

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences

Dr. Mohammed Saad Alqarni

Assistance Professor in Curriculum and Instruction

University of Jeddah

Email: msk_1404@hotmail.com

Abstract:

As Environmental Education (EE) is one of the most important subjects in the field of education that need further investigation, the current study explores one issue related to EE. Teachers' beliefs about EE are the subject addressed in this research, with a focus on two different variables related to their beliefs about their understanding of EE as well as their experiences with EE. Many studies have confirmed the role EE plays in developing students' cognitive skills, critical thinking, awareness, and motivation towards maintaining the environment (Hamrokulova, 2022; Al-Otaibi, 2014; Powers, 2004; Eames & Birdsall, 2019). Therefore, it seems to be important to explore what teachers think about EE as an academic content in many subjects taught in Saudi elementary schools. A questionnaire was used to collect data from male teachers of boys' elementary schools in Qurtuba district, Riyadh, KSA. In the analysis of the data descriptive statistics were used, and the data are analyzed

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

numerically using SPSS through the calculation of percentages, means, and standard deviations as well as through thematic analysis for the open-ended questions. The analysis reveals that teachers agreed that they believed they understand EE, with a general mean of (M= 1.75). They also mostly agreed about their beliefs about their experience with EE, the mean here decreased to (M= 2.14). The open-ended questions reveal that teachers have more than one answer for any of the two questions. This shows the different options they suggest about their understanding and experiences about EE in KSA.

Keywords: Environmental Education (EE), Teachers' beliefs, Elementary school teachers, EE in KSA.

Introduction

Humans are negatively impacting the environment for many reasons, including a lack of sufficient environmental education (EE), which has meant that we do not have the skills, attitudes, and commitment necessary to conserve the environment, and that we also lack the ability to find solutions to existing environmental challenges. The Organization for Economic Co-operation and Development (OECD) defines the term environment as the totality of all the external conditions that affect and support life, development, and survival of all organisms including human beings (OECD, 2005). Despite its importance to human, plants and animal existence, the environment is continually being degraded by human activities, with some of the biggest challenges coming from overpopulation, pollution, deforestation, and the burning of fossil fuels. Consequently, environmental degradation is rife throughout the world, and has accelerated due to the fast pace of industrialization that has taken place across the world (Aznar-Díaz et al., 2019).

But industrialization is not the problem in itself. According to Alam (2023), human's incapacity to create a set of social values, a way of life, and institutions that would drive us to live in harmony with the environment is what causes the world's environmental problems. The quest to promote a harmonious relationship between human beings and the environment has led to the development of EE programs.

There is broad agreement that EE plays a critical role in imparting human beings with the knowledge, skills, attitude, motivations, and commitments to finding solutions to the current global challenges and to prevent the occurrence of new ones (Hamrokulova, 2022; Nair, 2010; Kimaryo, 2011). Consequently, countries across the globe have introduced EE programs to ensure that citizens have the appropriate knowledge, skills, and attitudes to conserve the environment.

Although many countries have developed or are developing EE programs using international EE standards, the task of implementing and testing EE falls on individual countries, and particularly on the shoulders of teachers who have to develop and implement EE. While individual countries may develop whatever EE standards or programs they choose, the implementation and success of EE at the local level largely depend on teachers' beliefs about and experiences with EE.

The Kingdom of Saudi Arabia (KSA) has recognized the importance of EE and thus has reoriented and reorganized its educational system to include EE, by integrating EE topics in major academic subjects. The KSA National Framework for Education (2019) stated that one of the greatest contributors on national development is “[s]howing respect for and protecting the environment to ensure its development and sustainability” (p. 19).

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

Consequently, EE forms a part of the KSA's national curricula. The Ministry of Education has developed pedagogical standards that teachers in KSA should adopt when teaching EE. However, as noted by Osman and Meerah (2010), the effectiveness of the EE curriculum offered in the KSA largely depends on teachers' individual approaches when teaching the program.

The implementation of EE in the KSA relies to a great extent on the approaches of individual teachers. For this reason, this study sought to investigate the beliefs of elementary school teachers in the KSA. This included exploring their beliefs about their understanding of EE, and their beliefs about their teaching experiences with EE.

Problem Statement

The teaching methods and approaches adopted by teachers while teaching a curricular program are largely influenced by teachers' beliefs. Alam (2023) asserted that teachers organize students' knowledge and skills according to their beliefs about the program. The approaches and beliefs they adopt in turn impact the success or failure of the program. Consequently, teachers' beliefs play a crucial part in determining whether a program is successful, as observed by Marques and Xavier (2020).

Although the KSA curriculum includes EE in order to provide students with the knowledge and skills necessary to improve the environmental situation in the country, no study has yet explored the beliefs of KSA elementary school teachers about EE. Such research is necessary; Al-Otaibi (2014) explicitly recommended that future studies should explore elementary and middle school teachers' beliefs about EE programs in the KSA. Therefore, this survey research sought to understand EE as implemented in KSA by exploring the beliefs of elementary school

teachers about their understanding of EE as well as their beliefs about their teaching experiences with EE.

Research Questions

Research questions are the specific queries that a researcher seeks to discover answers to. Creswell and Poth (2016) explained that research questions are signposts that narrow the central intent of the study to specific predictions that will be examined over the course of the study. This study investigated the current situation of EE curriculum in KSA by exploring the beliefs of KSA elementary school teachers about EE. Therefore, the study sought to answer two research questions, namely;

1. What do KSA elementary school teachers believe they understand about EE and its importance?
2. What are KSA elementary school teachers' beliefs about their teaching experiences with EE?

Objectives of the Study:

The main goal of this study was to explore the elementary school teachers' beliefs about the current state of EE in the KSA. The study focused on teachers' beliefs since the literature has shown that teaching effectiveness is strongly affected by teachers' beliefs, opinions, and attitudes about the subject. Specifically, this study aims to explore:

1. KSA's elementary school teachers' beliefs about their understanding of EE and its importance.
2. KSA's elementary school teachers' beliefs about their teaching experiences while teach EE.

Significance of the Study

The desired aims of the curriculum do not always translate into the anticipated educational outcomes (Aalto et al., 2019). Instead, teachers must develop suitable pedagogical thinking to align with established curriculum goals; this development necessitates that teachers consider their ideas regarding the curriculum's components. Simply said, teachers' attitudes and beliefs about their subjects have a direct impact on how they teach and how well their students learn.

In regard to EE, teachers need to be environmentally-minded in order to be effective in teaching EE (Moroye, 2009). Conversely, inappropriate beliefs about EE might limit teachers' willingness and ability to teach EE, a factor that would reduce the effectiveness of the program in attaining its goals (Cotton, 2006). Consequently, by exploring KSAs' teachers' beliefs about EE, we can help researchers evaluate the situation of EE in the KSA and to assess whether their EE program meets the desired objectives of EE. Conducting this study also helped the participating teachers reflect on their attitudes towards EE and the approaches used while teaching EE. This in turn may have helped those teachers make appropriate adjustments to ensure that the KSA attains the desired EE program goals.

