

Environmental Education in the Maldives: The Implementation of  
Inquiry-Based Learning at the Primary Level

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## ABSTRACT

The Maldives islands are predominantly coastal entities, and our environment is among the most vulnerable in the world. For this reason the government of Maldives remains strongly committed to advancing Environmental Education (EE). This study reports on the implementation of inquiry-based approaches in the teaching and learning of Environmental Studies (ES) at primary schools in the Maldives. It also explores what teachers and students in primary ES classrooms do and whether this is what the ES curriculum recommends they should.

A review of literature indicates that a pronounced discrepancy exists between the problem solving and action-oriented goals associated with the contemporary philosophy of EE and the education that takes place in schools in many countries. While much of previous research has revealed the benefits of using inquiry-based instructional strategies over traditional methods. From the literature, key indicators of inquiry based instruction emerged which served as a conceptual framework for this study.

A case study approach utilising a qualitative method was chosen for this study which enabled me to gather detailed information from teachers as well as students from three different schools, by adopting semi-structured interviews, and observations as the main data gathering tools. The results of this study suggest that teachers use a variety of strategies in teaching ES at the primary level. However due to a number of reasons teachers are not able to implement the syllabus quite as the curriculum developers intended. Interviews and classroom observations revealed that education about the environment was the prevailing approach that teachers practiced in the primary schools in Maldives, which is a teaching procedure concerned mainly with the transmission of knowledge.

Even though the findings of this research are specific to this particular research context, it allowed me to draw useful recommendations in this research for other primary schools in the Maldives. The recommendations from this study suggests that the government should allocate sufficient resources to support the practice of inquiry-based learning.

This study also recommends that training teachers, especially through modelling of inquiry instruction, is vital for effective implementation of inquiry based-learning for a positive influence on students' learning and teachers' pedagogy. To expand our understanding of inquiry-based practices in the primary schools in the Maldives further research should be conducted utilizing both quantitative and qualitative research methodologies which would involve schools from all the 20 atolls of Maldives.

Key Words: Maldives, Environmental Education, inquiry-based learning, primary schools.

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## ABBREVIATIONS

EDC	Educational Development Centre
EE	Environmental Education
ES	Environmental Studies
ESD	Education for Sustainable Development
SDE	Sustainable Development Education
UNESCO	United Nations Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund

# CHAPTER ONE

## INTRODUCTION

### **Background to research**

The Maldives islands are predominantly coastal entities, and our environment is amongst the most vulnerable in the world. The Maldives have a narrow economic base that relies on two critical sectors, tourism and fisheries. As these sectors form the main source of employment and livelihood, protecting the Maldives fragile environment is crucial for sustainable development. Environmental Education (EE) is an important strategy in addressing environmental problems faced by communities around the world (Kwan & Stimpson, 2003; Ravindranath, 2007; Venkataraman, 2008). For this reason the government of Maldives remains strongly committed to advancing EE through formal and non-formal education and providing children, youth, community members and leaders with the knowledge and skills to govern natural resources (Ministry of Environment, 2006). The government delegates the responsibilities of EE to a range of its agencies. For example the Ministry of Education writes the syllabus for EE followed in schools. While the Ministry of Environment has a unit directly responsible for environmental awareness.

In the Maldives in the year 2009 there were approximately 44,000 students enrolled at the primary level in 214 schools which is around 50 percent of the total student population (Ministry of Education, 2009). Primary education begins at age seven (grade one) and continues till age 12 (grade six). These six years of primary education are compulsory for all. Unlike many other countries, EE is a mandatory subject in the primary school curriculum in the Maldives. On average there are six periods of Environmental Studies (ES) per week at the primary level, which is equal in number to Maths and English. However students learn ES only in the primary grades unless they specialize in science subjects or Geography at the secondary and post secondary level. The curriculum also focuses on the environment through subjects such as General Science, Social Studies, and Fisheries Science.

The lessons and activities suggested in ES teaching and learning materials in primary schools is based on the inquiry method of learning (Ministry of Education, 2009). Several studies have found that inquiry-based teaching and learning methods positively affect student performance (Allan & Norman, 2007; Karaduman & Mehmet, 2007; Lee & McKenzie, 2007; Lord & Terri, 2006). However, judging by published sources, teachers of EE have appeared to be slow by comparison in embracing inquiry learning (Fast, Harbor, Shepardson & Wee, 2007).

It is also worth noting that environment science and technology is one of the key learning areas of the new curriculum framework developed by the Educational Development Centre (EDC). This key learning area focuses on exploring the natural world and its phenomena, how it relates to the environment and society through systematic and organized inquiry. It emphasizes local as well as global environmental issues and the effect of them on society. The Maldives National Curriculum framework envisions the development of successful individuals who are motivated to learn; who are inquisitive and eager to seek, use and create knowledge (EDC, 2009 p.4). In other words, it places the student at the heart of the teaching-learning process. The framework clearly signals the commitment of governmental policy to support the use of inquiry-based approaches in the Maldives.

### **The Research Problem**

The educational problem I focused in my research is based on the assumption that in Maldives, the teaching and learning of ES in the primary level may be exam oriented, rote learned with little emphasis on inquiry. In other words there is a significant possibility of a misalignment between content, delivery and outcomes (Biggs 1999). From my own experience as a teacher, I have observed that activities based learning, which promotes concrete learning experiences, is seldom used. It is a problem because ES need to be taught using more student centred approaches, in order to develop the knowledge, skills and values among the younger children (Stevenson, 2007; Marsh, 1998). The development of thinking and problem solving skills is an important objective of EE and education for a sustainable future,

especially given the urgency of problems facing the Maldives and the world today (Blumstein & Saylan, 2007; Cotton, 2006; Stevenson, 2007).

Being currently involved in training teachers in the Maldives College of Higher Education, I am aware that the majority of teachers in Maldives have a Diploma of Teaching as their highest qualification. More than 50 percent of our primary teachers in the remote islands are untrained teachers (Ministry of Education, 2009). And as far as EE is concerned, it appears that most teachers (both trained and untrained) may not have the necessary skills and conceptual understandings to cope with the new curriculum which is designed to suit the inquiry method of teaching and learning.

In the Maldivian education system, a lot of pressure is imposed on the schools to prepare students for the external examination they sit at the end of secondary schooling. Attaining good results in the Cambridge GCSE examinations is a highly regarded achievement. It is anticipated that this trend has a direct impact on the teaching methodology used by teachers. As mentioned above, traditionally there has been a strong emphasis placed on examination oriented, subject centred teaching in the Maldivian education system. Teachers regard their prime duty to effectively transmit a body of knowledge to children and that consequently, a teacher must be a content expert. Therefore teachers assume considerable responsibility for the degree of learning success of their students. One reason for this may be that teachers tend to teach using the same methods and in the same ways they were taught at school.

To help children become more actively engaged in their education, the Ministry of Education and UNICEF have been working to transform the education system in the Maldives from teacher-centred rote learning to child-centred active learning (UNICEF, 2006). However there is little educational research done in Maldives on child-centred active learning. The current study is, therefore, timely to gain a better understanding as to how teachers are responding to this more explicit expectation to integrate the use of Inquiry within everyday teaching and learning experiences.

It is also important to note that very little research exists about teaching and learning of ES in the Maldives. At the time I started my research I could not find any qualitative research studies in this field.

Therefore I wanted my research to contribute towards filling this gap on a national level. I hope this research will contribute to the enhancement of knowledge about inquiry-based learning and ES and provide guidance on the development of educational approaches that has meaningful impact in Maldives.

### **Aims and objectives**

The aim of this research project is to examine the nature of current practice related to the teaching and learning of ES in Maldives. In other words to examine the extent to which inquiry-based strategies are being used in the teaching and learning of ES in the primary schools in Maldives. With this central aim the project involved the following objectives:

1. To explore primary teachers' understanding and use of inquiry-based instructional strategies in ES.
2. To examine the ways in which inquiry-based learning is currently incorporated as a teaching and learning strategy in ES.
3. To investigate the challenges to the implementation of inquiry-based learning in ES.

I intend to design the study to answer the following questions.

1. What are the key characteristics of EE practice in primary schools in the Maldives at this time?
2. To what extent do teachers practice inquiry-based learning approach as outlined in the ES curriculum?
3. What are the challenges to the implementation of these approaches in this context?

## **Overview of the thesis**

This thesis is presented in six chapters. Each chapter deals with different aspects of the research project.

Chapter One (Introduction) describes the rationale, the research problem the overall aim and objectives of this research project. Finally the research questions are described.

Chapter Two (literature Review) describes two important theories related to teaching and learning. It then explores contemporary works of researchers who focused their study on inquiry- based learning. It also explores some of the extensive international literature base pertaining to EE, especially in relation to teaching and learning in primary schools. This chapter also highlights examples of international practise in EE from both the developing and developed world. Finally it describes the teaching and learning of ES in the Maldivian context.

Chapter Three (Methodology) discusses and justifies the qualitative research paradigm that underpinned this research. It then proceeds to describe and justify the case study methodology and methods of data collection that were used in this study, detailing the process of sampling and data analysis. Finally, the significance of the reliability, validity, triangulation and ethical consideration employed in this study are explained.

Chapter Four (Findings) present the results of this research in four main sections. In the first section I have presented the results of the semi structured interview with the six teachers from the three case study schools. The second section focuses on the data from the group interview with 12 students. The next section presents the findings from written and recorded classroom observation data and in the final section the findings from the literature analysis are described.

Chapter Five (Discussion) discusses the findings expressed in chapter four, in relation to the literature presented in chapter two in order to answer the above research questions. The findings from the research questions are interconnected but

the questions are gone through separately to give a clear picture of the research findings.

Chapter Six (Conclusion & Recommendations) highlight the key findings presented in chapter four. This chapter also reveals the limitations in the research methods used and makes important recommendations in the hope that they will improve the teaching and learning of ES in the Maldives. The chapter is concluded by suggesting some future research.

## CHAPTER TWO

### LITERATURE REVIEW

#### **Introduction**

This study investigates the extent to which inquiry-based strategies are being used in the teaching and learning of ES in the primary schools in Maldives. This chapter begins by describing two important theories related to teaching and learning. It then explores contemporary works of researchers who focused their study on constructivist principle of teaching and learning and more specifically on inquiry-based learning. The aim is to identify what the literature says about the importance of using inquiry-based learning at the primary level and to identify the factors that enable or challenge the implementation of these approaches. I shall then look at some of the extensive international literature base pertaining to EE, especially in relation to teaching and learning in primary schools. This chapter also highlights examples of international practice in EE from both the developing and developed world. Finally this section describes the teaching and learning of ES in the Maldivian context. This literature base will be used in chapter five to discuss the findings presented in chapter four.

#### **Theories of teaching and learning**

Briefly defined, a theory is an organized set of principles about particular events in the environment (Gredler, 1992). In this section theories of teaching and learning will be examined with special focus on two major theoretical frameworks for learning. Until recently our understanding of the issues related to teaching and learning have been mostly dominated by psychological theories of learning. However many have questioned the applicability of these theories to the actual educational system. Recently a number of perspectives or theoretical approaches to teaching and learning have been invented by educational theorists and philosophers. These theories have focused more on the processes of learning and the structure of learning experience.

However to understand the reasons for the current orientation to the study of thinking and learning, it is important to have an appreciation of the two major traditions that have influenced instructional theory and practice, namely the behaviourist and the cognitive approach.

### **A behavioural framework for learning**

The behavioural approach to instruction has its roots in the work of Thorndike, Pavlov and Skinner, although the term 'behaviourism' was originally used by Watson (Ashman & Conway, 1997). Behaviourism has at its core the belief that behaviour is influenced by the environment in which learning occurs. In other words learning occurs when experience causes a relatively permanent change in an individual's knowledge or behaviours (Woolfolk, 2004). In their analysis of behaviourist orientation, Merriam and Caffarella (1999) indicate that the behaviourist theory is based on three basic assumptions. First, observable behaviour rather than internal thought processes is the focus of study; in particular learning is manifested by a change in behaviour. Second, the environment shapes behaviour; what one learns is determined by the elements in the environment, not by the individual learner. And third, the principles of contiguity and reinforcement are central to explaining the learning process.

According to Fosnot (1996) educators using a behaviourist framework pre-plan a curriculum by breaking a content area (usually seen as a finite body of predetermined knowledge) into assumed component parts, and then sequencing these parts into a hierarchy ranging from simple to more complex. It is assumed that observations, listening to explanations from teachers who communicate clearly, or engaging in experiences, activities, or practice sessions with feedback will result in learning. Teachers who are dominant in this orientation regard their prime duty to effectively transmit a body of knowledge to learners and that consequently, a teacher must be a content expert. Therefore teachers assume considerable responsibility for the degree of learning success of their students. It is worth noting that the behavioural approach to learning has made several important contributions to instruction, including systems for specifying learning objectives, mastery planning techniques and class management systems.

These approaches are useful when the goal is to learn explicit information or change behaviours and when the material is sequential and factual. Behaviourism also provided teaching techniques that led to marked changes in students' academic performance (Ashman & Conway, 1997).

### **A cognitive framework for learning**

Research into thinking and knowing, that is cognition, rose in prominence in the 1960s when it was becoming clear that an explanation of thinking and learning, using only behavioural terms was unsatisfactory. Cognition involves taking in, storing, retrieving, transforming, and manipulating information that is obtained through the senses. Cognitive psychologists, therefore, turned their attention towards the careful observation and testing of human memory, learning, and problem-solving to explain the processes of thought that occur within the brain (Ashman & Conway, 1997). Cognitive psychologists believe that "learning is an internal mental activity that cannot be observed directly" (Woolfolk, 2004, p.198). Therefore the cognitive foundation of learning theory was based initially on the study of human memory. We all know that memory is linked to learning. If there is no memory, there can be no learning. According to the cognitive view, students actively construct their ways of knowing.

The cognitive and behavioural views differ in their assumptions about what is learned. According to cognitive view, knowledge is learned and changes in knowledge make changes in behaviour possible. The cognitive approach suggests that one of the most important elements in the learning process is what the individuals bring to new learning situations (Slavin, 2003). Therefore any teaching process must create a bridge from this point to new ways of thinking by allowing a transformation in the students thinking process to take place. Teachers who are dominant in this orientation would consider learning to be more significant than teaching. Finally it is worth noting that because the cognitive perspective is a philosophical orientation and not a unified theoretical model, teaching methods derived from it are varied, which may include concept learning, problem solving and inquiry-based learning.

## **Constructivism**

Inquiry-based learning has a strong theoretical foundation in constructivism (Allan & Norman, 2007; Karaduman & Mehmet, 2007; Lee & McKenzie, 2007; Lord & Terri, 2006). Therefore, constructivism provides a theoretical framework for the present study to explore and investigate the issues related to current teaching and learning of ES and the implementation of inquiry learning by teachers at the primary school level in the Maldives. It is important to understand at the outset that constructivism is not an instructional approach, rather it is a theory about how learners come to know (Bransford & Hammond, 2005). Constructivism has been defined as the notion that people build their own knowledge and their own representations of knowledge from their experiences and thoughts (Karaduman & Mehmet, 2007).

According to Slavin (2003) one of the most important principles of educational psychology is that teachers cannot simply give students knowledge. “Students must construct knowledge in their own minds” (p. 257). He further explains that:

The teacher can facilitate this process by teaching in ways that make information meaningful and relevant to students, by giving students opportunities to discover or apply ideas themselves, and by teaching students to be aware of and consciously use their own strategies for learning. Because of the emphasis on students as active learners, constructivist strategies are often called student-centred instruction. (p. 257)

The constructivist approach to education attempts to shift education from a teacher-dominated focus to a student-centred one (Eller & Henson, 1999). In other words, to constructivists, the act of teaching is the process of helping learners create knowledge. However Bransford and Hammond (2005) argue that adopting a constructivist theory of knowing does not imply that all learning should be discovery oriented and that direct instruction should always be avoided. Instead, it implies that “teachers must take account of students’ prior conceptions in designing instruction, because these will influence what students learn” (p. 53).

This view is supported by Terwel (1999) who contends that, no single theory can provide an adequate foundation for educational practice. “Educators need multiple perspectives, multiple research findings and, especially, practical experiences and extensive deliberations to change classes into communities of inquiry” (p. 196).

In the constructivist approach to learning, students engage in classroom activities, which in turn lead them to acquire new conceptual knowledge and develop new skills. Social constructivism thus emphasizes the importance of the learner being actively involved in the learning process. Today the constructivist perspective is becoming a dominant paradigm especially in the field of the science education. However, as far as EE is concerned, I should say that there is not much literature written on the use of constructivist methods such as inquiry-based learning.

### **Inquiry-based learning**

If we inquire into something, we are directing our thoughts and actions towards developing a better understanding of it. Inquiry-based learning is a process where students are involved in their learning, formulate questions, investigate widely and then build new understandings, meanings and knowledge (Allan & Norman, 2007). According to Murdoch (1998) inquiry as a framework for developing understandings about the world has a long history in educational pedagogy and remains a powerful tool in the contemporary classroom. The inquiry approach reflects the belief that active involvement on the part of students in constructing their knowledge is essential to effective teaching and learning.

The emphasis in the inquiry approach moves from the view that knowledge is something ‘taught’ to knowledge as learned. Inquiry learning involves students forming their own questions about a topic and having time to explore the answers. According to Eller and Henson (1999) in this approach “the teacher serves primarily as a facilitator, organizer, and consultant to students engaged in inquiring about a subject matter” (p.313). Students are both problem posers and problem solvers within inquiry learning. In the words of Jan and Wilson (2003)“ inquiry learning encourages learners to examine the complexity of their world and form concepts and

generalisations instead of being told simple answers to more complex problems” (p.10).

As indicated earlier, inquiry learning is a learner-centred approach that emphasises higher order thinking skills (Allan & Norman, 2007; Karaduman & Mehmet, 2007; Lord & Terri, 2006). It may take several forms, including analysis, problem-solving, discovery and creative activities, both in the classroom and the community. Most importantly, in inquiry learning students are responsible for processing the data they are working with in order to reach their own conclusions.

With the rising popularity of constructivist theory, inquiry learning as a way to promote active learning, has become increasingly popular in the developed countries, such as America specifically in science education with the influence of National Science Education Standards calling for a reform of science education based on the use of inquiry within a constructivist-learning model (Lord & Terri, 2006). In the Maldives the new ES curriculum is developed to facilitate inquiry-based learning. As an approach to education, inquiry gives full recognition to the relationship between individual and the society. On the one hand it builds upon the experiences and interests of individuals and encourages them to direct their own learning, on the other it seeks for the socially valued ways of thinking and acting.

