the place we live in”, which might be interpreted as a relatively simple view. A similar meaning of the natural environment was stated by Fatemeh, who said “It’s the place of living, which could be outside (e.g. air, water, soil) or even inside of our body”. In this case, Fatemeh extended her idea of environment to comprise everywhere where life is, perhaps reflecting her expertise in biology. The other views in this category comprised a variety of ideas. One idea was associated with the view that the environment is something from which humans can benefit. As Hoseyn said “God gives us the environment to get benefits from it”. Leyla stated that “It’s a place where we live and we can meet our needs”. These two teachers appeared to perceive the environment as providing resources. However, Leyla also saw the relationship between the environment and humans as analogous to that of mother and child. She said, “It’s like our mother that when we are far from her, we have to tolerate the consequences”. It is reasonable to assume that when she used the word “consequences”, she was referring to environmental issues and that by saying “far from her” she meant when we don’t care for or we forget about the environment.

An ecosystem, or inter-related, view was held by five teachers. Among these five teachers, four were geography teachers and one was a biology teacher. Mohammad, who had the highest qualification among all the teachers, perceived the environment as:

The place of mutual relationships between humans and their surroundings ... they affect each other ... for example, when I stand next to a lake, I can affect that by fishing, swimming and even by making that polluted, and the lake makes me cool ... sometimes we disrupt the balance of nature and it has some consequences.

The other four teachers expressed similar ideas to Mohammad. For instance, Mona indicated an ecosystem view for the environment by saying: “It’s a place where living and non-living things exist and take advantage of that”. Leyla also said, “It’s our surroundings, with which we should have reciprocity”. The teachers who had these views tried to emphasise the interactions between different elements of the environment, which is consistent with an ecosystem view.

A similar but slightly different view was expressed by three teachers, who perceived the environment from a holistic perspective, as Atefeh said “It’s a place that we and other organisms around us are living in”. These teachers acknowledged that the environment consisted of many species, not just humans, but did not emphasise their interactions or relationships.

A natural habitat view was held by Sajad, who felt that “The environment is a place of living which is natural”. He had interesting reasons for this perception, suggesting that an environment had to be healthy and natural:

The environment should have natural standards, for example, for a lion it should be 10 square kilometres, then we can call it an environment for it, not when we bring them to the cage ... or for a fish, an aquarium cannot be considered as environment ... consequently I cannot consider Tehran city as an environment.

To sum up, teachers’ understanding about the natural environment indicated that there could be widespread meanings. This variety of meanings by the teachers was likely influenced by many factors, including their personal and professional backgrounds. According to Sauv   (1996), all these meanings can actually coexist in people’s minds and in society, and can be recognised in different ways. Similar to the students’ perceptions, a human-centred view was the most common meaning for the environment for the teachers.

5.2.2 Importance of the natural environment for Iranian people

To gain a deeper understanding of teachers’ perceptions about the environment and its importance, they were asked in the interviews, “How important do you think the natural environment is to the people in Iran?” All of the respondents reported that they felt that the natural environment is not highly valued by the people in Iran, but they had a variety of reasons for why this might be the case. Their responses were categorized into five themes: awareness, culture, education, government and policies, and values. Table 5.3 shows the emergent themes with the number of respondents.

As Table 5.3 indicates, the main reason the teachers gave for why they felt Iranian people did not value the environment was a lack of awareness and understanding, which was highlighted by seven of the 12 teachers. This suggests that the teachers felt there was not enough awareness for Iranian people to realize how important environmental issues are, and people do not have suitable resources from which to

get information. Maryam said, “The majority of the people don’t know how important environmental conservation might be for their daily life, especially for the next generation”. Two teachers pointed out the failure of media, particularly TV, as a source of environmental information to make people more aware of environmental issues. As Sajad said, “Media has to show the depth of disaster, not only very simple information for people to follow”. These data are consistent with students’ responses, all of whom reported that the information sources are not adequate in Iran (see Section 4.5.1).

Table 5.3 *Teachers’ Reasons for Their Perception of Lack of Valuing of the Natural Environment by People in Iran (n= 12).*

Themes	Number of teachers
Awareness	7
Culture	6
Education	6
Government and policies	3
Values	3

The lack of a culture of environmental protection was identified by six teachers as another reason why the natural environment is not valued by people in Iran. Maryam said, “A culture of environmental protection takes time to be developed and gradually attract people, we need to raise awareness and start from early ages to set the culture of environmental conservation”. A culture of environmental protection may be linked to environmental values. Dietz et al. (2005) defined environmental values as a way of conceptualizing how we make decisions about the environment and thus express some sense of what we consider good for the environment. The lack of these values among people in Iran was recognised as an issue by three teachers. For example, Atefeh said, “Many people have enough awareness, but they don’t know about values – values are not identified for them”. This is an important link being made by Atefeh between the need for environmental awareness and values. Zahra also highlighted the lack of values by stressing an intergenerational equity view. She said:

Because of selfishness, people don’t care about the future and next generations... for example, [they think] I have water so I try to use as much as I can... or I want to relax so I always use my personal car and don’t even care what will happen to my children.

Zahra's statement refers to her belief in the lack of intergenerational equity and sustainability beliefs among Iranians.

As already indicated, a further reason identified by teachers was related to inadequate environmental education and strategies in Iran, which was highlighted by six teachers. For instance, Mohammad said, "We don't have EE in our schools, TV and newspapers... maybe we talk about the environment in the shadow of other matters". Three other teachers pointed out the importance of starting EE from early childhood, which according to them does not happen in Iran. Leyla said, "It should be institutionalized by starting from the basics at early ages," which clearly refers to the importance of early childhood education and lifelong learning (Mackey, 2012). Hoseyn said:

We [people] don't care about the importance of subjects like geography, which contain environmental aspects, in schools. It seems only maths and physics are important in our education system ... and even when the parents of the students come to school, they just want to deal with maths and physics teachers, not geography or history.

From Hoseyn's point of view, education strategies, officials and even students' parents do not recognise the importance of school subjects like geography and they actually consider geography as an unimportant subject. Hoseyn recognised this as a barrier for teaching EE. This could indicate a lack of support from the Ministry of Education, schools and parents of the students for environmental learning. Possibly, this lack of support is due to political interests and economic development, or the Ministry of Education promoting scientifically-knowledgeable citizens, particularly through subjects such as mathematics and physics.

There were three teachers who pointed to the lack of responsibility of the government and failure of policies, directly and indirectly leading the community to not care about the environment. For example, Kiyanoosh started a conversation by saying: "I feel because in Iran, the government and the people are not aligned together, not in same direction, so we can see negative actions from the people's side, for instance, by polluting the environment". He continued:

On the other hand, the government doesn't do anything in reality and just says that we want to have a clean environment... the other reason is

imprudence of officials, so we face sanctions against Iran with the consequence of having less quality of petrol, which causes air pollution.

Indeed, because Iran has been facing political and economic sanctions because of its nuclear energy programme, the country cannot import high quality petroleum, which consequently means the country uses low quality petroleum, which is one of the major causes of air pollution in Iran.

Mohammad tried to illustrate how the government can indirectly impact environmental problems by saying:

In a country in which economic justice does not occur, people try to get their benefits as much as they can.... for instance, if there is a mine that has public benefit for all, people try to exploit as much as they can to take over it... or forests as natural resources, people try to benefit as much as they can... in fact these vested interests in developing countries harm the environment.

Because some natural resources have an economic value, environmental degradation or overexploitation of natural resources happens when the economic level of people is not satisfactory. The role of government to increase the economic status of people is therefore significant, according to Mohammad. In addition, Atefeh raised the issue of environmental law, and suggested:

In Iran we don't have proper policies and regulations against people who cause environmental problems. Laws should exist, then people will follow the rules. For instance, the lesson we learned was put on a seatbelt, but only when it became compulsory with threat of a high fine, the people complied.

Atefeh's view offers a clear example of the role that regulation can play in addressing environmental issues. However, this promotes environmental conservation in a compulsory way rather than through adopting an educational approach.

When teachers were asked, "Do you have any concerns about the natural environment in Iran?" they mentioned a range of environmental issues related to different environmental aspects. Air pollution (12 teachers), water pollution (9 teachers), destruction of natural resources like forests (6 teachers), noise pollution (5 teachers) and social issues (5 teachers) were the five most frequently stated issues that teachers were concerned about. Again, these data are consistent with students' responses, where almost all the students identified air pollution as their

main environmental concern (see Section 4.5.2.1). Additionally, teachers illustrated their concern about the consequences of some of these issues on people and the environment. For instance, according to their responses, air pollution is causing loss of life, cancer and many other health issues in Tehran. As Sajad, a biology teacher with a microbiology background, explained:

From the information I have, the amount of asbestos [extremely fine particles that can cause serious illnesses such as asbestosis and cancer] in the air in some parts of Tehran is 5000 times more than the global standard.

Water pollution and its related issues – like microbial contamination of crops by sewage water, ground water contamination and using too much chemical fertilizer, which causes water contamination – were the next most common concerns of teachers after air pollution. Examples of social issues reported by the teachers included mental illness (psychopathy) because of not having a ‘healthy’ environment in Tehran, and uncontrolled migration to the cities and its consequences like the loss of public welfare standards. The other environmental concerns that were also revealed by the teachers were drying lakes, like Urmia Lake (4 teachers), soil pollution, waste problems, and greenhouse gases, all of which are causing many health issues. Overall, the data demonstrate considerable concern about various environmental issues (mainly air and water pollution) faced by the country and also at the same time indicate teachers’ understanding of the general impact of human activities on the environment in Iran.

5.2.3 Teachers’ personal environmental awareness

As for the students, it was of interest in this inquiry to determine the level of personal environmental awareness of the teachers. The participants were asked to state whether they felt they were environmentally aware (i.e., have knowledge about) a range of global and local environmental issues, or not. Of the 12 teachers, seven replied (five teachers gave unclear responses about their level of awareness) to this question and among them only three confidently asserted that they were very aware of environmental issues locally and globally. These three teachers had the highest qualifications among all the participants and two of them had the most teaching experience. It is reasonable to assume that the assertion of awareness might be consistent with the level of education and teaching experience. However, these data are self-reported, so the experienced and more educated teachers could

think they know more – or feel they should know more. The other four teachers evaluated themselves either as having average awareness or not being fully aware.

These data are comparable with students' findings, where less than half of the students indicated that they were aware of environmental issues (see Section 4.4.8). When the teachers were asked about environmental sustainability, just less than half (5 teachers) reported they did not have any knowledge about this concept. It is reasonable to assume that an inadequate or even moderate level of environmental awareness of the teachers might affect their confidence to teach environmental issues – although it cannot be discounted that these teachers were aware of the complexity of these issues and the need to know more about them. Later in this chapter (see Section 5.3.4), data are presented related to teachers' views about their competence for developing students' environmental knowledge and values.

5.2.4 Teachers' reasons for teaching about the environment

The beliefs and reasons which attract teachers to teach students about the environment can influence how they develop students' environmental understanding (Corney, 1998), and their reasons and motivation for teaching are likely linked to their own environmental attitudes. To explore this, and to gain a sense of teachers' perceptions about teaching environmental issues, they were asked "Why do you like to teach about the environment?" Table 5.4 shows the frequencies of teachers' responses (note that some teachers' responses were placed in more than one category).

Table 5.4 *Teachers' Reasons for Teaching about the Environment (n=12).*

Themes	Number of teachers
Personal background and perspectives	6
Interest in their subject	5
Responsibility	3
Commitment to the environment	3

As shown in Table 5.4, the data suggest that personal background is the dominant theme that affected teachers' perceptions for teaching about the environment. There is also a possible relationship between teachers who were originally from rural areas and may have been connected with nature and pro-environmental

attitudes, as indicated by three teachers' comments. For example, Mohammad said:

I was born in village and grew up there... at the age of six, I used to walk 12 kilometres to go and come back from school through a natural environment... this made me become interested in this area.

Kiyanooosh explained:

I am from the northern part of the country [a rural area]... I still can remember how clean our environment used to be ... I would like to see that type of environment again. Maybe it is an unattainable wish but it motivates me to teach the students about the environment.

Other teachers with responses in the 'personal perspectives' category mentioned the positive feedback of their environmental teaching in their personal life. For example, Fatemeh said, "[Being in] the environment is enjoyable for me and helps me to be a good teacher, as well as a good mother". Similarly, Sajad said, "If I teach students and make them aware and they contribute to environmental protection, the feedback comes back to me and my health by having a clean environment". Mona said, "I like to teach [about the environment] because it helps me to follow the rules to protect the environment and enjoy the teaching".

Five teachers enjoyed teaching about the environment because it was related to the subjects they taught at school. A response by Zahra showed her strong affinity for biology. She said:

I used to be a math teacher for 15 years, then when later I studied biology it changed my ideology, views, attitudes and beliefs... it even affected my social relationships. Theory of evolution and behaviour in biology are the two topics which I have been influenced by learning about them.

Similarly, Fatemeh (another biology teacher) mentioned her interest in biology, particularly evolution. Data also suggests that the view of geography as subject considering the relationship between humans and their environment could be a cause of interest for teaching environmental topics. Regarding this, Mohammad explained:

I do believe that geography was the first science that humans developed ... and I also believe that all the sciences have a root in geography, and the environment is a branch of geography... so because of these interests and love, I like to make students familiar with these concepts.

A sense of responsibility for the environment was also recognised as a reason for teaching about the environment. This was reported by three of the 12 teachers. Mohammad revealed a strong feeling of responsibility by saying: “It’s the belief in my heart that I have to tell... I feel I am in debt to tell about these issues and I also have seen the positive outcomes of doing so in my personal life”. Kiyanoosh said, “I feel heavy liability on my shoulders that I should express these aspects [environmental issues]”.

There were three teachers who reported they like to teach EE because they want to help the environment itself. As Kiyanoosh stated, “I want environmental protection to become institutionalized for students, so that at least they try to not pollute the environment”. Reza said “Because of environmental protection, I like to increase students’ level of awareness and I like them to care for values, then they will live healthier in the future”. Mona’s comment, which was reported above in the personal background theme, could also apply here, as she mentioned environmental protection. She said, “It helps me to follow the rules and protect the environment and enjoy the teaching”. It appears, therefore, that having personal pro-environmental attitudes could be a key factor for behaving environmentally-friendly.

5.2.5 Teachers’ personal environmental behaviour

In order to enhance implementation of EE, teachers, as role models for students, need to personally undertake pro-environmental behaviour and encourage others to do so too (Said, Paim, & Masud, 2003). Because of this, the teachers were asked, “Do you see yourself as environmentally friendly? If yes, in what ways?” Of the 12 teachers, 10 reported they were environmentally friendly and spoke about personal environmental behaviours they did in their everyday lives, but the remaining two teachers did not identify themselves as such. Table 5.5 shows the types of pro-environmental behaviour that the ten teachers reported they performed in their everyday lives.

Comparing across environmental behaviours, the most frequent behaviour was energy and resource saving in different ways (heat, electricity, water, etc.), which was reported by half of the teachers. Turning off lights and tap water were two examples of the teachers’ responses, but, as these actions are relatively easy to perform, they do not represent a necessarily strong commitment to environmental

conservation. Only one teacher reported taking a short shower, which might be considered greater commitment to pro-environmental behaviour. These findings are consistent with students' reported environmental behaviour, where many of them indicated they turn off lights and running water, but don't take short showers (see Section 4.6.1).

Table 5.5 *The Frequencies of the Teachers' Reported Pro-Environmental Behaviour (n=10).*

Behaviour	Number of teachers
Energy and resource saving	6
Using public transport	6
Recycling	5
Cleaning the environment in any way	5
Gardening and planting	4
Using bicycle	1
Participation in environmental clubs	1

Among the six teachers who specifically try to conserve resources, two emphasized the importance of not being extravagant within an Islamic world view. As Reza said "Even in our religion (Islam) it's very important to not waste the water and prevent extravagancy". Avoidance of extravagance is highlighted in Islam, and Muslims are advised to withhold from extravagance in multiple places in the Quran. People who are wasteful with regards to the public purse, their life, and their daily expenditure, with full knowledge and awareness, are considered to be the "followers of the Satan". As the Quran states, "... do not squander wastefully, indeed the squanderers are the followers of the Satan and the Satan is ever ungrateful to his Lord" (Surah Bani Israel verse 26-27). In another place, the Quran advises the followers in ways of eating and drinking: "... eat and drink, but do not waste" (Surah A'raaf, verse 31).

Using public transport was another fairly common environmental action adopted by teachers (six out of the 10 who reported environmentally friendly behaviours), possibly to reduce air pollution and perhaps even with a view to saving energy. Specifically, they tried to use public transport as much as possible. Farhad said:

I always try to use public transport ... one of the big issues in our country is extra use of private cars even for short distance and unnecessary travel ... I

encourage my students to use public transport as well, I want them to see me as an example of someone who does this environmental action ...

From the behaviours listed, recycling and cleaning up the environment in any other ways were moderately undertaken, with five teachers indicating activity in each of these areas. Four of the five who indicated they clean up the environment highlighted that when they go out, particularly to mountains for walking or climbing, they pick up trash and waste (the northern part of Tehran is surrounded by mountains and these mountains are popular for walking, hiking and leisure activities). Regarding environmental activity, Mohammad said, "I usually go to the mountains with my students... apart from doing activities, we try to collect waste as much as we can". Similarly, Sajad explained:

Whenever I go to the mountains with my wife, we take a big plastic bag and when we are coming down off the mountain it's full of waste and rubbish (whatever is not degradable), we even pick up filters of cigarettes.

Recycling, which could be regarded as an easy action, was reportedly practiced by five teachers, although three of them referred only to separation of wet and dry wastes. The separation of wet (organic) and dry wastes is a way of managing waste in Tehran, and is organised by the Tehran Municipality in order to separate biodegradable waste from non-biodegradable waste. Only two teachers reported actively recycling other objects, and specifically buying recyclable products. Zahra said, "I use recyclable products, although these products are more expensive than the others ... I have the financial ability to do so". Zahra's quote indicates that some environmental actions require financial commitment, and the ability to meet this, but that where financial ability was there, people like her were prepared to pay. In summary, although recycling is an easy action to be performed, particularly separation of wet and dry wastes in Tehran, it was not a well-practiced action among teachers. Again, this is consistent with the students' results presented in Section 4.6.1.

Four teachers reported they usually do gardening and planting at home. Two of these teachers, who were from rural areas, reported a deep interest in this type of activity. As Kiyanoosh said, "I love gardening and I am the only one who does planting and gardening in our apartment ... I take care of trees and flowers in our apartment's yards". This again indicates the influence that being from a rural area

may have on positive attitudes and behaviour towards the environment (see also Section 5.2.4).

Using a bicycle and participation in environmental clubs were the activities least frequently reported by teachers. Leyla said, “I used to work with an NGO called ‘Green Association’ ... we used to go to the mountains to collect waste at least once a week”. The rest of the teachers did not report participation in any environmental activities organised by environmental groups. Again, the findings are comparable with students’ reported behaviours (see Section 4.6.1), who reported a similar lack of involvement in communicating and working with others on environmental issues, and that doing outdoor activities like cycling were not popular.