The researcher also felt that the findings of the study would provide helpful insights to KSA educational policy-makers and curriculum developers, compelling them to make appropriate policy changes that would help improve the quality of EE in KSA.

Definition of Terms

- *Environmental Education (EE)*: An educational program, policy, or philosophy that seeks to create environmentally

literate persons that are sufficiently knowledgeable and have appropriate attitudes and convictions to address environment challenges and prevent the occurrence of other challenges (Ardoin & Bowers, 2020).

- *Belief*: A strong conviction or acceptance that something is true or exists, even without proof.
- *Teachers' Beliefs*: Teachers' strong feelings and attitudes about things that can affect teaching-learning interactions. What teachers believe will have direct effects on the teaching-learning transaction (Gilakjani & Sabouri, 2017).
- *Elementary Schools in the KSA*: Also called primary schools, they offer education for the first six years in school, mainly for children between 6 and 12 years.

EE Procedural definition: The researcher defines EE procedurally as: the set of skills, knowledge, and implications that the curriculum aims to provide learners with in order to improve their level of awareness of the importance of protecting the environment and seeking to fix various environmental problems.

Literature Review

Environmental Education (EE)

EE is defined differently by different scholars. For instance, Ardoin and Bowers (2020) defined EE as an educational program, policy or philosophy that seeks to create environmentally literate persons that are sufficiently knowledgeable and have appropriate attitudes and convictions to address environment challenges and to prevent the occurrence of other challenges. In contrast, Neal and Palmer (2003) defined EE as organized efforts aimed at teaching how the natural world functions, and especially how humans can

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

adapt their behaviors and ecosystems to enhance environmental sustainability.

The Belgrade Charter asserted that EE aims at helping learners understand major problems of the contemporary world, and providing them with skills and attributes required for improving life and protecting the environment while respecting established ethical values (GDRC, 2020). The Tbilisi convention affirmed that the fundamental goal of achieving EE seeks to ensure that people comprehend the complex nature of the environment, including the various challenges created by humans, to gain practical skills which will allow them to participate responsibly in their communities and to effectively resolve challenges and to prevent the occurrence of new challenges.

Despite differences in wordings in definitions, it is evident from all of these definitions that EE seeks to convey and enhance knowledge and skills, and to cultivate responsible attitudes toward resolving current environmental problems and preventing the occurrence of other environmental challenges. EE connects human beings with both the natural and the built environment, raises awareness of issues that affect the environment, and enhances knowledge and skills to promote environmental sustainability.

Implementation of EE

The implementation of modern EE in schools can be traced back to the Belgrade Charter written in Yugoslavia in 1975 by UNESCO, and to important conferences such as the 1977 Intergovernmental Conference on Environmental Education in Tbilisi. These laid the foundation for the formal establishment of EE in schools by laying out EE's goals, objectives, and guiding principles.

According to the Tbilisi convention, EE has three main goals. The first goal is to foster a clear awareness of and concern about social, political, and ecological interdependence in both rural and urban areas. The second goal is to present people with opportunities to acquire appropriate knowledge, skills, commitment, and attitudes required to protect the environment. Finally, the third goal of EE is to create environmentally appropriate behaviors among individuals, groups, and society (Bengtson, 2010).

The Tbilisi convention also laid down a set of objectives of EE. These were labeled knowledge, skills, awareness, and participation. In addition, the Tbilisi convention laid down twelve principles that should guide all formal EE programs. These included lifelong learning, and total understanding of the environment through interdisciplinary learning in diverse and local environments (Lee et al., 2018). The EE goals, objectives, and guiding principles as laid down by the Tbilisi convention are attached as Appendix E. The Tbilisi declaration set the guidelines, objectives, and guiding principles for EE, and has frequently been used as a foundation for the implementing of formal EE programs across the globe.

While the Tbilisi convention offered a framework for formal EE programs, the actual implementation of EE programs has always rested with individual countries. As mentioned by Alam (2023), this has resulted in the development of numerous types of EE programs, some of which have ground-breaking concepts and breakthroughs and others of which have self-serving or unrealistic approaches.

The EE Curriculum

Palmer (2009) defined EE curriculum as the sum total of experiences aimed at providing learners with environmental literacy, skills to solve environmental problems, and aptitudes to make appropriate decisions and to take appropriate actions on matters of environment, while considering ecological, political, and economic factors. Reflecting on this definition reveals that an EE program requires thoughtful planning in order to ensure that students learn what they need to, because of the wide range of knowledge and skills involved, as well as the need to nurture attitudes and to help develop a holistic means of engaging with the subject. Palmer (2009) asserted that EE has three interlinked dimensions; education *about*, *through* or *in/from*, and *for* the environment. Education *about* the environment seeks to develop the awareness, knowledge, and understanding about the human-environment interaction. Education *through/in* the environment seeks to understand these interactions through experiences and hands-on activities, while education *for* the environment seeks to develop values, attitude, and informed concerns for the

environment. These three components are essential in planning EE in all levels.

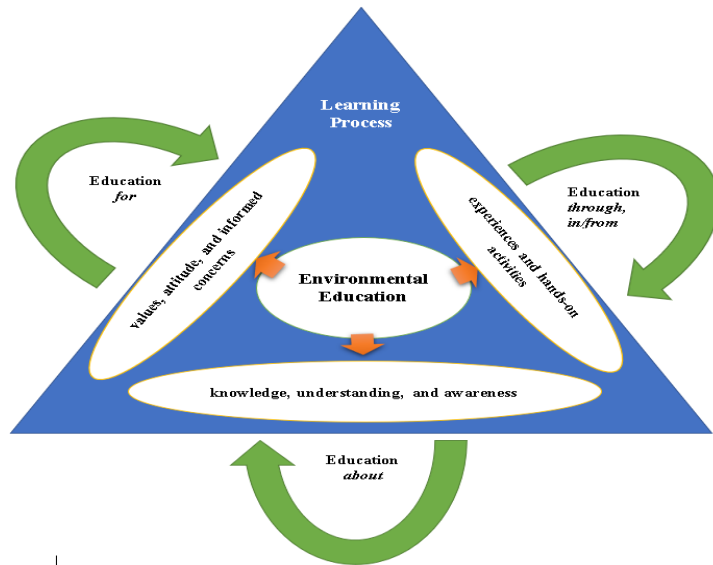


Figure 1: *The three components of a holistic EE curriculum:* Adapted from (L. A. Kimaryo, 2011).