### **Research on inquiry-based learning**

This section explores contemporary works of researchers who focused their study on constructivist principle of teaching and learning and more specifically on inquiry-based learning. As indicated earlier, my aim is to identify what the literature says about the importance of using inquiry-based learning at the primary level and to understand the factors that enable or challenge the implementation of these approaches. One piece of research was conducted by Fast, Harbor, Shepardson and Wee (2007) who investigated teachers' understanding of inquiry and their ability to design and implement inquiry-based pedagogy. These authors reported that teachers are unclear about the meaning of inquiry as it relates to pedagogy and assessment, and this confusion causes them to perceive inquiry as being difficult to implement in the classroom. Further, their ability to implement inquiry-based lessons

is hampered by the lack of pedagogical training using inquiry techniques. This research has shown that professional development programs that actively engage teachers, model appropriate inquiry, and interact with teachers as learners, rather than as information gatherers, are more effective in changing teachers' knowledge and practice (Fast et al., 2007).

Another important study in this field was conducted by Atwell, Cianciolo and Flory (2007) to determine the extent to which inquiry-based activities promoted inquiry-associated behaviours in both teachers and students. In short, they evaluated whether inquiry-based activities elicit inquiry behaviours. In this research they compared an inquiry-based classroom with a more traditional lecture-based classroom. The researchers contend that performing inquiry should enhance the intellectual development of students on numerous levels. By comparing these activities with traditional review sessions, they found that both inquiry-learning and teaching behaviours increase during inquiry-based activities, but that teachers can also foster inquiry even in a traditional setting (Atwell et al., 2007). This is an issue to be explored in the Maldives since the traditional method of teaching in the Maldivian schools emphasise a behavioural approach where students spend most of their time during the school day being taught or supervised by teachers instead of working on their own.

A similar study was done by Ashcraft (2006) to compare student understanding of 'seasons' using inquiry and didactic teaching methods. This research showed that there were statistically significant differences between the groups' post-test scores with those who participated in inquiry-based activities scoring higher. This study also supports an argument that courses for science majors should be taught with constructivist methods to improve student understanding. One interesting finding reported by the researcher is that attendance was markedly different between the classes with student attendance consistently higher in the constructivist group and consistently lower in the didactic group (Ashcraft, 2006).

As mentioned earlier most contemporary research on inquiry-based learning have focused on teaching of science. One such research was done by Lord and Orkwiszewski (2006) in which they used traditional teaching methods for a control

group and inquiry-based learning for an experimental group. This research revealed that students who were taught using inquiry based strategies developed a better attitude about science and were better equipped to think through science problems than students taught using traditional teaching methods (Lord & Orkwiszewski, 2006, p. 344). Furthermore, they reported that class attendance, enthusiasm, and interest in the labs were more evident in the experimental students each week. This finding was confirmed by Allan and Powell (2007) whose study revealed that depths of student learning and understanding in inquiry-based methods far exceed traditional didactic lecturing.

Gejda and Larocco (2006) examined the extent to which secondary science teachers reported practicing the indicators of inquiry-based instruction in the classroom and the factors that they perceived facilitated, obstructed or informed that practice. For their research indicators of inquiry-based instruction were derived from Bybee's (1997) 5E model. The 5 E stand for engage, explore, explain, elaborate and evaluate. According to this model teachers need to engage students with activities such as probing questions or brainstorming sessions on the topic under study, drawing out responses that uncover what students know or think about the topic.

Indicators of a classroom characterized by exploration include a setting where the teacher encourages the students to collaborate without providing direct instruction, in effect acting as a consultant rather than as an authority in the subject. Creating opportunities for students to work together is also a distinguishing feature of a learning environment characterised by exploration. Indicators of a classroom characterized by explanation include where the teacher asks students to give explanation in their own words, including clarifications and justifications for their thinking. Instructional strategies that promote elaboration include those used during the explanation stage and ones where the teacher serves to guide or re-direct student thinking.

Another characteristic of inquiry-based learning described in this model concerns evaluation. As teachers evaluate student learning they observe students applying new concepts and skills, assess their knowledge and skills and look for evidence that student have changed their behaviour or thinking as a result of their new learning.

Additional indicators of this phase of inquiry-based instruction include teachers providing formative feedback to students to enhance student thinking and skills and, students evaluating their own performance, learning and group process skills (Gejda & Larocco, 2006).

As mentioned above, most of the literature I reviewed gives ample evidence of the success of teaching and learning strategies such as inquiry learning based on the constructivist theories of teaching and learning. However some researchers have talked about the disadvantages of relying on such approaches that has a theoretical basis in constructivism. For example Clark, Kirschner and Sweller (2006) argues that even for students with considerable prior knowledge, strong guidance while learning is most often found to be equally effective as unguided approaches (Clark et al., 2006). Not only is unguided instruction normally less effective; there is also evidence that it may have negative results when students acquire misconceptions or incomplete or disorganized knowledge. They contend that: “the constructivist description of learning is accurate, but the instructional consequences suggested by constructivists do not necessarily follow” (p. 80).

This view is supported by Croasdale, Heppner and Kouttab (2006) who argue that little attention has been paid to the role of intellectual development in students’ capacity to learn profitably in an inquiry environment and point out the practical difficulties of inquiry instruction.

There is the possibility that some of the success reported for inquiry methods might have been due to expectance phenomena such as the “Hawthorne Effect” where the attention paid to the subjects in a performance experiment may produce the favourable effect noted. (p. 390)

They also raise the issue of methodology in research arguing that a number of research articles published, featured qualitative description or discussions of inquiry practices rather than quantitative evidence in favour of inquiry. For example, some of the studies they reviewed were brief one- time, one-semester investigations involving small groups of students, sometimes in as few as one or two classrooms. They also question the validity of such the research: “Furthermore the initial research did not

follow the progress of these students into other higher school or college courses to determine if any skills acquired during inquiry instruction persisted were used in other subjects” (Croasdale et al., 2006, p. 391).

So these researchers question whether inquiry oriented teaching provide students with long term benefits. However it can be argued that, due to the complex nature of educational problems, it is rare that a problem in educational research can be reduced in such a way that it can be viewed in terms of only two constructs or variables as in quantitative research (Keeves, 1997). This issue of methodology will be discussed in more detail in chapter three.

### **Experiential learning**

Experiential learning is another key method of constructivism (Eller & Henson, 1999). As indicated earlier proponents of constructivism believe that as we experience our environment, we tie the information that we get from this experience to our previous understandings, forming new understandings. For example, Bransford and Hammond (2005) are convinced that “many students seem to learn effectively in the context of authentic, real-life activities yet have difficulty with the more artificial tasks required in school” (p. 55).

Experiences outside the classroom provide students with learning activities in relevant situations beyond the walls of the classroom. It also enhances learning by providing students with opportunities to practice skills of inquiry, and problem solving in everyday situations. In ES this includes short visits into the school grounds and local community, as well as visits to farms, factories, offices, and natural settings such as a forest, a beach or a national park. According to Ballantyne and Packer (2002) learning in natural environments is attractive to students and has an important impact on their attitudes towards the environment, their desire to look after the environment, their behaviour in natural areas, and their household environmental practices. They are convinced that “combining observation with instruction is a powerful teaching strategy, especially when this allows students to understand the impact of human action on wild life and natural habitat” (p. 218).

## **What is Environmental Education?**

Most definitions of Environmental Education emphasize an understanding of environmental issues and the responsibility of the individual and society to take appropriate actions. The Tbilisi Declaration defines EE in the following way:

Environmental Education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action. (UNESCO, 1978)

## **The international origins of Environmental Education**

Several writers (Bolstad, Cowie & Eames, 2004; Blumstein & Saylan, 2007; Chatzifotiou, 2006; Jeronen, Jeronen & Raustia, 2008; Venkataraman, 2008) have pointed out that EE began as a result of global environmental concerns in the 1960s and 1970s. Bolstad et al. (2004) provide the following explanation for the development of EE over the years:

The evolution of Environmental Education during the last 30 years has been shaped to a large extent by a series of global summits and international status reports that reflect changing views about the environment and the role of education in contributing to the resolution of environmental problems. (p.18)

According to Stevenson (2007) the origins of EE can be traced first, to the promotion of nature and outdoor study, especially in primary schools, and later to the conservation movement. It can be argued that the most important international events which influenced the development of government policy and curricula in EE are the Stockholm Declaration, The Belgrade Charter, The Tbilisi Declaration, the Brundtland report and Agenda 21 of the Rio Earth Summit (Bolstad et al., 2004; Blumstein & Saylan, 2007; Chatzifotiou, 2006; Jeronen et al., 2008; Venkataraman, 2008).

The 1978 Tbilisi Declaration gave a framework, principles, and guidelines for EE at local, national, and international levels, for all age groups, both inside and outside the formal education sector (Bolstad et al., 2004). According to the Tbilisi Declaration the goal of EE was to "Help individuals and communities ... acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of the environment" (UNESCO, 1978, p.18).

Meanwhile Bolstad et al. (2004) is convinced that not enough have been done to achieve these goals, by stating that:

In the 1990s, many governments responded to these international summits and declarations, often after pressure from the Environmental Education community of interest, by implementing some changes or amendments to environmental education policy or curriculum. Despite the introduction of new policies and curricular to support environmental education, in many countries, environmental education continued to languish at the margins of mainstream schooling, competing with other priorities. (p. 20-21)

### **Environmental Education profiled in four countries**

As indicated earlier, there are several examples of EE, policy, practices and research in the literature. I have selected and described key characteristics of EE practice in four countries: England, Finland, India and Singapore in the hope that they will contribute to a wider understanding of EE from an international perspective in both the developed and developing world.

#### ***England***

Environmental Education is not mandatory for schools in England (Bolstad et al., 2004). However EE has been increasingly incorporated into the English school curriculum, and has aroused substantial research interest (Cotton, 2006). It is interesting to know that EE is one of the five cross curricular themes in the national

curriculum in England and Wales. It later became part of other subjects, aiming to provide pupils with knowledge, skills and values that can promote environmental awareness. The publication of Curriculum Guidance 7 was an important step towards the implementation of EE (Bolstad et al., 2004; Cotton, 2006 & Hopwood, 2007). It discussed the aims of EE, provided a framework for it, suggested ways of implementing it in the school curriculum and described case studies and classroom activities. This publication suggested that EE comprised three interlinked components, namely education about, for and in the environment. Each of these components was described in the publication. This threefold categorization reflected that which had been described in the papers of the Tbilisi conference (UNESCO, 1978).

In 1995, when the National Curriculum was revised EE, one of the cross-curricular themes of the 1990 National Curriculum, was referred to as a main subject of the revised curriculum. It was incorporated within the core subjects, notably geography and science. As a result the majority of EE in UK schools is still taught in geography and science disciplines. Today, the National Curriculum has moved on to use the term Education for Sustainable Development (ESD). Chatzifotiou (2006) argues that the two terms, namely EE and ESD, seem to have parallel courses in the primary school English National Curriculum (p.376).

### ***Finland***

In order to encourage the promotion of EE and Sustainable Development Education (SDE) in Finland, a national strategy for EE has been created, as well as a strategy for SDE (Jeronen et al., 2009). Sustainable development has also been taken into account in the national curricula for primary and secondary schools (National Core Curriculum for Basic Education, 2004; National Core Curriculum for Upper Secondary Schools, 2003, cited in Jeronen et al., 2009). In the primary and lower secondary schools (pupils aged 7–16), the theme is “Responsibility for the environment, well-being, and sustainable future”. It is the objective of basic education.

In Finland, the basis of education is provided by constructivist pedagogy (Jeronen et al., 2009). As mentioned earlier, this means that the role of pupils as constructors of their own knowledge is emphasized. In this process, the teacher acts as a guide, and her or his main task is to support the learning processes of the pupils. It is interesting to note that several models have been used in Finland to teach EE. The most widely known and used EE models are the Environmental behaviour model, the Onion model, the Tree model, the House model and the Model of ESD ( Jeronen et al., 2009).

Nature trips, games and playing in nature were mentioned as the most widely used educational strategies. A relatively popular method was also story telling. Drama, sense activities, nature exhibitions, earth walk, and experiential learning were also used methods. Some teachers in the Nature Schools reportedly used inquiry learning methods where pupils have opportunities to construct their own knowledge. However it was reported by the researchers that most pupils only had the opportunity to do such work a few times, and in some of the nature schools inquiry learning was not used at all. Their main aim is to develop skills and qualifications important for nature conservation, such as sensitivity for the environment, knowledge about nature and ecology, environmentally responsible emotions and values, understanding of environmental questions, critical thinking skills, social action skills, ethical growth, and responsible environmental behaviour (Cantell & Koskinen, 2004, cited in Jeronen et al., 2009).

### ***India***

According to Ravindranath (2007) EE is not altogether a new concept to the Indian education system. He is convinced that unlike many developing countries, in India, the need to promote positive environmental actions to protect and conserve the environment is well established in the school system. One positive aspect of EE in India is that it is compulsory at all levels of education, including higher education and therefore teacher education (Ravindranath, 2007). He further explains that:

Recognizing the need and importance of EE in India, recently several efforts have been made to reorient and reorganize school education and establish

EE more formally. School textbooks, in all subjects and at all levels, have been revised to integrate environmental concepts. Efforts have been made to develop curriculum and other support materials for introducing EE at all four levels of teacher education in the country. (p. 198)

He further argues that In India, the protection and conservation of the environment has always integrated social, economic and ecological factors, which indicates that a sustainable approach to EE exists in India. “This unified approach to protection of the environment is perhaps inherent in India’s cultural and religious ethos which emphasizes the interconnectedness between the natural environment and the human community” (p.192).

From the above quotation it is evident that in Indian culture human beings are not considered as separate from the environment but as a part of it. Over the last few years, the government of India, through its various ministries and institutions and in partnership with the departments of education at the state level and several non-Governmental Organizations (NGOs), has launched many initiatives and policies to promote EE in schools and colleges all over India. According to Ravindranath (2007) efforts have been made, both at the central and state levels, to integrate environment related concepts into the teaching of many subjects at the school level, develop and disseminate high quality teaching learning materials in EE and train in-service and pre-service teachers in the content and methodologies of EE. Departments of education at the national and individual state levels and several non-governmental organizations (NGOs) are actively involved in this effort (Ravindranath, 2007).

### ***Singapore***

Over the last decade, Singapore, in line with other countries in the region, has been attempting to develop a cross-curricular EE programme (Kwan & Stimpson, 2003).The Ministry of Education writes the programme for EE in schools, although this is based on environmental issues initially identified by the Ministry of Environment. Teaching and learning processes are the main concern of the former while the latter is more concerned with content. The approach in the formal school

sector broadly follows views expressed at various UNESCO conferences to integrate EE into the curriculum through infusion into existing school disciplines and areas of study (UNESCO, 1978; UNESCO-UNEP, 1988, cited in Kwan & Stimpson, 2003).

According to Kwan & Stimpson (2003) this is primarily through geography and through biology in secondary schools and through social studies in primary schools. They also note that, extracurricular activities act as an important medium and schools are encouraged to involve themselves in one of six programmes from the Public Education Department within the Ministry of Environment such as 'The Seashore Life Programme' and 'The Clean and Green Week Campaign'. The overall intention is that EE should emphasise action, active pupil involvement and experiential learning. However, in the statement of outcomes of education from the Ministry of Education (Ministry of Education, 2000, cited in Kwan & Stimpson, 2003) there is no direct reference to EE, although there is the aim for students 'to become committed to improving society' which presumably includes the environment.

Even in Singapore, curricula are there to be followed and teachers follow the textbooks that put the intended curriculum into practice. My findings also suggest that this is a common practice in the Maldivian primary schools. The set texts seem to dominate the classrooms not only in what is taught but how it is taught. However Kwan and Stimpson (2003) argue that this is not necessarily a bad thing but, the selection of environmental issues in the textbooks are somewhat narrow reflecting to a large extent the immediate concerns of the Singapore environment and the policy initiatives of the Government. According to Kwan and Stimpson (2003) the implemented curriculum in schools in senior forms is strongly examination oriented. Teachers seemed to see themselves as just implementers in a top-down bureaucratic educational system. As indicated in chapter one, these characteristics can also be found in the Maldivian education system.

### **Environmental Education in the Maldives**

As described in chapter one, the Maldives has one of the most delicate environments in the world. It also has a narrow economic base that relies on two critical sectors, tourism and fisheries.

As these sectors form the main source of employment and livelihood, protecting the Maldives fragile environment is crucial for sustainable development. Therefore it is obvious that the vulnerability of Maldives islands to environmental change have influenced EE policy developments in the country. For this reason the government of Maldives remains strongly committed to advancing environmental education through formal and non-formal education and providing children, youth, community members and leaders with the knowledge and skills to govern natural resources (Ministry of Environment, 2006) . The government delegates the responsibilities of EE to a range of its agencies. As in Singapore, the Ministry of Education writes the programme for EE in schools. Teaching and learning processes are one of their main concerns. Meanwhile the Ministry of Environment also has a unit directly responsible for environmental awareness.

In the Maldives in the year 2009, there were approximately 44,000 students enrolled at the primary level in 214 schools which is around 50 percent of the total student population (Ministry of Education, 2009). Primary education begins at age seven (grade one) and continues till age 12 (grade six). These six years of primary education are compulsory for all. Unlike many other countries, EE is a mandatory subject in the primary school curriculum in the Maldives. On average there are six periods of ES, per week at the primary level, which is equal in number to Maths and English. However students learn ES only in the primary grades unless they specialize in science subjects or Geography at the secondary and post secondary level. The curriculum also focuses on the environment through subjects such as General Science, Social Studies, and Fisheries Science. Environmental clubs are active in most schools, which engage students in the production of environment awareness raising materials such as leaflets, posters, banners, especially as part of activities to mark the world environment day. Each year the prestigious presidential award known as the 'green leaf' award is given to the school which makes outstanding contribution towards the protection and preservation of the environment and promoting environmentally friendly lifestyles.

It is also worth noting that environment; science and technology is one of the key learning areas of the new curriculum framework developed by the Ministry of Education (Ministry of Education, 2009). This key learning area focuses on exploring

the natural world and its phenomena, how it relates to the environment and society through systematic and organized inquiry. It emphasizes local as well as global environmental issues and the effect of them on society. The Maldives National Curriculum framework, envisions the “development of successful individuals who are motivated to learn; who are inquisitive and eager to seek, use and create knowledge” (Ministry of Education, 2009 p.4). In other words, it places the student at the heart of the teaching-learning process.

It is important to know at this stage that traditionally there is a strong emphasis placed on examination oriented, subject centred teaching in the Maldivian education system. This is becomes an issue not only for ES but also for all the other subjects taught at school. My findings revealed that this emphasis on transfer of knowledge through direct instruction also has a profound impact on the way students are assessed. Objective or scientific methods of assessment such as multiple choice questions, short answers and essays are emphasised, at the primary level which does not serve the purpose of ES as we know it.

As mentioned in Chapter One, very little research exists about teaching and learning of ES in the Maldives. At the time I started my research I could not find any qualitative research studies in this field. A survey conducted by Live and Learn Environmental Education in 2007 shows that EE does not have a high profile or usage amongst the government departments or organisations in the Maldives (Live & Learn Environmental Education, 2007). It also reported that there is little evaluation of EE success in the Maldives. The survey also showed that evaluations that have been conducted have measured outputs such as the number of materials developed or trainings conducted, rather than indicators of true impact on knowledge, skills and action competencies. The report suggests that a more qualitative evaluation of EE in the Maldives is an important first step prior to the development of more student centred, inquiry oriented approaches to EE in the country.