5.2.6 Section summary

This section reported on teachers’ personal characteristics relating to their environmental awareness, attitudes and behaviours, all of which might affect their teaching and could influence the interactions they have with their students. As discussed in Section 5.2.1, although a human-centred view of the environment appeared to slightly dominate participants’ perceptions for the meaning of the environment, literature indicates that all the identified meanings can actually coexist and can be recognised in different ways (Sauvé, 1996). Importantly, all 12 teachers felt that Iranian people did not recognise the importance of the natural environment, suggesting a lack of awareness and information about environmental issues as the main reason for this. Only one quarter of the teacher participants confidently reported that they were fully aware of environmental issues locally and globally, but there was insufficient evidence to conclude a lack of awareness among the other teachers. However, the data indicated that a higher level of qualification and teaching experience might be associated with teachers to feeling more environmentally aware.

Section 5.2.4 discussed the motives for teachers to teach EE. Personal background (i.e., being from rural areas or being connected with nature) appeared to be a key factor that affected teachers’ environmental attitudes for teaching EE. Interest in their subject’s content, and its links with the environment; feeling a personal responsibility to raise awareness; and promoting environmental conservation were further motivations for teaching EE.

Section 5.2.5 indicated that energy and resource saving, and using public transport, were the most practiced pro-environmental behaviours among the teachers, followed by recycling and picking up rubbish, and actively cleaning up the environment. Using a bicycle and participation in environmental clubs were the least frequent activities reported by teachers. These activities seem to require more effort and commitment.

The next section explores teachers' environmental awareness, attitudes, and behaviour in a professional context, that is, in terms of their implementation of EE.

5.3 Teachers' professional characteristics

This section describes data from the interviews that relates to teachers' professional characteristics, including their beliefs about EE and their environmental pedagogical practices. It was of interest in this inquiry to investigate teachers' views regarding EE, their participation and involvement, their level of curriculum awareness and their professional environmental actions, since each plays a key role in influencing students' environmental learning. Section 5.3.1 focuses on the teachers' professional background in teaching and their professional environmental awareness, which mainly focuses on teachers' training for teaching EE. Section 5.3.2 discusses teachers' environmental attitudes from a professional perspective, that is, their views of the significance of EE for school students and also their perceptions about the positioning of EE compared with other curriculum areas in Iran. Section 5.3.3 analyses data related to teachers' professional environmental behaviour in the implementation of EE in Iran. Next, a summary of the section is presented. Finally, Section 5.3.6 describes a case story of one teacher's EE in order to provide a more in-depth view.

5.3.1 Teachers' professional background

Information about the professional background of the teachers was sought through asking questions about length of teaching experience, subjects taught, curriculum areas in which EE might fit, and qualifications. Half of the participants (6 teachers) had 10-20 years teaching experience, five teachers had 20-30 years and one teacher had more than 30 years teaching experience. All the participants were therefore very experienced teachers. As shown earlier in Table 5.1, eight teachers held a bachelor's degree, three held a master's degree and one held a PhD qualification. The majority were geography teachers (7 teachers), followed by

biology teachers (4 teachers) and one chemistry teacher. They had 1-8 years teaching experience in the schools where the interviews were carried out.

5.3.2 Teachers' professional environmental awareness

Teachers' pedagogical content knowledge (PCK) plays a significant role in effective environmental teaching (see Section 2.4.2). Educating teachers to be more environmentally aware and to develop their EE PCK is important for empowering them to teach effectively about environmental aspects. To explore the teachers' participation in such training, they were asked, "Have you had any training about teaching and learning in environmental education?" The researcher tried to give examples to the teachers: that the training could have been offered by the Ministry of Education or other official organizations, or it could have been undertaken at a more informal level.

Almost all the teachers claimed that they had not had any formal professional training through organizations to help them to teach environmental issues. However, one reported having taken more than 1000 hours of training courses about different aspects, particularly geography and other related topics, like earthquakes, crisis management, etc. But this cannot be considered as formal EE training as it does not represent actual environmental training.

Many of the teachers also reported that they had some environmental education-related content in their bachelor's or master's education. However, their comments suggest that this type of training was not very significant in their preparation to teach EE, as they had, in general, not been inspired by it. The teachers also mentioned that they didn't limit themselves to the mandated textbook, but tried to give extra information from their own general knowledge. As Maryam said, "Generally students like us to talk from beyond the textbook, and relate things to their life".

Nearly half the teachers (5 teachers) reported that they had not had any training about environmental sustainability. These teachers were mainly biology teachers. However, the other teachers, who were mainly geography teachers, knew about sustainability, reporting that it is one of the chapters in the geography textbook. However, it is not included in the math or science curriculum areas, but only social science.

To gain insights into teachers' understanding about where EE might be taught in the curriculum, they were asked: "Where does the teaching of environmental topics sit in the curriculum?" Table 5.6 shows the frequency of the responses for where the teachers thought environmental topics were situated in the curriculum.

Table 5.6 *The Frequencies of Teachers' Responses Regarding the Curriculum Areas that Include Environmental Topics.*

Subject	Number of teachers
Geography	10
Biology	10
Chemistry	5
Physics	3
Geology	1
Religion	1

Their responses indicate that geography and biology are the main subjects that involve environmental topics in secondary schooling in Iran. Somewhat in contrast to this, most of the biology teachers said that there is very little about the environment in biology as a subject area.

5.3.3 Teachers' professional environmental attitudes

Teachers' attitudes regarding the importance of EE for school students were sought by asking: "Do you think it is important that students should be taught about the natural environment? If yes, why?" All twelve of the teachers reported that it is very important for students to learn about the environment. Therefore, attention was given to the reasons that participants gave for EE being important. Analysis of the responses led to the six themes that are summarized in Table 5.7.

Table 5.7 *The Frequencies of Teachers' Responses Related to Reasons EE is Important.*

Reason	Number of teachers
Lifelong habits	9
For future and next generations	7
Health	4
Values education	3
Transferring information to others	3

As the data in Table 5.7 indicate, the key reason why EE was seen to be important was in order to develop lifelong habits among students. In addition, five specifically thought that if we start EE from early ages it will be institutionalized and become a habit for students to protect the environment. For example, Atefeh said, “It is very hard to teach and change the behaviour of adults”. Of the nine teachers, almost all believed that the age of 15 or 16 is too late to start teaching about environmental values.

Another key reason for EE being important was connected to future and next generations, which was reported by more than half of the participants. Of these, three teachers indicated that because students are the ones who will determine the future, it’s very important to educate them. Kiyanooosh said, “They will be the leaders and policy makers in the future, so they should learn about the environment”. The learning of the next generation was also considered important. For example, Atefeh said, “By educating them they will transfer the information to the next generations”. Farhad said, “Because students can influence their families (parents, brothers, or sisters) and their children in the future by transferring the environmental knowledge they get”.

Other themes that emerged as reasons for teaching EE included health, values education, and transferring information to others. Regarding the importance of values education, Zahra said, “We can teach them scientifically and, in this way, they believe about the issues, for example, recycling [why should we recycle] and the wastes which are not degradable”. Fatemeh said, “Because if they learn about the environment maybe they will have a right attitude [or values] and right behaviour in the future, so EE is essential for them”. Regarding health improvement, Sajad said, “Because they are the base of our society and if we educate them well, they will live healthier”. However, it is important to note that raising awareness of environmental issues among students does not ensure they will take positive environmental action in the future. As Kollmuss and Agyeman (2002) indicated, there is a gap between the environmental awareness, and displaying pro-environmental behaviour and many factors shape an individual’s environmental action. (See also Section 2.3.4)

In order to further explore teachers’ professional attitudes towards EE they were asked, “Do you think environmental education is as important as other curriculum areas in school? Why or why not?” All twelve teachers reported that EE is even

more important than other curriculum areas. In general, they thought that EE is more relevant to students' future health and daily life. For example, Zahra said, "Primarily a person has to be healthy and to know about his or her environment, and then learn about other subjects". Sajad said, "EE is more important because when the environment is not healthy no one can properly learn about math or physics". Fatemeh and Kiyanoosh similarly stated that if we are not healthy, maths and physics will be useless. Farhad said "If we know about a math formula, for instance, but don't know how to live, even that mathematic is not useful". Mohammad said:

EE is more important because other subjects can live under environment's shadow... environment defines life and human existence... if humans and the environment are not interrelated with each other there is no need to learn other sciences.

However, Kiyanoosh criticized the current curriculum by saying: "... it seems here other subjects are more important because of wrong strategies of policy makers". Mona also mentioned the higher status of other subjects: "Unfortunately here [in Iran] students care more for other subjects, like math, physics and chemistry, because of high ratio of these subjects in the university entrance exam".

As can be seen, the views of the participants were supportive of environmental education. However, there was recognition that environmental education is downplayed because assessment of other school subjects drives learning in the education system in Iran.

5.3.4 Teachers' professional environmental behaviour

With regard to teaching environmental topics, teachers were asked, "What are you teaching [in terms of environmental topics] and how is this teaching done (i.e., lectures, field trips etc.)?" As mentioned earlier, the participants were geography, biology and chemistry teachers. Additionally, two of the geography teachers had experience teaching geology. The teachers named a range of environmental topics in the curriculum they taught. Table 5.8 shows the topics reported by the teachers.

Table 5.8 indicates that geography is the subject that covers the greatest variety of environmental issues, followed by biology, chemistry and geology. Data also indicate the overlapping of the subjects in introducing/exploring/learning about some environmental issues. For example, air pollution, acid rain and inversion are

common topics in both geography and geology. Similarly, energy resources (renewable and non-renewable energies) is a common topic in geography and chemistry.

Table 5.8 *The Subjects and Topics that Environmental Aspects, as Reported by Teachers.*

Subject	Topic
Geography	Air pollution, Acid rain, Alternative energies (nuclear, thermal etc.), Deforestation, Deserts, Desertification, Destruction of the Ozone layer, Destruction of vegetation, Effects of global warming, Erosion, Forests and jungles (Amazon forest), Fossil fuels, Inversion, Marine pollution, Mountain glaciers, Natural disasters, Pollution, Reasons for pollution (natural and anthropogenic), Water pollution, Soil pollution, Pollution in agricultural lands, Ground water pollution, Population and natural resources, Renewable and non-renewable energies, Sustainability, The interaction of humans with the environment, Tourism, Weather
Biology	Different ecosystems, Ecology (Food web, energy pyramid, food decay), Environmental pollutants, Extinctions, Fertilizers, Theory of evolution (only in 4th year), Cellular biology and human organs (only in 3rd and 4th year)
Chemistry	Natural resources, Energy resources (renewable and non-renewable energy), Nuclear energy (in the 'knowing more' section), waste management
Geology	Air pollution, Acid rain, Air inversion, Greenhouse gases

Teacher participants also reported that the most frequently used method for teaching about these environmental issues was lecturing. However, there were three teachers (Mohammad, Kiyanoosh and Atefeh) who reported they had extra activities for their students, like 'Power Point presentation' by students, 'group discussion', 'doing assignments and investigation on environmental issues'. There appeared to be no field trips or out-door education and activities for students, which possibly reflects the dominance of teacher-centred methods of teaching over student-centred methods. However, a few teachers mentioned that if they had the opportunity, time and could overcome the obstacles to taking students for outdoor education, they would occasionally do this. While traditional methods such as lecturing may be effective in 'covering' broad environmental content, when students learn in the environment (out-door education), which is more

tangible for them, their understanding about environmental issues is more effective. This shows the importance of education *in* the environment which has a strong experiential orientation through contact with nature (Tilbury, 1995; see also Section 2.2).

As reported in Section 5.3.1, teachers had 1-8 years teaching experience at the schools where the interviews were carried out. In addition to questions about where in the curriculum and how they taught EE, teachers were asked in the interviews, “Can you talk about your past experiences with environmental education?” Interestingly, their responses related largely to outdoor experiences they had with their students. Although these outdoor experiences were not frequent, the teachers’ recollection of them hints at the memorable nature of these events, and possibly the effectiveness of outdoor education with respect to the environment. Giving students assignments and trying to open their eyes to the environment by including relevant, everyday examples was also included in some of the teachers’ responses. Additionally, there were two teachers who reported their own personal EE experiences. They said they share these experiences with their students as well. Reza’s experience was when he was in the war. He said, “I learned how important a glass of water can be when I was a soldier in the war... I tell my students and anyone else to conserve water”. Kiyanoosh also described the lesson he had learnt through an environmental experience:

Once, my family and I went to a national park. Suddenly, I realized there was a fire at the top of the park... I reached it quickly but as a geography teacher I did not have any training on how to contain the forest fire when you don’t have anything ... finally some people from a conservation organisation arrived and they showed me how with the help of pines tree leaves we can do that... I always tell this to my students.

Sharing these environmental experiences with students has potential to impact the development of students’ environmental learning and imagination. Reza and Kiyanoosh’s experiences could be meaningful examples to develop students’ skills enthusiasm for taking care of the environment, and to increase their awareness about the importance of natural resources.

With knowing about where and how in the curriculum the teachers taught EE, as well as their past experiences with EE, this research intended to explore

environmental attitudes and values which teachers expressed in their teaching. This is presented in the following section.

5.3.4.1 Expressing environmental attitudes and values

Developing knowledge and understanding of environmental issues needs to be done alongside addressing students' attitudes and values if EE is to effectively develop students' environmental awareness, as defined earlier. For this reason, teachers were asked, "Does your teaching relate mainly to developing knowledge and understanding of environmental issues? Or does it also address attitudes and values to a significant extent?" The majority of the teachers (nine) confidently reported that they address attitudes and values along with developing knowledge and understanding of environmental issues in their teaching. These teachers agreed that for students to understand and care for the environment, it is necessary to help students develop positive attitudes towards the environment. To support this, Mohammad said, "I try to enter their [the students'] hearts by stimulating their feelings when I teach about environmental issues ... I always tell them don't study for marks". Similarly, Atefeh commented, "I always tried to really teach them not just for getting marks because they are the ones who will make the future". However, Hoseyn commented on the content demands of Iranian education by saying:

In our education system there is nothing about values because everything is taught in theory and, for students, getting marks is also important ... when teachers have to teach a book with 150 pages with only two hours in a week, it means the education system does not care about values.

Sajad, on the other hand, suggested that it is because of students' lack of interest that values and attitudes are not addressed. He said, "It depends on how eager students are to learn about these topics, but the majority of them are not receptive, they are not eager, they just want something in theory for getting marks ... ". Kiyanoosh underlined the importance of embodiment of environmental values by stating:

I always address values and attitudes because I want environmental conservation to become embodiment for students and they accept it and take action ... if my teaching relates only to developing knowledge and understanding of environmental issues, students don't accept it.

Fatemeh spoke about the importance of environmental attitudes and values in students' future lives. She said:

I believe that students, before obtaining their bachelor's and master's degrees, they are the children of this society ... I tell them you will be mothers in the future ... I try to stimulate them about their position in society and their responsibilities for the environment, and society as well.

Fatemeh's explanation for addressing values and attitudes is aligned with many indigenous perspectives, which show a strong connection between mothers and the earth. For instance, the Māori culture in New Zealand has strong spiritual bonds with the land, soil and water. Māori see themselves as the guardians of these resources. These resources can provide everything for their life, and they refer respectfully to "Mother Earth" (Panelli & Tipa, 2009).

As can be seen from teachers' responses, there were varied views on the place of values and attitudes in teaching about environmental issues. Although the majority of the teachers reported that they addressed these aspects, there were three teachers who reported that they did not specifically address values in their teaching, although it is possible that these three teachers misunderstood the meaning of values in relation to religious aspects. Teachers also highlighted the theoretical nature of the Iranian education system, rather than a more action-based curriculum.

5.3.4.2 Encouraging students to take environmental action

In order to explore the place of environmental action in EE in Iran, teachers were asked whether they encourage their students to take environmental action, and if they do, what sort of actions. Of the 12 teachers, 11 reported they encouraged their students to take environmental action. Table 5.9 shows the type of actions and frequency of the responses regarding particular actions.

Table 5.9 *Environmental Action Teachers Encourage Their Students to Take.*

Action	Number of teachers
Clean up the environment	6
Using public transport	4
Energy saving	3
Recycling	2
Spending time in the natural environment	2
Taking care of plants	2

As Table 5.9 indicates, the most frequently reported action that teachers encouraged their students to perform is cleaning up the environment. Mostly this referred to picking up litter. For example, Sajad said, “I tell them, whenever you go to a mountain, try to pick up litter as much as you can ... bury those which are biodegradable and take those which are not back down the mountain ...”. Kiyanoosh also explained: “I tell them that the environment is like our home ... the way in which we try to keep our home clean should also apply to the environment”. Reza and Atefeh reported that they encourage their students to clean up the classroom and school yard. Comparing the teachers’ responses with students’ self-reported behaviour regarding cleaning up the environment and trying to create less rubbish (see Section 4.6.1) indicates that the teachers’ encouragement was not very effective, as students revealed diverse responses and did not show strong commitment to managing litter. The sorts of actions mentioned by Sajad, Kiyanoosh, Reza, and Atefeh, which do not target the cause of the issue, appear to not be very effective.

Encouraging students to use public transport, particularly to reduce air pollution, was reported by a third of the teachers. Again, comparing this with students’ self-reported behaviour (Section 4.6.1), where just less than a quarter of the respondents confirmed they frequently use other types of transportation, such as biking or the bus instead of going in a car, illustrates the low level of this behaviour in practice. Encouraging students to save energy (electricity and water) was another action three teachers reported encouraging. As noted earlier, students revealed a high level of commitment for turning off lights and electrical appliances when they were not using them, but such an action is easy to perform, so does not necessarily represent a strong commitment to environmental action (see Section 4.6.1).

Recycling, spending time in the natural environment and taking care of plants were other environmental actions which the teachers encouraged students to do. However, as Table 5.9 indicates, only one-sixth of the teachers tried to encourage these actions, and this mirrors students’ environmental behaviour, reported in Section 4.6.1 — except for ‘going to the natural environment’, in which students showed relatively high interest.

5.3.4.3 Teaching methods for environmental education

Developing students' knowledge, values and actions in environmental education requires teaching methods designed to integrate students' environmental awareness, attitudes/values and behaviours (Ballantyne & Packer, 1996). To investigate teachers' education approaches, they were asked to describe an environmental topic that they had taught at school and explain what they did. The decisions made by teachers to select the topic that they talked about mostly appeared to be related to their interests to that particular topic. Table 5.10 shows the topics that were talked about by the teachers. Interestingly, data appear to suggest that there was no outdoor education associated with these topics, although three reported that they had included some extra activities in addition to the lectures in their class (see also Section 5.3.4). Atefeh reported she included extra activities like group discussion, assignments and reading academic papers in her class about alternative energies, particularly solar energy. The other teachers reported that they gave mainly theoretical explanations about the topics, although some of them said they gave much more information than what was available in the textbook. For example, Kiyanoosh said, "About noise pollution, I teach from my information only ... the geography book does not say anything, just names it ... I bring relevant examples for students to make them aware".

Table 5.10 *Environmental Topics that Teachers Chose to Talk about in Terms of How They Teach EE.*

Environmental topic	Number of teachers
Air pollution	2
Destruction of vegetation and soil destruction	2
The effects of using too many fertilizers	2
Water pollution	1
Alternative energies	1
Desertification	1
Food decay	1
Noise pollution	1
Theory of evolution	1

5.3.4.4 Constraints and supports for teaching EE

To investigate what obstacles and difficulties the teachers faced with regard to teaching EE, as well as what and/or who supported them to teach EE, they were asked to indicate the constraints and supports for teaching EE. The major barrier was seen to be limitations associated with class time, which was reported by seven teachers (see Table 5.11). Other obstacles included education strategies and policies, for example, views that subjects like geography are simple and not important.