As shown in figure 1, the three components of EE can be linked to the critical, practical, and technical curriculum models. The technical curriculum model of EE emphasizes education *about* the environment. Therefore, EE using this model emphasizes designing the most effective and robust subject matter content for teachers to use while teaching, with the aim of providing learners with the desired knowledge, skills, and attitude related to the

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

environment. Kimaryo (2011) noted that the technical model is the most common curriculum model adopted in formal education settings across the world. Conversely, the practical (or interpretive) curriculum model teaches *through* the environment. The model assumes that learners are active participants in constructing knowledge and meanings from their experiences in the environment. Consequently, teachers using this model are tasked with organizing and enhancing learners' experiences within the environment so that they can develop appropriate environmental knowledge, skills, and attitudes related to the environment. The critical curriculum model, which emphasizes education *for* the environment, encourages students to build their knowledge via experiences and actions while taking into account the political, social, and cultural facets of society (Hamrokulova, 2022). As Verma and Dhull (2017) put it, EE is holistic and meaningful if the curriculum integrates all the three components of EE.

Methods of Integrating EE into A National Curriculum

According to Verma and Dhull (2017), EE can be included in the school curriculum as an independent subject or integrated into other subjects.

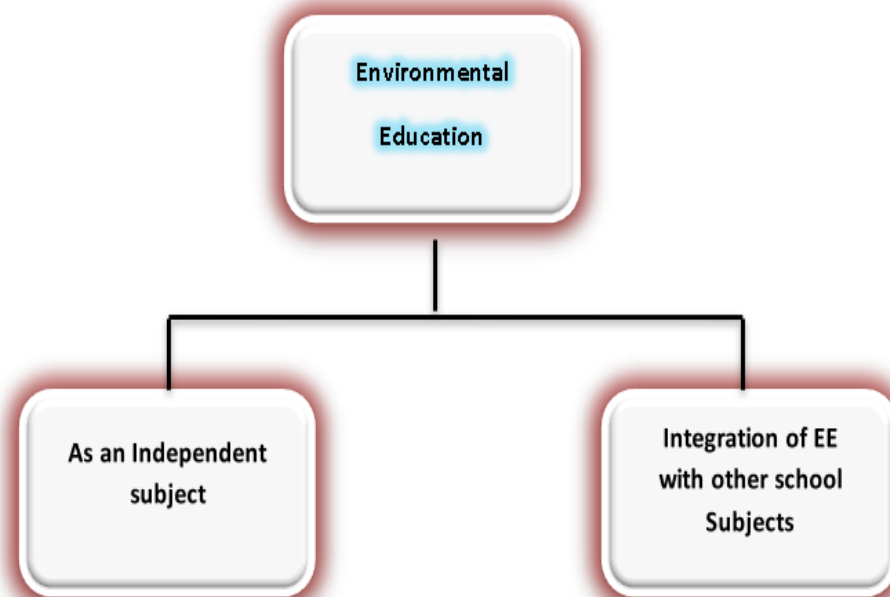


Figure 2: *Illustration of the various ways that EE can be integrated into the curriculum.*

EE as an independent school subject

This is the traditional method of integrating EE into the curriculum. This approach treats EE as a discrete component of the curriculum, thus accorded its own syllabus, and allocated its own time in the school schedule. Proponents of introducing EE as a discrete subject argue that the approach gives EE its own identity, making it easier to teach (Sterling, 2004).

However, while integrating EE as a stand-alone subject is a traditional curricular approach, at the same time several arguments have been developed against treating EE as an independent subject. According to UNESCO, EE should be integrated into other subjects given to all students, regardless of age, rather than being taught as a separate subject (Hamrokulova, 2022). This is perhaps

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

the biggest justification against establishing EE as a stand-alone curriculum.

Different studies have explored the various challenges associated with teaching EE as a stand-alone subject. For instance, Rusinko (2010) argued that teaching EE as an independent subject narrows its scope since its components are taught separately from components of other subjects. Along these lines, Powers (2004) pointed out that teaching EE as an independent subject impedes the attainment of its main objectives especially when learners have the mandate to choose subjects that they wish to study and choose not to learn about EE. The probability that students can select out of a stand-alone subject was restated by Siddqui & Khan (2015) who argued that students often give less importance to EE as a subject because they perceive it to have no academic value for them. Taken together, these factors reduce the possibility that a stand-alone EE program would attain its desired objectives. Consequently, this method of integrating EE has become less common.

EE integrated into other school subjects

In curriculum development, the integration approach (also referred to as correlated subject design) refers to the incorporation of the component and skills to be learned from a program into a subject without compromising the integrity of the subject. In this regard, implementing EE by integrating it into other subjects means that components of EE are addressed through the lens of different subjects. Rather than replacing a particular subject, EE is treated holistically through all areas of the subject in which it is integrated. Kimaryo (2011) argued that EE can be integrated in Sciences, Mathematics, English, Native Studies, Social Sciences, and Career Education. Abdullah et al. (2011); Teksoz et al. (2010); Hassan and Ismail (2011); and Ozden (2008) found that in practice, EE is

mostly integrated in science subjects, while Verma and Dhull (2017) argued that with teachers' willingness, EE can be integrated into all subjects in the curriculum.

Integrating EE into other subjects has been applauded for its considerable benefits. For instance, Verma and Dhull (2017) noted that it helps fill in the gaps within the curriculum bridging subjects that are related since the integrated subjects are combined in innovative ways, which helps students understand the connections between the two subjects. According to McClaren and Hammond (2005), integrating EE into other subjects facilitates the exchange of knowledge and collaboration between EE and the other subjects, thus making learning more meaningful. Moreover, integrating EE into other subjects provides learners with holistic knowledge about the environment, since EE is taught in a wider scope that shows the relationship between the environment and all spheres of human lives (Bolstad et al., 2004; McClaren & Hammond, 2005). Additionally, integrating EE into existing subjects ensures that all students are exposed to EE (Bolstad et al., 2004).

However, integrating EE into other subjects has its own drawbacks. For instance, McClaren and Hammond (2005) argued that integrating EE into the content of other subjects might cause learners to fail to clearly distinguish the disciplines or forms of knowledge that contribute to knowledge and understanding of environmental topics. In addition, Adedayo and Olawepo (1997) were concerned that incorporating EE into contents of other subjects could cause EE to be regarded as insignificant by both teachers and students, especially in exam-oriented curriculum. According to Adedayo and Olawepo (1997), teachers in exam-oriented curricular systems emphasize helping students pass their exams, and thus tend to reduce the time and resources spent on

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

non-tested items. Thus, teachers teaching host-subjects tend to dilute the importance of EE, and spend less time teaching it because it is less likely to be tested, or is seen to have reduced value on exams (Adedayo & Olawepo, 1997). The integration has also been called out for causing content overload in the hosting subject, since an integrated curriculum means that a teacher has to teach the elements of the host subject in tandem with those of EE (Grace & Sharp, 2000).