## **Schooling and Environmental Education**

A number of authors have observed contradictions between the problem solving and action-oriented goals associated with the contemporary philosophy of EE and an emphasis on the acquisition of environmental knowledge and awareness in school programs (Blumstein & Saylan, 2007; Cotton, 2006; Stevenson, 2007). According to Stevenson (2007) this rhetoric–reality gap is to be expected given the traditional purpose and structure of schooling. This is an important issue that will be explored in this research in the Maldivian context. According to Stevenson (2007) “Educational sociologists have described the contemporary role of schools as still primarily concerned with the transmission of cultural knowledge, skills and values” (p.145).

As indicated earlier, the guiding principles of the Tbilisi Declaration and key characteristics of EE establish particular kinds of curriculum and pedagogical practices as being necessary to achieve the stated goals (UNESCO, 1978). They focus on learners working individually and collectively towards the resolution of current environmental problems. Stevenson (2007) explains how the process of teaching and learning should be organized in ES:

Teaching and learning 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 or 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 (that is the inquiry) and taking action. Consequently, curriculum and pedagogical planning need to be highly flexible. For example, as well as adapting to students’ own social constructs, the teacher should be amenable to students’ decisions in relation to both their learning and their actions. (p.146)

In contrast, numerous studies have indicated that there is one consistent, and markedly different, pattern to the curriculum and pedagogical practices to be found in the majority of classrooms (Blumstein & Saylan, 2007; Cotton, 2006; Stevenson, 2007). They argue that the common curriculum emphasis in many countries can be described as the mastery of many fragmented facts, concepts and simple

generalisations organised loosely within discrete bodies or fields of study. The predominant pedagogical process involves the teacher as dispenser of factual knowledge. Official student participation is usually limited to making short oral (or, less frequently, written) responses to teacher questions which elicit 'largely recitation of information already defined by the teacher or textbook' (Young, 1980, cited in Stevenson, 2007). The teacher is frequently the only participant who actively engages in higher order thinking processes, such as the critical analysis of explanations and arguments and the making of value judgements. Characteristically, student thinking is confined to applying factual information to familiar 'well-structured' problems: that is, problems with unambiguous definitions and goals, and a single correct solution which has already been determined. Beyond such relatively simple application, knowledge is acquired individually for future use. The test of students' thinking occurs in private artificial situations (that is written examinations) on theoretical material which is usually far removed from the realm of the students' present or future life experiences.

According to Stevenson (2007) these contrasting practices suggest an extensive list of curriculum and pedagogical contradictions between EE and schooling.

While an EE curriculum should be interdisciplinary and focus on real practical problems, school curricula are discipline-based and emphasise abstract theoretical problems. Whereas a curriculum in EE is emergent and problematic in that the content arises as students are involved in specific environmental problems, most school curricula are predefined since they are designed to serve predetermined behaviourally specific ends (that is, ends whose attainment can be readily assessed). Similarly, pedagogy in EE ought to be problematic in the sense that the way for students (and teachers) to solve environmental problems is uncertain, in contrast to the unproblematic pedagogy of information dissemination which results from instructional means being clearly defined by the criterion of the efficient achievement of the desired ends. (p. 147)

He further contends that while EE advocates learning that is holistic and co-operative, school learning tends to be atomistic and individual.

In EE rhetoric students are active thinkers and generators of knowledge, but in schools students are usually in the passive position of spectators and recipients of other people's knowledge and thinking. Instead of learning and action proceeding hand in hand, the acquisition of knowledge precedes its application. Finally, the mastery of relevant knowledge and skills is demonstrated in EE by students' actions in real situations, that is, their performance in exerting influence on environmental decision making, not by students writing about theory in artificial situations.

Traditionally teaching in schools require one adult to interact all day in a confined space with one (in primary schools) or several different (in secondary schools) large group(s) of students whose attendance is coerced. Teachers' work with these groups is defined, to a large extent, by the demands of an assessment system which measures students' mastery of a broad range of standardised content (so that the academic performance of students across the state or country can be compared). Therefore, to be regarded as an effective teacher (by the majority of school authorities, colleagues, parents and students, as well as even oneself), the efficient coverage of material is necessary. Together, the organisational conditions and the demand for covering material compel teachers to be concerned, first and foremost, with maintaining order and control in their classrooms (Stevenson, 2007).

### **Assessment of student learning in Environmental Studies**

Assessment plays a crucial role in the teaching-learning process, providing opportunities for students to demonstrate evidence of what they know, understand and can do (Ancess, Falk & Hammond 1995; Gronlund, Linn & Miller, 2009). However the methods we use in assessment depend very much on the nature of the subject. According to Tal (2005) simple paper and pencil testing conducted at the end of the year is not suitable for ES, because it is a subject that requires higher-order cognitive skills. As he points out, the curricular and instructional shift in EE from transmission of discrete facts and isolated pieces of information to integration of content and cognitive functions requires new strategies for assessment of student learning. Isolated facts if learnt quickly disappear from the memory because they

have no meaning and do not fit into the learners' conceptual map. Dunn (2003) contend that the objective or scientific methods of assessment such as multiple choice questions, short answers and essays was emphasised in the past because of the dominance of cognitive psychology during that time. Later when students approach to learning became more dominant, assessment was done in a more qualitative manner (Dunn et al., 2003).

When assessment, instruction and the intended curriculum are aligned, it provides optimum conditions for learning, thus maximizing students' achievement (Biggs, 1999). The type of assessment techniques used should be related to the learning outcomes and the purpose of assessment. In order to match assessment with the goal and purpose of EE, which is concerned with knowledge, skills, values and action, we must give less emphasis to mere recall and low-level comprehension of facts and concepts, and more emphasis to applying knowledge to tasks that require high-level cognition. It is important to note that the nature of the assessment task also influence students' perception and approach to learning. For example, whether they are using a surface approach or a deep approach to learning (Entwistle, 1992). "If the student thinks that the assessment task requires memorizing and recall, then that is exactly the approach adopted to the learning task" (Dunn et al., 2003 p. 30).

According to Gejda & LaRocco (2006) the need to administer high-stakes mandatory assessments may force a teacher to make choices between using an approach that encourages more student inquiry and covering material for an exam. In their study on primary teachers beliefs about teaching and learning, Brown, Gipps and McCallum (1999) found that the knowledge to be transmitted matched closely to knowledge that is tested in end of key stage tests and the knowledge to be discovered matched with knowledge that is teacher assessed (Brown et al., 1999). This finding also suggests that if teachers have to prepare students for end of semester examinations, then teaching would obviously be more teacher-centred.

## **Conclusion**

This chapter has attempted to examine the issues related to teaching and learning of ES. The literature described two important theories or frameworks related to teaching and learning that have influenced instructional theory and practice, namely the behaviourist and the cognitive approach. An examination of contemporary research shows that students who are taught using inquiry strategies perform better compared to students taught using traditional methods. The literature also identified the factors that enable or challenge the implementation of inquiry approaches in the school context.

It can be seen from the literature that EE began as a result of global environmental concerns and despite the introduction of new policies and curricular to support EE, in many countries, this subject continued to languish at the margins of mainstream schooling. Many observers have commented on disparities between the theoretical understandings of EE portrayed in academic literature and the environmental education that takes place in schools. Finally it suggests that new strategies for assessment of student learning is required for ES.

## CHAPTER THREE

### METHODOLOGY

#### **Introduction**

As mentioned in Chapter One, a case study approach utilising a qualitative method was chosen for this study. This chapter first discusses and justifies the qualitative research paradigm that underpinned this research. It then proceeds to describe and justify the case study methodology and methods of data collection that was used in this study, detailing the process of sampling and data analysis. Finally, the significance of the reliability, validity, triangulation and ethical consideration employed in this study are explained.

#### **Research questions**

It is important to know that the methodology researchers choose depends on the nature of the questions they are asking. The aim of this study was outlined previously in Chapter One. As stated, the overall aim of this study was concerned with exploring issues related to the current teaching and learning of ES at primary schools in the Maldives. With this central aim, this research study, which was conducted at three different schools in the Maldives, attempted to answer the following research questions.

1. What are the key characteristics of Environmental Education practice in primary schools in the Maldives at this time?
2. To what extent do teachers practice inquiry-based learning approach as outlined in the Environmental Studies curriculum?
3. What are the challenges to the implementation of these approaches in this context?

## **A qualitative approach**

The role of research in education is to find ways to improve education. Creswell (2005) defines educational research as the systematic application of a family of methods employed to provide trustworthy information about educational problems, issues, and topics. As the focus of this study is on teachers' and students' subjective experience, I used a qualitative research approach because the teachers' and students' experiences must be interpreted from their perspectives (Bryman, 2008).

Qualitative researchers believe that since humans are conscious of their own behaviour, the thoughts, feelings and perceptions of their informants are vital (Burns, 2000). According to Creswell (2005) the traditional approach relied too much on the researcher's view of education and less on the research participant's view. Only qualitative methods, such as observation and interviewing, permit access to individual meaning in the context of ongoing daily life. Therefore qualitative methods attempt to capture, and understand individual definitions, descriptions and meanings of events. According to Bryman (2008) qualitative research is a research strategy that usually emphasizes words rather than quantification in the collection and analysis of data. As a research strategy it is inductivist, constructionist, and interpretative. He further explains: "Four important features of qualitative research are; seeing through the eyes of the people being studied, description and the emphasis on context, emphasis on process, and flexibility and limited structure" (p. 386).

From the above explanation we can see that the qualitative researcher is not concerned with objective truth, but rather with the truth as the informant perceives it. Hence one could argue the appropriateness of a qualitative approach to this study because the aim of this study was to understand teachers' and students' perceptions and experiences about teaching and learning in primary schools. In particular the experience of teachers and students in the teaching and learning of ES. Further, the goal of qualitative inquiry is a holistic picture rather than a numeric analysis of data. In other words the problems need to be explored to obtain a deep understanding.

According to Airasian and Gay (2003) the qualitative researcher studies the perspectives of the research participants towards events, beliefs, or practices. “Qualitative research can answer questions and illuminate issues that cannot be addressed by quantitative methods” (p. 163). In addition to that, qualitative research is useful for exploring complex research areas about which little is known (Airasian et al., 2003). I chose a qualitative research approach for this study because, very little qualitative research exists about teaching and learning of ES in the Maldives. As indicated earlier, at the time I started my research I could not find any qualitative research studies in this field. Therefore I wanted my research to contribute towards filling this gap on a national level. A qualitative approach enabled me to gather detailed information from teachers as well as students in this field, by adopting semi-structured interviews, and observations as the main data gathering tools for this study.

As Ary, Jacobs and Razavieh (2002) points out, quantitative research use objective measurement and statistical analysis of numeric data to understand and explain phenomena. It generally requires a well-controlled setting, especially when an experimental design is used. Meanwhile Bryman (2008) gives the following explanation for using a qualitative approach rather than a quantitative methodology in conducting educational research: “Due to the complex nature of educational problems, it is rare that a problem in educational research can be reduced in such a way that it can be viewed in terms of only two constructs or variables” (p. 31).

Furthermore, it is rare that a large experiment with the power of generalization could be designed in educational research in which, through randomization both to groups as well as the random allocation of groups to treatments, it would be possible to provide effective control over the many factors likely to be involved in learning (Keeves, 1997). As indicated earlier the purpose of this research is to describe what teachers and students in primary ES class rooms do and whether this is what the ES curriculum recommends they should. Therefore it can be argued that quantitative methods will be inadequate for this research. A case study approach is used to overcome the problems associated with the many variables involved in educational problems.

Within this approach, the whole largely determines the characteristics of the parts which it contains. The discrete elements that make up the whole are considered to be independent and inseparable.

### **Case Study research design**

A research design provides a framework for the collection and analysis of data. Within the qualitative research paradigm, I used a case study design for this research project. Case study research in education is conducted so that specific issues and problems of practice can be identified and explained. Merriam (1998) gives the following criteria for conducting case study research:

A case study design is employed to gain an in-depth understanding of the situation meaning for those involved. The interest is in process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation. (p. 19)

Therefore we can say that case studies provide a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories and principles. This view is supported by Yin (1994) who states that: "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 13). He further explains that case study is the preferred strategy when 'how', 'who', 'why' or 'what' questions are being asked. This research also meets the criteria for case study put forward by Merriam (1998) who contends that there should be a limit to the number of people involved who could be interviewed, or a finite amount of time for observations. Since this research is conducted in three primary schools in Maldives, there is a limit to the number of teachers and students who are interviewed and observed.

It is interesting to find out that case study research is becoming increasingly established in research on specific educational situations which aim to identify key factors relevant in environmental educational processes (Graber, 2004). Case study

research is also used to show good practice in EE and its impacts on pupils, parents, and the local environment. If one wants to understand why and how EE can be established and or why it fails, and what understanding participants have of environmental issues, the framework and subjective theories which underpin their actions have to be reconstructed from their living experiences (Graber, 2004).

I chose a case study methodology for my research with the knowledge that it also has many critics. According to Bryman (2008) one of the standard criticisms of the case study is that “findings deriving from it cannot be generalised” (p. 57). In other words how can a single case possibly be representative so that it might yield findings that can be applied more generally to others? In response to this question it can be argued that case studies opt for analytic rather than statistical generalisation, that is they develop a theory which can help researchers to understand other similar cases, phenomena or situations (Cohen, Manion & Morrison, 2007). In other words the research findings of this study may not be generalisable but it can be transferable to other similar cases. Because something occurs in one classroom at a particular school and at a particular time does not mean that similar occurrences should be expected elsewhere or even in the same classroom at another time. Even though the findings of this research are specific to this particular research context, it may be relevant to a number of primary schools in the Maldives.

Another concern that may be raised is the perceived lack of rigor in case study research (Yin, 1994). He argues that this stems from an investigator “who has been sloppy and has allowed equivocal evidence or biased views to influence the direction of the findings and conclusions” (p .9). It is important to know that rigor in a qualitative research like this derives from the “researcher’s presence, the nature of the interaction between researcher and participants, the triangulation of data, the interpretation of perceptions and rich, thick description” (Merriam, 1998, p. 151). With that in mind, I tried to report all evidence fairly and clearly in a systematic way.

## **Methods of data collection and analysis**

Methods refer to the techniques or instruments used for data collection. Case study is not actually a data-gathering technique but a methodological approach that incorporates a number of data gathering measures (Berg, 2004). Merriam (1998) emphasizes the need to do in depth data collection in case study research. She argues that: "Understanding the case in its totality, as well as the intensive, holistic description analysis characteristic of a case-study mandates both breadth and depth of data collection" (p. 134).

This is supported by Burns (2000) who contends that if a case study is to make any contribution to educational knowledge, it should involve the collection of very extensive data to produce understanding of the entity being studied. Meanwhile, Yin (1994) identifies case study's unique strength as its ability to deal with a full variety of evidence such as documents, artefacts, interviews, and observations. For this purpose I used three data collection methods, namely semi-structured interviews, classroom observations and literature analysis to understand the current practice of teaching and learning of ES in the primary schools in Maldives.

The use of multiple data collection methods helped in triangulation of data and it also maximized the reliability and validity of the study. It is anticipated that the use of multiple data sources will help minimize bias which could arise from exclusive reliance on any one method and make the study more convincing. Burns (2000) notes that the use of multiple sources is the major strength of the case study approach. Further I chose interviews and observations for this research because these methods are viewed as particularly helpful in the generation of an intensive, detailed examination of a case (Bryman, 2008, p. 53). The explanation for my selection and sampling processes are described later in this chapter.

### ***Semi-structured interviews with teachers***

Semi-structured interviews are sometimes called guided conversations where broad questions are asked. This is relatively informal discussion based around a predetermined topic.

As indicated previously, qualitative approaches require that the researcher have the opportunity of gathering data directly from the participants. Interviewing is probably the most common form of data collection in qualitative studies in education. In fact, Merriam (1998) argues that interviewing is the best technique to use when conducting intensive case studies. This is also supported by Burns (2000) who writes: "Interviews are essential, as most case studies are about people and their activities" (p. 467).

Semi-structured interviews were chosen as a primary method in this research because they enable participants to discuss their interpretations of the world in which they live, and to express how they regard situations from their own point of view (Cohen et al., 2007). In other words the informants' (teachers) perspective is provided rather than the perspectives of the researcher being imposed. In this case it was the teachers' beliefs and experiences of teaching and learning ES. Another reason why I chose interviews for this research is because it allowed me to obtain important data which cannot be acquired from observation. For example observations cannot provide information about the changes teachers have brought to the way they are teaching ES. However one disadvantage of the interview as a data gathering tool is that interviewees may not be willing to share information or may even offer false information. Moreover, interview data can easily become biased and misleading if the person being interviewed is aware of the perspective of the interviewer. This happens because often interviewees provide information based on what they think the interviewer wants to hear (Best & Kahn, 2006).

According to Bryman (2008) "keeping structure to a minimum is supposed to enhance the opportunity of genuinely revealing the perspectives of the people you are studying" (p. 389). Another advantage of using structure is that in multiple case study research the use of structure is important to ensure cross-case comparability and also to address more specific issues. This study is written as a single case study describing in detail the current practice of teaching and learning ES in three different schools in the Maldives. For this purpose an interview guide was developed for the study, to give direction to the interview so that the content focuses on the research questions that informed this study (see Appendix A).

Questions were generally straight forward and open-ended which allowed me to generate my own questions to develop interesting areas of inquiry during the interviews. At the end of the interview, I asked the informants whether they had anything to add to the interview that had not been addressed by any of my questions or their responses. This was supposed to help avoid a situation where the interview failed to cover some important area.

In this study, two primary teachers from each case study school were interviewed for approximately half an hour each to find out about their perceptions and experience of teaching ES and using inquiry-based learning in their classrooms. All the individual interviews were conducted at the teachers' respective schools during non-teaching periods or after school hours. The interviews took place in the audio-visual room of the school as it was sound-proof and had air conditioning. The interviews which were conducted in English were audio recorded with the consent of the teachers and transcribed verbatim later for analysis.

Permission to conduct interviews with the teachers and students was agreed via prior permission letters sent to the Principals of the schools concerned. Once permission from the head of the schools was obtained, a supervisor or a lead teacher was nominated by the principal to inform the teachers and to facilitate the study. During staff meetings two teachers from each school agreed to take part in the research on a voluntary basis. Meanwhile individual teachers arranged the times for the interviews and classroom observations. The interviews were carried out after consent forms were completed by each teacher. Since this research study involved three case study schools, the findings from this research helped me to make comparisons between schools regarding teaching and learning of ES. This will be discussed in detail in chapter five.

### ***Group interviews with students***

For the purpose of triangulation I felt it was important to include the students' voice in this research and for this reason I conducted group interviews with the children selected from the three case study schools.

According to Cohen et al., (2007) “Group interviewing can be useful with children, as it encourages interaction between the group rather than simply a response to an adult’s question” (p. 374).