Table 5.11 *Teachers' Responses Regarding Constraints for Teaching EE.*

Constraints	Number of teachers
Class time	7
Education strategy and policies	4

Perhaps not surprisingly, class time was seen as a main barrier by teachers, who are under pressure to cover all textbook topics. For instance, Hoseyn said, “The time allocated for geography is not consistent with the amount of content”. Atefeh also said, “I need to think of covering all topics laid down by the curriculum”. There were four teachers who recognised the political nature of environmental problems and other priorities in the education system as obstacles for not teaching EE effectively. For instance, Farhad said, “Some of the environmental issues are political (like nuclear energy), which we cannot talk freely about”. He added, “Another thing which discourages me is because there are many unskilled [not having special skill or training about EE] people who have high positions in education and other sectors”. It is possible that Farhad saw a lack of understanding of EE amongst education bureaucrats as constraining his ability to deliver it. Lack of school support, for example, considering subjects like geography as less important, was the other barrier to teaching EE. Regarding this, Mohammad said:

Even education authorities consider geography as a simple and not important subject ... or sometimes parents come and say, ‘Why do you take the time of students for this simple subject?’ ... They just think that maths or physics teachers are important ... I always think, why do they hurt me by this kind of naive thinking?

Mohammad's statement indicates the lack of support for EE from the educational structures in Iran, and from families.

When the teachers indicated they did not get support from educational authorities, it became of even greater interest to find out what factors did support them to teach EE. Data suggest that personal interest is the main reason that encourages and supports teachers for teaching EE (Table 5.12; see also Section 5.2.4). Being worried about the environment (reported by three teachers) was another theme, and is closely associated with personal interest. Note that in Table 5.12, unlike other tables, teachers each reported only one category.

Table 5.12 *Teachers' Responses Regarding Support for Teaching EE.*

Supports	Number of teachers
Personal interest	7
Being worried about the environment	3
The responsibility of being a teacher	1
The principal of the school	1

When teachers were asked “Do any groups or individuals from inside or outside the school help with your teaching?” 10 teachers reported that no one from inside or outside the school helped them teach EE. However, Kiyanoosh said, “Sometimes parents of the students who are working in these areas (having positions in environmental departments or agencies) help me by giving statistical data or other information”. Reza highlighted the importance of leadership in the school for supporting her provision of EE. He said, “The principal of the school where I currently teach helps and encourages me to teach environmental education ... but no one from outside of the school helps me with it”. Although the importance of school leadership in students' learning has been highlighted in the literature (e.g., Eames et al., 2008), data in this study suggest that in general there is no – or very little internal (inside of the schools) or external help or support for teachers to teach EE in Tehran/Iran.

5.3.4.5 Benefits of teaching students about the environment

Teachers were asked “Who do you think benefits from your EE (students, teacher, school, parents, community)?” The majority of the teachers (nine, see Table 5.13) felt that whole community benefits from their EE teaching. Regarding this, Mohammad said:

I think everyone in our community benefits from my teaching because we all are connected like a chain ... I even think the indirect effects of my teaching are more than the direct effects, because it involves more people.

Leyla's view was even more broad:

I think the people who live in other parts of the Earth also get benefits from my words ... for instance, when a butterfly flies in China it has effects even on Pacific Ocean storms ... when I talk in the classroom the people in Japan, Islands in the Pacific Ocean, etc., will see the effects of that, because it's the matter of the environment.

Table 5.13 *Teachers' Responses Regarding Who They Think Benefits from Their EE.*

Theme	Number of teachers
Community (everyone, people in general)	9
Students	8
Students' families	5
Teachers	4
Teacher's family, friends, children	3
Next generation	1

Eight teachers felt students benefit from the environmental teaching. Most likely this is because of the direct influence of teaching on students' learning. Because the students might share the information that they had learned with their families, students' families also benefit (reported by 5 teachers). The teacher's family, friends, children and teachers themselves also benefit from teaching EE, as reported by 3 and 4 teachers respectively. Only one teacher specifically mentioned the benefits for the next generation.

5.3.4.6 Teachers' desires related to EE and their intentions to act

In order to explore teachers' hopes and desires regarding EE at schools, they were asked, "What do you hope to achieve through your teaching in EE and what do you hope students will gain?" Almost all the teachers (11/12) reflected on their hope to help the environment through teaching EE. Their comments mainly referred to what students might be able to ultimately achieve for the environment—that because of their learning they would take environmental action. In other words, they highlighted that, in the end, the feedback they seek relates to the society and the environment. For example, Farhad said, "If I get positive feedback from students to protect the environment, it's an achievement

for me”. Mohammad had an even larger hope: “If I as a teacher can perform well to make students believe that these issues are real, it’s like a circle and the feedback comes back to us and whole world will benefit from that”. Zahra said, “I hope through my teaching students will learn how to be environmentally friendly and reach the point that [they see] the environment is something for their survival and that then they don’t destroy it”. There were some teachers who had lower expectations from what would or could be achieved. For instance, Kiyanoosh said, “I hope if students cannot help by removing pollution, at least don’t pollute the environment ... if they do this, I feel as a teacher I have done my duty to make them aware”. Similarly, Maryam said, “I hope they don’t harm the environment much”. Hoseyn said, “If out of 10 students, only one student behaves nicely with the environment it’s enough for me and I feel peaceful”.

As can be seen from the data, some teachers hoped to see environmental conservation as a result of their environmental teaching. Although they did not say how exactly this might be achieved, some indicated that they hoped that by increasing the level of students’ awareness and educating them, they hoped students would contribute actively to environmental protection. Other teachers hoped that students would not contribute to environmental destruction, even if they did not reach a point of environmental conservation.

Teachers’ hopes related to teaching outcomes could influence their intention to implement EE. As discussed in Sections 2.3.4.1 and 4.6.2, intention to act environmentally is an indicator of environmentally responsible behaviour and has a direct effect on people’s actions. To gain an understanding of the teachers’ intentions regarding EE they were asked, “What else would you like to do in EE if you could?” Six teachers reported an intention to include outdoor education (Table 5.14). It appears that an outdoor education approach was favoured by teachers as they thought education in the environment would be more effective because of the tangibility of the environmental issues for the students. For example, Zahra explained:

I would like at least once a month to take the students into the environment and explain about the characteristics of that particular environment ... for example, tell them about the animals and plants that used to live here ... or the river which used to be there and now it’s dried and also the reasons for why this happened.

She added that, “When students closely observe these issues, their environmental learning is more effective than theoretical explanations in the classroom”. Kiyanoosh also said, “The best way of EE is to take students to the environment [outdoor education] but unfortunately in our education system they [authorities] only want teachers to concentrate inside the classroom”. These insights into teachers’ hopes are consistent with the students’ responses in Section 4.3.4, where more than half of them reported they would like to have outdoor activities related to the environment.

Table 5.14 *Teachers’ Desires for EE.*

Suggestions and interests	Number of teachers
Outdoor education	6
Modify the curriculum or education system	5
Run an NGO or groups	3
Increase their own awareness	2
Extra activities	2
Make students familiar with the culture of environmental protection	1

Five teachers reported that if they could they would like to modify the curriculum or – more broadly – the education system in Iran. Among these five teachers, three suggested that if EE could be taught as a separate subject it would be more effective. For example, Zahra said, “It would be good if all environmental topics in the curriculum could be gathered into one subject in order for students to learn about the relationships between these topics”. According to her, a separate subject for the environment would ensure that it is taught in depth, rather than more sketchily. Furthermore, she reported that there was not enough EE content in the current curriculum. Regarding developing EE in Iran, Mohammad said, “We should bring the scientists and people who have knowledge of this science [knowledge of EE] to their right position [work in the right place]”. Mohammad’s comment indicates that environmental scientists are not as valued in Iranian education system.

One quarter of the participants (three teachers) explained that they would like to run an NGO or organise a group to carry out environmental actions. Regarding this, Kiyanoosh said “I would like to run an NGO to do environmental activities (e.g., cleaning, collecting rubbish)”. Two of the three teachers also mentioned the

challenges that may arise for this type of working group, which could reduce their motivation. When asked in more detail what kind of challenges they thought they might face, they said because of political reasons they were not interested in talking further.

Two teachers showed particular interest in increasing their personal level of environmental awareness and becoming more updated about the environment in order to increase the effectiveness of their teaching. Reza, a geography teacher, who a few times during the interview repeated that he would like to raise his own environmental awareness, at the end of the interview said one last time:

If I had the opportunities I would like to be involved in training courses in order to increase my awareness and knowledge, then I can transfer this information in detail to my students ... however, I don't say my awareness is low but I would like to have much more awareness.

Two teachers reported they would like to do some extra activities to support students' environmental learning. Activities like providing leaflets, posters and CDs about the environment for students and organising competitions between students to motivate them to learn more about the environment were the examples of extra activities they suggested.

Finally, Fatemeh explained that for her the priority is to make students familiar with the culture of environmental protection. She said:

... for example, if there is a piece of gold over there, no one can pass by without noticing but if a piece of paper is there everyone passes through without curiosity. We should learn that this piece of paper also has value for us and we can recycle and return it to the nature ... if I learn this lesson, my children also will learn to pick up a piece of paper like gold.

Fatemeh's statement is a clear example of the importance of environmental values and beliefs in influencing environmental behaviour, which in the end leads to cultural embodiment of environmental protection in society.

5.3.5 Section summary

Section 5.3 reported on teachers' environmental awareness, attitudes and behaviours from a professional (teaching) perspective. The section began by outlining their professional background characteristics such as teaching experience, curriculum area and qualifications. Data showed that the participants were experienced in teaching, represented a range of curriculum areas and held

diverse qualifications. Questions about teachers' environmental awareness in relation to their profession (Section 5.3.2) indicated a lack of training in EE across all the participants. This was also true for the teachers' knowledge of sustainability, and nearly half the teachers reported they did not have any information about environmental sustainability. They considered geography and biology as the main subjects that cover environmental topics in secondary schooling in Iran.

Section 5.3.3 reported on teachers' attitudes and views about the importance of EE for school students. A wide variety of reasons were given for the importance of EE, with the benefits of incorporating EE in early childhood education mentioned by nine teachers, and reference to future and next generations mentioned by six teachers. Findings presented in Section 5.3.4 related to teachers' reported EE practice, focusing on their actions and involvement in EE at school. It started by identifying the environmental topics they taught through their subject and the methods they used for teaching those topics. Lecturing appeared to be the most frequently used method to teach EE, with no field trips or outdoor education and activities for students. This suggests a dominance of teacher-centred methods.

The majority of the participants (nine teachers) reported that they address attitudes and values along with developing knowledge and understanding of environmental issues in their teaching. Nearly all the participants reported they encourage their students to take action, although 'cleaning up the environment in any way' appeared to be the most popular action encouraged by the teachers. Data also indicated that 'encouraging' may not necessarily lead to action. For example, encouraging students to use public transport was in contrast with the low level of students' actual use of public transport.

Class time was reported by the majority of the participants (seven teachers) as being the major barrier for better implementation of EE in the classroom. For example, in geography, the teachers reported that two hours of class time per week is not enough. Consequently, teachers indicated that educational authorities consider geography as a "simple" and unimportant subject. The teachers also indicated that, for the majority, no one from inside or outside the school helps them with their environmental teaching and it is only personal interests that drives them to teach EE. In spite of this, the majority of the participants (nine teachers) felt that the whole community benefits from their EE teaching.

By teaching EE to students, almost all of teachers hoped to improve the environment and many of them reported that whether by improving students' awareness or understanding, or by ultimately encouraging students to take environmental action, their teaching has an impact on society and the environment. It appeared that teachers intended or wanted to have more opportunities to take students out of the classroom, as they thought education in the environment is more effective based on the tangibility of the environmental issues in out-door education. There were also three teachers who suggested that if EE could be taught as a distinct subject it would be more effective. Running an NGO or groups, increasing the level of their own environmental awareness and organizing extra activities for students were other examples offered for improving EE.

Teachers' personal and professional environmental awareness, attitudes, and behaviour can strongly influence EE practices when attempting to teach their students. To get a more in-depth image of teachers' environmental awareness, attitudes and behaviour towards the environmental issues, the following section presents a case story of one teacher, Mohammad, who appeared to be most motivated to teach EE in school.

5.3.6 Case story

The case story in this section is provided to give a more in-depth view of one teacher's EE in Iran, showing the complicity of multiple factors that influence an effective teacher who was positively influencing his students. Mohammad was also selected based on the richness of his data and the consistency between his and his students' responses (Focus Group 5). If we wanted a positive model for what teaching EE in Iran could look like, Mohammad was the teacher who had most of the attributes associated with EE. There seemed to be a strong link between his personal and professional environmental awareness, attitudes, and behaviour. It also appeared that the link between his personal and professional life played a significant role in making him an environmentally friendly person. There is a strong likelihood that teachers like Mohammad deliver effective EE for students. In contrast, other teachers in this study tended not to exemplify all of these attributes and this appeared to be associated with less certainty and commitment to being involved in EE.

Mohammad was a geography teacher with 30 years teaching experience and had the highest qualification (PhD) among all the participants. Among all the teachers who participated in this study, he also appeared to be the most motivated, enthused, engaged and inspired to teach EE in school, and demonstrated a strong level of environmental awareness, and pro-environmental attitudes and behaviour. He confidently confirmed that he is “fully aware” of environmental issues locally and globally. He was one of the few teachers who was very familiar with the concept of environmental sustainability. He even reported that he had published some papers related to this. He commented: “I use the term ‘environmental balancing’ instead of environmental sustainability because the environment gets problems when the balance of the nature is disrupted ... for creating sustainable environment, the balance should be maintained”. His personal environmental behaviours appeared to be significant. For example, he reported that he regularly cycles. He also reported that he does a lot of gardening and growing food. But, according to him, most importantly he tries to prevent wasting energy as much as he can.

As discussed earlier in this chapter, the most holistic meaning for the environment was given by Mohammad, who said:

The environment is a place of mutual relationships between humans and their surroundings (organisms, objects, etc.) ... they affect each other ... for example, when I stand near to lake I have an effect on that by fishing, swimming and even by making polluting it. The lake makes me cool ... sometimes we disrupt the balance of nature and it has some consequences.

His meaning for the environment was consistent with his students’ responses (see Section 4.2.1, Focus Group 5. When his students were asked about their environmental learning during their schooling, all of them admired their teacher (Mohammad) for his knowledge and broad, clear explanations of environmental issues. For example, his students expressed his concern that air pollution in Tehran could increase due to inappropriate design strategies and having all factories in the western parts of Tehran—with the wind blowing all the pollution across Tehran.

Mohammad reported that it was because of his undergraduate and postgraduate studies in geography studies, part of which happened abroad, and also being familiar with research in this area that he had special vision for and high level of

information and awareness about the environment. However, with respect to formal EE training, he and the rest of the teachers in this study reported that they hadn't had any professional EE training through the Ministry of Education or any other organization to help them to teach environmental issues.

Mohammad had strong feelings and interest about the subject he taught and also a sense of responsibility to teach about environmental issues. Additionally, it appears that his personal background (originally being from rural area) was another reason that he loved to teach about the environment. His attitude towards teaching environmental issues was clearly affected by his belief that geography was the first science humans had developed. He also believed that every science has a root in geography and that study about the environment is a branch of geography. He mentioned the importance of EE in early childhood education in order to achieve the embodiment of environmental conservation in the society when students grow up.

With regards to the importance of the environment for human health and well-being, Mohammad said, "Students before learning about physics and mathematics should learn about the environment because it relates to their health". Similarly, regarding the importance of EE compared to other curriculum areas, Mohammad tended to believe that EE is even more important than other curriculum. He said:

EE is more important because other school subjects can live under environment's shadow... environment defines life and human existence... if human and the environment are not interrelated with each other there is no need to learn other sciences.

He suggested that if, in addition to mathematics and physics, social science, and experimental science, we could have another curriculum called the environment, it would be very useful.

Mohammad said that besides lecturing, he set extra work for students like Power Point presentations, group discussions, and doing assignments and investigations on environmental issues. He said sometimes he and his students go to the mountains and there they will try to collect waste. However, there was no evidence for any organised field trip or outdoor activities through the school. This was true across all the teachers, with a lack of field trips reported.

Regarding the benefits and importance of EE, and his motivation, Mohammed said, “If we as teachers do our job well to make students aware and they believe that these environmental issues are real then the world will benefit from that ... this is an achievement for me”. He added that he got positive feedback from his students and he thought that the results of his EE teaching are quite encouraging. This was particularly indicated when his students in Focus Group 5 demonstrated a good level of environmental awareness and attitudes. Data also indicated that, among all the students, Mohammad’s students were most optimistic about their ability to do or change the environment or even influencing others. In contrast, other teachers who participated in this study revealed that normally they did not get positive feedback from their students. Mohammad also reported that he encourages his students to take action, but in a way that they believe that these environmental actions (e.g., not wasting water) have benefits for them and for their future.

Despite his enthusiasm for EE, he was not happy knowing that school strategies, officials and even students’ parents consider geography to be a simple subject, and just two hours per week is allocated to its teaching. He recognised this as a constraint for teaching EE. He added that it was his sense of responsibility as a teacher, and the love he had for this subject, that supported him to teach EE. He emphasized that no groups or individuals from inside or outside the school helped support him to teach EE.

From this case story, it appears that the influence of Mohammad helps to inspire his students about the environment. The level of qualification and personal life background and interests seemed to be factors inspiring him to teach EE and to increase students’ awareness about environmental issues. However, there was no strong evidence about his students taking environmental actions, although they did demonstrate higher awareness of environmental issues when compared with the other student focus groups. This case story also suggests the lack of support by schools and the Ministry of Education for subjects like geography, and for EE more generally.

5.4 Chapter summary

This chapter explored teachers’ environmental awareness, attitudes, and behaviours toward environmental issues, focusing first on how these were

reflected in their personal lives (Section 5.2) and second on how these were reflected in their teaching (their professional lives) (Section 5.3). It started with teachers' perceptions towards the environment (Section 5.2.1), which focused on teachers' meanings for the environment. Overall, they demonstrated a wide range of views, which all could actually coexist and be accepted in different ways. Importantly, the majority of teachers believed that lack of environmental awareness and information among many Iranian people caused inattention to environmental problems in Iran. Furthermore, only three of them confidently reported that they are fully aware of environmental issues, although there was not enough evidence to conclude an actual lack of personal environmental awareness among the other teachers and they may have under-reported their awareness, possibly thinking about what they don't know rather than what they do. Data also suggested that awareness levels might be associated with qualification and teaching experiences. Teachers' 'personal life background' seemed to be related to their positive attitudes towards teaching EE. In addition, it seemed that the higher level of personal and professional environmental attitudes, the more tendency they had to take personal and professional environmental actions. However, when reporting a range of personal environmental behaviours, it appeared that those actions that represent a deep commitment to pro-environmental behaviour were least frequent among participants. These findings appeared to be consistent with students' reported environmental behaviour (see Section 4.6.1).