Despite the challenges, integrating EE into other subjects is considered to be the most meaningful approach to EE, in particular due to its considerable impacts on enhancing holistic knowledge and skills related to environment. Consequently, integrating EE into other subjects is the most common method used across the world, including in the KSA.

Role of Teachers: Curriculum Development and Implementation

The curriculum includes the competences (knowledge, attitude, and skills) that learners are supposed to acquire through an organized learning process in formal and informal setting (Chen, 2006). The curriculum also details the pedagogical approaches that should be followed in attaining the desired learning outcomes, and thus the success of an educational program largely rests with the quality of the curriculum. According to Glatthorn et al. (2005), all stakeholders in the education sector should be involved in the curriculum development process to ensure that the curriculum is as detailed and as comprehensive as it should be. While the involvement of educational stakeholders such as principals, parents, educational inspectors, and directors is key, Alsubaie (2016) argued that teachers' participation is the most crucial component owing to their considerable impacts on the process.

Glatthorn et al. (2005) attributed this significance to teachers' classroom experiences of teachers in terms of learning and instruction. This was restated by Marsh and Willis (2003) and Mathers and Oliva (2008) who singled out teachers' classroom experiences as adding critical insight in the curriculum development, and educational efforts. Glatthorn et al. (2005), Hamrokulova (2022), Mathers and Oliva (2008), and Chen (2006) have all argued that teachers' experiences in learning and teaching gives them considerable insight on what will likely work and what will not. This point was emphasized by Jadhav and Patankar (2013) who made the case that because teachers understand the psychology of their students, they can therefore more easily identify the most appropriate teaching and assessment methods, and can shape learning environments that will work effectively for their students, leading to a more ideal curriculum. As a result, Hamrokulova (2022) asserted that the curriculum would not be effective if teachers were not actively involved in its design and development.

Besides contributing to the development of enhanced curriculum, teachers are tasked with implementing the curriculum through teaching (Alsubaie, 2016). Thus, as noted by Boyle and Charles (2016), the act of teaching (implementing the curriculum) allows teachers to identify the shortcomings of the existing curriculum, which would be critical in its reformation and/or change. Consequently, studies such those conducted by Marques and Xavier (2020) and Handler (2010) describe teachers as central to the curriculum development, reformation and implementation processes. Additionally, Chen (2006) put teachers at the center of the success of a curriculum arguing that their beliefs and understanding of the curriculum is the most critical aspect

impacting its implementation. According to Chen (2006) teachers' beliefs are those teachers' subjective realities, and have to be re-cultured and converted into objective realities, which ideally translates into improved curriculum. Furthermore, teachers' beliefs about a curriculum and its importance have a direct impact on how they implement the curriculum, including the choice of materials and methods used in teaching elements of the curriculum. Thus, teachers are the single most critical stakeholders that have the greatest impact on the success of a curriculum (Chen, 2006). However, involving teachers in the curriculum development process is not enough; teachers need to adopt positive beliefs that will stimulate the desire to appropriately develop their knowledge and skills to teach EE effectively to enhance learning.

Teachers' Beliefs about EE Programs

Gilakjani and Sabouri (2017) defined teachers' beliefs as strong feelings and attitudes among teachers about things that can affect teaching-learning interactions. This includes what teachers believe will have direct implications for the teaching-learning transaction. According to Goodenough (1971), beliefs are propositions that are accepted as true, or personal understanding of the workings of the world that guides individuals' actions. They are psychological concepts that are different from knowledge but closely related to personal subjective knowledge. Pajares (1992) noted that many terms have been used in relation to belief, among them "attitudes, judgments, opinions, values, perceptions, [and] ideologies" among others. Irrespective of the terms used, teachers' beliefs have been found to have considerable impacts on how a program is taught, thus considerably impacting the success of a program. Stern et al. (2022) claim that teachers' beliefs affect the crucial choices they make about the curriculum as well as the way

they provide knowledge and information for the instruction of learners. In order to clearly comprehend teachers' teaching strategies and behaviors, Stern et al. (2022) confirmed that it is essential to investigate their beliefs about a curriculum. Similarly, Cotton (2006) identified the critical role played by teachers' beliefs in influencing the success of a program and opined that curriculum developers should take teachers' beliefs into account while designing a new curriculum.

According to Aalto et al. (2019), teachers do not always carry out the curriculum as it is intended. Instead, they alter the planned implementation to align it with their worldviews and settings of instruction. A recent study by Nation and Feldman (2021) explored how teachers' beliefs influenced their teaching. The study found that teachers' beliefs about a topic, especially a controversial topic, directly impacted how they teach those topics. The study concluded that teachers' beliefs should be considered while examining how they teach particular topics. This is supported by Eisenhart et al. (1988) who noted that teachers are likely to implement change and be positive about their work when policies are compatible with their beliefs.

A considerable number of studies have explored teachers' beliefs in regards to EE. For instance, Moroye (2009) found that teachers who believe that EE is critical in enhancing environmental conservation and sustainable development are more likely to enhance students' knowledge and skills in ways designed to conserve the environment. Additionally, Stern et al. (2022) argued that educators' beliefs and understanding about EE are critical for enhancing its teaching. In addition, as Moroye (2009) noted, environmentally conscious teachers incorporate environmental perspectives into the teaching process as a complementary

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

curriculum and use the means available to best present environmental content, while teachers with negative beliefs about the importance of environmentalism are ineffective in delivering EE.

Another study by Seow and Ho (2016) sought to explore the beliefs of Singapore teachers about the purpose of climate-change education and student readiness to handle controversy. The researchers interviewed four pre-service teachers and six practicing geography educators in Singapore schools and found that teachers were passionate about EE programs because they believed that EE contribute to environmental conservation, and that being able to teach it helped to improve their career paths. Seow and Ho (2016) concluded that positive beliefs about the importance of EE are a key element for their participation in activities that are enhancing environmental conservation. This critical information proves that teachers' beliefs about a program including EE have a significant impact on how the program is taught in classrooms, and therefore impacts its overall success.

Teachers' Experiences While Teaching EE

Teachers' experiences with EE include the pedagogy they use in teaching EE, or sets of activities including whole-class, group, or individual activity aimed at enhancing learning. According to UNESCO (2015), effective pedagogy promotes higher-order thinking and metacognition, which are critical effective learning. The importance of pedagogical practices in enhancing learning has compelled environmentalists to explore the different pedagogical practices used to teach EE and their impacts on learning. For instance, Tomas et al. (2015) noted that current EE teaching practices are almost wholly teacher-centered and do not focus on addressing challenges facing the environment. These

findings resonate well with the findings of Ko and Lee (2003), who found that EE generally follows a teacher-centered approach, a factor that reduces students' participation in learning, and prevents higher-order thinking. This led to the recommendation that there should be a pedagogical shift to pedagogy that puts a stronger emphasis on environmental sustainability.