Group interviewing was chosen because it is less intimidating for children than individual interviews. According to Hopwood (2007) adult discourses, teacher perspectives and practice, curricular documents and schemes of work cannot fully account for how pupils experience EE and the environmental learning they engage in (Hopwood, 2007). He further states that:

To understand processes and outcomes (the how and the what) of environmental learning, one must attend to the ways pupils interpret their experiences and the ways their own feelings and agendas are brought to bear in their engagement with environmental issues in the classroom.( p.453)

Each teacher who was interviewed and observed was requested to select two students from their class. The teachers were advised to do a ‘purposeful selection’ concentrating on students who are able to express their ideas effectively. Four students from each school were selected for the interview which means twelve students took part in the interview in total. All of the children’s group interviews were conducted in their respective schools. An interview guide was developed for the study, to give direction to the interview so that the content focuses on the research questions that informed this study (see Appendix B). The interviews which were conducted in English were audio recorded with the consent of the students, and transcribed verbatim later for analysis. The data from the children’s’ interviews were triangulated with data previously collected from teachers’ interviews and classroom observations.

### ***Classroom observations***

I decided to use observations in this study because it offers an investigator the opportunity to gather ‘live’ data from naturally occurring social situations (Cohen et al., 2007). In other words, observations were used to record and study behaviour of teachers and students as it normally occurs in the ES classroom.

This does not suggest that observation is haphazard or unplanned. Best and Kahn (2006) argue that observation as a research technique must always be systematic, directed by a specific purpose, carefully focused, and thoroughly recorded. Compared to interviews, observations are also known to produce more authentic and valid data. As mentioned earlier one disadvantage of the interview as a data gathering tool is that interviewees may not be willing to share information or may even offer false information. For example we could ask teachers about the use of inquiry-based learning in their teaching, but more objective information would be obtained by observing teachers' classes rather than depending on teachers' reflection. According to Moyles (2002), observation can enrich and supplement data gathered by other techniques, such as interviews.

It is important to note that observation data are sensitive to contexts and demonstrate strong ecological validity (Moyles, 2002). This enables researchers to understand the context of programmes, to be open-ended and inductive. According to Airasian and Gay (2003) classroom behaviour of the teacher, student, and the interactions between teacher and student can best be studied through naturalistic observation. "The qualitative researcher's goal is a complete description of behaviour in a specific natural setting rather than a numeric summary of occurrences or duration of observed behaviours" (Airasian & Gay, 2003).

It is important to know that observation as a data collection technique also have some limitations. Systematic observation of human behaviour in natural settings, such as classrooms is to some degree an intrusion into the dynamics of the situation. This intrusion may be reactive, that is it may affect the behaviour of the persons (teachers and students) being observed. It is widely believed that individuals do not behave naturally when they know that they are being observed. The situation may become too artificial, too unnatural, to provide for a valid series of observations (Best et al., 2006).

In this research I observed one teaching session of each of the six teachers I interviewed from the three case study schools to identify the key characteristics of teaching and learning ES. Each teaching session lasted for approximately 35 minutes with a total of over three hours of observational data collected for the study.

Since there were approximately 30 students in each class, a total of 180 students took part in this study.

All the teaching sessions except one lesson from Male' School A, (MATBO) were also video recorded. I did not video this lesson because the teacher preferred not to do so. However she allowed me to record the audio of the teaching session using a digital sound recording device that I used to record the interviews. Moyles (2002) admits that videoing classroom events or meetings can be useful in capturing the essence of the whole context but he argues that there are some limitations. "The focus range of the camera or the particular 'fix' used by the person operating the camera can skew the data. The mind-set of the observer can determine what is 'seen' and what is therefore video-recorded" (p.182).

Since, my research focused on the whole pedagogic process that took place in the classroom, both students and teachers were observed and video recorded. During the classroom observations, the video recorder which was fixed a wide lens was set up on a tripod at the front corner of the class so that the whole class remained within the camera range. The video also captured all of the teacher conversations and most of the verbal interactions that took place between the teacher and the students. While the teaching session was video recorded, I sat at the rear corner of the class room and made additional observational notes. This allowed me to do a complete transcription of the whole teaching session. I also copied down material from the black board when I felt it was necessary and would be useful in data analysis. While the students were engaged in group tasks I sometimes walked around and had a closer inspection of students' work.

During the observations and while analysing the field notes and video data, I focused on how the teacher was interacting with the students, and to what extent the teaching and learning revealed the characteristics of inquiry-based learning . In addition to that, information such as classroom size, classroom layout, facilities and resources were also observed. All the classroom observations were done within the school session without bringing any interruptions to the regular class timetable.

## ***Literature analysis***

The purpose of doing a literature analysis was to increase the authenticity, reliability and validity of the research. In addition to that it was used to establish whether the actual teaching and learning that took place in the classrooms were aligned with the documented expectations described in the curriculum. The documents analyzed include the ES Syllabus of the National Curriculum, which is the official government document that guides teaching in schools, ES text books and teacher guides, scheme of works, lesson plans and documents related to recent government initiatives to implement inquiry-based learning in primary schools.

These documents were useful throughout the research process. They were used to provide the research context and for referencing purposes. The documents also helped me to conceptualize and formulate the research problems and aim. More specifically they were used to investigate whether the planning, teaching and assessment of ES in the primary schools were conducted according to inquiry based-learning strategies. In other words, whether the content, delivery and outcomes were aligned (Biggs, 1999). The documents used in this research were obtained from the case study schools and from the official websites of relevant government authorities, in Maldives such as the Ministry of Education and the EDC.

## **Sampling**

According to Wellington (2000) a sample is a “small part of anything which is intended to stand for, or represent, the whole” (p. 58). He argues that we can never be sure that our sample is fully representative of the whole population, wherever we draw the lines. Even in quantitative research we can never be absolutely sure that a random sample (unless it forms 100 per cent of the population, which is in practice impossible) is representative. We can only estimate a certain probability that the part represents the whole. “Thus anyone who holds the view that quantitative research using random samples can be generalized from, and that qualitative research cannot, is completely mistaken” (p.58). Therefore, no attempt was made to randomly select participants for this study.

I selected three primary schools using a non-probability sampling technique called purposive sampling to represent typical examples of schools where ES is taught. It is anticipated they will provide a suitable context for the research questions to be answered. Purposive sampling, as its name implies, involves using or making a contact with a specific purpose in mind. Typical case sampling will involve selecting cases, e.g. people, students, schools, colleges, which are believed to be fairly typical or normal (Wellington, 2000). As indicated earlier, the gathering of data from more than one site is one of the strengths of case study research and was chosen because it allowed for the strengthening and corroboration of evidence across multiple sources.

I used a non-probability sample in the full knowledge that it does not represent the wider population. In other words I did not intend to generalize the findings of this research beyond the sample in question. However using a purposive sample allowed me to draw useful recommendations in this research for other primary schools in Maldives. I chose two schools from the capital Male' which is a densely populated urban area which consists of 60 percent of the student population, and one school from a rural island for a comparison. School A, is the largest and oldest primary school in Male', School B is the second primary school that was opened in Male' and school C was an average school in a rural island. The assumption is that the new ES curriculum which recommends teachers to use inquiry-based learning is implemented in these schools. Two teachers and four students from each school took part in the interview. And two classes of approximately 30 students from each school were observed. This adds up to a total of six teachers and approximately 180 students.

I chose the sample size based on literature on conducting case study. As mentioned earlier, since I did a case study, the findings of this research may not be generalisable but is applied only to the specific population under investigation. Therefore the sample size is not determined by the need to ensure generalisability but by a desire to investigate fully the chosen topic and provide information rich data. Further the sample size is determined to suite the scope and time frame for a Master's thesis. Consent forms were sent to the heads of schools to obtain voluntary teacher participation (for both interview and observation) from two teachers at each

of the three primary schools. In school A, there were more volunteers than were needed, for this research and the final two were chosen by random selection. Five out of the six teachers who took part in this research were Maldivians. They were all females and one teacher, who was the only male participant, was from neighbouring India. Their teaching qualifications ranged from diploma of teaching to Bachelors degree. Meanwhile their teaching experience ranged from five to 25 years.

## **Case studies**

### ***Rural school***

The rural island lies approximately 117 km south of the capital island of Male. With a total population of around 2500, the main occupation of the inhabitants is fishing and the island is also renowned throughout the country for its lacquer work. It is also one of the fortunate islands which have 24 hour electricity. The school where the research was conducted is one of the oldest schools in the country which celebrated its 60<sup>th</sup> anniversary this year. It is the only higher secondary school in the island. This is a typical rural school with a large tree filled compound in the centre surrounded by single storey classrooms, administrative office, staffroom, library, science laboratory and a computer laboratory.

The total student population of the school was around 465 students with 212 females and 253 males. At the time of data collection there were a total 23 classes in the school, that is 14 primary and nine secondary classes. The average class size up to grade seven (primary level) was 22 with a slightly lower average of 20 for the entire school. Like most schools in the Maldives this rural school also runs in two sessions with the morning session starting at 6:45 am and ending at 12:50 pm while the afternoon session begins at 1:00 pm and finishes at 6:00pm.

Lessons were divided into 35 minute periods and all the subjects except Islamic studies and Dhivehi language are taught in English. There are a total of 75 academic and administrative staff working in the school which is headed by the deputy principal who is an expatriate from Sri Lanka who served as a teacher in the biggest secondary school in Male' for almost two decades.

The school which is owned and funded by the government employed a total of 50 teachers of whom 25 were locals and the rest were from India. All the expatriate teachers had at least a bachelors degree and 50 percent of them had a Masters degree in their subject area. However only a few expatriate teachers hold a teaching qualification. In contrast the vast majority of local teachers had a diploma of teaching certificate as their highest qualification.

### ***Urban school A***

Urban school A is the oldest and largest primary school located in the capital island of the country, Male' with a student population of around 2000 students enrolled in grades one to seven in this year. The school had its beginning in the early 1960s and became a fully fledged primary school in the 1990s which catered for grades one to five. At the time of data collection, the school employed around 120 teachers, of whom 30 were expatriates from neighbouring India and Sri Lanka. It also had 24 senior management staff with five deputy principals and 31 office staff.

Unlike the rural school, which was quite and calm, the urban school which is located in the centre of Male' surrounded by the narrow traffic filled streets had a noisy environment. This school also had an open area in the centre which was surrounded by four storey buildings that housed the classrooms, administrative offices and other facilities such as the library, audio visual room a science lab and a computer lab. As in the rural school, teaching is conducted in two sessions and English is the medium of instruction for all subjects except Islamic studies and Dhivehi. When looking at the qualifications of the teaching staff, I noticed a similar pattern to the rural school. That is all of the expatriate teachers having at least a bachelors degree in their subject area but without a teaching qualification. On the other hand most local teachers held a diploma of teaching as their highest qualification.

### **Urban school B**

Urban school B is a government primary school which is the second primary school opened in Male'. The school was opened in the mid 1980's and was shifted to a complete new building with modern facilities in the year 2000. This is also a large school by Maldivian standard, with a student population of around 1700. The students were divided into 61 classes with an average of 29 students in each class. There were roughly an equal number of classes in the morning and afternoon sessions. A total of 125 teachers were employed at the school at the time of data collection. Unlike the rural school, the vast majority of teachers in this school were locals with only 11 expatriate teachers. The aim of the school is to bring out the individuality of each child so that they can realize their potential with self-discipline and respect. It is also interesting to note that this school plays an important role in the development of the exceptional child with a class for the hearing impaired children. These classes are conducted according to the normal curriculum. Apart from classroom activities these children are offered vocational training like sewing, typing, daily life skills and computer studies.

### **Validity and Reliability**

Validity is a requirement for both quantitative and qualitative research. Ensuring validity and reliability in qualitative research involves conducting the investigation in an ethical manner (Merriam, 1998). One of the assumptions underlying qualitative research is that reality is holistic, multidimensional, and ever changing. "It is not a single, fixed, objective phenomenon waiting to be discovered, observed, and measured as in quantitative research" (Merriam, 1998, p. 202). Since the primary rationale for this research is to understand the issues related to teaching and learning of ES, in the primary schools in Maldives, the criteria for trusting the study are going to be different. Cohen (2007) argues that threats to validity and reliability can never be erased completely. For example in qualitative data the subjectivity of respondents, their opinions, attitudes and perspectives together contribute to a degree of bias.

The fact that this investigation included data from three different schools increases the validity of the study. According to Merriam (1998) the use of predetermined questions and specific procedures for coding and analysis as in the case of this research, enhances the generalisability of findings in the traditional sense. As suggested by Bryman (2008) in order to increase the validity of this study complete records are kept of all phases of the research process, that is from problem formulation, selection of research participants, field work notes, interview transcript, and data analysis decisions, and so on in an accessible manner. Validity was assured by designing questions for the interviews in accordance with the overall aims of this study. Validity of this study was also enhanced through triangulation, that is by using three different data collection methods, namely semi-structured interviews, classroom observations and literature analysis.

Reliability refers to the extent to which research findings can be replicated. In other words if the study is repeated will it yield the same results (Merriam, 1998). However in qualitative research, the question is not whether findings will be found again but whether the results are consistent with the data collected. In this case study it is anticipated that careful documentation of procedures would help to make judgments about the possible replication of the study. However one has to bear in mind that because something occurs in one classroom at a particular school and at a particular time does not mean that similar occurrences should be expected elsewhere or even in the same classroom at another time.

### **Triangulation**

Cohen (2007) defines triangulation as “the use of two or more methods of data collection in the study of some aspect of human behaviour” (p. 141). As mentioned earlier, triangulation in this research project was established through using three different data collection methods, namely semi-structured interviews, classroom observations and literature analysis. For example through triangulation of interview and observation data, I was able to establish whether teacher beliefs about the use of inquiry methods were consistent with their actual practice in the classroom.

## Data analysis

In this research, the primary goal of data analysis was to communicate understanding. As indicated earlier, data for this research was derived from interviews, observations and documents. All the interviews, which were conducted in English, were audio recorded using a digital voice recorder. The interviews were then transcribed verbatim for analysis on a computer. According to Merriam (1998) verbatim transcription of recorded interviews provides “the best database for analysis” (p. 88). As mentioned earlier, I was able to video record all the teaching sessions except one lesson in Male’ school B. After each observation, videos of the lessons were played on a TV to do a complete transcription of the whole teaching session and to cross-check the observation notes against the video footage in order to maximise the accuracy of written notes. The observation data was analysed against a list of indicators of inquiry-based instruction described in Chapter Two (see Appendix C). Before commencing the analysis all the information about the case was brought together, and a case study data base was formed.

After the interviews, and observations notes, and videos were transcribed, each phrase or unit of words that stood alone in meaning was separated and coded, read in detail several times, and analysed using a constant comparative method where the researcher “constantly compares phenomena being studied under a certain category so that a theoretical elaboration of that category can begin to emerge” (Bryman, 2008, p. 542).

Data analysis for this study also involved generating themes or concepts. Interview data was analysed by grouping answers together across informants. First the interview transcripts were colour coded so that each participant had a different colour. Then the responses of the six teachers for each of the selected questions were, cut and pasted under the appropriate question. As far as the analysis of the interview data is concerned, the main themes that arose were actually addressed in the interview. They include teachers’ perception of inquiry-based learning, common strategies used for teaching ES, the use of resources, the nature of assessment, and so on.

Finally they were organized under the following broader themes.

1. Key characteristics of Environmental Education practice
2. Implementing an inquiry-based learning approach
3. Challenges to the implementation of these approaches

### **Ethical issues**

In the Maldives there are no clear institutional policies, unified set of regulations or guidelines for conducting research. I followed Unitec, New Zealand ethics guidelines and the proposal for the study was reviewed by Unitec ethics committee to ensure that the ethical principles are adequate in compliance to the requirements for undertaking a Master's thesis study. Written permission from the Maldives Ministry of Education was sought one month prior to commencing the field work. At least one month before data collection principals of all the three schools were contacted and informed of the purpose of the project, who is conducting the study, the amount of time to be taken in participating, how data collection will take place, who will access the data and where the data is stored and for how long and the likely benefits arising from the study (See Appendix D).

This information was also shared with the teachers participating in the study (see Appendix E). All the participants took part in the research in a voluntary basis through informed written consent. All the participants were informed of the right to confidentiality which means using codes for the participants and that they have the right to withdraw from the study up to four weeks after the collection of data. Consent forms were sent to the heads of schools to obtain voluntary teacher participation (for both interview and observation) from two teachers at each of the three primary schools (see Appendix F). In school A, there were more volunteers than were needed, so the final two were chosen by random selection. During the interview they were free to decline to answer any of the questions. Participants can withdraw their data up to two weeks after the collection of data. All meetings with the teachers were held in their respective schools at a pre arranged time that suited them.

The major ethical consideration with this research design was in the use of students. For the group interview with students and classroom observation, informed written consent was gained from the students and their parents /guardians in addition to school principal and teachers. The students in this research were approximately 10 to 11 years old. Group interviewing was chosen because it will be less intimidating for children than individual interviews. All the observed teaching sessions were videotaped with one exception.

The letter to parents with information about this research was translated to Maldivian language (see Appendix G). Consent forms and information sheets for participants of this study were designed and arrangements for confidentiality were explained. These forms briefly outlined a statement about the nature and purpose of the study and detailed how and where the data is likely to be presented. It also included a statement about their right to terminate proceedings at any time should they feel uncomfortable with any aspects of the research being observed, interviewed or recorded. It is also worth noting that only I and my supervisor have access to the data collected for this research. The data is stored in a separate folder in my personal computer which is password protected. The consent forms are stored in a secure filing cabinet in my supervisor's office. Interview tapes, video tapes, transcripts, participants' contact details are stored separately.

## **Conclusion**

As has been stated, a qualitative research method was chosen to carry out the investigation for this research. In particular a case study approach was used as a research methodology in order to answer the research questions. I used three methods of data collection for this study, namely semi-structured interviews, classroom observations and literature analysis. Three primary schools were selected using a non-probability sampling technique called purposive sampling to represent typical examples of cases where ES is taught. Details of the sampling procedure and data analysis are described in this chapter. Finally, the significance of the reliability, validity, triangulation and ethical consideration employed in this study are explained. The findings which were obtained by these methods are described in the next chapter.

## CHAPTER FOUR

### FINDINGS

#### **Introduction**

As outlined in the previous chapter this research project aimed to examine the nature of current practice related to the teaching and learning of ES in Maldives. With this central aim, this study attempted to answer the following research questions

1. What are the key characteristics of EE practice in primary schools in the Maldives at this time?
2. To what extent do teachers practice inquiry-based learning approach as outlined in the ES curriculum?
3. What are the challenges to the implementation of these approaches in this context?

The results of this research are presented in four main sections. In the first section I have presented the results of the semi-structured interviews with the six teachers from the three case study schools. The second section focuses on the data from the group interview with 12 students. In the next section I have presented the findings from written and recorded classroom observation data and in the final section the findings from the literature analysis are presented.