Section 5.3 discussed teachers' awareness, attitudes, and behaviours with respect to EE, or their professional characteristics. In general, teachers' environmental awareness appears to have been gained primarily through self-study and through the content of the subjects they teach and none of them had received formal training or support in implementing EE. In addition, it is reasonable to assume that the lack of environmental education training among all the teachers could have influenced students' environmental awareness. Findings for teachers' attitudes towards the importance of EE for school students highlighted that the majority thought early childhood education was particularly important for developing a base for the embodiment of environmental protection in the society. That the teachers reported that lecturing was the main method for them to teach EE suggests a dominance of teacher-centred, transmissive methods. Additionally, a lack of field trips or outdoor education for students was also reported. However,

many of them revealed that they do address attitudes and values along with developing knowledge and understanding of environmental issues in their teaching.

Encouraging students to take environmental action was considered to be widespread by the teachers and they tended to believe that by encouraging students to take such actions it's possible to improve the quality of the environment. Further, many of them indicated that the whole community benefits from their EE teaching. Lack of class time appeared to be the most important constraint for teachers to teach EE. Some of them reported that the education curricula in Iran, for example, being too academic or theory-based, were also barriers. Additionally, they tended to emphasize that they did not get any support or help from either inside or outside of their schools to teach about the environment. In terms of their intention to act, they would like to have more opportunities to take students out of the classroom, as they felt education in the environment is more effective for the students. Some of teachers indicated that EE being taught as a distinct subject at schools would be more effective. Overall, and despite the obstacles, the teachers seemed generally highly motivated to carry out actions which could support EE and eventually lead to the environmental conservation.

In order to provide a more in-depth analysis of one teacher, Section 5.3.6 presented the case story of Mohammad, who appeared to be most motivated to teach EE in school, and who expressed the most pro- environmental awareness, attitudes, and behaviour of the participating teachers. He indicated that his personal background, higher qualification and interest about the subject that he taught (geography) influenced his environmental awareness, attitudes, and behaviours both personally and in the classroom (professionally). Although he revealed a higher level of personal environmental awareness, his lack of professional EE training might be identified as a barrier for better implementation of EE.

In addition to positive attitudes, he was actively involved in taking personal environmental action in different ways. However, it appeared that he put less emphasis on education *for* the environment, compared with education about the environment, as he reported limited encouragement for students to take environmental actions. The absence of education *in* the environment (field trips,

outdoor activities) also appeared to be a limitation in his environmental teaching. Lack of class time and school strategies were the two main barriers for him to implement EE effectively, and it appeared that teachers in general face a lack of support from school and Ministry of Education to teach EE.

Given Mohammad's story and the other data presented in this chapter, it is possible to suggest that EE in Iran is faced with limited education in and for the environment. Chapter 6 discusses these findings in relation to the EE literature, and presents the conclusions, recommendations and implications, and limitations of this study.

Chapter 6 Discussion, conclusions, recommendations and implications

6.1 Chapter outline

Since 1992, when *Agenda 21* (UNESCO, 1992) argued for the re-orientation of environmental education towards sustainability, the challenge for many countries, including Iran, has been to prepare students to be critically engaged in the resolution of environmental issues (Tilbury, 1995). The research presented here sought to contribute to an understanding of the current state of the EE context in Iranian secondary schools through investigating the environmental awareness, attitudes, and behaviour of secondary school students and teachers in Tehran/Iran. In this context, this final chapter provides discussion and conclusions of the findings presented in Chapter 4 and 5. Finally, the recommendations along with implications and limitations of this research are presented.

6.2 Discussion

The discussion is focused on the main findings of the study and how these relate to the EE literature. The sections are structured according to the research questions that guided the research. Section 6.2.1 addresses research sub-question 1: What are the environmental awareness, attitudes, and behaviour of secondary school students in Tehran? Section 6.2.2 addresses research sub-question 2: What are the environmental awareness, attitudes, and behaviour of secondary school teachers in Tehran?

6.2.1 Students' environmental awareness, attitudes, and behaviour

This research aimed to explore students' and teachers' awareness, attitudes, and behaviour towards the environment. This section provides an in-depth discussion focused on students' environmental characteristics to provide some insights into how EE in Iran may have impacted on them. The following sections therefore discuss the main findings presented in Chapter 4.

6.2.1.1 Environmental awareness of students

As discussed in Section 2.4.2, environmental awareness of students is one of the major components of EE and is clearly highlighted in the objectives of EE in the

Tbilisi Declaration as a prerequisite to action. This section discusses how aware students believed they were of environmental issues, from which sources they felt they learned about these issues, and the actual awareness demonstrated by the students on a range of specified environmental issues.

6.2.1.1.1 Students' perceptions of the environment

An understanding of students' perceptions about the natural environment is important to provide a context for current EE in Tehran/Iran (Liu & Lin, 2014; Palmer, 1998; Sauvé, Berryman, & Brunelle, 2007). These perceptions about the environment and human–nature relationships can give insights into their environmental worldviews. As discussed in Section 2.3.2.3, different meanings, conceptions and perceptions of environment can also coexist (Liu & Lin, 2014; Pointon, 2014; Sauvé, 1996).

The findings of this study indicated variations in students' meanings for the natural environment, although the majority of the students across the focus group interviews and questionnaire respondents (83%) held human-centred views of nature, or anthropocentric views (see Sections 4.2 and 4.4.1). These findings are in line with Pointon's (2014) study with 384 students of 13-14 year olds in England, where the majority of respondents (more than half) exhibited an anthropocentric perspective. Similar findings were also observed by Loughland et al. (2003) and Loughland et al. (2002), who found that Australian students (9-17 year olds) tended towards an anthropocentric view of the environment. However, the findings seem to be in contrast with a recent study in Taiwan (Liu & Lin, 2014), where the majority of the undergraduate student participants indicated a pro-ecological understanding about nature. It is not clear whether the human-centred view of Iranian students is due to their age, or whether there is a cultural component – or both.

In this study, Iranian students seem to be mainly using a typology consistent with Sauvé's (1996) analysis (see Section 2.3.2.3). According to her study, different meanings for the environment include: environment as nature, environment as a resource, environment as a problem, environment as a place to live, environment as the biosphere, and environment as a community project. Sauvé's typology has been helpful for interpretation of the data regarding students' views about the environment. Comparing the findings with Sauvé's ideas, the two main themes that come out from the data were the environment as a place to live for “us” or as

the biosphere in which all organisms live together. However, when students were asked about their meanings for the environment, they did not talk about the environment as a “community project” or as a “problem”, both of which are included in Sauv  s typology. This suggests that the current Iranian context may not encourage or support students to think of the environment as a community project. This became more clear when the most uncommon environmental behaviour reported by the students was involvement in communicating and working with others on environmental issues (see Section 4.6.1). Importantly, students “who perceive the environment as an object may not necessarily grasp and understand the need to take personal responsibility for it” (Yavetz et al., 2014, p. 366). This raises questions about whether secondary schools in Iran should place more emphasis on students’ perceptions to increase students’ understanding of their relationship with the environment, which is likely a pre-requisite to positive environmental attitudes (Schultz, Shriver, Tabanico, & Khazian, 2004). The social and cultural context in Iran also likely influences students’ views about the environment (Johnson, Bowker, & Cordell, 2004; Stern, Dietz, & Guagnano, 1995). For instance, if there is the general perception in Tehran that the environment is something to be exploited, then it is unlikely that students will think of the environment as a place where people and the environment are in a mutually sustaining relationship. This could be in contrast to the students who live in rural areas in Iran, who might have a more inter-dependent view about the environment. Therefore, further research investigating the influence of urban versus rural backgrounds on students’ understanding about nature would be of value. (In Iran, approximately two thirds of the population lives in highly populated urban areas.)

Students’ experiences in the natural environment are likely to have an influence on their perceptions. All the students in the focus groups were able to talk about experiences that they had had in the natural environment, but most of them focused on negative experiences or aspects, including seeing pollution when visiting forests, beaches, rivers and lakes. It is reasonable to assume that they had some good experiences as well, but they did not mention these. Despite prompting students to consider positive experiences, students seemed more inclined to talk about negative ones, which suggests that there was concern, in particular about environmental pollution. Considering that these students are growing up in a world challenged by significant environmental issues, experiencing and facing

these issues may cause students to be physically vulnerable as well as emotionally concerned. Palmer (1993) noted that students' experience in the environment is an important factor in developing their environmental concern. But being concerned and only recollecting negative experiences may have some undesirable consequences (see Section 6.2.1.2.1).

The findings of students' perceptions of the environment verified that perception plays a significant role in students' environmental awareness and this is consistent the theoretical model which has been introduced in Section 2.6. However, there seemed to be some contradictions in terms of interrelationship between students' actual environmental knowledge and their perception; their relatively high level of knowledge did not always align with their perceptions. Students' actual environmental knowledge is discussed in the following section.

6.2.1.1.2 Students' understanding of complex environmental issues

Students' understanding of complex environmental issues might guide them towards resolution of the problems (Kollmuss & Agyeman, 2002). Because of this, the current study set out to identify what Iranian students think about their level of environmental awareness and how much they know about a set of local and worldwide environmental problems. The majority of the Iranian students in this study rated themselves as not well informed about environmental issues in Iran/Tehran (see Section 4.5). However, when they were asked about their familiarities about a range of environmental issues, they reported a high level of awareness. This finding is in line with the PISA research in 2006 where the vast majority of students from 57 countries reported that they are familiar or at least they know something about environmental issues (OECD, 2009). An issue that Iranian students indicated they knew a lot about was air pollution, which was also indicated by many students in the PISA study. In addition, when Iranian students' actual environmental knowledge was probed in the questionnaire, again they revealed a relatively high level of knowledge. These findings are in line with a number of previous studies that have indicated a high level of students' environmental knowledge (e.g., Negev et al., 2008; Thomson & De Bortoli, 2008). The contradiction between students' actual environmental knowledge and their self-evaluation seems to reflect a low level of students' confidence in their environmental knowledge. However, students' uncertainty about their

environmental knowledge could be due to a lack of quality teaching about the environment in schools.

Students indicated that they are more aware of those environmental issues which have more direct effects on their lives, which raises the important issue of context (Tilbury, 1995). For example, students indicated that they had awareness about air pollution and associated issues, such as greenhouse gas effects and global warming issues. It is reasonable to assume that they know about these problems because they are relevant to their daily life and are frequently covered in the media, particularly on TV (Strife, 2012) and in newspapers (Hillcoat et al., 1995). This finding is also consistent with a study in Hong Kong (Chan, 1998), which found a high level of environmental awareness amongst 1032 secondary school students, particularly about issues such as air pollution and wildlife, both of which were connected to students' lives in Hong Kong. However, being environmentally aware does not necessarily lead to taking action. In other words, the challenge for EE is to transfer awareness into action. This is discussed further in Section 6.2.1.3.

Students were least knowledgeable about issues related to energy and natural resources, with just over half reporting that they felt they were informed of the energy shortages issue (see Section 4.5.2.2). Once again, this lack of understanding could be attributed to their everyday lives as they do not tend to face these issues because of the abundance of energy resources in Iran. Chan (1998) interpreted a lack of understanding of an issue as indicative of the low priority of such environmental issues for the students. However, issues related to natural resources should be more deeply considered to make Iranian students more aware of these issues and future resource availability.

6.2.1.1.3 Sources of environmental awareness

The findings from the questionnaire and focus group interviews indicated that media, in particular TV, was the central source of environmental information for the students and influenced their environmental awareness. Other information sources reported by students included school, the Internet, and family and friends. These findings are consistent with several other studies that have indicated TV/media and school are the main sources of students' environmental awareness in the US (Roper Starch Worldwide, 1994; Strife, 2012), the UK (Morris & Schagen, 1996), Hong Kong (Chan, 1998), and Australia (Connell, 1998). In contrast, the PISA 2006 (OECD, 2009) findings indicated the greater importance

of school relative to other sources of environmental awareness, with media (TV, radio, newspaper or magazines) placed second after school across all countries.

The findings in the current study indicate that school has less influence on Iranian students' environmental awareness than popular media. In addition, this study and others provide evidence that there is no single way in which students learn about the environmental issues. While TV was reported as the most common source of environmental awareness, students across the studies referred to above also indicated the importance of other sources, such as school, the Internet, family and friends, and books. The PISA findings suggested that if students are gaining information from multiple sources of learning, it can reinforce their attitudes and behaviour towards the environment. Furthermore, studies of student learning about environmental issues through media alone do not necessarily show a positive correlation with development students' knowledge about the environment. For example, the findings of one study in Turkey by Alp et al. (2008) indicated that media was the main source of information for students, but they had low level of environmental awareness regarding topics such as recycling, water and energy usage, and environmental pollution. The authors concluded that media reports were not helping to increase the students' environmental awareness across a range of issues. Together, these findings offer insights for educators and policy makers in Iran, and around the world, of the role that secondary schools, teachers, and students' parents can play in developing students' environmental awareness.

6.2.1.1.4 Environmental learning at school

As discussed in Section 4.3, although EE has no specific place in the Iranian National Curriculum, students have opportunities to learn about a range of environmental issues in their secondary schooling. This study found that nearly half of students' recollections (47%) were linked to their EE in their secondary schooling, with chemistry in the first year of secondary school and geography in the second year the major subjects in which students reported learning about environmental topics. Only a few students in the focus groups mentioned learning about environmental topics in biology, particularly in the first year of secondary schooling. However, this study found that the majority of the students were not satisfied with their EE.

Although the National Curriculum contains opportunities for teaching about various environmental topics, students generally reported that they had not been influenced by these. Possible explanations for this could be a lack of detail in subject content, a lack of the teacher's ability to implement EE effectively, lack of strong curriculum support for EE – or even an undervaluing by the students of the topics. In New Zealand, Chapman (2004) noted that a lack of curriculum support for EE has led to the marginalisation of EE in the curriculum. Similarly, Eames et al. (2008) argued that because EE is not compulsory, and consequently had no achievement objectives like other compulsory learning areas, teachers would need to justify their environmental teaching for the purpose of students' environmental learning. Overall, this study indicates that EE in secondary schools in Iran does not offer sufficient opportunities to support students' environmental learning. A major contributor to this could be the lack of outdoor education, which was reported by the majority of the participants.

6.2.1.2 Environmental attitudes of the students

In general, the data from the questionnaire and focus group interviews indicated that the students had positive attitudes towards the environment. In particular, students' environmental attitudes tended to be strongly positive with respect to those questionnaire items that were more general in nature and had less direct impact on their lives. For instance, students strongly supported the importance of interdependence in ecosystems (92%) and protecting the environment for future generations (95%) (see Sections 4.4.3 and 4.4.5). This finding is in line with the study by Ivy et al. (1998), which indicated that secondary school students (15-16 year olds) in Singapore had positive attitudes towards preventing waste disposal in the oceans, the conservation of forests, and reducing ozone depletion – which all could have been perceived to have a less easily discernible impact on Singaporean students' everyday lives. Ivy et al. suggested that such positive attitudes might be 'learned responses'.

In contrast, students' pro-environmental attitudes reduced and the level of diversity in attitudes increased in this study when the items implied personal sacrifices in order to protect biodiversity or reduce air pollution. Again, these findings are in line with a number of previous studies, which have similarly indicated low levels of pro-environmental attitudes when relating to students' own environmental behaviour and personal sacrifice. For instance, in a recent study,

Carmi (2013) found that Israeli undergraduate students understood “sacrifices for the sake of the environment as actually contradicting their own future interests” (p. 438). On the other hand, findings in this study indicated that students’ pro-environmental attitudes were associated with concern for their own health. Furthermore, 93% of the students perceived that environmental protection is a responsibility of every citizen. This was consistent with the Singaporean study by Ivy et al. (1998), who found that 90% of their participants reported that everybody should be responsible for the protection of the environment. Stern et al. (1993) argued that these values, which can transfer beliefs into action, are much less mutable. But, again, when items challenged their future job opportunities and personal freedom in order to protect the environment, Iranian students’ attitudes were not as positive, indicating the cost of personal sacrifices on their environmental attitudes.

Regarding economic sustainability, students had positive attitudes towards preserving wilderness areas. However, this contradicted their more negative environmental views about valuing environmental protection over economic development. This latter finding is in line with studies by Yilmaz et al. (2004) and Alp et al. (2008), which found that elementary and middle school Turkish students were not willing to give priority to environmental protection over economic development although they were concerned about the importance of environmental issues. Perhaps Iran and Turkey’s status as developing countries, with many social and cultural similarities, means that it is difficult for students in these countries to value environmental protection over economic growth.

Findings from this study also indicated considerable attitudinal uncertainty, with Iranian students recognising that humans are causing environmental issues but that they were not sure about the benefits of environmental protection when compared to the problems caused. Similar to Ivy et al.’s (1998) study, Iranian students had low levels of pro-environmental attitudes concerning the relationship of humans with nature (see Section 4.4.1), reflecting a shift from a pro-ecological worldview to an anthropocentric worldview in the NEP items. Perhaps this shift could be because the students lived in a big city, where they are less interconnected with nature and consequently may have less value for nature compared with students who grow up in a rural environment. There is a consensus in the EE literature that direct interactions with natural environments and

participating in out-door activities play an important role in developing human-nature relationships which shape pro-environmental attitudes (Goldman et al., 2006; Palmer et al., 1999; Stevenson et al., 2014). The lack of students' interactions with nature through schooling was evident in that they reported very little outdoor education organised by their schools. This lack of interconnection of students with nature highlights a gap for curriculum designers in Iran, with the need to introduce more outdoor education related to the environment.

As discussed in Section 2.3.3.1, the general consensus among researchers is that environmental attitudes are constructed on three underlying levels (Hansla, 2011; Schultz, 2001; Stern & Dietz, 1994; Wesley Schultz & Zelezny, 1999). Considering these bases for environmental attitudes – towards the individual (egotistic), all people (social-altruistic), and all living things (biospheric) – it appears that Iranian students have more egotistic environmental attitudes, as findings indicated that they thought of environmental consequences on their personal lives more than other aspects. In general, children and teenagers tend to be much more egotistical (Hicks & Holden, 2007). They don't tend to know or relate so much to the world beyond themselves and their family. As they get older they learn more about the world beyond their personal lives and begin to think more about the environment. A research study involving 14-18 year old British students by Hicks and Holden (2007) showed that teenagers were optimistic about their personal future but less optimistic about the quality of life of others in Britain or around the world. Perhaps this individually-centred way of thinking is reinforced by the cultural context. My experience as a young person growing up in Iran was that within Iranian culture there is a heavy emphasis on individual achievement. For example, students "get ahead" by sitting exams individually in order to compete for places in universities (Kamyab, 2008). This individualistic way of being is not very conducive/supporting for solving environmental issues, which usually require a social approach with the cooperation of many people acting together rather than as individuals.

The present study also explored the environmental attitudes of students by examining their views of agency and attitudes towards environmental behaviour. While in general, students revealed positive attitudes towards the environment, they were less positive about their perceived ability and willingness to take future action for the environment. This low level of agency is likely related students'

self-efficacy – their belief that they are able to make a difference through their environmental actions (see Section 6.2.1.3.1 for further discussion). In addition, researchers have indicated that transforming a sense of obligation into environmental action is complex, difficult, and may depend on many factors, such as social context, income, knowledge of action strategies, and level of education (Eden, 1993). However, it was not within the scope of this inquiry to explore the reasons behind students' sense of responsibility, or their low self-efficacy.