Valderrama-Hernández et al. (2017) found that the most appropriate pedagogical approach to enhance EE is integrating EE in the core curriculum. The study also emphasized the need for EE teachers to specialize in specific problems affecting the environment to increase their knowledge and efficiency in teaching EE. Blanchet-Cohen and Reilly (2013) argued that methods used for EE must teach that students have a role to play in protecting the environment. Additionally, Blanchet-Cohen and Reilly (2013) described a need to involve many voices when developing an EE curriculum to accommodate all learners regardless of their cultural backgrounds. These studies give a general outlook of pedagogical practices that might enhance EE. However, individual countries have adopted their own specific pedagogical practices to teach different programs. Accordingly, it is critical to explore pedagogical practices adopted by KSA elementary school teachers while teaching EE.

As described above, different countries have adopted different approaches to incorporate EE in their curriculum. Moreover, the implementation of the curriculum as developed is also affected by country-specific factors, the most notable being the teachers' engagement with and expertise related to the curriculum. Teachers play crucial roles in enhancing the success of an education program. They (1) play a role in the design of the curriculum; (2) provide feedback on the effectiveness of the

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

curriculum and thus participate in its development; and (3) implement the curriculum through teaching. The actual practice of teaching is affected by different factors including teachers' beliefs and experiences with the curriculum. Consequently, teachers' beliefs about the curriculum can provide a useful assessment of the curriculum. Accordingly, the actual state of EE curriculum in KSA elementary schools can be assessed indirectly by examining the beliefs and experiences of KSA elementary school teachers with EE. The next section evaluates the steps taken by KSA towards enhancing EE in the country.

EE in Saudi Arabia

For many years, the KSA has had a keen interest in conserving the natural environment. This is guided by the KSA's vision of being an effective partner in the global effort to reduce risks to the environment (Al-Otaibi, 2014). According to KSA National Framework for Education (2019), one of the greatest contributors on national development is "[s]howing respect for and protecting the environment to ensure its development and sustainability" (p. 19). KSA's National Framework for Education (2019) lays out a road map to achieve sustainable development goals "by preparing learners for a flourishing future based on improving quality of life for all and ensuring its sustainability socially, economically, and environmentally" (p. 25).

Thus, since the start of EE, the KSA has participated in many international and regional conferences and workshops that relate to environmental conservation. For instance, in 2012, King Abdul-Aziz City for Science and Technology held the International Environmental Technology Conference in Riyadh. The conference affirmed that the KSA's vision for environmental technology is to achieve sustainable environmental development through the

transfer of advanced environmental technologies around the world to make them accessible to all countries (Al-Dossary, 2016).

Besides participating in environmental conferences, the KSA government has worked to create governmental institutions that specialize in environmental conservation. For instance, in 1984, the KSA passed legislation to protect the environment and natural resources from pollution and depletion of environmental resources (Zahrani & Ibrahim, 2012). In 1986, the KSA Government established a specialized authority called the National Wildlife Protection Authority aimed at protecting KSA wildlife, as an affirmation of the country's firm resolve to conserve the environment. In addition, the KSA government launched the Saudi Vision 2030 program with the vision of achieving environmental sustainability as one of its key pillars (Alharbi, 2020). Based on the vision outlined by the government, the country is implementing EE to fulfill what it sees as its Islamic, human, and moral duties (Alharbi, 2020).

Consequently, the KSA has incorporated EE in its academic curricula in a deep-rooted way, based on Article 49 of the KSA Education Policy, which affirms that one of the general goals of education is to help students understand the environment and to teach them how to preserve the country's raw resources (Ministry of Education, 2004). Moreover, in 2001 the government issued a General Environment Regulation stipulating that the educational system should include concepts about environmental conservation in the curricula in all levels of education including the elementary level (Presidency of Meteorology and Environmental Protection, 2007).

A study conducted by Al-Asmari (2012), sought to investigate the degree of inclusion of environmental concepts in

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

social science textbooks in secondary schools, particularly in light of the global EE concepts. The study found that like the majority of gulf countries, the KSA places the majority of curricular emphasis on education *about* EE, which seeks to impart learners with environmental knowledge and skills (Al-Asmari, 2012), rather than *through* or *for* EE. At the same time, Al-Asmari (2012) noted that secondary school text books in the KSA have in-depth and relevant EE information. In terms of implementation, KSA uses the method of integrating EE into other subjects, especially science subjects, geography, and history. Because of this integration, theoretically EE in KSA should be taught everyday throughout the week.

Unfortunately, this is not the case. Al-Otaibi (2014) sought to explore the role of education in developing environmental awareness for secondary school students in Riyadh from principals, teachers, and students' point of view. In the study conducted by Al-Otaibi (2014), he noted that there is no specific guideline compelling teachers to teach EE, or allocating a specific number of hours that EE should be taught within a subject. Therefore, teachers' prerogative dictates if, when, and how EE is incorporated within the curriculum, and also dictates the hours to set aside for teaching EE (Al-Asmari, 2012; Al-Otaibi, 2014). EE in KSA has faced its fair share of challenges. For instance, Al-Dossary (2016) examined the reality of EE in public education in the KSA. He found that centralization and bureaucracy in KSA education has impeded the effectiveness of EE in the KSA. In addition, Al-Asmari (2012) and Al-Otaibi (2014) both indicated the need to increase the time and curriculum space devoted to EE in the KSA.

However, while there is still much room for improvement, the state of EE in KSA does seem to be improving over time. A study by the Arab Forum for Environment and Development

(AFED, 2019) found that Saudi Arabia and other Arab countries have witnessed a dramatic increase in educational programs associated with the environment and sustainable development. The report particularly singled out Saudi Arabia and Egypt as leading in the production of environmental research in the Arab world. In AFED's view, these are significant and bold steps which will improve the state of EE in Saudi Arabia, and the Arab world. However, as in other studies, the AFED report identified the need to teach with/in environment, by including environmental topics that plague the region such as climate change, drought and desertification.

From the above we can see that the gulf region has made significant strides to improve the quality of EE in their respective countries. However, studies have pointed out considerable challenges and barriers with EE in individual countries, indicating the need for change of policies and practices to enhance EE. Specifically, different studies have pointed out some of the challenges of EE in the KSA and have offered recommendations. But these studies do not offer sufficient information on the state of the EE program in elementary schools in the KSA to help us understand what is currently happening at that level in terms of EE. Therefore, the researcher believes that understanding elementary school teachers' beliefs on the situation of EE in KSA will help with improving EE in the country.