#### **Analysis of Teachers' interview**

Interviews were chosen as the primary method of data collection in this research. Two teachers from each case study school were interviewed for approximately half an hour each to find out about their perceptions and experience of using inquiry-based learning in their teaching. The first question was intended to explore teachers understanding of inquiry-based learning. Even though teachers did not give a precise definition of inquiry-based learning, all the six teachers I interviewed expressed some understanding of the word inquiry. Teachers expressed ideas such as student-centered learning, to find out, learning from others, and asking questions.

In the second question I asked the teachers to describe some of the inquiry-based learning approaches they have used in teaching ES. None of the teachers gave a detailed description. However all teachers mentioned about some activities that they have done in the class to involve the students. These include getting students to do concept maps, brainstorming, using pictures, and discussing. One teacher further explained:

For example now we are doing food chain so what I did was I just gave some pictures, after explanation I gave some pictures to students so they have to go and take the pictures and they have to go and form the food chains on the board using those pictures and then they are going to tell ok what's going to be the producer which is the first consumer, secondary like that they will be telling so the children are going to be participating more. (MATAI)

The third question required participants to describe common approaches they usually follow when teaching environmental studies. Teachers mentioned activities such as group work, pair work, individual work, brainstorm, discussion, activities, asking questions, showing pictures, flip charts, storytelling, role plays, and learning outside the classroom. One teacher went on to explain:

Mostly we have to use the pictures, and sometimes we have to give some information about the lessons. For example last week I finished the topic 'trees', sometimes we have some classes under the trees. And sometimes they go out and count the leaves and flowers and after that they classify the parts of the flowers. (RTAI)

When asked whether they believe inquiry-based learning is a useful strategy in teaching ES all the answers were affirmative. All the six teachers agreed that this approach will facilitate productive discussions to take place in the class and it will guide the students as well as the teacher in carrying out the lesson. Further they added that inquiry is a much easier method and since ES is a subject that depends on the skills, it is important that teachers follow this method. One teacher made the following comment:

Of course, because different children will have different ideas and also when someone share their idea then all the others will get those ideas they don't have so a lot of discussion will be going on inside the classroom. (MATAI)

The interview went on to discuss the changes teachers have brought to their teaching methodology over the years and five teachers said that their approach has changed in some way since they first began teaching. One teacher told that she is teaching in the same way since she began teaching in 2005. Another teacher explained that she is giving a lot of extra information to the students in addition to the information that is in the text book. Five out of six teachers agreed that they have been teaching in a more teacher centred approach in the past and that teaching and learning has become more student centred now. Apart from this, participants did not give any additional details about the changes, for example what activities were involved in the student-centred approach they are following now. However they explained reasons for such change including availability of more resources, such as the internet, and more coordination and planning in the schools. In answering this question one teacher shared her experience:

Of course at the very beginning when I worked in my island we didn't get actually much facilities. Very less things are there, less books and no equipments and it is really very difficult and at that time we have to teach in the lecture method and I felt that the students also get really bored but when we changed the teaching like this the students shows their interest in learning. So that is something that I had experienced. (MATAI)

The next part of the interview focused on resources. In this context, resources refer to the equipment or materials, supplemental to a course text that affect inquiry-based instruction. Firstly participants were asked to describe the resources they are currently using in teaching ES. All participants confirmed that they are using a variety of resources in the classroom. The following resources were mentioned by teachers as most commonly used in teaching. They include books, computers, multimedia projectors, videos, pictures, flash cards, diagrams, information sheets, real objects like fruits, vegetables and animals.

It is interesting to note that all the teachers were unanimous in emphasizing the importance of using more resources to enhance student learning and understanding of ES concepts. However all the teachers raised the issue of lack of resources available from the schools, especially scientific equipment that they need to carry out activities involving students in the classroom. The following response from a teacher illustrates this issue:

From school we don't get any resources. For plants we had two experiments we just couldn't get things so we just explained and got them to know it from the conclusion we didn't get the resources needed. We prepare teaching aids and things from now on and then we ask children to bring pictures and things.  
(MATBI)

When asked which resources the teachers believed were more effective or useful, all the participants said that it would depend on the topic that they are teaching. One teacher commented that almost all the things are useful. Others said the best teaching aids are the real things or objects that students can see, touch and find out. In answering this question teachers elaborated further on the importance of resources. They explained that without enough teaching aids they cannot carry on the activities especially practical experiments in the class. Teachers felt that by doing activities students will get more ideas, will be more interested and even the weaker students will be motivated to learn. The following comment by a teacher exemplifies this view:

Showing real things. I'm saying this because when I did turtle, life cycle of turtle I brought different types of turtles it seems that children are more interested. I borrowed the turtles from different people. When we did birds I brought a bird. If we use it (teaching aids) more children will tend to get into the lesson more otherwise if the teacher stands in front of the board and explains nowadays children don't pay any attention. Not like when we were students. The more you use teaching aids students will like it more for example when I did flowering plants I took the students down and got them to identify so they did it better. When I brought the birds they are more interested

they want to touch it and its fun. I even brought a crab for the first lesson. I have used quite a lot of teaching aids. (MBTAI)

Question eight focused on giving specific attention by teachers to environmental issues that we face in the Maldives. In answering this question teachers mentioned problems such as beach erosion, issues related to migration, population, waste disposal and the widespread use of plastic bags, and so on. Even though all the teachers were aware of what those issues are, responses from participants varied when they answered this question.

One interesting finding was that the two teachers from the rural schools reported giving more attention to environmental issues that the islands are facing today compared to the teachers from the urban schools. One teacher from Male' explained that it was difficult to take students to field trips because they face different obstacles when they organize such trips and that she had to cancel many in the past. She went on to explain that it was mainly the bureaucratic procedures across schools and the difficulty in getting parents consent that is discouraging teachers to arrange any excursions. The geography of Maldives with 99% of the country being the ocean, and people living in 200 islands makes it even more difficult to conduct field trips as the main form of transport between the island is by sea. More over the absence of regular ferries between islands makes the travel much, more difficult.

One Indian expatriate teacher from the rural school expressed a different opinion about engaging students in a problem based learning approach:

We can't give any specific attention you know. We can't take children; we can't do anything to stop beach erosion. We can't do that type of activities. They are small children. We can just tell them so that they also discuss with their parents. So the island community they have to take care and in some place they have dumped all the waste and those bricks so that would also stop erosion so we can't specifically do all the activities because they are students and here students are given more priority we can't ask them to do any work (RTBI).

Another important aspect that was focused in the interview was the factors that facilitate or encouraged teachers to use inquiry-based learning in their schools and the challenges they face in implementing this method. From the responses it was evident that there were more challenges or constraints than encouraging or positive factors. However all teachers acknowledged that the school management, students as well as the parents are committed to involve the students in a more activities based teaching and learning approach. All the participants admitted that they experience some difficulties in implementing inquiry-based learning in the school. For example, one teacher was worried about student behaviour as students get noisy while having discussions and doing activities in the classroom. Another teacher explained that she did not have enough time, resources and space to do the activities in a class of 30 students. Teachers also noted that they are under a lot of pressure to cover a lengthy syllabus, but at the same time they have to cater for the individual needs of the children.

Another issue that was raised was professional development of teachers. Professional development refers to the training that teachers receive to inform their practice of inquiry-based instruction and increase their pedagogical knowledge and confidence in this subject. One teacher from the rural school had this to say regarding the problems she faces in implementing inquiry-based instructional approach:

I want more resources. That is the first one. Then I want some training for this subject. Then I want to give more attention for this subject. Now I teach two subjects I don't have enough time. The teaching aid that is the problem. Now I have 24 periods every week. Two class Maths and two class E.S. I'm a Dhivehi language teacher but the syllabus is and the books are also in the English language I have a language problem also so I want to do some training (RTAI).

From the conversation with the participants it became known that at the primary level (grades one to five) all teachers have to teach five different subjects namely English, Maths, ES, Practical Arts and Physical Education. Islamic studies and Dhivehi language are taught by teachers who are specialized in those subject areas.

In addition to teaching, teachers have many other responsibilities in school. All the six teachers I interviewed are also assigned with the task of preparing the scheme of work, teaching aids, exam papers and marking assignments. In addition, they are also involved in extracurricular activities such as girl-guide, cub-scout, and sports competitions. One teacher from the rural school expressed a somewhat different viewpoint about implementing inquiry-based learning. His main concern was that most of the students are weak in English language.

Here as you know when we see this Inquiry-based learning, when we ask children some questions they feel shy and because they don't have that much English knowledge and they will come up slowly...Conflict is there sir, because still this step has to be taken, the good children, those who are more interested should be segregated. Then only we can take challenge to take care of them. Really that's what I talked to parents in previous meeting.  
(RTBI)

However, he even seemed optimistic about this new method of teaching and learning, and believed it would require time to become accustomed to.

The next part of the interview focused on assessment. All the six teachers confirmed that they are having continuous assessment which include one project and two written tests before students sit for a end of semester examination. One teacher explained more about the project:

Tomorrow we will be doing a project on sea creatures...Three periods, that is one hour forty five minutes, with in the given time they have to finish yea. It will include so parents help a lot and they are happy with that. And children like to do that in a project because instead of doing assessment they score lot of marks in this project because they are looking something and doing that project isn't it after finding information. So we are giving three weeks to search the net and to get the information. After that in the class they will be doing the project. (MBTAI)

However two teachers felt that assessment in schools are still 'pencil and paper based'. This was clear from a comment made by one of the teachers:

fill in the blanks are there , sometimes terminological exercises are there , so definitions, matching , direct questions will be there , one- one answer questions, also that we use work sheets, and some topical questions we ask in the class and class test we conduct and then mid-term test, term test like that (RTBI).

Talking about assessment, one teacher from the rural school mentioned that there is a lot of competition between parents even at the primary level and that parents take exam results very seriously. She went on to explain that in her island parents put a lot of pressure on teachers regarding marks given to students and that it is very common for parents to complain about teachers not being consistent in marking.

To wrap up the interview, one final question that I asked from the participants was to share any other thoughts that they had regarding the teaching and learning of ES. One teacher from Male' said that her message to the curriculum developers at the Educational Development Centre (EDC) is if they include any activity in the text book it should be something that the teachers can practically carry out. Her main concern was that it is not easy to take children to fieldtrips, especially in Male'. Similarly one other teacher said that she found it difficult to adjust to the new text which requires teachers to carry out a lot of activities. The following comment made by a teacher from Male' also reveals that even though students are doing some activities inside the classroom they are not getting the opportunity to do any activity outside the classroom which is a very important aspect of inquiry-based learning.

Actually if we do more practical work other than sitting in the class other than doing all these lecture type then it will be more interesting. If we can take them out and find out these things so it will be more interesting for them. Now they are just learning what we are teaching ...so instead of that it will be more fun for the students to explore more on their own. for example if they are learning about soil erosion or if they are learning about sea creatures, it will be

very interesting if we can take them to the beach or somewhere where they can observe things on their own that will be something very good. (MBTBI)

### **Analysis of Students' group interview**

As mentioned in the previous chapter the purpose of including the students' voice in this research is for triangulation of data which would maximise the validity and reliability of the study. And for this reason I did a group interview with the children. A total of 12 students were interviewed, that is four students from each school. The focus was on students' perceptions of ES, group work, and the use of teaching aids by teachers and experiential learning or learning outside the classroom. As mentioned above, the initial discussion focused around the students' perception of ES.

The first question invited students to share their thoughts about learning E.S. It is an open question so as to leave it up to the students to express their opinions and highlight what they felt were the most important features of this subject. From this initial discussion it became evident that all the students had a positive attitude towards the subject. All the 12 students from the three schools said that ES is an interesting subject and eight students confirmed that it is their favourite subject. It is interesting to note that students also had a broad perspective of the nature of ES. What was identified from this discussion was that students were aware of environmental issues such as global warming, deforestation, beach erosion and animal and plant extinction. The following quotes share some of their ideas with regard to the subject.

I think we should learn this subject because we learn a lot about plants and insects and everything and there are some endangered ones and we will know how to protect these things if we learn this subject. Because it gives me a lot of information about the environment and it also helps me to know what sort of things harms the environment and keeps it safe. Because teacher teach us lots of information about nature, and resources around us. (MASGI).

Another interesting finding was that students expressed very positive attitudes towards learning outside the classroom with all the participants agreeing that they enjoyed doing activities outside the classroom. The 12 students I interviewed not only conveyed their interest in doing activities but they also took the opportunity to reason out why they liked it. Students acknowledged that learning outside the classroom enhances their knowledge in the subject and gives them the opportunity to practice the skills of inquiry. Some of their comments with regard to learning outside the classroom were:

I like activities outside the class room because it usually gives information about the plants and I like to study .It's very fun it gives lots of information. Well I like the outside ones because, we want to know lot about nature outside and also inside we like it because we bring our own things and we do it. We do like we bring balloons and vinegar and things like that. I like the outdoor activities mostly because I go to see the plants and then learn about it. I remember when we were in grade two, we were tracing the bark and then we have to paste it in our E.S exercise book. We were learning about parts of plants. It was very interesting (MBSGI).

When asked what other activities they enjoyed while learning ES, students mentioned experiments, role plays, games, using pictures and riddles. However there was one student from Male' who said he did not like games. The following two comments exemplify some of the activities students did.

We put water in a jug and marked the water level and put it in a freezer and when the other day we went and found that the place it was marked it increased. Last year we played 'germs' and we put glitter on our hands and we played chase and when the person touched the glitter is there so we know that like the glitter the germs will also spread (MASGI).

Another topic I inquired in the group discussion was about project work. All the 12 students from the three schools indicated that they have to do projects as part of the continuous assessment in ES. As mentioned by teachers, the project requires students to get information from the library, internet and other sources and prepare a

booklet on a given topic such as food, natural disasters, and so on. Students also expressed their appreciation for project work as evidenced from the following quote: “My project was about volcanoes which is also one of the natural disasters, I learned a lot about volcanoes so I enjoyed a lot” (MBSGI).

Along with project work the other topic I focused on was students’ perception of or attitude towards group work. Eight students from the two urban schools mentioned that they do group work almost every day or at least every week. In contrast all four students from the rural school said they have done only a few group work so far. However in general all the 12 students from rural and urban schools expressed positive attitudes towards group work in class. Students acknowledged that in group work they get the opportunity to put their heads together, discuss and share their ideas with their friends. The following comment is representative of all the 12 students’ ideas: “I like doing group work because we usually do it with our friends and its’ rather fun to do it, all of us gets a lot of information” (MBSGI).

The last question was intended to capture students view about the use of resources or teaching aids by their teachers. Books, pictures, drawings, toys, videos, globes and maps were the most commonly noted teaching aids. All students agreed that the use of more resources makes the lesson more interesting for them. One student explained that when the teacher is using teaching aids, the students get quiet and pay more attention to the lesson. One student explained more about the use of resources by her teacher: “She use some diagrams to teach us which part is which and she also uses information she gets from other people and she shares with us, she use globes and maps” (MBSGI).

One important finding from this interview is that the English language skills of the students from the urban schools is significantly higher than the children from the rural school. Although the students from the rural school understood the question I asked, most of the time they simply answered ‘yes’ or ‘no’ which indicates that they have difficulty in expressing their ideas in English. As one teacher noted in the interview, the students are disadvantaged by the fact that they have to learn all the subjects except Islamic studies and Dhivehi language in their second language which is English.

In the past in the rural schools all the subjects were taught entirely in their first language (Dhivehi) or sometimes a bilingual approach was used in instructional time. Since all the schools are following the same national curriculum, the text books and medium of instruction has now changed to English.

It is important to note that in the Maldives, students starting grade one (primary level) come with a wide range of English language abilities. Some start having had no exposure to English at all especially in the rural islands. Others may have attended pre-school and learned how to write the English alphabet and a limited number of vocabulary. Meanwhile some students especially in Male' may come from homes where English is often spoken and may therefore already have some understanding of the language.

### **Analysis of classroom observation data**

In conjunction with the teacher and student interviews, classroom observations provided a valuable source of research data and established an additional means of data triangulation. As mentioned in the previous chapter, in this research I observed six lessons in total, that is one lesson of each of the six teachers I interviewed from the three schools to consider whether the teaching and learning reveal the characteristics of inquiry-based learning. In addition to that, information such as classroom size, classroom layout, facilities and resources were also noted during the observations. All the teaching sessions except one lesson from Male' School A, (MATBO) were also video recorded. I did not video this lesson because the teacher preferred not to do so. However she allowed me to record the audio of the teaching session using a digital sound recording device that I used to record the interviews.

The video recorder which was fixed a wide lens was set up on a tripod at the front corner of the class so that the whole class remained within the camera range. The video also captured all of the teacher conversations and most of the verbal interactions that took place between the teacher and the students. While the teaching session was video recorded, I sat at the rear corner of the classroom and made additional observational notes. This allowed me to do a complete transcription of the whole teaching session.

The first lesson I observed was a grade five class from the rural school. There were 24 students present in the class which took place in the afternoon session. The classroom had a traditional seating arrangement with all desks arranged in rows and facing the chalkboard. The teacher began the lesson by showing a piece of coral to the class and asking what it was. The transcript of this teaching session showed that there were 20 interactions between the teacher and the students during the 35 minute lesson. During the lesson the teacher posed seven questions related to the topic she was teaching. Most of the questions were simple close ended questions that required students to name objects and tell the meaning of a word or say whether they agree or disagree to a fact by raising their hand. The teacher asked only one open-ended question in which students were asked to tell the reasons why tourists visit Maldives. None of the students provided an answer to this question.

The teacher spent the first nine minutes of the lesson explaining about different types of corals. In her explanation she used real coral samples and pictures as teaching aids. She also used the white board to illustrate the two types of coral, namely soft coral and hard coral. After that the teacher asked students to copy down notes which she wrote on the board and this continued for the rest of the lesson which is exactly 26 minutes. While the students were copying the notes, from the board, the teacher walked around the classroom to check on how the students are getting on with their work. In summary 26% of teaching time was spend on direct explanation and 74% of the time was spent by students copying down the teachers notes. The students remained seated at their desks throughout the lesson, with little or no interaction among them except for some private conversations or social interactions that was not focused on learning.

The second lesson I observed from the rural school was taught by an expatriate teacher from India. This lesson was also in the afternoon session. The teacher appeared to be very well prepared for the lesson because he brought lots of materials as teaching aids. The lesson was on materials so the teacher brought a variety of objects that we use in our daily life which are made out of either plastics or metals. These include, tooth brush, hanger, toys, bottles, tin can, adapter, tooth pick, scissors, bangles, screw driver, peeler to name a few.

The teacher started the lesson by asking the students what they have learned in the previous lesson. The following extract from the transcript of the video footage shows how the lesson continued:

17:30 Teacher : We learned about mangroves, rain forests, what else? Teacher points to a student, student stands up and answers “endangered species”.  
Teacher points to another student and repeats the question  
Students replies “sea turtles, pests”.  
Teacher: very good.  
Teacher : Ok if you think about this, these are all living things isn't it?.....plants are living things birds are living things.  
Teacher : “When we learn about our environment do you think it's enough to learn about only living things”?  
Students respond “No”  
Teacher : Then is there anything more?  
Teacher calls student by name “Yes Zaha, What do we have to learn more about”?  
Student did not answer  
Teacher: “ok what do you do when you get up early in the morning?”  
Student answers “Brush teeth”.  
Teacher: Very good you brush your teeth. You need tooth brush, isn't it?  
Any thing more? tooth paste, water , tap isn't it?  
Students replies “Yes”  
Teacher: So what is a tap made up of?  
17: 34 Students : “Materials” .....(RTBO).