6.2.1.2.1 Environmental concerns of the students

This study explored students' environmental concerns, along with their emotional reactions to environmental issues they thought were important. Almost all the students expressed concern about seven specified environmental problems (air pollution, energy shortages, extinction of plants and animals, clearing of forests for other land use, water pollution, over population, and climate change), with most concern expressed about air pollution (93% of the students, see Section 4.5.2.1). This finding is in line with the PISA report in 2006, where an average 92% of students all over the world reported their concern and responsibility towards air pollution (OECD, 2009). This concern and positive attitude towards air pollution was “fairly consistent across countries, with the proportion ranging from 82% in New Zealand to 98% in the Czech Republic” (p. 52).

Of the seven environmental issues, students were also least optimistic about the improvement of air pollution over the next two decades. Again this finding is similar to the PISA research, where in general students in other countries were not optimistic about the improvements of environmental issues in the future, with only less than one fifth of students optimistic that air quality will improve over the next 20 years (OECD, 2009). Students in the current study also had concerns about the future related to water pollution and water scarcity, which have recently become major problems in Iran. In the focus groups, they expressed fear, hopelessness, worry, and sadness when discussing their feelings about the future state of the Earth. These findings are in line with other studies across different cultures, such as American, British, Mexican, and Australian, which indicated many students are fearful, cynical, and pessimistic about environmental issues (Barraza, 1999; Connell, 1998; Hicks & Holden, 2007; Hutchinson, 1997; Strife, 2012).

Feelings of anxiety and fear might lead to feelings of helplessness, which may in turn cause students to feel overwhelmed by environmental issues. Importantly, these negative feelings could have an impact on Iranian students' willingness to take action, including immediate and long-term participation in addressing environmental problems. Overall, Iranian students in this study expressed feelings of powerlessness to make a positive change for the future of the environment. This is in line with Connell et al.'s study (1999a) in Australia where 15-17 year old students felt hopeless and incapable of changing the environment for the better. Such studies are important because they indicate that many students around the world have similar negative feelings, including powerlessness towards improving the environment. This may result in the lack of participation and engagement in environmentally responsible behaviour (Strife, 2012). Strife also stated that, "an awareness of the possible solutions to environmental problems was associated with hope for a better world and hope for positive change" (p. 50). Therefore, the finding that large proportions of students in this research indicated a sense of hopelessness regarding the future of the environment should motivate educators and policy makers in Iran to critically consider how to address this through EE that can empower students.

The findings of students' concerns about a list of environmental issues shows that environmental concern is a component that led them to have positive attitudes towards environmental protection (see Section 2.3.3.1 and the theoretical model in Section 2.6).

6.2.1.3 Environmental behaviour of the students

The ultimate goal of EE is to "make present and future citizens capable of acting on a societal as well as a personal level" (Jensen & Schnack, 2006, p. 472). Therefore, one aim of this study was to investigate students' level of participation in different environmental actions. To do this, students were questioned about a range of possible environmental actions. These included 17 items relating to energy saving and conservation, nature-related activities, cleaning up the environment, "3-R" activities (reduce, reuse, recycle), planting trees, and participation in environmental activities organised by clubs or organizations (see Section 4.6.1).

In general, the findings suggested that actions which were easy to perform and have an economic benefit, such as turning off lights, were more likely to be completed than those that required higher levels of commitment, like participating in tree planting or commitment to environmental activities organised by clubs or organizations (see Section 4.6.1). Findings also indicated that the motives underpinning the ‘easy’ actions may not have been completely environmental. For instance, students reported low levels of commitment to taking shorter showers, indicating a contradiction in behaviour when considered from an environmental view (they were much more likely to turn off the tap while brushing their teeth).

While the previous sections discussed the espoused high level of environmental awareness and attitudes among students, and their concern about environmental issues, it seems actions to address these concerns were inconsistently manifested (Cleveland, Kalamas, & Laroche, 2005). This inconsistency reflects contradictions between what students say and what they actually do (Scott & Willits, 1994), and may be related to a lack of knowledge of action strategies (Hines et al., 1987), or the influence of factors such as agency, locus of control, and intention to act (Alp et al., 2008). (Note that locus of control is seen as slightly different to agency, as locus of control depends on the availability of resources as well as internal ability.) As Eden (1993) noted, “the inconsistency between attitudes and behaviour is more pronounced as the individual wants to be environmentally friendly but also to have luxuries—the desires pull both ways” (p. 1754). In addition, understanding how and why environmental behaviours occur is a challenge because they are complex (Heimlich & Ardoin, 2008; Kollmuss & Agyeman, 2002) and largely situation-specific (Cleveland et al., 2005), which makes them difficult to transfer to other situations.

Fewer students were likely to report being involved in nature-related activities such as watching documentary movies on TV on wildlife; reading books or magazines with an environmental message; spending time in the natural environment; and planting trees, vegetables or doing gardening at home. These kinds of activities depend on the availability of resources (external locus of control) as well as the cultural context. For instance, the majority of the students in Tehran do not have the opportunity to garden at home because they live in apartments. In addition, these activities require more effort and commitment. It should be noted that although reading books or magazines and watching

documentary movies don't require more effort, students still showed a lack of high interest towards these activities. However, Goldman et al. (2006) found that such behaviours occur with high environmental commitment among Israeli students, possibly because students perceive these actions as leisure activities rather than environmental behaviours. In addition, Israeli students may engage in these kinds of activities because it is relatively convenient to do so (Johnson et al., 2004).

Although a large proportion of Iranian students indicated that they were aware of recycling and had positive attitudes towards doing it, "3-R" actions were reported to be relatively low. For instance, 65% of the students reported they never recycled paper at school. This finding is in contradiction with Goldman et al.'s (2006) study, which found high levels of recycling among Israeli students. The finding of this study in regard to recycling paper at school is disappointing because this activity is relatively easy to do and has positive environmental outcomes. The reason for the lack of action may be because there is insufficient access to these types of services, such as lack of recycling bins, which raises the issue of the context in which environmental action takes place. Perhaps, with effective EE, students would demand mechanisms for recycling paper at their school. In other words, it seems Iranian secondary schools are not taking the opportunity for providing this (low) level of EE at schools at present. As Heimlich and Ardoin (2008) argue, people usually behave in ways that are consistent with their culture, availability of resources, socialization, and enculturation.

The lowest level of students' environmental behaviour evident in the findings was commitment to collective actions, particularly to environmental activities organised by clubs or organizations (71% reported that they never participated). This finding is again in line with Goldman et al.'s (2006) study, which found that this had the lowest level of commitment by Israeli students. As indicated earlier, this could reflect that in the Iranian culture there is a heavy emphasis on individual achievement. The findings of the students' environmental behaviour illustrate that the role of cultural norms as discussed in Section 2.6 (see Figure 2.6) is considerably important for the lack of actions among the students. This cultural influence has even been argued to extend to other fields of Iranian performance, such as sports and arts. For instance, "Iranians are good at individual sports such as wrestling and in literary activities such as writing novels or making movies, but

not in collective activities” (Gheissari, 2009, p. 243). Additionally, more than a half of the Iranian students in this study reported that they never talked with friends about environmental issues. This also may reflect the lack of social involvement in communicating and working with others towards solving environmental issues. However, this finding may also indicate that a substantial number of students were not really concerned about environmental problems, as generally when people are concerned about issues, they talk and share with friends or people around them about these issues. Again, the contradiction between what students indicated about their concerns in the survey (an indicated by high level of concern) and their actual environmental behaviour is noteworthy.

Jensen and Schnack (2006) theorized that an environmental action must be a conscious decision and should be targeted towards the resolution of environmental problems (that is, addressing the source of the problem rather than the downstream impacts). Pro-environmental actions also require effort and skills to be completed (Heimlich & Ardoin, 2008). For instance, when students reported they frequently turned off lights, their motivation to do this could be because this behaviour is easy and has a direct financial impact. Note that the cost of electricity in Iran is relatively high. Such a simple behaviour could not be characterised as pro-environmental behaviour if students are not doing it for environmental reasons. Therefore, EE in Iran needs to do more than just teach these types of actions, or the education system runs the risk of teaching students “a simplistic and individualistic approach to environmental problems” (Jensen & Schnack, 2006, p. 480).

6.2.1.3.1 Students’ intention to act and locus of control

The low level of students’ reported environmentally responsible behaviour in the present study may be explained by their perceived locus of control, self-efficacy, and their intentions to act. Students’ locus of control and sense of empowerment likely helps explain why students were highly concerned about environmental issues, but their concern did not translate into actions, which are more complex. In this study, half of the students indicated that they were not sure about their ability to change the environment through their own actions, and a further 9% of the participants indicated that they definitely did not have the ability to make a difference for the future of the environment (see Section 4.6.2). Other studies indicate that the locus of control acts as a moderator and has a direct influence on

students' environmentally responsible behaviour (e.g., Alp et al., 2008; Hwang et al., 2000; Meinhold & Malkus, 2005). It seems that at least some Iranian students feel that the situation is beyond their control. Building on Alp et al., this feeling could derive from their lack of perceived external locus of control. However, the relationship between locus of control and pro-environmental behaviour may vary significantly from behaviour to behaviour (Cleveland et al., 2005). In addition, Hwang et al. (2000) found that general knowledge about environmental issues has a small effect on locus of control. They suggested that knowledge about action skills and action strategies might be more important for increasing students' locus of control. Further, Heimlich and Ardoin (2008) have shown that the locus of control could be influenced by factors such as income and educational level. However, it was not within the scope of this study to identify the factors influencing students' locus of control, and more research is required in the Iranian context.

A general consensus among researchers is that a high level of locus of control is positively connected with an increased intention to act (Boyes et al., 2009; Hwang et al., 2000). For example, a number of studies have indicated that intention to act is one of the most important factors influencing the performance of environmentally-responsible behaviours (e.g., Alp et al., 2008; Boyes et al., 2009). As an example, Alp et al. found low levels of willingness to take environmentally friendly actions among 1140 Turkish primary school students. The authors theorized that their participants were not aware enough of the consequences of their actions on the environment. There were indications of similarities to this in terms of the Iranian students' behavioural intentions and their environmental behaviours (see Sections 4.6.1 and 4.6.2), but exploring this relationship was beyond the scope of this study.

Importantly, the majority of the students in this study (65%) indicated that they would be willing to contribute to a school organization aiming to improve the quality of the environment. About two thirds (61%) of the participants were prepared to take action if they knew more about how to care for the environment in their community. Considering that the lowest reported behaviour item was participation in organised clubs, it seems that the students see their schools as having potential to help them commit to taking environmental action.

Overall, the findings suggested that actions such as cleaning up rivers, streams and coastlines, which are more difficult to do, were less likely. In addition, a high level of uncertainty and low intention to act seemed to be associated with indirect actions, such as writing to politicians about environmental concerns, or increasing taxation to contribute to environmental protection. Boyes et al. (2009) suggest that students need to feel empowered that their environmental actions will have an effect. Possibly, students in this study did not fully understand the implications of these types of actions on the quality of the future environment. Hence, perhaps students did not see the value of writing to politicians or considering issues such as taxation. Overall, based on the findings related to students' environmental behaviour, this research offers insights into areas of focus for EE in Iran, including the development of students' pro-environmental behaviour, particularly group action, and encouraging them to consider the effectiveness of different types of environmental actions, in order to target the root cause of environmental issues.

6.2.2 Teachers' environmental awareness, attitudes, and behaviour

The personal and professional environmental awareness, attitudes, and behaviour of teachers are important to developing EE programs. As highlighted in Section 2.4.2, UNESCO-UNEP (1990) identified teacher education as "the priority of priorities" (p. 1). This research aimed to explore Iranian teachers' awareness, attitudes, and behaviour and the influence of these factors on their teaching about environmental issues. The following sections discuss the main findings presented in Chapter 5.

6.2.2.1 Teachers' personal environmental awareness

As discussed in Section 2.4.2, teachers' understanding of the concept of the 'environment' may influence effective EE (Yavetz et al., 2014). Because of this, this research explored teachers' perceptions about different meanings for the environment. Half the teachers (6/12) had a human-centred perspective about the environment, reflecting its object dimension. This finding is similar to that in a recent study in Israel (Yavetz et al., 2014) and the study by Van Petegem et al. (2007) in Zimbabwe, in which pre-service teachers did not have a broad understanding of all components of the environment. This teacher view about the environment could possibly have influenced Iranian students in this study, as the

students also revealed mainly human-centred perspectives about the environment (see Section 6.2.1.1.1). It could also reflect broader cultural influences.

More positively for EE, an ecosystem, or inter-related, view in which the environment was perceived as mutual interactions between humans and nature was held by five of the 12 teachers. Nonetheless, these teachers indicated a limited understanding about the concept of the environment as they did not refer to the importance of social, economic, and political impacts on the environment. This emerging issue became more apparent when five teachers reported a lack of understanding about the concept of sustainability. An incomplete or even moderate level of understanding about the environment is consistent with a low level of environmental awareness and likely reflects a lack of environmental training and professional preparation (Yavetz et al., 2014) (see Section 6.2.2.4 for further discussion).

Findings demonstrated the need to enhance the environmental understandings of the Iranian teachers, particularly about the concept of sustainability. Birdsall (2014) also found a low level of understanding of sustainability among many pre-service teachers in New Zealand, further reporting that over half of her participants were not able to accurately rate their own level of understanding. The need for development of Iranian teachers' understandings about the environment is highlighted by four teachers in the current study who considered themselves as either not adequately aware or as having an moderate level of awareness about environmental aspects in general, although most of the teachers expressed an intention (or desire) to know more (see Section 5.2.3).

The reasonably low level of teacher personal environmental awareness may not be sufficient for helping Iranian students to understand environmental issues, which are complex and often interrelated with environmental perspectives of the people. As the findings indicate (see Section 5.2.3), factors such as level of education (Özden, 2008) and teaching experience (McKeown-Ice, 2000) could be influencing Iranian teachers' personal environmental awareness. The significance of awareness as a key factor in EE becomes more evident in the finding that the majority of the teachers reported that lack of awareness and understanding among Iranians is the main reason that people in general do not value the environment. This lack of awareness can constrain agency and personal responsibility towards taking pro-environmental behaviour (Eden, 1993).

6.2.2.2 Teachers' personal environmental attitudes

Findings from the present study indicated that the participating teachers had a variety of reasons for teaching about environmental issues. These reasons appeared to be linked to their personal environmental attitudes. This is supported by EE literature, in which personal background, perspectives, and life experiences are reported as shaping teachers' attitudes and beliefs towards teaching environmental issues (Kennelly et al., 2008). Esa (2010) noted that "life experiences serve to inculcate values that are retained and reinforced during the teachers' life as a student teacher and intern" (p. 41). In this study, teachers who were originally from rural areas seemed to have greater interest in, and more positive attitudes towards, teaching about the environment than those from urban areas, although the experiences of a larger group of teachers would need to be further investigated to confirm this. Interestingly, this finding is also inconsistent with the study by Ozden (2008), which found Turkish student teachers who lived in big cities had more pro-environmental attitudes towards environmental issues than those from countryside. Ozden suggested that the intensity of environmental problems in big cities could be the main reason affecting the student teachers' positive environmental attitudes. However, the findings of the current study suggest that being more closely connected with the natural environment might be a reason teachers from rural residential districts have pro-environmental attitudes towards the environment and environmental teaching.

Similar to Palmer's (1993) study, half the teachers in the current study reported the significant effect that teaching about environmental issues had had on their personal lives. In addition, Ozden (2008) found that the academic major of the teachers was a factor affecting teachers' environmental attitudes. A similar finding in this study showed that teachers liked teaching about the environment because it was related to their academic major, and therefore the subjects they had studied at university and now taught at schools (see Section 5.2.4).

6.2.2.3 Teachers' personal environmental behaviour

Evaluating teachers' self-reported personal environmental behaviour indicated different levels of environmental commitment in their daily lives (see Section 5.2.5). As with many of the students, the teacher findings indicated that teachers' personal pro-environmental attitudes were not effectively translated into pro-

environmental behaviours. Although the teachers reported commitment to actions related to energy and resource saving, and using public transport, there was a general lack of personal pro-environmental behaviour among the teachers. As discussed earlier (see Section 6.2.1.3), actions such as energy saving are likely more common because they are relatively easy to perform, or due to financial motivation.

Again, these findings are in line with other international studies, such as in Malaysia (Esa, 2010; Said et al., 2003) and Israel (Yavetz et al., 2014), which indicated that many teachers implement these sorts of actions. For example, Esa (2010) found that among 115 Malaysian pre-service teachers, 95% of the participants made efforts to save electricity and 93% tried to turn off the tap water when brushing their teeth. Esa also found that actions such as walking rather than taking a private car over a short distance, which takes more effort than turning off lights, was less practiced – fewer than a quarter of the teachers undertook such an action. The current study found a similarly low level of teachers' commitment regarding activities that need more effort, such as using a bicycle (only one teacher) or participation in environmental clubs (only one teacher).

Additionally, similar to students, teachers undertook individual types of environmental actions rather than group approaches, such as cooperating with NGOs. This possibly suggests a cultural norm, with Iranian students and teachers more comfortable taking individual action. This finding is also in line with several previous international studies from Israel and Greece (e.g., Boubonari et al., 2013; Esa, 2010; Goldman et al., 2006; Hsu & Roth, 1998; Stir, 2006) that teachers were more comfortable taking individual types of environmental actions than collective actions. Boubonari et al. (2013) speculated that because of a lack of social trust among Greek people, teachers might avoid participating in collective action. They also suggested that the teachers might have a lack of self-efficacy about the effects of such actions to bring any changes on the environment. It was not within the scope of the study presented here to investigate the reasons for more individual approaches to action, rather than group approaches.

6.2.2.4 Teachers' professional environmental awareness

As reviewed in Section 2.4.2, teachers' professional environmental awareness can be influenced by factors, such as curriculum, training, pedagogy, and subject

matter (Corney, 1998). This distinctive awareness, teachers' professional environmental awareness, has also been described by educators as teachers' environmental content knowledge.

There is general consensus among EE educators that teaching of EE should begin with teachers learning about environmental topics as a first step in developing their EE PCK (Goldman et al., 2006; Kennelly et al., 2008; Meredith et al., 2000; Mosothwane & Ndwapi, 2012; Nagra, 2010). Supporters of this view believe that if teachers are well trained, their level of self-efficacy to teach EE in the classrooms may increase, supporting the implementation of EE. In addition, EE training needs to address "ways of representing and formulating the subject that make it comprehensible to students" (Corney, 1998, p. 94). Training should therefore include both pedagogical and subject matter knowledge, each of which is significantly important to teaching.

The teachers in the present research were highly experienced in teaching, represented a range of curriculum areas and held diverse qualifications (see Sections 5.3.1 and 5.3.2). However, these highly experienced teachers had no official training in EE. Possible explanations for this lack of training are that education policy makers in Iran are not sufficiently concerned about the development of EE and teacher education, or there are other competing priorities, or they don't have facilities such as curriculum development specialists in EE, funding, and time to develop EE training courses for teachers. Mosothwane and Ndwapi (2012) found that because of a lack of EE training, Batswana pre-service teachers did not identify themselves as successful teachers in implementing EE in schools. In another example, Yavetz et al. (2009) found that their academic studies and training had not influenced Israeli pre-service teachers' environmental literacy, because teachers had little contribution from their academic studies to develop their levels of environmental awareness, attitudes, and behaviour.