Research Method

This study sought to describe the current situation of EE in KSA by exploring the beliefs of elementary teachers about EE. Specifically, the researcher investigated KSA elementary school teachers' beliefs about their understanding and experiences of EE. The study adopted a non-experimental quantitative research

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

method. Creswell (2009) explained that quantitative research methods are a process of collecting, analyzing, and interpreting results of a study. Moreover, according to Creswell (2009), non-experimental quantitative research collects data using questionnaires, surveys, and polls, or manipulates existing statistical data using computational techniques. Furthermore, as Salkind (2010) explained, non-experimental researchers measure the variables for the research as they occur in the natural setting and do not manipulate their conditions. Thus, non-experimental researchers do not have experimental and control groups.

In addition, the study used a survey research design. Kraemer (1991) claimed that survey designs are critical for answering questions raised, solving problems that have been observed, assessing needs that have been set, and determining whether specific objectives have been met. Survey designs must describe a specific aspect of a society and therefore data must be collected from a selected portion of the people. Survey designs are excellent for measuring non-observable data such as opinions, preferences, and beliefs (Creswell, 2012). Additionally, survey designs are convenient for both the researcher and the respondent since the questionnaires can be sent through emails or phone applications and then respondents can answer them at their convenient time. This research collected non-observable traits (beliefs) among the KSA teachers, thus the survey design was the most appropriate data collection method for the study to answer the study's research questions.

Population

The population of this study is a selected group of elementary school teachers who teach in boys' schools in the Qurtuba Elementary School District. Therefore, the study used

three inclusion criteria. The target population for the study was the elementary school teachers, in boys' schools, within Qurtuba Elementary School District. The Riyadh General Administration of Education (2021) indicated that there are 1646 male elementary school teachers in the school district.

Sample size

The selected sample should be a fitting representation of the population so that the findings obtained from the sample can be generalized to the whole population. To achieve generalization of the study results to the whole population, the researcher employed self-selection sampling method to recruit the participants. The questionnaires were sent by the Qurtuba Elementary Schools District office to the targeted schools and then schools principals were ordered to send the questionnaire to their teachers. Thus, the respondents of the study presented a selection from the different elementary schools within the Qurtuba Elementary School District.

Data Collection Instrument and Tools

This study used a survey questionnaire to collect quantitative data as it is the most suitable instrument to collect non-observable data such as opinions, preferences, and beliefs (Pinsonneault & Kraemer, 1993). It was created and presented in both English and Arabic languages.

In addition to the effort of the researcher in developing the questionnaire, a number of questionnaires that had been created and used by some of the previous researchers have been examined in order to improve the current study's questionnaire. There were five studies that the researcher examined and borrowed from in developing this questionnaire including those used by Gardener

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

(2009), Hamrokulova (2022), Bengtson (2010), Bennett (2003), and Haight (2015).

The questionnaire contained open- and close-ended questions. The researcher offered a range of choices for the close-ended questions for respondents to select from. A four-point Likert scale was used so that the participants could make choices of numbers to represent their thoughts, beliefs, and experiences (Strongly Disagree, Disagree, Agree, Strongly Agree). The questionnaire had two main sections. The first section collected respondents' personal information including their age range, their years of experience in the teaching profession, the school subject they teach, and the highest levels of education they have attained (qualifications). The researcher was careful not to collect personally identifiable information to enhance the privacy and confidentiality of the respondents.

The second section of the questionnaire addressed teachers' beliefs about EE, and was divided into two subsections. The first subsection explored teachers' beliefs about their understanding of EE, especially opinions on the importance of EE. The second subsection evaluated teachers' beliefs about their teaching experiences with EE. Open-ended questions were included in each section to allow respondents to offer more insights especially on issues that they felt were not captured by the close-ended questions.

Data Analysis and Findings

The researcher calculated the frequencies, percentages, means, and standard deviations, and displayed the same using tables and charts. To determine the length of each scale of the four-point Likert scale, the range ($4-1=3$) was calculated and then divided by the number of cells ($3\div 4=0.75$) then this value was

added to the lowest value in each scale, so that the length of the cells became:

- From 1 to 1.74 represents the degree of response strongly agree.
- From 1.75 to 2.49 represents the degree of response agree.
- From 2.50 to 3.24 represents the degree of response disagree.
- From 3.25 to 4.0 represents the degree of response strongly disagree.

Additionally, the researcher used qualitative coding techniques to evaluate open-ended questions. Specifically, the researcher used thematic coding to determine emerging themes among responses, which were then used as codes for the study. Participants provided responses that could be coded in more than one code category thus the responses/codes were greater than the number of respondents. The codes were then grouped together to form emerging themes, which were then discussed as the findings of the study.

Sample Background Information

Before delving into exploring teachers' beliefs about EE, it is critical to get a look at teachers' background information. This includes their age, years of experience, qualifications, and subjects taught in order to ensure that we have thorough information about the target population.

Age group

As shown in figure (3) below, (14.6 %) of the respondents were between twenty-two and thirty, while (37.4%) of the

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

respondents were between thirty-one and forty, and about half (48%) of the teachers were above forty-one years old.

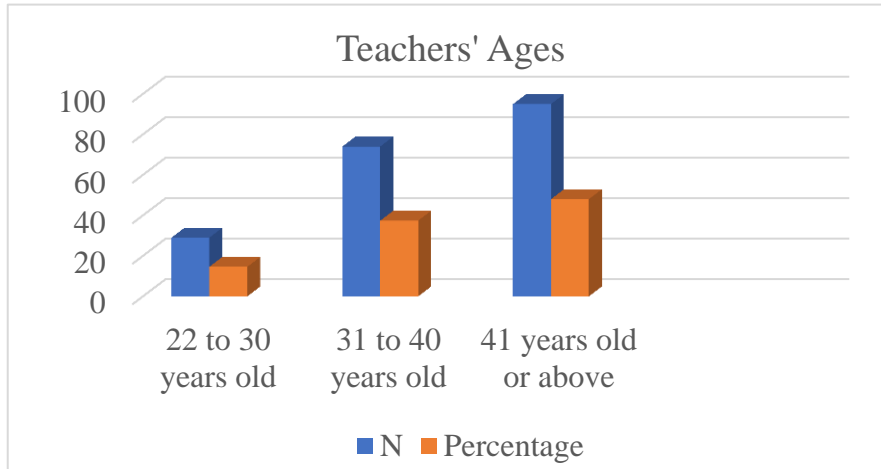


Figure 3: Teachers' Ages
Teachers' experiences

As is visible in figure (4), more than half of the teachers (63.6%) had more than 11 years of experience. In contrast, 37.3 % of the respondents had no more than 10 years of teaching experience, while 23.2 % of the teachers selected had from 5 to 10 years of experience, with 7.6 % of them having only 2, 3 or 4 years of experience. Finally, just 5.6 % of the teachers in the schools targeted either did not have earlier teaching experience or they had just one year of experience.