The teacher posed a total of 29 questions during the 35 minute lesson. 17 of the 29 questions were asked during the first six minutes of the lesson. Most of the questions required students to recall what they have studied in the previous lesson, name objects and tell what the objects are made up of, for example metals or plastics. The teacher also used questioning as a behaviour management strategy by focusing the questions to students who are not attentive in class. The transcript of this lesson also showed that students asked two questions to the teacher.

During the observation I noted that throughout most of the lesson, students sat quietly at their desks and listened to the teacher's explanation.

Generally there was an absence of student to student interactions in the classroom that were learning focused. One distinguishing feature in this lesson was that unlike the first lesson I observed, the teacher did not write notes on the board and students did not spend any time copying notes from the board. Instead the teacher had written the notes on bristle boards and pasted one at a time on the black board while explaining the topic. This allowed the teacher to manage the time more effectively as he covered a wider area of content compared to the previous lesson. Within the 35 minute period he explained the properties of plastics and metals, their origin and moved on to discuss about waste and recycling.

The third lesson I observed was a grade five class from School B in Male'. The observation notes indicate that the teacher spend the first 10 minutes of the lesson on direct explanation. She began the lesson by reading a riddle and asking the student what the riddle was about. Almost all the students raised their hands to answer, and the teacher asked one of them who answered correctly. Next the teacher asked students to turn to page 88 of their ES text book and started reading from it. While reading from the text the teacher asked for definitions of and Maldivian name for certain words. Next the teacher put up an illustration of life cycle of mosquito on the board and explained each stage of it. She also explained about diseases spread by mosquitoes and measures that can be taken against it. The students were listening quietly while the teacher explained. The teacher showed the class an electric racquet, used to trap mosquitoes and insect repelling cream.

After 10 minutes has passed the students were asked to get ready for a group work. Students quickly formed four groups and were given a blank paper and cut pieces from a diagram of life cycle of mosquito, and asked to arrange and paste the different stages correctly. While the students were engaged in their work the teacher gave guidance on how to do the work, for example everybody must contribute and that there should be no shouting in the class. However it was observed that some students were not actively participating in the group work especially in larger groups. Students were given five minutes to complete this task and when everybody finished

the teacher asked one student to stand up and explain the life cycle of mosquito which she did. After that the students were asked to prepare for a role play. The following extract from the observation notes describes the role play:

14:25 thirteen students are taking part in this role play. Some students, acting as “mosquitoes” are flying in a house where a baby has fallen ill. A group of people from the Centre for disease control and prevention visits to inspect the house but the people at the house refuse to let them in and insists that there are no mosquitoes in the house. Later they change their mind and allowed the inspectors to check their house and took the baby to the hospital. The role play ended when one student kills all the “mosquitoes” with an electric racquet (MBTAAO).

To end the lesson the teacher asked students to paste a diagram of life cycle of mosquito in their note book.

The fourth observation took place in the same school in Male'. The class was held in the audio visual room which was equipped with a desk top computer, multimedia projector and a smart board. In this lesson also the teacher introduce the topic by asking a simple question. The following extract from the lesson transcript shows how she began:

15:57 Teacher : Are you all very tired, how many of you are sweating , ok so most of us sweat, but there are some insects and some animals that do not sweat, today I'm going to tell you some information about an animal that doesn't sweat. Can you guess what it is?

Students: Rat, butterfly, etc.

Teacher: Yes very good, rat (MBTBO).

After the introduction, the teacher switched to a power point presentation which lasted for the rest of the 30 minute period. The whole teaching session constituted of direct teaching, or a lecture method where the teacher showed pictures, read and explained lesson notes from the power point slides which were projected on a smart board. The lesson transcript showed that during the lesson, the teacher asked a total

of 10 questions to the class and the students asked an equal number of questions to the teacher. Since the students did not do any activity, there was little or no student to student interaction related to learning. With this method of teaching, the teacher was able to cover a lot of content in a short period of time.

As mentioned in the previous chapter, two classroom observations were made in each school, that is one lesson of each teacher who took part in the interview. My fifth observation took place in school A in Male'. There were 27 students and the desks were arranged in clusters so that students sat in groups of four or five. The class was very noisy since most of the students were engaged in private conversations. I could also hear construction work going on in a building just across the street. The teacher started the lesson on the topic 'endangered species' by engaging the students in a group task in which they were given toy animals and asked to group them according to similar features. The students spent approximately three minutes on this activity. After that, the teacher inquired why they grouped or classified the animals in that way. According to the lesson transcript, the teacher posed 10 questions which the students answered.

One interesting finding from this observation is that there was continuous student and teacher interaction in the lesson and students were very much involved in the whole class discussion. Students were also given the opportunity to contribute to the discussion and share their ideas with the class. For example one student described a strange mammal she saw on the National Geographic Channel. While another student told a story about a panda. There was another student who talked about "over exploitation". These were all student initiated interactions. After ten minutes the teacher gave another group task which is mentioned in the text book. In this activity they have to discuss and write the names of five endangered animals in Maldives and explain why they are endangered. The teacher gave 13 minutes to complete the task and once they finished they presented their answer to the class, one group at a time. After a brief discussion the students did a third group activity in which they were asked to identify reasons why some species are endangered and what could be done to protect those species. The teacher closed the lesson by discussing the answers with the students.

The last lesson I observed was also in Male' school A. The lesson was about camouflage. The teacher began by giving a brief outline of the previous lesson. The video recording of this lesson showed that the teacher posed 22 different questions to the class and that the students answered most of them. While explaining the lesson she used eight pictures of different types of animals, birds and fish and drew one diagram on the board. At the end of the lesson the students did a group activity. Like the first lesson I observed from this school, there was a lot of teacher initiated whole class discussion in this lesson as well.

### **Coding used to describe the research results**

<b>Code</b>	<b>Type</b>
RTAI	Rural School Teacher A Interview
RTBO	Rural School Teacher B Observation
RSGI	Rural School Student Group Interview
MASGI	Male School A Student Group Interview
MATAO	Male School A Teacher A Observation
MBTBI	Male School B Teacher B Interview

### **Literature analysis**

The purpose of doing the literature analysis was to increase the authenticity, reliability and validity of this research. In addition to that it helped to establish whether the actual teaching and learning as practised are aligned with the documented expectations described in the E.S curriculum. Documents analysed include the ES Syllabus, E.S text books and teacher guides, scheme of work and documents related to recent government initiatives to implement inquiry-based learning in the primary schools of Maldives.

## ***The Environmental Studies Syllabus***

In all the primary schools in Maldives teaching is based on a locally designed syllabus while the content of the secondary curriculum is based on the syllabuses of the Cambridge International Examinations. As mentioned earlier EDC is the professional body of the Ministry of Education who is in charge of developing the school curriculum in the country. EDC is also responsible for producing the text books and other learning materials such as audio visual aids. The primary environmental studies syllabus is divided into five units, namely the people, the earth, living things, the changing world and interdependence.

These units are sub divided into various topics which include student-centred activities. The activities are designed in such a way that the students will play an active role in collecting information, analysing, presenting and in some cases even in self evaluating. The lessons and activities suggested in ES teaching and learning materials are based in the inquiry method. In other words the syllabus encourages students to ask questions and to actively search for their answers. This method also enables teachers to design an extensive range of teaching strategies to address the needs of the students in the classroom. Inquiry-based method of learning is based on activities such as investigation, communication and participation. The syllabus also recommends that teachers should only guide students and not over assist them and emphasize skill development and real experience which is at the centre of activities in the syllabus.

### ***The scheme of work***

In order to achieve the outcomes of the national curriculum, schools develop their schemes of work for each subject which translates the outcomes of the curriculum into teaching and learning activities. At the beginning of each term, subject coordinators from each school prepare the scheme of work. The schemes are unit/topic based and organized in the form of a table, with columns entitled: week, topic, objectives, reference page, materials, activities and marks. For example, topics mentioned in the grade four scheme include, states of water, water pollution, tides, seasons, solar system, plants and photosynthesis.

Specific objectives or learning outcomes that the students should be able to achieve for individual topics were listed under the next column. The materials or teaching aids mentioned include mainly pictures, posters, word cards and materials used to do experiments. Under the activities column was the general procedures for implementing the weekly topics, in other words it is a description of how each lesson should be taught. The following is extracted from the scheme of work that was followed by grade four teachers in school B in Male' which is representative of the schemes used in all the three schools.

Period/ week	Unit/topic	objectives	Re. pg	materials	activities	marks
5 and 6	plants	Be able to write parts of the tree. Be able to write what is pollination	pg 72, 73	pictures	Show pictures of a tree and explain the parts. Explain and show stems, root, flowers seed using pictures. Explain how pollination takes place. Ask them to draw and label a tree in exercise book.	

While doing the literature analysis one common feature I noticed is that the schemes were organized so that it will align with the ES syllabus described above.

## Conclusion

This chapter has presented the findings of this research obtained from three case study schools under four main sections. These include the results of the semi-structured interviews with teachers; children's group interviews; findings from classroom observation data and documentary analysis. The findings from this research indicate that education about the environment was the prevailing approach that teachers practiced in the primary schools in Maldives. In other words teaching was mainly subject centred direct instruction which focused on transmission of

knowledge. Another important finding was that students from urban schools were more engaged in group work compared to their peers in the rural school. There was also a lack of experiential learning in the schools.

The findings also revealed that assessment in the case study schools were still 'pencil and paper based', which emphasises lower cognitive skills such as recall of knowledge. An important aspect of the findings in this study concerns primary teachers' understanding of inquiry-based learning. Despite having limited knowledge in this new approach to teaching, teachers from both urban and rural schools used some indicators of inquiry approach in their teaching.

Finally the results of this study suggest that teachers faced severe constraints in terms of, teaching the subjects in the limited amount of time in the school day. Structural barriers such as too much curriculum material to cover, lack of resources, time, or the ability to take students outside were cited as major constraints to the implementation of inquiry-based learning in ES. Lack of training in inquiry-based instructional strategies was also an issue identified by teachers.

## CHAPTER FIVE

### DISCUSSION

#### **Introduction**

This investigation aimed to examine the extent to which inquiry-based strategies are being used in the teaching and learning of ES in the primary schools in Maldives. The research questions, as outlined in Chapter One, that informed the basis of this study are as follows:

1. What are the key characteristics of EE practice in primary schools in the Maldives at this time?
2. To what extent do teachers practice inquiry-based learning approach as outlined in the ES curriculum?
3. What are the challenges to the implementation of these approaches in this context?

The findings described in the previous chapter have been obtained from three case study schools. The data collected enabled these questions to be answered and also served to bring to light several other issues. This chapter discusses the findings expressed in chapter four, in relation to the literature presented in chapter two in order to answer the above research questions. The findings from the research questions are interconnected but the questions are gone through separately to give a clear picture of the research findings.

#### **Key characteristics of Environmental Education practice**

##### ***Planning for instruction***

One of the key features of EE practice in the primary schools in the Maldives concerns planning for teaching and learning. This is an issue which concerns all other subjects too.

From the interview data and lesson observations, I was able to ascertain that teachers in the primary schools give a high priority for instructional planning. Teachers reported in the interviews that they meet weekly to plan their lessons for the next week based on the scheme of work which is prepared by subject coordinators. As mentioned in the findings, the schemes are designed focusing on specific behavioural objectives or learning outcomes that the students should be able to achieve for individual topics. For example in the scheme of work from Male' school B, under the topic 'plants' the first objective requires students to be able to write parts of a tree and the second objective was to write what is pollination. For this topic, suggested activities include, showing a picture of a tree, and teacher explaining its parts, and explaining how pollination takes place.

It is interesting to know that many educational theorists are critical of the behavioural objectives model of teaching and learning. For example, Elliott (1998) argues that complex and important learning outcomes may be neglected at the expense of more trivial and less important. He argues that the pre-specification of behavioural goals may also encourage an inflexible approach with in the classroom and intended behaviours do not always represent the way individuals learn. According to Marsh (1998) behavioural objectives are too demanding and they have limited application to the studies of society and environment field.

It can be argued that objectives model of planning is suitable for instruction and training but it breaks down in subjects such as EE where a process inquiry model is more appropriate. Therefore the daily, weekly, and yearly planning should be structured according to the principles of inquiry teaching and learning (Hornsby & Murdoch 1997). As indicated in Chapter Two, curriculum and pedagogical planning need to be highly flexible. However, given the time constraints, lack of professional development, and resources, planning for inquiry-based learning may not be an easy task for primary teachers in the Maldives. These issues will be presented in more detail later when I discuss about the challenges teachers in Maldives face in implementing inquiry-based instructional approaches.

### ***Direct instruction***

From the conversation with the students it became apparent that students had a broad perspective of the nature of ES. The themes that emerged from the students' replies when they were asked to share their thoughts about ES reflected the threefold categorization of education about, in and for the environment (UNESCO, 1978). According to Chatzifotiou (2006) education about the environment refers to knowledge of the environment (for example, topics such as climate, water, plants, animals and air). Education in the environment refers to the environment as a resource which pupils can use in order to carry out investigations. Education for the environment is concerned with developing positive attitudes and fostering positive actions towards the environment (Chatzifotiou, 2006).

Even though students expressed their interest for education about, in and for the environment, classroom observations indicate that education about the environment was the prevailing approach that teachers practiced in the primary schools in Maldives. In other words teachers were concerned mainly with the transmission of knowledge about the environment to their students. For example observation of one teaching session in the rural school showed that within the 35 minute period the teacher explained the properties of plastics and metals, their origin and moved on to discuss about waste and recycling. This clearly indicates that teachers are under pressure to cover a lengthy syllabus. Further I saw no instance of any activity outside the classroom in any of the lessons I observed.

This resembles the findings of (Chatzifotiou, 2006) who studied the impact of EE upon English primary school teachers. His findings also revealed that teachers mostly focused their practice of EE on education about the environment. At this stage it is important to note that my findings have confirmed that teacher-centred methods based on the transmission of information from teachers to students through direct explanation has been the dominant method of teaching employed by teachers in the Maldivian schools for several decades. This suggests that the content to be taught was far more important than making this content understandable to their students through effective teaching techniques.

It is likely that teachers who took part in this study were also taught in a traditional setting, and this could also account for their practice of direct teaching.

### ***Whole class discussion***

A quite different view of learning suggests that, irrespective of the pupil, certain forms of teaching, such as direct instruction, are best for achieving certain forms of learning outcomes (Eller & Henson, 1999). Though teaching of ES in the rural and urban schools I observed were dominated by direct instruction, it was also characterised by teacher pupil interactions which took place in whole class discussions, usually at the beginning of lessons.

Proponents of whole class teaching approach argue that highly interactive whole class teaching, which when done well allows the pupils to learn material in a way recognized as encouraging deep learning (Entwistle, 1992). This is also supportive of the argument put forward by Atwell et al. (2007) who contend that teachers can foster inquiry even in a traditional classroom environment, perhaps using a whole class teaching approach.

### ***Questioning***

Questioning is one of the fundamental characteristics of inquiry-based learning that gives students the opportunity to develop their thinking skills. According to Marsh (1998) the questions that teachers ask are often related very closely to their overall strategy. For example, teachers who pose questions that begin with 'Who?' or 'What?' have an orientation to studies of society and environment which gives a high priority to learning facts. As highlighted in the previous chapter, the type of questions teachers asked especially in the lessons I observed in the rural school and to a lesser extent in the urban school were mostly close ended which prompted close ended responses such as recall of information.

It can be argued that the predominance of closed or factual questions is a less positive finding in terms of how classroom interaction promotes inquiry-based learning. This style of teacher questioning seeks predictable correct answers and only rarely are teachers' questions used to assist the development of thinking skills which lies at the heart of inquiry-based learning (Hardman, Smith and Wall, 2003; Abd-Kadir & Hardman, 2007). On the other hand, the use of open questions provides opportunities for broader, more personal responses and generates further rich discussion and investigation.

### ***Teacher – student interactions***

As indicated in chapter four, my observations confirmed that most of the interactions in the lessons were teacher initiated. Transcript of the teaching sessions also indicate that the practice of asking pupils to complete a sentence either through a direct repetition of the teacher's explanation or pupil's answer or through omitting the final word, or words, or a combination of both these strategies was very common in the rural school. The following extract, taken from the transcript of an ES lesson on the topic "coral" is typical of the discourse style used by both teachers in the rural school.

Teacher: corals belong to two groups; the first one is soft coral ok. The second one is.....?

Students: hard coral.

Teacher: Ok the soft coral is easy to .....?

Students: break

Teacher: and hard coral is difficult to.....?

Students: break (RTAO).

As evidenced from the above example, students' verbal interactions with the teacher were limited to single words or phrases and almost all the interactions were teacher initiated. The analysis of the video data showed that teachers especially from urban school A often used questioning to challenge students rather than making explicit statements. For example in one lesson I observed in urban school A, the teacher

while discussing a group task, which required students to classify toy animals based on similar features they possessed asked the following questions to the students.

Teacher: How did you group the animals?

Why did you group the animals that way?

Why there are fewer animals in some groups than in other groups?

(MATBO).

In contrast in the rural school, despite using a whole class teaching approach, teachers used more statements than questions in their teaching implying that student participation was more related to listening than talking. This finding is consistent with Nazeer (2006) who noted that in the lessons he observed teachers do not allow students to ask questions during the lessons, but they asked students few questions at the beginning of each lesson to revise the previous work. And also asked questions towards the end of each lesson, if they have time, to summarise the lessons. His observations also showed that normally teachers select one or two students to answer the questions being posed.

This is also confirmed by Nashia (2006) who claimed that school culture in rural schools was one factor that hindered positive teacher pupil interaction.

Students were expected to stand up to greet the teacher, raise their hands if they wanted to speak, and wait to be called on to speak, which they were expected to do standing up. Rules imposed by teachers like this clearly inhibited students' participation and discouraged them from speaking out in class. (Nashia, 2006, p. 170)

Therefore, success with inquiry-based learning requires a change in school culture. In other words, schools need to make inquiry-based learning their instructional priority. Lesson observations in the rural school indicate that teacher feedback to student responses also consisted mostly of the implied affirmation of repetition of what the child said. However it can be argued that asking factual questions will not always hinder inquiry learning. This is because many of those factual questions teachers ask also serves to check students' prior knowledge, or checked pupils

understanding which could be said to promote student learning (Burns & Myhill, 2004). According to Jan and Wilson (2005) some factual or conceptual knowledge may need to be established before more complex questions are possible. One positive finding observed was that in both urban and rural schools, teachers checked pupils understanding in their lessons with probing questions, but it is equally important to adjust their questioning according to pupils' answers so that the function of questioning will shift from checking understanding to developing pupils' understanding (Burns & Myhill, 2004).