In terms of curriculum, according to education policy documents, EE is embedded in many parts of the Iranian secondary school curriculum, particularly in geography and biology. However, some teachers in this study mentioned the simplicity of content of the environmental topics in the curriculum (see Sections 5.3.4.3 and 5.3.4.6). In addition, as with Gayford and Dillon's study (1995), teachers in the current study reported being inadequately supported by their school structure and educational authorities to teach and implement EE at schools.

Gayford and Dillon theorized that a lack of EE training and professional development support could lead the teachers to use means beyond their mandated textbook, such as their own general knowledge, to generate participation. As most of the teachers in this study wished to have more personal environmental awareness (see Section 6.2.2.1) as well as professional environmental awareness to help their students become better aware of environmental issues, education policy makers in Iran could usefully review the curriculum in order to include more in-depth environmental content, and establish EE training for teachers.

6.2.2.5 Teachers' professional environmental attitudes

Teachers' professional environmental attitudes regarding the relevance, and importance, of EE for students were found in the present study to be very positive, with all the teachers professing pro-environmental attitudes. Teachers' positive attitudes were mainly linked to the importance of EE for students to develop lifelong habits – a view expressed by nine of the 12 teachers (see Section 5.3.3). In addition, the significance of EE for the future generations was emphasised by six teachers. Ko and Lee (2003) also found favourable environmental attitudes among Hong Kong teachers and a valuing of the importance of EE for school students. Ko and Lee's participants believed that EE is linked to attitudes education, and helps students to learn how to contribute to a better environment. It has been recommended that EE should start at early ages in life to promote students' lifelong learning (Mackey, 2012; UNESCO, 2008), and this view was supported by the participating teachers.

A high level of professional environmental attitudes among the teachers in this study was evident when all of the participants reported that EE is more important than other curriculum areas. Mohammad (geography teacher) said: "EE is more important because other subjects can live under environment's shadow. Environment defines life and human existence. If humans and the environment are not interrelated with each other there is no need to learn other sciences" (Section 5.3.3). In line with this, Mosothwane and Ndwapi (2012) found that teachers in Botswana perceived EE as an essential subject for developing the environmental awareness of school students.

There appears to be a consensus among EE researchers that teachers with positive professional environmental attitudes are more likely to demonstrate environmental

behaviour in their profession (Kennelly et al., 2008; Ko & Lee, 2003). However, this study found that teachers' professional positive environmental attitudes do not necessarily translate into EE / actions in the classroom, as discussed in the following section.

6.2.2.6 Teachers' professional environmental behaviour

Taking into consideration the range of settings in which EE could take place in Iranian secondary schools, this research sought to gain insights into how teachers' professional environmental awareness and attitudes interact with their environmental teaching practice.

Teachers' intentions to act

Findings from the current study indicated that teachers wanted to have more opportunities to take students for learning experiences out of the classroom, as they thought education *in* the environment was more effective based on the tangibility of the environmental issues in outdoor education. Similarly, Ko and Lee (2003) found in Hong Kong that secondary school teachers indicated that the best way of teaching EE is through field experience. However, the authors indicated that only 27% of participating teachers had used this method in their teaching. Regarding the importance of outdoor education, Cosgriff (2008) said: "Outdoor education are "skill-full" adventures that foster students' connectedness with local environments, help develop sustainable human-nature relationships, and promote orientation towards environmental action" (p. 23).

Although Iranian teachers' intentions to arrange outdoor education experiences were high, their actual practice was significantly lower, with teachers reporting using lecturing as their main teaching method. This is discussed in the following paragraphs.

Teaching methods for EE

EE can be taught using a variety of ways, which may reflect a teacher's own value judgments (Corney, 1998). In the current study, traditional methods such as lecturing were found to be the most frequently used method for teaching EE, indicating a teacher-centred approach to environmental teaching – and possibly teaching in general. Ko and Lee (2003) found that lecturing, which requires relatively less preparation time, was the most popular way of teaching EE among

Integrated Science teachers in Hong Kong. While some teachers may argue that the lecturing method has an advantage of covering broad environmental content, this method may develop knowledge but not experience leading to attitude development, and for this to happen students' environmental learning should include education *in* the environment (outdoor education), which would help them to understand the issues from their own experience (Palmberg & Kuru, 2000).

A lack of use of outdoor education was reported by the teachers (see Section 5.3.4.3). Ko and Lee (2003) also found that their participants were not very active in taking students for field trips and outdoor activities. There might be several reasons for this lack in the Iranian context. Firstly, there are no specific places requiring such teaching in the Iranian secondary school curriculum, and often more time is required for education outside the classroom. Secondly, difficulties and risks exist around taking students out of school, such as managing student behaviour and learning in non-classroom settings. Thirdly, there may be the existence of logistical barriers, such as access to suitable locations. According to Ko and Lee, "if a teacher does not actually teach EE as his or her intention predicts, there may be external barriers that prevent him or her from teaching environmental education" (p. 192). Findings in this study indicated that because teachers had to focus on covering all textbook topics, they felt there was no time for 'additional' (environmental) education. Lack of time has been reported as a major constraint to EE by many teachers around the world, including Hong Kong (Chan, 1998; Ko & Lee, 2003), Switzerland (Lindemann-Matthies & Knecht, 2011), and the US (Ham & Sewing, 1988). The Iranian teachers reported feeling overwhelmed with academic pressure as they needed to spend a lot of time preparing students for assessment, including examinations, particularly the university entrance exam which is regarded as very important by students as well as their parents.

Including values education

As discussed in Section 2.4.3.1, there is a strong link between EE and values education (Gayford & Dillon, 1995). Ballantyne and Packer (1996) have argued that teaching environmental issues along with considering values is a more effective way of developing students' environmentally responsible behaviour than teaching of environmental knowledge. In Iran, values education has been considered as fundamental in the pedagogy of educational practice in the

educational system (Ministry of Education, 2011). In the current study, three quarters of the participating teachers (nine out of 12) agreed with the importance of values education in EE and they reported including addressing values in their teaching. In line with this, Yavetz et al. (2014) reported the significant place of value education among Israeli teachers. Gayford and Dillon also found a high level of contribution of British secondary school teachers to value education. But again, similar to the current study, they indicated that few of the teachers (12%) had any particular EE training to help them to address values in their classrooms. In addition, values education is not easily consistent with a teacher-centred style of teaching, or lecturing, which was found to be prevalent among teachers in this study. In contrast, a student-centred approach to teaching – listening to the students’ voices and concerns and encouraging them to get involved in discussions and democratic participation regarding addressing environmental issues – may play a significant role in the effectiveness of EE (Mackey, 2012).

In addition, as Ballantyne and Packer (1996) stated, values education deals more with the process of student decision-making than with learning the content about issues. One of the effective ways of values education in the field of EE is to take students *into* the environment for better understanding of the values of nature. Therefore, in order to address values, Iranian teachers may need to take more responsibility to acknowledge the place of values education and outdoor education for the students.

EE as separate subject

Some teachers in the study were of the view that EE should be taught as a separate subject and that this approach would be more effective for raising the profile of EE and for supporting students’ learning. Within the research literature, there is ongoing debate about whether to teach EE as a separate subject to ensure that it is taught in depth (Lamb, 1998; Yueh, 2007), or whether it should be embedded in other subject areas such as geography, biology and chemistry (Clark, 1975). I support an interdisciplinary approach to EE in the Iranian secondary school curriculum for the following reasons. Firstly, introducing a new subject to an already overcrowded curriculum is not an easy task and requires significant financial and professional development. Secondly, and perhaps the most important reason, the nature of EE is holistic and interdisciplinary as it involves a variety of components such as nature, people, society, culture, technology, and politics. For

example, these components have been infused into the Australian Curriculum as well as the New Zealand Curriculum to assist schools and students to develop the capacity to contribute to sustainability (Australian Curriculum and Assessment Reporting Authority, 2015; Ministry of Education, 2015a). Thus, it can be argued that, instead of a separate subject, EE should be embedded in every academic discipline. However, it should be noted that teachers need to be motivated to teach EE and they need to be supported with appropriate EE training courses.

Encouraging students to take environmental action

Many environmental educators believe that one of a teacher's important roles in EE is to engage students in inquiry practices that support learning *about* and *for* the environment (Forbes & Zint, 2010; Kim & Fortner, 2006; Lucas, 1979; Palmer, 1998). Often, there is an action component – particularly with respect to education for the environment. For example, Yavetz et al. (2014) argue that meaningful learning in environmental teaching involves encouraging students towards decision making and taking action about environmental issues. The findings of this study suggested that the participating teachers encouraged their students to take a variety of environmental actions (see Section 5.3.4.2). The most frequent action teachers encouraged their students to take was to clean up the environment, such as picking up litter and cleaning the classroom. This indicates a contradiction between what theoretical ideas of effective action are and what the teachers were actually doing. The theoretical ideas indicate that these types of actions that are not targeted at the cause of the issue are not very effective (Jensen & Schnack, 2006). Furthermore, little connection may be made by teachers between how this kind of action can help address environmental issues and why they have been undertaken in the first place. In line with this, Silo (2013) found that primary school teachers in Botswana considered cleaning up the environment through actions such as litter pick-ups to be the main strategy for increasing students' environmental actions. Silo indicated that because of the ways teachers' historical and cultural backgrounds had influenced their views of EE (picking up litter is a traditional approach in EE), they wanted students to participate in such activities. Although Iranian teachers also encouraged their students in other environmental participation, such as using public transport, they could focus much more on developing students' understanding in regard to how meaningful environmental actions can influence the resolution of environmental problems.

In summary, both students and teachers had human-centred perspectives about the environment, which may be linked to the individual focus in Iranian education. They also had a high level of awareness of environmental issues and seemed to have positive attitudes towards the environment. However, students showed a low level of agency and locus of control to make a difference for the future of the environment, and teachers seemed to lack an ability to guide them into actions. Teachers are enthusiastic about teaching EE in schools, but face barriers such as class time and a teacher-centred approach of teaching. Most importantly, there was a significant gap between students' and teachers' awareness and attitudes for the environment and their actual behaviour.

6.3 Limitations of the research

This research was an interpretive study and efforts were made to ensure the trustworthiness of data, as per Section 3.7 in the methodology chapter, but that, as with all research, a number of limitations existed.

One of the important limitations of this study was associated with the analysis of the environmental behaviour of the students and teachers using only self-reported data. In self-reported data, participants may not be trustworthy in their responses. Particularly for exploring teachers' professional environmental behaviour and their EE content knowledge, alternative methods of data collection such as classroom observations could have been applied for triangulation of data and investigating the consistency between what teachers said and what they really did in the classrooms. But because of the limitations on time and difficulties in conducting this type of research in Iranian schools, observations were not carried out in this research. Directly observing people's personal environmental behaviour would be very intensive, and for this reason, research in EE often relies on self-report data.

A further limitation in this study was related to cases where students did not explain why they held particular views, and there was no opportunity for subsequent probing at a later date. For example, there were no opportunities to further investigate apparent contradictions in the data, such as when 79% of students supported the idea that "We don't need to worry much about the environment because future generations will deal with environmental problems", compared with 95% who supported the idea that "Protecting the environment is

important for the future generations” (see Section 4.45). For future research, two stages of data collection would offer more opportunities for the researcher to clarify findings which may arise from participants’ responses in the first round of data collection.

It should also be noted that the teachers and students in this study may represent a biased sample of Iranian secondary school teachers and students due to the sample selection and size, but additional research would be needed to verify this. However, the sampling was purposeful in the sense that it acknowledged the possibilities of the transferability of teachers’ data to other Iranian teachers. In addition, different findings may have resulted if the research was conducted in other parts of Iran, including rural areas. Broadening the sample would help to represent a more clear state of EE in Iran, not just in middle-class urban areas. Therefore, it would be worthwhile to conduct further research to explore Iranian students’ and teachers’ environmental characteristics nationwide.

In addition, successful EE programmes strongly need collaboration between students, teachers, and schools to implement EE in an effective way. It would be useful to conduct further research to investigate how collaboration work, particularly in supporting teachers, may engage teachers and students in more effective EE in Iran. Having considered the study’s findings and its limitations, the next section draws the conclusions of this research.

6.4 Conclusions

This thesis examined the environmental awareness, attitudes, and behaviour of secondary school students and teachers towards environmental issues in Iran.

One of the conclusions of this study is that the theoretical model which was discussed in Section 2.6 has been validated. In particular, certain relationships within this model were highlighted within the context of the findings of this study. The theoretical model shown in Figure 6.1 highlights these relationships in bold.

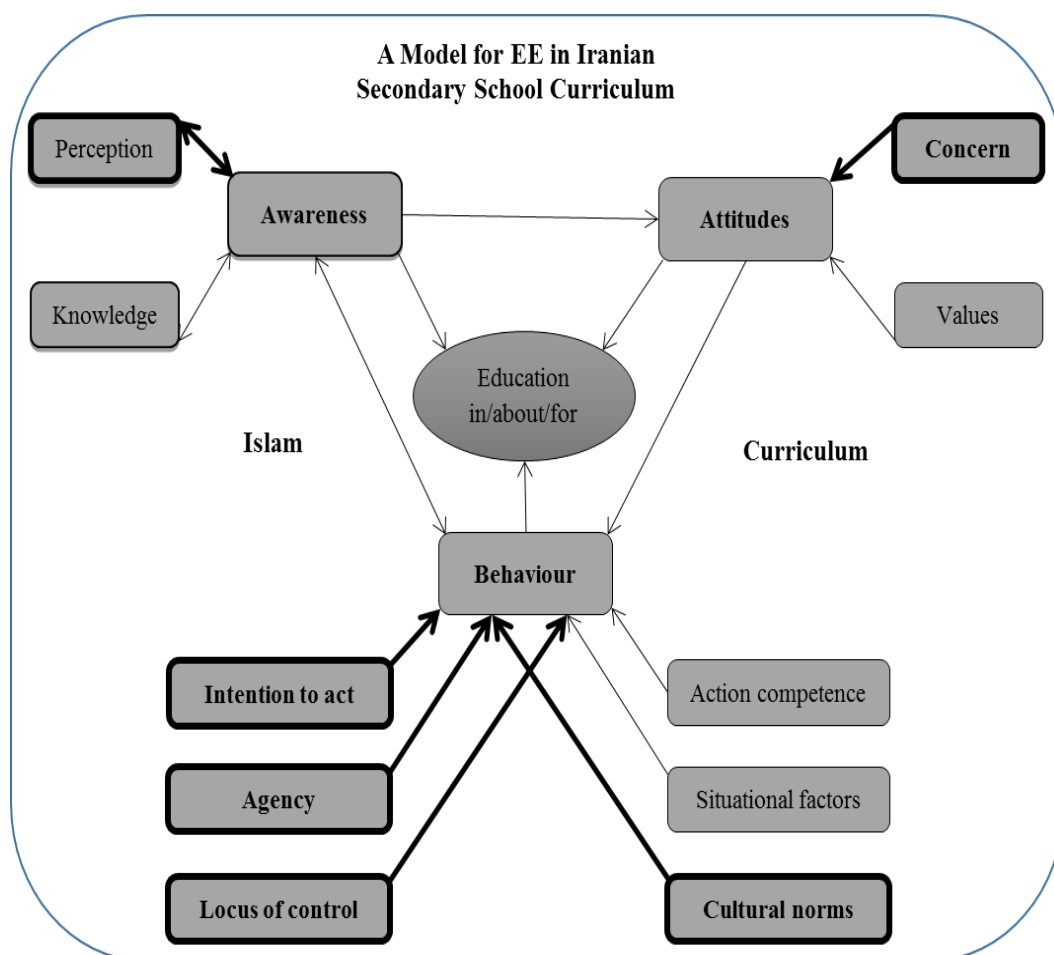


Figure 6.1 Representation of the theoretical model of this study

The above theoretical model indicates that in this study some factors such as environmental perception, concern, intention to act, agency, locus of control, and cultural norms seemed to be more important than the other factors in determining environmental awareness, attitudes, and behaviour of Iranian secondary school students and teachers. It should also be noted that there was not enough evidence from the findings to illustrate the strong effectiveness of the other factors such as values, action competence, situational factors, and knowledge in EE in Iranian secondary schools. As mentioned in Section 2.3.4.4, the relative contribution of these factors in the theoretical model show discrepancies in research in this area in different countries, and this might be due to the different contexts of these studies. The importance of these factors in the Iranian context is presented in the following paragraphs.

In this study, set in Tehran, Iran, a human-centred view of the environment was found to dominate many of the students' and teachers' ways of thinking about the

environment. This view tends not to acknowledge that people are dependent on healthy ecosystems and services they provide, including social and cultural interactions, and supporting the economy. Having this type of human-centred perspective appears to be consistent with a more individualistic approach in students' and teachers' environmental attitudes and particularly their environmental behaviours. This humanistic approach may be linked partly to an Iranian culture, which promotes competition amongst people and downplays cooperation with others. This tends to be at odds with the prevailing view that effective EE generally promotes a social collective approach to solving environmental problems and sees society as a whole rather than as individuals. Therefore, this study concludes that emphasising a holistic and sociocultural approach to EE in Iran is important for Iranian students and teachers. This approach must start from the Iranian cultural context, and it should be noted that changing cultural fundamentals is not an easy task and will not happen in a short period of time.

In addition, there was some evidence that the teachers saw a clear connection between the teaching of the Quran and the goals of EE. However, there was little evidence from the students to support this linkage. As Iran is an Islamic country, and the Quran is so clear about how people should be thinking about their responsibility for environmental sustainability and protecting the environment, this suggests that religious teaching (which is embedded in the National Curriculum) could place greater emphasis on environmental aspects in order to help students think more holistically, collectively, and environmentally. This is an important area for further research and development. For instance, research could be carried out to compare EE approaches in other similar nations. For example, Turkey has a very similar context to Iran and is a Muslim country, but these two countries do respond to religious teaching in different way. Therefore, it would be interesting to consider the connection between Islamic faith and EE more deeply in order to consider the role that a religion like Islam might play to help people to become environmentally friendly citizens.

This study found that, in general, both students and teachers demonstrated a high level of awareness about environmental issues, although this wasn't so strongly found in teachers' professional awareness about EE. In particular, both students and teachers showed a strong understanding of air pollution as a serious

environmental issue in Tehran, possibly because it has a locally direct effect on their lives in that city. However, students seemed to be less aware of issues related to energy and natural resources, which may have a less direct effect on their lives. Although an emphasis on the local context is culturally and socially important to Iran and it should be recognised in teaching and learning, for a holistic environmental understanding, a sense of issues beyond the city or country boundaries should also be acknowledged for their global impact – and because everything is ultimately interconnected.

The students and teachers in this study appeared to have positive attitudes towards the environment along with having a sense of caring for nature. This appeared to have been influenced by their environmental experiences, even though these appeared to be limited. However, many students appeared uncertain about their own contribution to human impacts on the environment, either positive or negative. The concern that participants in this research reported about the environment and its associated problems did not appear to translate into environmental actions. Students in particular indicated a low level of agency and internal locus of control, and it is likely that the Iranian context does not easily provide opportunities or mechanisms for them to take action, including common international practices such as recycling at school.