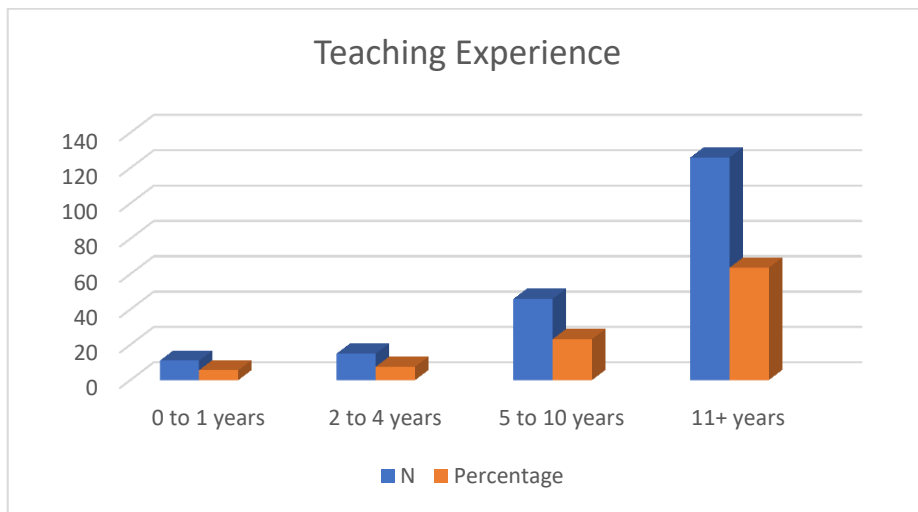


Figure 4: Teachers' Years of Experiences
Teachers' qualifications

As shown in figure (5) below, the highest level of education attained by the majority of the respondents, 73.2%, was a Bachelor's degree. Only 6.1% of the respondents held a Post-Graduate diploma, which is an educational specialization granted by Saudi colleges of education that comes after a bachelor's degree, while the highest level of education for 18.7% of the respondents was a Master's degree. 2% of the respondents held the Doctoral degrees.

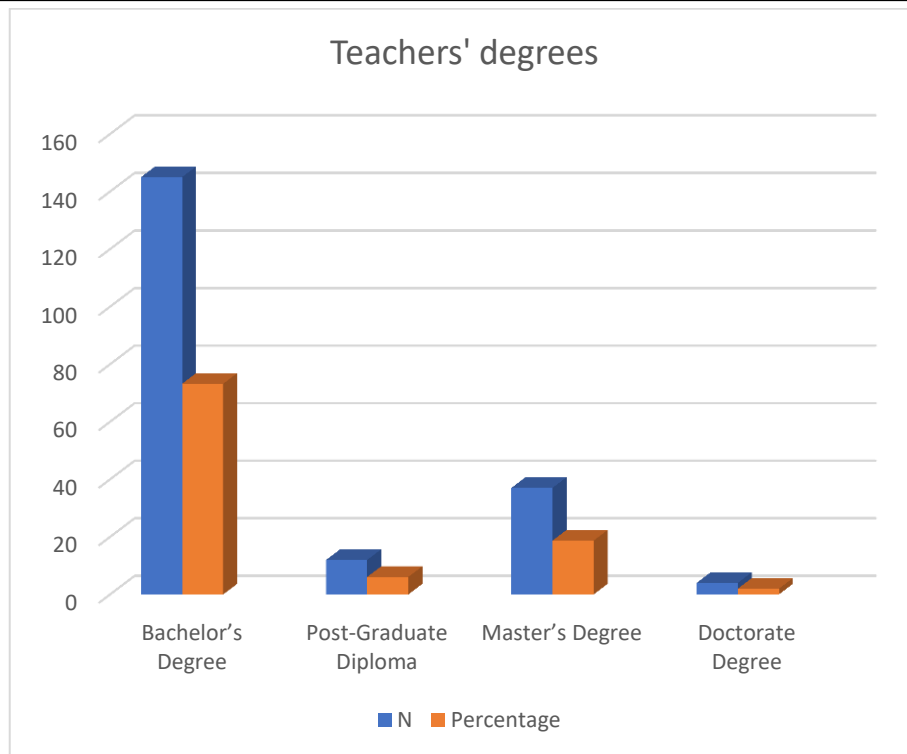


Figure 5: *Teachers' qualifications*

Subjects taught

As reported in figure (6.A) below, more than three out of four (77.8%) of the respondents taught only one school subject, while 12.1% of the respondents taught two school subjects, and 6.1% of the participants taught three school subjects. In addition, only 4% of the participants taught four or more school subjects.

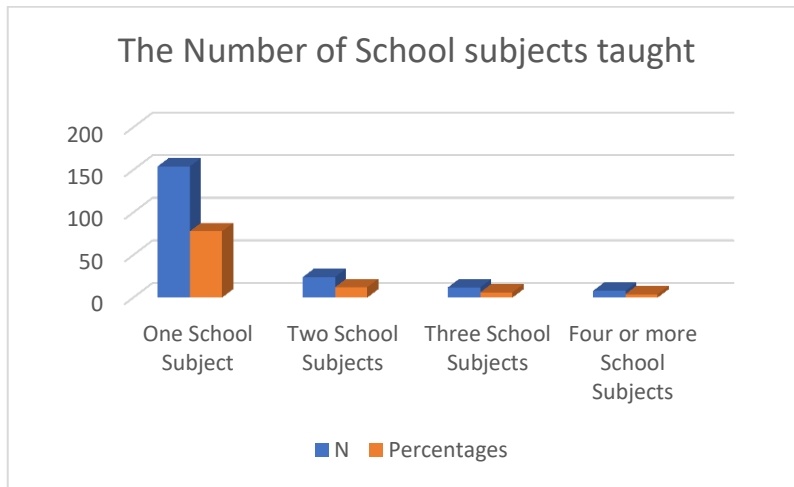


Figure 6 A: *The Number of the school subjects each teacher teaches*

Moreover, figure (6. B) below clarifies that 12% of the participants taught Quran; 25% taught Islamic Studies; 5% taught Social Studies; 19% taught Arabic; 2% taught English; 7.1% taught Mathematics; 10.4% taught Science; 5% taught Digital Skills; 2.5% taught Art Education; 3.5% taught Life and Family Skills; 2.5% taught Physical Education; while the remaining (6%) taught other subjects.