### ***Group work***

When discussing the key characteristics of EE practice in the primary schools in the Maldives, it is important to note that students from urban schools were more engaged in group work compared to their peers in the rural school. There is considerable evidence in the literature that indicates the benefits of engaging students in group work, which facilitates student inquiry and positively affects student learning (Marsh 1998). Group interviews with the students also confirmed that students from the rural as well as the urban schools had a positive attitude towards group work.

This may be because group work provides opportunities for children to interact and work together in teams and encourages them to help and support one another. I observed that in both schools in Male', the group work that took place were very much teacher directed and students were given set tasks which is provided in the environmental studies text book.

Even with overwhelming evidence in support of group work and corporative learning, there are some research findings that indicate that group work may not always be advantageous to student learning. According to Baines, Chowne and Blatchford (2007) accounts of the use of groups in UK schools have consistently shown that little genuine group work takes place and still less is of good quality (Baines et al., 2007). They are convinced that within the majority of primary classrooms children "sit in groups but rarely work as groups" indicating that group work may not always facilitate inquiry based learning (Galton et al., 1980, cited in Baines et al., 2007).

My lesson observations also revealed that some pupils did not actively participate in group discussions especially in larger groups in which up to seven students were working.

As mentioned earlier, during my visit to the rural school I saw no instance of group work or corporative learning in the ES lessons I observed. One reason for the lack of group work in the rural school may be due to the teachers' belief that students learning in groups will cause disciplinary problems. Traditionally teachers believe that student discipline problems are likely to occur if interactive classroom activities are implemented or small group based discussions are introduced (Nazeer, 2006). This echoes the findings of Brown, Gipps and McCallum (1999) who reported that teachers held the belief that children who have behavioural difficulties need more 'transmitting'.

Another reason may be the lack of pedagogical knowledge and current teaching and learning theoretical knowledge among the Maldivian teachers. I also observed that the classrooms in the rural school had a traditional seating arrangement with all desks arranged in rows and facing the chalkboard. For group work to be effective, it is important that the physical layout of furniture is conducive to group discussions such as circles of chairs and horseshoes (Marsh, 1998).

### ***Experiential learning***

As mentioned in the previous chapter the students only get few opportunities to engage in experiential learning which is vital for helping students appreciate their first hand experiences from a variety of different perspectives (Ballantyne & Packer, 2002; Dewey, 2008). In fact, several of the teachers noted difficulties in organising field trips. Most frequently noted was the lack of funding and time available for field trips and the bureaucratic procedures the teachers have to go through in order to get permission for such trips. Experiences outside the classroom provide students with learning activities in relevant situations beyond the walls of the classroom (Ballantyne & Packer, 2002; Dewey, 2008).

Experiences outside the classroom also enhance learning by providing students with opportunities to practice skills of inquiry, and problem solving in everyday situations. This includes short visits into the school grounds and local community, as well as visits to farms, factories, offices, and natural settings such as a forest, a beach or a national park.

Teachers from Male' schools acknowledged that there are no natural settings in Male' (the capital island) such as beaches, mangroves or coral reefs where children can carry out investigations since the whole island has been transformed into an overcrowded metropolis. The geography of Maldives with 99% of the country being the ocean, and people living in 200 islands makes it even more difficult to conduct field trips as the main form of transport between the island is by sea. More over the absence of regular ferries between islands makes the travel much, more difficult.

### **Assessment**

The nature of assessment in the primary schools in Maldives is also an important issue related to the teaching and learning of ES. Traditionally there has been a strong emphasis on examinations in the Maldivian school system. As mentioned in Chapter One, in Maldives teaching even in the early primary grades is exam oriented, and as a result much emphasis is given to rote learning and memorization of facts. One teacher reported in the interview that in all primary schools they give an equal number of tests that is three written tests each semester. As Tal, (2005) points out, the curricular and instructional shift in EE from transmission of discrete facts and isolated pieces of information to integration of content and cognitive functions requires new strategies for assessment of student learning. Isolated facts if learnt quickly disappear from the memory because they have no meaning and do not fit into the learners' conceptual map.

As evidenced by my findings, even today much instructional planning in the primary schools is directed by behavioural objectives that specify the behaviour to be exhibited by learners. According to the behavioural objectives model of teaching and learning, learning is defined as a relatively permanent change in behaviour. It follows that assessment or evidence of learning must be some capturing of that change or

some recording of the new potential behaviour. Dunn et al.,(2003) contend that the objective or scientific methods of assessment such as multiple choice questions, short answers and essays was emphasised in the past because of the dominance of cognitive psychology during that time. Later when students approach to learning became more dominant, assessment was done in a more qualitative manner (Dunn et al., 2003).

During the interview, two teachers agreed that assessment in their school is still 'pencil and paper based', which emphasises lower cognitive skills such as recall of knowledge (Duschl & Gitomer, 1997; Treagust *et al.*, 2001 cited in Tal, 2005). We all know that simple paper and pencil testing conducted at the end of the year is not suitable for ES, because it is a subject that requires higher-order cognitive skills (Tal, 2005). My findings also indicate that a substantial proportion of a teacher's day is devoted to marking students' written work, which consists mostly of traditional forms of assessment such as matching, completion and true or false items. As far as ongoing classroom assessment practice is concerned I did not find a significant difference between the rural school and schools in Male'.

In order to match assessment with the goal and purpose of environmental education, which is concerned with knowledge, skills, values and action, we must give less emphasis to mere recall and low-level comprehension of facts and concepts, and more emphasis to applying knowledge to tasks that require high-level cognition. It is important to note that the nature of the assessment task also influence students' perception and approach to learning. For example, whether they are using a surface approach or a deep approach to learning. "If the student thinks that the assessment task requires memorizing and recall, then that is exactly the approach adopted to the learning task" (Dunn et al., 2003 p. 30).

The recent introduction of project work in the primary EE is a positive move towards multiple modes of assessment. Both teachers and students I interviewed reported doing a project as part of continuous assessment in ES. Projects are extended pieces of work completed over a period of time. A Key characteristic of project work is investigation, which involves the collection, organization, evaluation, and presentation of material or data; which are exactly the same sort of skills involved in

inquiry. Projects were usually completed by individual students or small groups of students with the teacher acting as a supervisor.

### **The practice of inquiry-based learning**

An important aspect of the findings in this study concerns primary teachers' understanding of inquiry-based learning. This is an important issue because teachers' understanding of the terms does influence their planning and teaching (Murdoch & Hornsby, 1997). As mentioned in the previous chapter, in all the primary schools in Maldives teaching is based on a locally designed syllabus which is the official government document that guides teaching. Since the lessons and activities suggested in ES syllabus is based on the inquiry method, it could be anticipated that all the primary teachers should be familiar with this approach.

However from the conversation with the teachers it became apparent that teachers from the rural school as well as from Male' did not give a precise definition of inquiry based learning nor a detailed description of an inquiry-based approach they have used in teaching ES. This may be due to their limited knowledge of inquiry-based instructional strategies or they are not confident in their ability to teach using inquiry-based approaches.

My findings regarding teachers' understanding of inquiry-based learning also resembles that of Fast, Harbor, Shepardson and Wee (2007) who investigated teachers' understanding of inquiry and their ability to design and implement inquiry-based pedagogy. These authors argue that teachers are unclear about the meaning of inquiry as it relates to pedagogy and assessment, and this confusion causes them to perceive inquiry as being difficult to implement in the classroom (Fast et al., 2007). However one important finding from this study was that all the teachers who took part in this research expressed positive attitudes towards inquiry-based learning. Teachers agreed that it is a useful strategy in teaching ES at primary schools in Maldives.

This becomes an important finding because teachers' beliefs is one of the central features in understanding teacher practice (Hansen et al., 2006). In educational settings, Haney et al. (2003) defined beliefs as "one's convictions, philosophy, tenets, or opinions about teaching and learning" (p. 367). Research evidence indicates that teachers' beliefs influence their teaching practices, how they believe content should be taught and how they think students learn (Cochran-Smith and Lytle, 1999; Mellado, 1998; Pajares, 1992).

A number of studies investigating the relationship between teacher beliefs and practice have found that teacher beliefs are not consistent with classroom practice. For example a teacher might espouse a developmental epistemology and yet demonstrate a strong tendency to use transmission related teaching characteristics. As Hansen et al.,(2006) point out, to engage in inquiry students need teachers who not only believe that inquiry-based teaching is the best instructional approach to support their students' learning, but also, students need teachers who are confident in their ability to teach using inquiry-based approaches. Classroom observations revealed that even though teachers held positive beliefs about inquiry-based learning, they may find it difficult to implement in their teaching for various reasons such as limited time, the need to cover the syllabus, and lack of resources.

### **Examples of inquiry-based learning**

Although the teachers who participated in this study did not specifically identify many aspects of inquiry in their teaching, their descriptions of how they teach environmental issues or concepts included some of the features of inquiry. This is confirmed by the classroom observations that revealed that despite having limited knowledge in this new approach to teaching, teachers from both urban and rural schools used some indicators of inquiry approach in their teaching. These include engaging students with activities such as probing questions or brainstorming sessions on the topic under study, drawing out responses that uncover what students know or think about the topic. Analysis of the teaching sessions also indicate that students were exposed to a variety of skills associated with various inquiry stages. These include brainstorming, discussing, drawing, listening, reading,

classifying, presenting, etc. These activities usually took place at the beginning of lessons.

Engaging students in learning is one of the key characteristics of inquiry-based learning outlined in the new ES syllabus. The above finding echoes the findings of Atwell, Cianciolo and Flory (2007) who found that teachers can also foster inquiry even in traditional settings. As mentioned in the literature this also shows that Inquiry teaching and learning can occur at several levels, from highly structured activities (more teacher directed) to open inquiry (more learner-centred) based on the goals a teacher has for the students (Hansen,2006).

Although lesson observations revealed that teachers were engaging students in the lesson with probing questions and brainstorming sessions, there was a lack of exploration in the classroom. Indicators of a classroom characterized by exploration include a setting where the teacher encourages the students to collaborate without providing direct instruction, in effect acting as a consultant rather than as an authority in the subject (Trowbridge & Bybee, 1990, cited in Atwell et al., 2007). Creating opportunities for students to work together is also a distinguishing feature of a learning environment characterised by exploration. From the transcript of the video I was able to ascertain that this was not the case in most of the lessons I observed. Despite teachers' claims that their approach to teaching has become more student centred over the years, lesson observations revealed that teaching, especially in the rural school was undoubtedly teacher dominant. This confirms the findings of Nashia (2006) who described the teaching in a rural school in Maldives in the following way:

The students were generally passive, unenthusiastic and remained seated at their desks throughout the lesson, with little or no interaction among them. I saw no instances of any pair or group work in any of the classes. Teaching was simply a process of knowledge transference from the teacher to the students. (p. 165)

Indicators of a classroom characterized by explanation include where the teacher asks students to give explanation in their own words, including clarifications and justifications for their thinking.

Classroom observations revealed that this strategy was also more evident from teachers in the urban schools than the rural school. Children were given the opportunity for explanation mostly in whole class discussions and while they were working in group tasks. However given the number of children in the class, time constraints meant that it was often difficult for the teacher to address all the children who raised their hands in lessons.

Instructional strategies that promote elaboration include those used during the explanation stage and ones where the teacher serves to guide or re-direct student thinking. This inquiry strategy was not sufficiently used by teachers, as the majority of teacher-student interaction took place in whole class discussions. Moreover, teachers could not elaborate on student answers because the questions they asked were mostly closed-ended which prompted close-ended responses. My findings revealed that teachers gave more emphasis to the content and did not encourage students to apply skills, in the classroom.

Another characteristic of inquiry-based learning described in the literature concerns evaluation. As teachers evaluate student learning they observe students applying new concepts and skills, assess their knowledge and skills and look for evidence that student have changed their behaviour or thinking as a result of their new learning. Additional indicators of this phase of inquiry-based instruction include teachers providing formative feedback to students to enhance student thinking and skills and, students evaluating their own performance, learning and group process skills (Trowbridge & Bybee, 1990, cited in Gejda & Larocco, 2006).

I came across only few instances of this sort of evaluation in the lessons I observed. These include teachers observing group work, role play, presentations, and individual work items such as drawings. As mentioned earlier, teachers gave more attention to assessing knowledge, than skills. However skill development and real experience is at the centre of activities recommended in the primary ES syllabus. My findings indicate that due to time constraints teachers were not able to do thorough formative assessments in the classroom.

## **Challenges to the implementation of inquiry-based learning**

The main factors reported by teachers as affecting the practice of inquiry-based instruction are time, resources, professional development, and mandatory assessment. These situational constraints were faced by teachers in both Urban and Rural schools, and this would have undeniably encouraged the teachers to opt for the traditional instructional strategies, that is direct instruction which emphasized transmission of knowledge.

### ***Time***

Interview data indicate that many teachers found time to be in short supply to plan for classes according to inquiry learning methods. The findings from this study reflect those from Nazeer and Nashia (2006) who reported that obtaining sufficient time during the school day to plan for classes was the most pervasive concern of the teachers, as they were overloaded with teaching and extra curricula activities. This finding is also consistent with Gejda & LaRocco (2006) whose results indicated that 77.6 percent of the participants reported that time was extremely or reasonable important in their decisions to practice inquiry-base instruction in their science classrooms. The factor time also refers to the length of the class period. The traditional primary school class in Maldives is 35 minutes, with occasional double periods allocated for students' activities. Extended class time would allow for deeper investigations and learning, in addition to opportunities for students to demonstrate their learning in various, authentic ways (Gejda & LaRocco, 2006).

### ***Resources***

The resource factor refers to the equipment or materials, supplemental to a course text which may include laboratory equipment, online access and so on. Resources are a critical element in effective teaching of studies of society and environment (Marsh, 1998). Haycock (1991, cited in Marsh, 1998) argues that learning environment is enhanced if, in addition to the 'lecture' and the textbook, teachers make use of other print resources such as news papers or magazines, and audio-

visual resources such as films or video tapes as well as other human resources such as guest speakers. In the interviews teachers from the rural and urban schools reported that there were not enough resources or teaching aid available from the schools to facilitate inquiry-based learning approach. This reflects the findings of Gejda & LaRocco, (2006) who found that more than 77percent of the teachers indicated that resources were extremely or reasonably important in their decisions to practice inquiry based instruction in their classrooms.

Two teachers I interviewed said that due to the limited access to resources from the school, they are preparing teaching materials on their own and bearing the expenses for most of the materials they use in the class. Classroom observations also revealed that the lack of resources forced teachers to limit themselves to using largely textbook-based activities. Therefore it is vital that the Ministry of Education allocate sufficient resources to support the practice of inquiry-based instruction in all the primary schools in Maldives. From the conversation with the teachers it became known to me that one Indian teacher from the rural school was alien to the idea of students using learning resources. He held the view that resources should only be used by teachers and not by students. This also indicates that teaching in the rural schools is dominated by direct instruction.

### ***Professional development***

The professional development factor refers to activities conducted for individuals employed in advancement of learning and teaching in the schools, working in the professional field and for those working for the development of physical and mental health of school students (Ministry of Education, 2009). This includes seminars, workshops, induction, online programmes, and content upgrading courses for upgrading the professional level of teachers. Two teachers I interviewed explicitly mentioned about need to get more training that would assist them to gain content and pedagogical knowledge in order to successfully implement inquiry-based learning.

According to the professional development policy of the Ministry of Education, every professional employee of the school should participate in at least 15 hours of professional development activity every academic year (Ministry of Education, 2008). However, in her study of professional development practices in Maldivian primary schools, Shareef (2008) noted that professional development in Maldivian primary schools is based on one-off isolated professional development sessions held for all teachers after school hours. She reported that teachers in her research did not consider the professional development seminars to be effective as those sessions were unconnected to the developmental needs of the teachers. "They viewed these sessions to give only background information and to lie down the expected outcomes but not truly building the teachers knowledge to implement student-centred classrooms" (Shareef, 2008, p. 79).

This finding is consistent with Nazeer (2006) who explored issues related to current teaching methods employed by teachers at Maldivian schools. He stated that there was an apparent limited knowledge among the teachers about current teaching methods and learning issues due to the absence of professional development and training programmes for teachers in the Maldives. This was evidenced by the fact that many of the teachers who took part in his study have been teaching for more than eight or nine years without any further training since they were employed by their schools (Nazeer, 2006). This is a cause for concern as professional development is necessary to assist teachers gain personal and technical knowledge and skills so that they able to take responsibility for achieving pedagogical change successfully.

### ***Mandatory assessment***

Teachers reported that preparing students for the end of semester examinations is also a challenge they face in implementing inquiry-based learning approach. According to Gejda & LaRocco, (2006) the need to administer high-stakes mandatory assessments may force a teacher to make choices between using an approach that encourages more student inquiry and covering material for an exam. In their study on primary teachers beliefs about teaching and learning, (Brown et al., 1999) found that the knowledge to be transmitted matched closely to knowledge that

is tested in end of key stage tests and the knowledge to be discovered matched with knowledge that is teacher assessed (Brown et al., 1999). Their finding also suggests that if teachers have to prepare students for end of semester examinations, then teaching would obviously be more teacher-centred.

### ***The use of English language***

One important issue this research served to bring to light is the existence of a significant disparity in the English language abilities between students from Male' and their peers from the rural school. Classroom observations and students' group interviews ascertained that English language skills of students from Male' were significantly higher than students from the rural island. Teachers from the rural school also raised this issue in the interview.

As mentioned in the ES syllabus, all forms of communication, including written and spoken is one of the key approaches in conducting inquiry-based learning. Students learn the skills and knowledge related to the topic of inquiry through the use of language. Thus language is used in the process of identifying, gathering, organizing, presenting and reflecting on information, skills, values, and attitudes explored during the process of inquiry (Jan & Wilson, 2003). However the ability to use English to communicate in the classroom becomes an issue for the students as well as for some teachers who took part in the study.

The native language of Maldives is called Dhivehi, while English is the medium of instruction in all secondary schools, and in most primary schools in Maldives. Therefore almost all students in Maldives are actually learning English as a second language. In the past in the rural schools, all the subjects were taught entirely in their first language (Dhivehi) or sometimes a bilingual approach was used in instructional time. That means children in rural islands are less exposed to English language even from the very early stage. However since all the schools are following the same national curriculum, the text books and medium of instruction has now changed to English. This issue of English language was also raised by Nazeer, (2006), who claimed that the problem of English language proficiency was a concern for both teachers and students at the secondary schools as well.

All nine students who took part in the study acknowledged the difficulty of communication in English and understanding of the subject content. Students' limited English was confirmed by some of their teachers during the post-interviews although the degree of their lack of English knowledge was not clear, nor what aspects of the language they lacked proficiency in (Nazeer, 2006, p. 212).

One reason behind this rural-urban gap in English language skills may be attributed to the school culture. Even though Maldives is a nation with a homogenous culture, language, ethnicity and religion, teaching in remote islands can be same as teaching students from a different culture. This view is supported by the findings of Nashia (2006) who made the following comment regarding the behaviour she observed from students in a rural school.