Importantly for the implementation of EE, this study indicated that teachers' connections with nature, their life experiences, personal interests, and teaching areas are factors that can contribute to effective EE in Iran. In particular, the teachers who reported a strong connection with the environment also expressed a sense of commitment in teaching EE, which likely can provide valuable outcomes for developing Iranian students' environmental values through an attitude/values-education approach. As a reminder, the case story of Mohammad (see Section 5.3.6), a geography teacher who was the most motivated, enthused, engaged and inspired to teach EE in school, gives evidence of how teachers who have a strong passion about nature could inspire their students about the value and importance of caring for the environment.

A further conclusion is that students' and teachers' environmental behaviour depends on internal and external factors, which may explain the existing gap between their concern for the environment and their actual behaviour. For instance, as an internal barrier for students, this study found that they expressed a

low level of agency or internal locus of control. This may well affect their motivation and perceived ability to act environmentally in the future. In addition, external barriers for students, such as a teacher-centred approach to environmental teaching as a way that Iranian teachers appeared to try to deliver EE is not in line with what the global EE literature suggests for effectiveness of EE. This suggests a need to develop Iranian teachers' pedagogical content knowledge, including in student-centred approaches of teaching that the literature indicates are more successful in EE. In addition, a low level of in-depth environmental content in the curriculum, time pressures, and a need for more support within schools and from the Ministry of Education for teachers appear to be significant barriers to the delivery of EE in Iranian secondary schools. These internal and external barriers will need to be addressed at both the macro (policy/societal) and micro (classroom/individual) level to help Iran develop a more sustainable/systematic approach to EE.

Finally, this study concludes that in order to mitigate environmental issues in Iran, a substantial shift is needed in students' attitudes, dispositions, values, agencies, and their behaviours, ultimately leading to more sustainable ways of living. For example, the problems associated with air pollution, water pollution and litter can be addressed in the future if EE in Iran moves towards educating and engaging children in action-based learning strategies that target the root cause of these issues. If Iran wants a more sustainable approach towards the future, then teachers' training to implement EE needs to be seriously considered, including pedagogical strategies such as a student-centered approach and outdoor education. Based on these conclusions, the final section provides some recommendations.

6.5 Recommendations

Based on the findings and conclusions of this research, recommendations are made for students and teachers, and then for educational authorities.

6.5.1 Recommendations for students and teachers

Findings regarding students' actual environmental knowledge have some implications for development of their environmental learning. Although students indicated they had high levels of environmental knowledge, their knowledge of a number of issues of importance to Iran was limited, and steps could be taken to

address this. First, the Iranian secondary school curriculum should be reviewed for its emphasis on these key issues, such as the sustainability of natural resources. Second, teachers and the pedagogical practices they use play an important role in developing students' knowledge and their critical thinking skills regarding environmental issues. Developing critical thinking skills among students as highlighted in EE literature as being important for sensitizing young minds to both local and global environmental issues, should be prioritised by teachers and curriculum. Critical thinking challenges students to think about the ways they view the environment and how their knowledge and perceptions are shaped by those around them. This process involves students questioning and reflecting on their own and others' decisions and actions, so they can re-think and re-design their environmental activities (Tilbury & Cooke, 2005).

In addition, the Iranian education system has been well designed to produce scientifically knowledgeable citizens, with subjects such as mathematics and physics having high status. This system is intended to produce a future workforce that can drive technological advancement, but this must be balanced by sustainable practices informed by effective EE. A holistic EE is not just about developing environmental knowledge, it also includes developing positive attitudes, values and behaviour towards the environment. Therefore, special attention is needed for developing a holistic approach to EE in the Iranian secondary school curriculum, including opportunities for education *in/about/for* the environment in order to also produce environmentally-responsible citizens.

In particular, as a considerable lack of education *for* the environment was reported in this research, the secondary school curriculum should include education *for* the environment in order to engage students not only in investigating environmental problems, but also leading them to make their own decisions and address environmental issues. Tilbury and Cooke (2005) highlighted that involving students in decision making processes may encourage students to be engaged in open discussions and “eliminates inequitable power hierarchies as it does not rely on expert knowledge” (p. 4). This will be a significant challenge for the current education context in Iran, and will require a substantial shift from traditional ways of teaching and learning.

In addition, there is an essential need to inspire Iranian students to have environmental actions which target the root cause of the issues to enhance the

effectiveness of the actions. For this purpose, and if EE in Iran aims to improve the quality of the environment, it will be necessary to focus on students' intention to act, including developing students' internal locus of control. Taking a student-centred approach to learning, including inquiry learning to focus the students on issues of relevance, and an action learning approach to develop action planning and taking skills will address education *about* and *for* the environment. In this way students will have the abilities to act with regard to their environmental concerns.

Having pro-environmental attitudes appeared not to stop students thinking of their personal benefits and their individualistic perspectives. Particular attention on values education may enhance students' attitudes towards the importance of social and community benefits (as opposed to individual). One may argue that addressing this type of values education will not be an easy task for schools in Iran, as individualistic attitudes are deeply embedded in the Iranian social and cultural context. However, environmental issues are not only personal threats, they can have an even greater effect on society. Iranian teachers may need, therefore, to highlight the advantages of social benefits over individual achievements. This could be done by teachers through addressing values in their environmental teaching.

In addition, students' indicated little hope for the future of the environment, and teachers, educators, and policy makers in Iran need to critically consider the issues around students' concerns. Likewise, students' emotional feelings towards environmental issues should not be ignored by other stakeholders since these feelings can be used to prompt students to take care of the environment. On the other hand, if they are not adequately addressed, they can cripple students' responses. A range of pedagogies are needed by teachers, such as taking students for field trips; helping them express their concerns and emotions; and providing opportunities to actively contribute to real issues.

As EE does not have a mandated or specific place in the Iranian secondary school curriculum, teachers who felt overwhelmed by their other duties believed that the lack of time is one of the main barriers which constrains them from implementing EE in an effective way. Therefore, if EE is to be prioritized in the school curriculum, space will need to be created for it to be taught, and teachers will need to be supported to implement EE and to develop their environmental pedagogy. In

addition, because of the significant lack of student-centered approaches to teaching reported by the teachers, Iranian teachers may need to modify their ways of environmental teaching in order to better their students' action competence, which can be one of the outcomes of a student-centered approach. Further, teachers can pay attention to their own personal environmental characteristics, particularly regarding participation in group actions. In this way, they may encourage their students to participate in environmental group actions, which can be more effective than individual ones. Therefore, support is needed for teachers to develop a broader range of environmental teaching practices, particularly action strategies with the students to create pro-environmental behaviour which more likely leads to a sustainable future. For teachers who intend to be more involved in EE, but who have a lack of awareness and confidence, pre-service and in-service teacher training is required.

6.5.2 Recommendations for educational authorities

Based on the evidence from this study, and as Palmer (1998) suggested, EE at secondary schools should be supported by learning institutions and governmental organizations who are responsible for students' learning. In Iran, the Ministry of Education with cooperation of the Department of the Environment and other relevant authorities can lead the reform of EE. This support can be provided in different ways, such as recognizing that education and EE are inseparable, and support each other; implementing practical government EE policies, not just the theory; and allocating funding and technical resources to improve EE in Iran.

In general, students and teachers in this study reported that the current EE curriculum content was inadequate, and educational authorities and curriculum publishers should consider including more in-depth environmental content in textbooks. Although this would not exactly address best practice in EE as using textbooks too much is strongly linked to teacher-centred learning approach, it is realistic considering the typical educational in secondary schools in Iran is through textbooks, and therefore this approach could be seen as a step in the right direction. In order to provide opportunities for environmental learning for students, implementation of any new curriculum needs to be within the exam-driven learning approach in Iranian secondary schools, even though this may not be the most effective means for EE. However, it should be noted that curriculum

modification alone does not necessarily lead to an effective EE. The curriculum needs to also include an innovative pedagogy and practice. For example, the findings of this study indicated that there is no specific place in the curriculum for outdoor education. Hence, curriculum should be designed in a way to include plans for outdoor activities and education *in* the environment in order to develop students' pro-environmental attitudes and action skills. There is a need for the Ministry of Education with cooperation of the Department of the Environment in Iran to design appropriate curriculum (including assessment), including a detailed set of learning outcomes, to help students and teachers better implement EE in Iranian secondary schools if students' education in EE is to be enhanced/developed/pursued.

In addition, it is recommended that the Ministry of Education develops EE training courses for Iranian teachers, since all the teachers in this study reported not having any official EE training to develop students' environmental awareness, attitudes and behaviour. As discussed throughout this thesis, environmental issues are complex, which makes it difficult for teachers to effectively support students to take action to address the issues. Teachers need to have EE content knowledge and pedagogical content knowledge to make effective decisions about what and how to teach about the environment. Hence, suitable pre-service and in-service training courses are needed. Because of a significant lack of environmental sustainability awareness among both teachers and students, particular attention should focus on understanding of sustainability concepts in order to increase teachers' environmental awareness. Such an understanding will likely help teachers in making their students aware about environmental aspects and values, and sustainable approaches to future development and environmental management. However, it should be noted that simply being more aware is not necessarily enough for teachers to effectively implement EE, they need to have positive attitudes towards the environment and environmental teaching, and actively engage in the EE process.

As is discussed in Section 6.3, individualistic ways of being tend to be promoted by the Iranian cultural context. From an environmental point of view, having a holistic perspective is an important way of thinking in order to address complex issues. It may be appropriate for the Ministry of Education and the Ministry of Culture and Islamic Guidance to critically consider this issue and find ways to

encourage people to be more cooperative, having more holistic views socially, culturally, and environmentally. It is unlikely that any notable changes will happen in secondary schools in Iran if no significant changes occur in Iranian social and cultural values.

As a final statement, this study has been conducted at a critical time when Iran is facing significant environmental issues, such as air pollution, which are threatening Iranian ecosystems and the wellbeing its people. I hope the recommendations presented in this research can effectively make a difference in improving EE in secondary schools in Iran through helping our children to become environmentally active citizens who can contribute to the environmental sustainability of my country.

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Appendix A: Student questionnaire

Section A

Tick your answers in the boxes (☑)

1. What is your gender? ☐ Male ☐ Female
2. What is your age? 14 15 16 Other (*Please specify*)
- ☐ ☐ ☐ ☐ ...

Section B

Tick your answers in the boxes (☑).

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
1. Humans were meant to rule over the rest of nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Humans have the right to modify the natural environment to suit their needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Our current lifestyles are causing environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Human activities are changing the Earth's climate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Plants and animals have as much right as humans to exist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. All plants and animals play an important role in the environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Protecting the environment will threaten jobs for people like me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Protecting the environment limits my choices and personal freedom.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Protecting the environment is important for the future generations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Protecting the environment will improve my health.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Protecting the environment is the responsibility of every citizen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. We don't need to worry much about the environment because future generations will deal with environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14.I believe that I have the ability to make a difference for the future of the environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.I would not take a job with a company I knew was harming the environment, even if they paid me a lot of money.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.It is more the government's responsibility to control pollution than the people's.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.I'd be willing to make personal sacrifices to reduce pollution even if others don't.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.The benefits of modern consumer products are as important as the pollution that results from their production and use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.I think it is important that school students learn about environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.Maintaining economic growth is more important than protecting the natural environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21.Science and technology can overcome environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Some wilderness areas should be preserved from development even it costs a lot of money.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.The environmental problems facing Iran have been exaggerated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24.Predators such as crows, Persian leopards and coyotes which prey on farmer's grain crops and poultry should be eliminated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.I am informed about environmental issues in Iran/Tehran.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section C

1. How informed do you think you are about the following environmental issues?
(Please tick **only one** box in each row)

	I am familiar with this and I would be able to explain this well	I know something about this and could explain the general issue	I have heard about this but I would not be able to explain what it is really about	I have never heard of this
a) Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Energy shortages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

c) Extinction of plants and animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Clearing of forests for other land use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Water pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Over population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. From which source(s) do you mainly learn about each of these environmental issues?
(Please tick **as many boxes as apply** in each row)

	None of these, I am not sure what this is	My school	The TV, radio, newspaper or magazines	My friends	My family	The internet or books
a) Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Energy shortages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Extinction of plants and animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Clearing of forests for other land use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Water pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Over population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Do you see the environmental issues below as a serious concern for yourself and/or others?
(Please tick **only one box** in each row)

	I have never heard of this	This is a serious concern for me personally as well as others	This is a serious concern for other people in my country but not me personally	This is a serious concern only for people in other countries	This is not a serious concern to anyone
a) Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Energy shortages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Extinction of plants and animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Clearing of forests for other land use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Water pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Over population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Do you think problems associated with the environmental issues below will improve or get worse over the next 20 years?
(Please tick **only one box** in each row)

	I have never heard of this	Improve	Stay about the same	Get worse
a) Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Energy shortages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Extinction of plants and animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Clearing of forests for other land use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Water pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

f) Over population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. The main reason that the Persian leopard is endangered is:(Tick only one box)

- ☐ Their habitats are being destroyed by humans
- ☐ Competition from an introduced species
- ☐ Climate change is affecting them
- ☐ Don't know

6. Which of the following do you think contributes to the greenhouse effect?
(Tick any that apply)

- ☐ An increase in oxygen in the atmosphere
- ☐ Sunlight radiating more strongly through a hole in the upper ozone layer
- ☐ Carbon emissions from cars, homes and factories
- ☐ Increased activity from volcanoes worldwide

7. Which of the following statements comes closest to your view? (Tick one only)

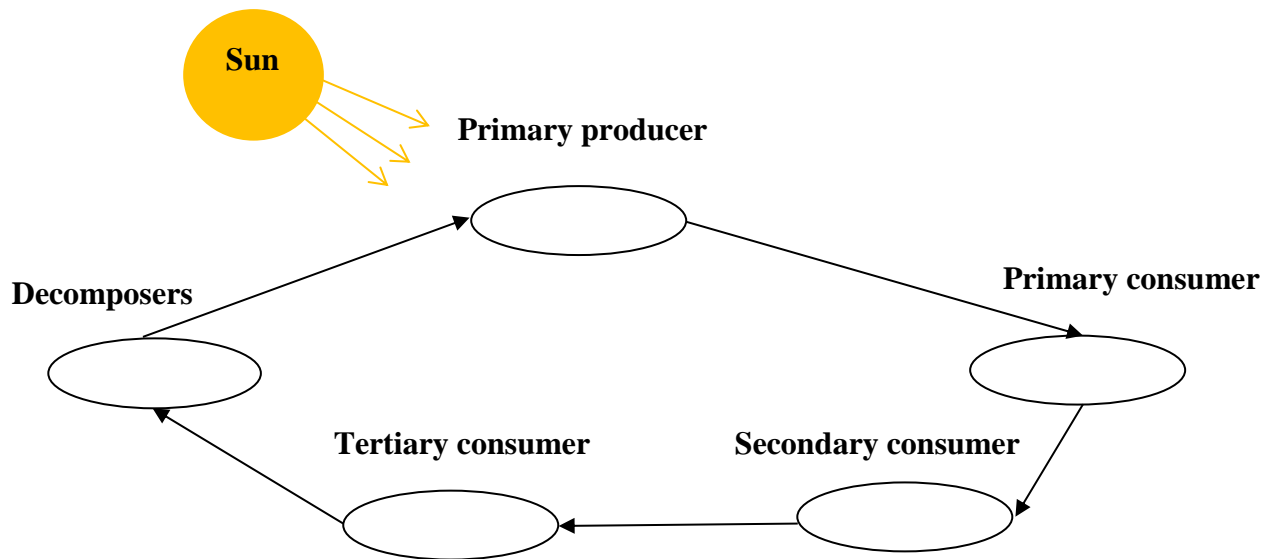
- ☐ Global warming isn't happening.
- ☐ Humans can't reduce global warming, even if it is happening.
- ☐ Humans could reduce global warming, but people aren't willing to change their behaviour to reduce it
- ☐ Humans could reduce global warming, and people are making changes to reduce it

8. What do you think is the main source of water pollution in Iran? (Tick one only)

- ☐ Domestic sewage
- ☐ Industrial effluents
- ☐ Agricultural run off
- ☐ I don't know

9. The food web below shows the path of energy from one living thing to another. Please replace the name of the following animals and plants in the boxes below.

- a) Persian leopard
- b) Grass
- c) Grasshopper
- d) Birds
- e) Soil organisms



10. Which of the following statements comes closest to your view? (**Tick one only**)

- ☐ The earth has plenty of resources for all the people that live here now.
- ☐ We can always get resources from other planets if we run out on Earth.
- ☐ Many resources on earth are finite and we will run out of them
- ☐ We can recycle everything so we will never run out of resources

11. What impact does generating electricity using these energy sources have on the environment?

	Much impact	Some impact	Very little impact
a) Oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Coal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Solar energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Wind	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Nuclear energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. What is current world population?(**Tick one only**)

- ☐ 1-2 billion
- ☐ 7-8 billion
- ☐ 10-12 billion
- ☐ 25-36 billion

13. What is the main consequence of deforestation in Iran?(**Tick one only**)

- ☐ Soil degradation and erosion
- ☐ Changes in climatic conditions
- ☐ Destruction of natural habitats
- ☐ Reduction in carbon dioxide (CO₂) production

14. What, do you consider to be the two main sources of air pollution in Tehran?

.....

.....

Section D

1. The table below contains a list of some things you may do in your day-to-day life. For each of the following things, would you please tick (☑) to show if you never do it, sometimes do it, or frequently do it.

	Frequently do it	Sometimes do it	Never do it
a) Recycle things at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Recycle paper at school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Buy biodegradable or recyclable products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Turn off lights and electrical appliances when I am not using them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Try to cut down on the amount of rubbish I create	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Use other types of transportation, such as biking or the bus, instead of going in a car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Participate in a tree planting day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Talk with friends about problems related to the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Watch documentary movies on TV on wildlife	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Read books or magazines with an environmental message	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) Pay attention when environmental issues are reported by the news media, including radio, TV, newspapers, and magazines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l) Clean up the environment in any way (e.g. pick up litter etc).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m) Spend time in the natural environment (e.g. Go camping/picnicking/hiking)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n) Plant trees, vegetables or do gardening at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o) Participate in environmental activities organised by clubs or organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p) Take a short shower (< 10 minutes) in order to use less water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q) Turn off the tap water while I brush my teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How likely is it, do you think, that you will do the following actions?

Tick your answers in the boxes (☑).