These students are just unbelievably passive! Students (and especially girls) are extremely polite and DO NOT speak in class unless spoken to. And even when asked a question, some students just lower their heads and seem to simply ignore the fact that the teacher is asking a question. This must be a serious problem for teachers who want their students to speak up, ask questions and hold discussions (Nashia, 2006, p. 71).

Following this theme, Nazeer (2006) argues that the distance teachers traditionally maintain from students appears to be part of the cultural nature of teaching practices at the Maldivian schools. "My classroom observations confirmed that teachers expected students to be obedient, sit passively, and receive the lesson content without making any noise", (Nazeer, 2006, p. 180).

Such comments suggest that English language abilities of students is a vast and complex issue that needs further research in order to find out the multitude of reasons behind the lack of English proficiency among the Maldivian students. Research shows that proficiency in the language of school instruction is an important factor for effective communication that appears to play a vital role in students' ability to understand the content.

Finally socio-economic status is another factor that I would like to explore in this discussion of inquiry-based learning implementation issues. Like many other developing countries, there exists a huge gap between the urban and rural island in terms of socio-economic status in Maldives (Ministry of Planning and National Development, 2007). The primary determinants of socio-economic status are occupation, educational attainment, and income. This disparity can be attributed to the development of the tourism sector around Male', the establishment of government sector operations in Male' and setting up of major education and health facilities in the capital city. We all know that inequities in the distribution of wealth in any society will impact negatively on individual children, schools and communities.

Studies by numerous researchers have documented the relationship between socio-economic level and academic success. Such studies indicate that the effect of socio-economic status on school achievement is entangled with the effect of language and culture on achievement. For example children from low-income families are more likely to achieve less well in school than their peers. Similarly schools in urban communities are more likely to have adequate resources and programs than schools in rural areas. However there has been no research done in the Maldives so far regarding the issue of socio-economic level and academic success, hence this is an area to be further investigated.

## CHAPTER SIX

### CONCLUSION AND RECOMMENDATIONS

The purpose of this investigation was to examine the extent to which inquiry-based strategies are being used in the teaching and learning of ES in the primary schools in Maldives. The research questions as outlined in chapter one, that informed the basis of this study are as follows:

1. What are the key characteristics of EE practice in primary schools in the Maldives at this time?
2. To what extent do teachers practice inquiry based learning approach as outlined in the ES curriculum?
3. What are the challenges to the implementation of these approaches in this context?

#### **Summary of the research findings**

The findings from this research indicate that education about the environment was the prevailing approach that teachers practiced in the primary schools in Maldives. In other words teaching was mainly subject centred direct instruction. Though teaching of ES in the rural and urban schools I observed were dominated by direct instruction, it was also characterised by teacher pupil interactions which took place in whole class discussions, usually at the beginning of lessons. However the findings also revealed that students' verbal interactions with the teacher were limited to single words or phrases and almost all the interactions were teacher initiated.

Another important finding is that students from urban schools were more engaged in group work compared to their peers in the rural school. During my visit to the rural school I saw no instance of group work or corporative learning in the ES lessons. There was also a lack of experiential learning in the schools. Several teachers noted difficulties in trying to teach outside the classroom.

Most frequently noted was the lack of funding and time available for field trips and the bureaucratic procedures the teachers have to go through in order to get permission for such trips.

The nature of assessment in the primary schools in Maldives is also an important issue related to the teaching and learning of ES. During the interview, two teachers agreed that assessment in their school is still 'pencil and paper based', which emphasises lower cognitive skills such as recall of knowledge. My findings also indicate that a substantial proportion of a teacher's day is devoted to marking students' written work, which consists mostly of traditional forms of assessment such as matching, completion and true or false items

An important aspect of the findings in this study concerns primary teachers' understanding of inquiry-based learning. From the conversation with the teachers it became apparent that teachers from the rural school as well as from Male' did not give a precise definition of inquiry-based learning nor a detailed description of an inquiry-based approach they have used in teaching ES. One important finding from this study was that all the teachers who took part in this research expressed positive attitudes towards inquiry-based learning.

Although the teachers who participated in this study did not specifically identify many aspects of inquiry in their teaching, their descriptions of how they teach environmental issues or concepts included some of the features of inquiry. This is confirmed by the classroom observations that revealed that despite having limited knowledge in this new approach to teaching, teachers from both urban and rural schools used some indicators of inquiry approach in their teaching. These include engaging students with activities such as probing questions or brainstorming sessions on the topic under study, drawing out responses that uncover what students know or think about the topic. Analysis of the teaching sessions also indicate that students were exposed to a variety of skills associated with various inquiry stages. These include brainstorming, discussing, drawing, listening, reading, classifying and presenting. These activities usually took place at the beginning of lessons.

Finally the results of this study suggest that teachers faced severe constraints in terms of teaching the subjects in the limited amount of time in the school day. Structural barriers such as too much curriculum material to cover, lack of resources, time, or the ability to take students outside were cited as major constraints to the implementation of inquiry-based learning in the classroom. Lack of training in inquiry-based instructional strategies was also an issue identified by teachers.

## **Recommendations**

Maldivian primary schools are looking to develop pedagogies in the lower primary grades from their existing rote learning strategies to student-centred learning strategies. It is hoped that the following recommendations would help in achieving this goal.

### ***Professional development***

Teachers are the main professional bodies who translate the curriculum in the classroom. Therefore, teachers need to be supported through various planned and systematic continuous professional development programmes, exchange of ideas, seminars and cluster teaching at school level. Teachers need to be continually updated with new methodologies. In their work, Supovitz and Turner (2000) outline some characteristics of effective professional development. These characteristics include immersion of participants in inquiry questioning and experimentation through modelling of inquiry instruction, and the engagement of teachers in concrete teaching tasks based on teachers' experiences with students. To be effective professional development should be conducted by experts in pedagogy. Schools can collaborate with Maldives College of Higher Education which can also serve as content area experts.

## ***Time***

Inquiry as a teaching and learning process does require more time for students to construct knowledge in an individual manner. The duration of a typical primary school class in Maldives is 35 minutes. I recommend that more double periods are allocated for ES so that this would allow more time for inquiry-based learning, in addition it would provide opportunities for students to demonstrate their learning in various authentic ways such as using multimedia facilities to do power point presentations in the classroom. Traditionally almost all the schools in the Maldives are run in two sessions. It is worth noting that the new government is in the process of changing schools in to single sessions which would allow more time for teachers to practice inquiry-based instruction.

## ***Resources***

Teachers should have easy access to a comprehensive set of instructional materials and necessary tools to effectively teach the outlined content in ES. The ministry of education should allocate sufficient resources to support the practice of inquiry-based instruction. In a classroom that promotes inquiry-based instruction, learning resources must be available to support student inquiry. Learning resources can include educational technology, instruments for doing field investigations and experiments.

## ***Limitations***

The limitations of the present study are derived from its design. As mentioned in Chapter One, a case study approach utilising a qualitative method was chosen for this study. This descriptive study relied on data gathered from three case study schools. One concern that may be raised is the perceived lack of rigor in case study research (Yin, 1994). The primary methods used for data collection were interviews and observation. One disadvantage of the interview as a data gathering tool is that interviewees may not be willing to share information or may even offer false information. Interview data can easily become biased and misleading if the person

being interviewed is aware of the perspective of the interviewer. This happens because often interviewees provide information based on what they think the interviewer wants to hear (Best & Kahn, 2006).

Observations as a data collection technique also has some limitations. Systematic observation of human behaviour in natural settings, such as classrooms is to some degree an intrusion into the dynamics of the situation. This intrusion may be reactive, that is it may affect the behaviour of the persons (teachers and students) being observed. It is widely believed that individuals do not behave naturally when they know that they are being observed. The study used a small purposely selected sample of participants from a wider population. Due to this, and the fact that it was based in a particular context, I can only make modest claims about the generalisability of my findings to other primary schools in the Maldives. Finally I have to admit that data collection took longer than previously anticipated as teachers were busy with extracurricular activities, and were preparing students for Independence Day celebrations.

### **Implications for future research**

As mentioned earlier very little research exists about teaching and learning of ES in the Maldives. At the time I started my research I could not find any qualitative research studies in this field. Hence the present study adds to the existing literature base. As mentioned in the literature review, contemporary research has provided convincing evidence that inquiry-based approaches assist students in acquiring a better understanding of science and various other subjects. However most of these researches took place in laboratory settings. They did not offer descriptions of how this process occurs in typical classrooms. Hence, this research is important in the sense that it was conducted in typical classroom environments.

To expand our understanding of inquiry-based practices in the primary ES classrooms, this study could be repeated in other primary schools in Maldives. A future research could also utilise a mixed method approach which involves both quantitative and qualitative research methods.

For example a survey could be conducted across all the primary schools in the country using a questionnaire. And the findings can be triangulated with qualitative data gathered from selected case study schools.

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**Interview Schedule for teachers**

- I. Teacher details
  1. How long have you been teaching environmental studies?
  2. How many classes do you teach now? which grades?
  3. What about your workload? What other responsibilities do you have other than teaching?
- II. Inquiry based learning
  1. What do you know about inquiry based learning?
  2. Could you describe some of the inquiry based learning approaches you have used in teaching E.S?
  3. Do you think inquiry based learning is a useful strategy in teaching environmental studies? Why?
- III. Resources
  1. What resources do you or your students use when teaching/learning about environmental issues or concepts?
  2. Which environmental studies resources are most effective? Why? What environmental studies resources are there now?
  3. Are there major environmental issues for the island on which you are teaching? Are they covered in the curriculum?
  4. Is there any culturally or environmentally important information on your island? Is it incorporated into the environmental studies curriculum? If yes, what & how? If no, why not?
- IV. Barriers
  1. What factors facilitate the practice of inquiry based teaching and learning such as time, resources, professional development, standardised testing?
  2. What challenges do you face in implementing inquiry based instruction in the classroom such as time, resources, professional development, standardised testing?

**Interview schedule for students**

1. What are the things that you like most about learning Environmental Studies?
2. Do you like to do activities outside the classroom, like observations, visit places?
3. Have you done any project work this year, if yes, can you describe what you did?
4. What activities do you like most, such as role play, drama, games, debates?
5. How often do you do group work, .....every week, twice a week?
6. Do you think environmental studies is an important subject. Why?
7. Does your teacher use any resources like maps, globes, any equipment other than the board?
8. Would you like to use equipment while learning E.S? If so, what?
9. How does you teacher explain new topics (e.g. tell stories, show pictures, visualize etc)

## Appendix C

**A framework for classroom observations with some characteristics of inquiry based learning derived from Bybee's (1997) 5E model.**

<b>Engage</b>	<b>Explore</b>	<b>Explain</b>	<b>Elaborate</b>	<b>Evaluate</b>
<p>Begin the lesson with probing questions</p> <p>Begin lesson with brain storming</p> <p>Ask students for information</p>	<p>Observe student interactions</p> <p>Ask probing questions to re direct students</p> <p>Act as consultant for students</p> <p>Create opportunities for students to work together</p>	<p>Ask students to explain concepts</p> <p>Ask students to justify their thinking</p> <p>Draw on students' previous experiences</p> <p>Ask students to clarify their thinking</p> <p>Ask students to explain definitions</p> <p>Provide directions for students</p> <p>Provide explanation for students</p>	<p>Encourage students to apply concepts</p> <p>Encourage students to apply skills</p> <p>Encourage students to extend concepts</p> <p>Encourage students to extend skills</p> <p>Refer students to existing evidence</p> <p>Remind students of alternative explanations</p>	<p>Assess students' knowledge</p> <p>Observe students applying new concepts</p> <p>Observer students applying new skills</p> <p>Assess students skills</p> <p>Provide students with feedback to enhance thinking</p> <p>Provide students with feedback to enhance skills</p> <p>Ask open ended questions</p> <p>Look for evidence of changed behaviour</p> <p>Look for evidence of changed thinking</p> <p>Allow students to assess their own learning</p> <p>Allow students to assess their group skills</p>

## Appendix D

### Letter to the Principal

Dear \_\_\_\_\_,

I am a Postgraduate student at Unitec Institute of Technology, New Zealand, enrolled in the Master of Education programme in the Department of Education. This letter is to request your school's participation in a research project investigating the use of inquiry based learning in Environmental Education in three primary schools of Maldives. The Ministry of Education has given me written permission to conduct my research. However participation is voluntary. More specifically my research aims to answer the following questions

- What instructional strategies are currently being used in the teaching of Environmental Studies
- In what ways is inquiry based learning incorporated as a teaching and learning strategy in Environmental Studies
- What challenges do teachers face in the implementation of inquiry based learning in Environmental Studies.

For this research I would like to interview two teachers and four students from your school. The interviews will be conducted at your school at a time that suits you and it would last for approximately 60 minutes for the teachers and 30 minutes for students. The interviews will be tape recorded and I will be transcribing them (typing the conversation out) later. All features that could identify the participants and your school will be removed and the tapes used will be erased once the transcription is done.

In addition to this, I would also like to observe one class of each teacher who took part in the interview. The purpose of the observations is to learn about current teaching practices employed by teachers of Environmental studies and the interactions that take place in the class. In addition to that, information such as classroom size, classroom layout, facilities and resources will also be included in the observation schedule. The observed sessions will also be video recorded with the

consent of teachers, students and their parents. The video tapes will also be erased once data analysis is done.

The interview for the students will be semi-structured, group interviews. I would like to talk to children about learning and teaching of environmental studies for about 30 minutes; at a time that will be least disruptive to their school-work. Participation will be entirely voluntary. The participants may choose not to answer a question, or withdraw from the interview at any time. The interview will be audio-taped with the participants' consent. The participant's name will not be used in the final research report and everything s/he tells us will remain confidential. The only people to have access to the data will be my supervisors and myself. When the research report is complete, I will forward a summary of the thesis to your school.

I would value your help in arranging for the interviews and observations, if possible by mid- July. I enclose letters of information and consent forms for the teachers to be interviewed. A separate letter of information for parents or guardians of the children is also enclosed. If you need more clarification on the topic or more information on this research study, please contact me on (960) 3323707 (evenings), (960) 7713137(mobile) or email me at [mohamedhareef@yahoo.com](mailto:mohamedhareef@yahoo.com). At any time if you have any concerns about the research project you can contact my supervisor at Unitec, New Zealand. My supervisor is Dr Mary Panko, phone 64 9 815 4321 ext. 8552 or email [mpanko@unitec.ac.nz](mailto:mpanko@unitec.ac.nz)

Yours Sincerely,

Mohamed Shareef

**UREC REGISTRATION NUMBER: (2009-960)**

**This study has been approved by the UNITEC Research Ethics Committee from (27.5.09) to (27.5.10). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.**

### Information for participants

My name is Mohamed Shareef. I am currently enrolled as a postgraduate student in the Master of Education programme at Unitec Institute of Technology, New Zealand. This letter is to request your participation in a research project investigating the use of inquiry based learning in Environmental Education in three primary schools of Maldives. As part of data collection I would like to interview you and talk about the following:

- The instructional strategies currently being used in the teaching of Environmental Studies
- In what ways is inquiry based learning incorporated as a teaching and learning strategy in Environmental Studies
- What challenges do teachers face in the implementation of inquiry based learning in Environmental Studies.

The interviews will be conducted at your school at a time that suites you and it would last for approximately 60 minutes. The interview will be tape recorded and I will be transcribing them (typing the conversation out) later. All features that could identify you will be removed and the tapes used will be erased once the transcription is done.

I would also like to observe one of your classes. The purpose of the observation is to learn about current teaching practices employed by teachers of Environmental studies and the interactions that take place in the class. In addition to that, information such as classroom size, classroom layout, facilities and resources will also be included in the observation schedule.

If you agree to participate, you will be asked to sign a consent form. This does not stop you from changing your mind if you wish to withdraw from the project. However, because of my schedule, any withdrawals must be done within 2 weeks after I interviewed you.

Your name and information that may identify you will be kept completely confidential. All information collected from you will be stored on a password protected file and only you, the researcher and my supervisors will have access to this information.

I hope that you will agree to take part and that you will find your involvement interesting. Please contact me if you need more information about the project. At any time if you have any concerns about the research project you can contact my supervisor at Unitec, New Zealand.

My supervisor is Dr Mary Panko , phone 64 9 815 4321 ext. 8552  
or email [mpanko@unitec.ac.nz](mailto:mpanko@unitec.ac.nz)

**UREC REGISTRATION NUMBER: (2009-960)**

**This study has been approved by the UNITEC Research Ethics Committee from (27.5.09) to (27.5.10). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.**

## Appendix F

### Participant consent form

I have had the research project explained to me and I have read and understand the information sheet given to me.

I understand that my participation is completely voluntary and I may withdraw within four weeks after the interview/ observation.

I understand that everything I say is confidential and none of the information I give will identify me and that the only persons who will know what I have said will be the researcher and their supervisor. I also understand that all the information that I give will be stored securely on a computer at Unitec for a period of 5 years.

I understand that my discussion with the researcher will be taped and transcribed and one of my classes will be observed and video recorded and all features that could identify me will be removed and the tapes used will be erased once the transcription is done.

I understand that I can see the finished research document.

I have had time to consider everything and I give my consent to be a part of this project.

*Participant Signature: ..... Date: .....*

*Parent/Guardian Signature..... Date.....*  
*(where appropriate)*

*Project Researcher: ..... Date: .....*

#### **UREC REGISTRATION NUMBER: (2009-960)**

This study has been approved by the UNITEC Research Ethics Committee from (27.5.09) to (27.5.10). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

**Letter to the Parent/Guardian**

To the parent/guardian of .....  
(Please fill in your son or daughter's name)

I am a post graduate student at Unitec Institute of Technology, New Zealand, enrolled in a Master of Education degree in the Department of Education. I am doing some research to find out about students' perspectives towards learning Environmental Studies. I would like to give your child the opportunity to talk about what s/he thinks about learning Environmental Studies at school.

I would like to have a chat with your child in a group interview with three other children. S/he has the choice not to answer a question, or leave the interview at any time. The interview will be audio-taped with your child's agreement. Your child's name won't be used in the final report and any other publications. I would also need your permission to observe and video record one teaching session of your child's classroom. The video tapes used will be erased once the data analysis is done.

If you are happy about this, please fill in the consent form below and return it to school with your child by 15th July 2009. If you have any questions or require further information, please feel free to call me on (960) 3323707 or (960) 7713137 or email on [mohamedshareef@yahoo.com](mailto:mohamedshareef@yahoo.com) . At any time if you have any concerns about the research project you can contact my supervisor at Unitec, New Zealand. My supervisor is Dr Mary Panko, phone 64 9 815 4321 ext. 8552 or email [mpanko@unitec.ac.nz](mailto:mpanko@unitec.ac.nz)

Yours sincerely,

Mohamed Shareef

**UREC REGISTRATION NUMBER: (2009-960)**

This study has been approved by the UNITEC Research Ethics Committee from (27.5.09) to (27.5.10). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.