	Very likely	Likely	Not sure	Unlikely	Never
a) I will contribute to a school organization that wants to improve the quality of the environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) If I knew more about how to care for the environment in my community, I would take action to do so.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) In the future when I have a job, I would be willing to have my taxes increased to protect the environment in my community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) In the future, I will write/talk to politicians about things that concern me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) In the future, I won't buy a car and will try to use public transportation in order to reduce air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Voluntarily I will participate in cleaning up streams, rivers and coastlines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) I will use as much energy (petrol, electricity, heat etc.) as I can afford to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) I will donate money to save the Persian leopard from becoming extinct	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix B: Student focus group interview

Questions	Purpose
1. What does the natural environment mean to you, from your own point of view? Prompt: Can you tell me about your experiences in the natural environment?	Perception
2. Through your life, how have you learnt about the natural environment? a. Prompt: How adequate do you think these sources are for you?	Sources for environmental learning
3. Can you tell me about the environmental learning you have had at school? When, what, how?	Environmental learning
4. Do you think it is important that students should have the opportunity to learn about the natural environment at school? Why/why not?	Attitudes
5. Would you like to change anything about your environmental learning at school? When, what, how?	Agency
6. What are your main hopes and fears about the future of the natural environment?	Concern
7. Do you have concerns about the environment? a. Prompt: How serious do you think these concerns are? b. Prompt: How does this make you feel? c. Prompt: Do you think older people share your concerns?	Concern
8. What do you think causes environmental problems in general?	Awareness perception
9. Do you think environmental problems are more or less serious in Iran than overseas? a. What environmental problems do you know of in Iran? b. Are you concerned about these?	Concern Knowledge
10. What do you think is being done to improve the environment? a. Prompt: Do you think we are doing enough? Who should be responsible? b. Prompt: What stops us dealing adequately with environmental problems?	Awareness Attitudes
11. What changes are necessary so we can look after the environment more effectively? a. Is looking after the environment as important as developing the economy – which is more important to you?	Attitudes
12. Do you think you can do anything for the environment? a. Prompt: Do you think you will be able to influence others? b. Prompt: Do you think you will be able to do anything in the future to help the environment?	Locus of control

Appendix C: Teacher interview

Background information:

- a. What is your age?
 - ☐ 20-30
 - ☐ 31-40
 - ☐ 41-50
 - ☐ 51-60
 - ☐ 61-70
- b. How many years have you been teaching?
- c. What is the name of the school at which you are currently teaching?
- d. How many years have been teaching at this school?
- e. What curriculum areas do you teach regularly?
 - ☐ Science
 - ☐ Social science
 - ☐ Arts
 - ☐ Math
 - ☐ Other:

Questions	Purpose
1. What does the natural environment mean to you, from your own point of view? Prompt: Can you tell me about your experiences? (include urban areas?)	Perception Personal awareness
2. How important do you think the natural environment is to the people in Iran?	Personal attitudes
3. Do you have any concerns about the natural environment in Iran? If so, what are they?	Concern
4. Do you see yourself as environmentally friendly? If yes, in what ways? Ways might be: <ul style="list-style-type: none"> ➤ Environmentally aware (i.e. to have knowledge about a range of global and local environmental issues). ➤ Environmentally committed (i.e. in terms of your behaviour, for example by using a bicycle rather than a car wherever possible, or actively seeking to use recycled or other 'environmentally friendly' products or by being involved in environmental improvement projects). 	Personal behaviour Personal awareness

5. Do you think it is important that students should be taught about the natural environment? Why/why not?	Professional attitudes
6. Have you had any training about teaching and learning in environmental education? If so, what?	Professional awareness
7. Can you talk about your past experiences with environmental education? Probes: –any environmental education programming you may have done in your classroom or with outside groups?	Professional behaviour
8. Are you teaching about the environment at this school? If so, what are you teaching?	Professional behaviour
9. Why do you like to teach about the environment?	Professional attitudes
10. Where does the teaching of environmental topics sit in the curriculum? a. How is this teaching done (i.e. lectures, field trips etc.)? ➤ Environmental topics include all topics related to environmental science. These may include environmental issues such as pollution or the degradation of the environment. Relationships between organisms, biodiversity and conservation of resources would also be examples of environmental topics.	Professional awareness Professional behaviour
11. What do you hope to achieve through your teaching in EE and what do you hope students will gain? Probe: a) Does your teaching relate mainly to developing knowledge and understanding of environmental issues? Or b) Also address attitudes and values to a significant extent. c) Encourage them to take action? What sort of action?	Professional behaviour Values Professional behaviour
12. Can you describe an environmental topic that you have taught at school and what you did?	Professional awareness and behaviour
13. What supports you to teach environmental education and what constrains you? Do any groups or individuals from inside or outside the school help with your teaching?	Professional behaviour
14. Who do you think benefits from your EE (students, teacher, school, parents, and community)? What else would you like to do in EE if you could?	Professional behaviour
15. Do you think environmental education is as important as other curriculum in school? Why/Why not?	Professional attitudes

Appendix D: Ethical approval

Dr Karsten Zegwaard

Chair, Human Ethics Faculty of Science and
Engineering
Te Pūtaiao me te Mātauranga Pūkaha
The University of Waikato
Private Bag 3105
Hamilton, New Zealand

Telephone 64-7-838 4892
Email k.zegwaard@waikato.ac.nz



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

To: Farshad Hashemzadeh
Date: 10-June-2015
From: Karsten Zegwaard
Subject: Ethical approval for research
Application # #FSEN/TEMS-2015-7

Dear Farshad,

The Faculty of Science and Engineering Human Research ethics sub-committee has, in 2012, considered your proposal "*Environmental awareness, attitudes and behaviour of secondary school students and teachers in Tehran, Iran*".

This memo is to confirm that your ethics application was approved.

We wish you all the best with finishing your PhD research!

Signed

Date:

3-7-2015

Appendix E: Application for permission from the Ministry of Education

4, First De, Shafighe Balkhi,
Zolfaghari St, Shadmehr St,
Sattarkhan St, Tehran, Iran
Email: fh41@waikato.ac.nz
Phone: 0098-2166509884

Technology, Environmental, Mathematics & Science (TEMS)
Education Research Centre
The University of Waikato
Private Bag 3105
Hamilton, New Zealand
Phone: 64-7-838 4035 (Centre direct line)
Fax: 64-7-838 4272
Email: cster@waikato.ac.nz

The Director,
Ministry of Education

Dear Sir,

Application for Permission to Conduct Research in Iran Schools

I am a PhD student at the University of Waikato, New Zealand. I am writing to formally request permission to conduct my research in six Tehran schools. My thesis topic is "Environmental awareness, attitudes and behaviour of Grade 9 secondary school students and teachers in Tehran/Iran". The study focuses on students' and teachers' perceptions towards environmental issues. I hope I can use the information gathered to help inform environmental education practice in schools in Iran.

The research will involve individual interviews of one hour per teacher (two Grade 9 teachers in each of 6 schools), and completion of a questionnaire of about 30 minutes duration for Grade 9 students (50 students per school), and a sample of these students will also be interviewed in a group for about 30 minutes (5 students per school), as summarized below. I plan to audio-tape interviews for later analysis with the participants' permission.

Participants and the nature of involvement in the study

Participants	Number of participants	Interviews	Focus group interviews	Questionnaires
Students	337			√
Students	30		√	
Teachers	12	√		

Data collected may be used in writing thesis, reports, and publications or in presentations. I will not use names of any participant or their schools in any publications or presentations but any data used in the reports will use pseudonyms. I will make sure that I store all the information that I gather securely. Invited students and teachers can decline to be involved in the research, and can withdraw any or all comments made in interviews at any time up to two weeks after receiving a transcript of their interview. If a participant withdraws, I will destroy any data gathered from them.

I would appreciate if you grant permission for this research project. If you need any more details about the study please contact Farshad Hashemzadeh (fh41@waikato.ac.nz, Phone: 0098-2166509884). If you have a concern about the project that you wish to discuss with someone else, please contact Dr. Chris Eames, the Chair of the Ethics Committee (email: c.eames@waikato.ac.nz, Phone: 00 64 7 8384357) at the University of Waikato.

I would be most grateful if you could issue and either send by mail or email to me an official letter of approval to enable me to conduct the research. If permission is granted, I will then seek approval from the Director of the State Education Department and if that is granted, I will then seek permission from school principals to gather data in their schools. Your support and cooperation is very much appreciated and I am looking forward to hearing from you soon.

Thank you.

Yours sincerely,

Farshad Hashemzadeh

Appendix F: Application for permission from the State Education Department

4, First De, Shafighe Balkhi,
Zolfaghari St, Shadmehr St,
Sattarkhan St, Tehran, Iran
Email: fh41@waikato.ac.nz
Phone: 0098-2166509884

Technology, Environmental, Mathematics & Science (TEMS)
Education Research Centre
The University of Waikato
Private Bag 3105
Hamilton, New Zealand
Phone: 64-7-838 4035 (Centre direct line)
Fax: 64-7-838 4272
Email: cster@waikato.ac.nz

Director
State Education Department

Dear Sir,

Application for Permission to Conduct Research in Iran Schools

With regard to the above matter, I am writing to formally request permission to conduct my research for my PhD study entitled "Environmental awareness, attitudes and behaviour of Grade 9 secondary school students and teachers in Tehran/Iran". The study focuses on students' and teachers' perceptions towards the environmental issues. I hope I can use the information gathered to help inform environmental education practice in schools in Iran.

The research will involve individual interviews of one hour per teacher (two Grade 9 teachers in each of 6 schools), and completion of a questionnaire of about 30 minutes duration for Grade 9 students (50 students per school), and a sample of these students will also be interviewed in a group for about 30 minutes (5 students per school), as summarized below. I plan to audio-tape interviews for later analysis with the participants' permission.

Participants and the nature of involvement in the study

Participants	Number of participants	Interviews	Focus group interviews	Questionnaires
Students	337			√
Students	30		√	
Teachers	12	√		

For your information, permission from the school principals will be requested and teachers' and students' participation is on a voluntary basis. Time and location of the interview and written survey instrument will be determined by the respective school management.

Data collected may be used in writing thesis, reports, and publications or in presentations. I will not use names of any participant or their schools in any publications or presentations but any data used in the reports will use pseudonyms. I will make sure that I store all the information that I gather securely. Invited students and teachers

can decline to be involved in the research, and can withdraw any or all comments made in interviews at any time up to two weeks after receiving a transcript of their interview. If a participant withdraws, I will destroy any data gathered from them.

I would appreciate if you grant permission for this research project. If you need any more details about the study please contact Farshad Hashemzadeh (fh41@waikato.ac.nz, Phone: 0098-2166509884). If you have a concern about the project that you wish to discuss with someone else, please contact Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 7 8384357) at the University of Waikato.

I would be most grateful if you could issue and either send by mail or email me an official letter of approval to enable me to conduct the research. Your support and cooperation is very much appreciated and I am looking forward to hearing from you soon.

Thank you.

Yours sincerely,
Farshad Hashemzadeh

Appendix G: Application for permission from the Principals of the schools

4, First De, Shafighe Balkhi,
Zolfaghari St, Shadmehr St,
Sattarkhan St, Tehran, Iran
Email: fh41@waikato.ac.nz
Phone: 0098-2166509884

Technology, Environmental, Mathematics &
Science (TEMS) Education Research Centre
The University of Waikato
Private Bag 3105
Hamilton, New Zealand
Phone: 64-7-838 4035 (Centre direct line)
Fax: 64-7-838 4272
Email: cster@waikato.ac.nz

Principal

_____ *[name of school]*

Dear Sir,

Application for Permission To Conduct Research at _____ *[name of school]*

With regard to the above matter, I am writing to formally request permission to conduct research in your school for my PhD study entitled “Environmental awareness, attitudes and behaviour of secondary school students and teachers in Tehran/Iran”. The study focuses on students’ and teachers’ perceptions towards the environmental issues. I hope I can use the information gathered to help inform environmental education practice in schools in Iran.

With your permission, I would like to interview two Grade 9 teachers in your school who are involved in teaching about environmental issues. I expect each interview about their awareness, attitudes and behaviour towards environmental issues to last up to one hour and with the teacher’s permission I would like to audio tape the interview for later analysis. I would also like to survey using a written questionnaire up to 50 Grade 9 students about their awareness, attitudes and behaviour towards environmental issues. I expect the questionnaire to take up to 30 minutes to complete and to be completed during class time with their teacher’s permission. I would also like to then interview a small sample of 5 of these students as a group to further discuss their views in depth. I expect the group interview to last up to 30 minutes and would like to also audio tape this for later analysis. I would plan to conduct this group interview outside class time.

For your information, participation of your school, your teachers and students is on a voluntary basis. Both the interviews and written survey instrument would be conducted as allowed by your school and at a time, after discussing with teachers of an appropriate time that is convenient for the students in order to avoid disruption of the teaching and learning activities.

Data collected may be used in writing thesis, reports, and publications or in presentations. I will not use names of any participant or your school in any publications or presentations but any data used in the reports will use pseudonyms. I will make sure that I store all the information that I gather securely. Invited students and teachers can decline to be involved in the research, and can withdraw any or all comments made in interviews at any time up to two weeks after receiving a transcript of their interview. If a participant withdraws, I will destroy any data gathered from them.

Approvals from the Ministry of Education and the State Education Department for me to conduct my research are enclosed. I would appreciate it if you could sign the informed consent form granting your permission for me to conduct my study in your school. For any concerns or questions you can contact me or my supervisor Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 78384357) at the University of Waikato in New Zealand.

Yours sincerely,
Farshad Hashemzadeh

Appendix H: Research consent form for secondary school principal

I have read the attached letter of information.

I understand that:

1. My school's participation in the research is voluntary.
2. I have the right to withdraw my school from the research at any time up to completion of the questionnaires and agreement to use the transcripts for analysis.
3. Data collection involves interviews and survey completion of selected students and teachers from 9th grade.
4. Data may be collected from my school in the ways specified in the accompanying letter. This data will be kept confidential and securely stored. The data will be destroyed five years after research completion.
5. Data obtained during the research will be used for the purpose of writing of the thesis, reports, published papers and making presentations. This data will be reported without use of my name or identity, the names or identity of my staff, my students' names or identity or the name or identity of the school. Any self-identifying statement will be excluded.

I can direct any questions/concerns about the study to, Farshad Hashemzadeh, at the University of Waikato (email: fh41@waikato.ac.nz Phone: 0098-2166509884).

For any unresolved issues I can contact Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 78384357) at the University of Waikato in New Zealand.

I give consent for my school to be involved in the project under the conditions set out above.

Name: _____

Signed: _____

Date: _____

Appendix I: Research information form for student participation in the questionnaire

4, First De, Shafighe Balkhi,
Zolfaghari St, Shadmehr St,
Sattarkhan St, Tehran, Iran
Email: fh41@waikato.ac.nz
Phone: 0098-2166509884

Technology, Environmental, Mathematics & Science (TEMS)
Education Research Centre
The University of Waikato
Private Bag 3105
Hamilton, New Zealand
Phone: 64-7-838 4035 (Centre direct line)
Fax: 64-7-838 4272
Email: cster@waikato.ac.nz

[date]

Dear student,

I am writing to invite you to participate in my research study. This study involves investigating students' environmental awareness, attitudes and behaviour towards environmental issues. Your Principal has given me permission to carry out my research in your school. I hope I can use the information gathered to help inform environmental education practice in schools in Iran.

Firstly, I would like to invite you to complete a survey about your ideas and views about environmental issues in Tehran. I expect the survey to take up to 30 minutes to complete. You do not put your name on the survey so that your answers are anonymous. If you agree to participate in the survey please complete the questionnaire.

Secondly, I also invite you to participate in a small focus group of 5 students from your school to further discuss your ideas and views. I expect the interview to last about 30 minutes, and to be held outside class time so that your learning is not disrupted. I would like to audio tape the interview for later analysis. If you would like to be part of the focus group, please complete the attached form.

Data collected from the survey and during the interviews may be used in writing a thesis, reports, and publications or in presentations. I will not use your name or identity in any publications or presentations but any data used in the reports will use pseudonyms. I will make sure that I store all the information that I gather securely. You can decline to be involved in the research.

I would appreciate if you would agree to be involved with this research project. If you need any more details about the study, or issues arise for you during the study, please contact Farshad Hashemzadeh (fh41@waikato.ac.nz, Phone: 0098-2166509884). If you have a concern about the project that you wish to discuss with someone else, please contact Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 78384357) at the University of Waikato.

Thank you very much for your help in my study.

Yours sincerely,

Farshad Hashemzadeh

Appendix J: Research consent form for student

I have read the attached letter of information.

I give my agreement to be interviewed for this study. I understand that:

1. My participation in the project is voluntary. Participation in the interview gives my consent to analyse the data gained from it.
2. Data may be collected from me in the ways specified in the accompanying letter. This data will be kept confidential and securely stored.
3. Data obtained from me during the research project may be used in the writing of the thesis, reports or published papers and making presentations about the project. This data will be reported without use of my name or identity. Any self-identifying statement will be excluded.

I can direct any questions/concerns to the study, Farshad Hashemzadeh, at the University of Waikato (email: fh41@waikato.ac.nz, Phone: 0098-2166509884).

For any unresolved issues I can contact Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 78384357) at the University of Waikato in New Zealand.

Student name(s): _____

Signed: _____

Date: _____

To be returned to Farshad Hashemzadeh in the classroom.

Appendix K: Research information form for teacher participation in the interviews

4, First De, Shafighe Balkhi,
Zolfaghari St, Shadmehr St,
Sattarkhan St, Tehran, Iran
Email: fh41@waikato.ac.nz
Phone: 0098-2166509884

Technology, Environmental, Mathematics & Science
(TEMS) Education Research Centre
The University of Waikato
Private Bag 3105
Hamilton, New Zealand
Phone: 64-7-838 4035 (Centre direct line)
Fax: 64-7-838 4272
Email: cster@waikato.ac.nz

[date]

Dear,

I am writing to invite you to participate in my research study. This study involves investigating students' and teachers' environmental awareness, attitudes and behaviour towards the environmental issues. I would like to get your views about environmental education in schools. I hope that this study will improve environmental education in Iran. Your Principal has given me permission to carry out my research in your school.

I expect the interview to last about an hour. I would like to audio-record the interview. I undertake to return a transcription of the interview to you to check or change any contents within a two week period after receiving the transcription. This transcription would be confidential to you and me.

If suitable to you, I would like to interview you in a private space in your school, and would arrange to conduct this interview at a time convenient to you (as also allowed by your principal). Alternatively, I can arrange a different interview space of mutual convenience and comfort. Data collected during the interviews may be used in writing reports, publications or in presentations. I will not use your identity in any publications or presentations but any data used in the reports will use pseudonyms. I will make sure that I store all the information that I gather securely. You can decline to be involved in the research, and can withdraw any or all comments made in the interview at any time up to two weeks after receiving the interview transcription. If there is a withdrawal, I will destroy any data gathered from you.

I would appreciate if you would agree to be involved with this research project. If you need any more details about the study, or issues arise for you during the study, please contact Farshad Hashemzadeh (fh41@waikato.ac.nz, Phone: 0098-2166509884). If you have a concern about the project that you wish to discuss with someone else, please contact Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 78384357) at the University of Waikato.

If you agree to participate in the study, please read and sign the attached research information form. Please also call me at the number above, for me to collect the form and arrange a time and place for the interview. Thank you very much for your support.

Yours sincerely

Farshad Hashemzadeh

Appendix L: Research consent form for teacher

I have read the attached letter of information.

I give my agreement as a teacher to be interviewed for this study. I understand that:

1. My participation in the project is voluntary.
2. I have the right to withdraw any or all of the information I have provided at any time up to two weeks after receiving a transcription of my/our interview.
3. Data may be collected from me in the ways specified in the accompanying letter. This data will be kept confidential and securely stored.
4. Data obtained from me during the research project may be used in the writing of the thesis, reports or published papers and making presentations about the project. This data will be reported without use of my name or the school's name or identity. Any self-identifying statement will be excluded.

I can direct any questions/concerns to the study, Farshad Hashemzadeh, at the University of Waikato (email: fh41@waikato.ac.nz, Phone: 0098-2166509884).

For any unresolved issues I can contact Dr. Chris Eames (email: c.eames@waikato.ac.nz, Phone: 00 64 78384357) at the University of Waikato in New Zealand.

Teacher name: _____

Signed:_____

Date: _____