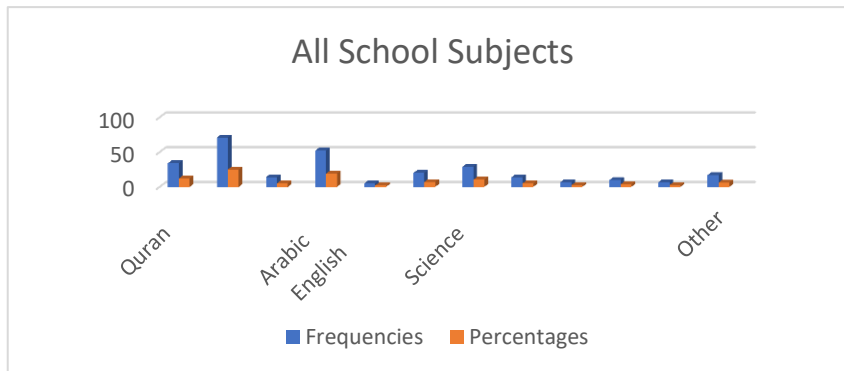


Figure 6 B: *Teachers and the school subjects they teach*

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

To summarize all three of the teachers' background information described above, table (3) below indicates the number of teachers and the percentages in details concerning teachers' ages, years of teaching experiences, educational degrees (qualifications); and tables (4) and (5) clarify the subjects they taught during the academic year.

Age	N	Percentage
22 to 30 years old	29	14.6
31 to 40 years old	74	37.4
41 years old or above	95	48.0
Teaching Experience	N	Percentage
0 to 1 year	11	5.6
2 to 4 years	15	7.6
5 to 10 years	46	23.2
11+ years	126	63.6
Highest Degree Completed	N	Percentage
Bachelor's Degree	145	73.2
Post-Graduate Diploma	12	6.1
Master's Degree	37	18.7
Doctorate Degree	4	2.0
Total Number of Respondents	198	100%

Table 3: Percentages and frequencies of participants' ages, years of teaching experience, and qualifications

Table (4) and (5) summarize the number of school subjects taught by each teacher and their percentages as well as the number and percentages of each school subject taught in general.

Number of School subjects	N	Percentages
One School Subject	154	77.8
Two School Subject	24	12.1
Three School Subject	12	6.1
Four School Subject or more	8	4
Total	198	100

Table 4: Percentages and frequencies in terms of number of school subjects taught (four groups)

School subjects	Frequencies	Percentages
Quran	34	12
Islamic Studies	71	25
Social Studies	14	5
Arabic	52	19
English	5	2
Mathematics	20	7.1
Science	29	10.4

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

Digital Skills	14	5
Art Education	7	2.5
Life and Family Skills	10	3.5
Physical Education	7	2.5
Other	17	6
Total	280	100

Table 5: Percentages and frequencies in terms of all school subjects

First Section: Teachers' Beliefs about their Understanding of EE

As shown in figure (7) below, descriptive statistics indicated that most (83%) of the respondents agreed that they understood the meaning of EE quite well, only about one in five (17%) of them disagreed with the idea. This means that more than three out of four of the teachers affirmed that they are familiar with this notion. In addition, the three out of four of the respondents (77.8%) agreed that they understood the basic concepts needed in teaching EE, in contrast, about one in four teachers (22.2%) found it not important to be familiar with the effective concepts in EE.

Moreover, the idea that EE provides learners with critical knowledge about the environment to resolve environmental issues and prevent the occurrence of new problems was confirmed by more than nine out of ten (92.8%) of the respondents. The majority of the respondent (90.8%) maintained that EE provides learners with the skills and expertise to resolve environmental issues and

prevent the occurrence of new problems, while a minority (9.2%) disagreed with this statement and found it inadequate in achieving that goal. More than four out of five (85%) of the respondents believed that the elementary level is a suitable one to start teaching EE, and only 15 % disagreed.

The strong majority of the participants (89.7%) agreed that the lack of EE is a reason why the majority of people do not lead an environmentally friendly lifestyle. However, a small minority (10.3%) did not agree with this. An Overwhelming majority (96.9%) of the participants agreed that introducing kids to EE is vitally important to help them become environmentally responsible citizens. 80.4% of the respondents believed that they had good understanding of the challenges facing the environment and how these challenges could be resolved, while 19.6% of them disagreed with this.

More than nine out of ten (92.8 %) of the participants agreed that they had a professional responsibility to raise ecologically sensitive citizens who will play a frontline role in advocating for environmental conservation. However, only less than one out of ten (7.2%) of the participants found the idea inappropriate. This means that about 14 participants do not believe they have a responsibility to raise environmentally responsible citizens. Finally, 92.8 % of the participants agreed that as teachers they are duty-bound to play an active role in activities that aim to protect the environment. This means that more than nine out of ten of the total respondents see a crucial role for teachers in raising students' awareness to care for the environment.

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

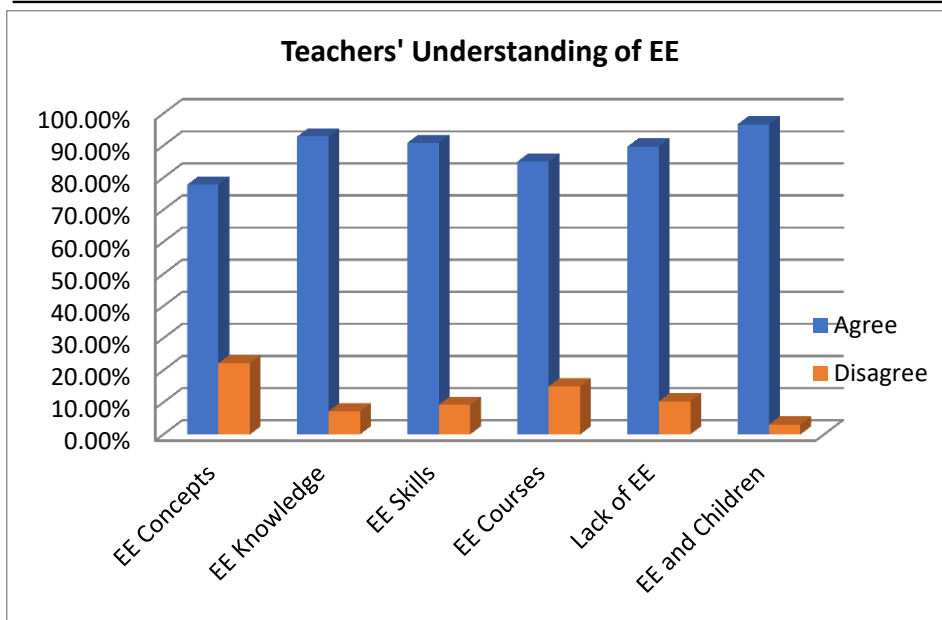


Figure 7: Teachers' Beliefs about their Understanding of EE

In the following table (6), there is a detailed indication of the percentages of the respondents who strongly agreed or strongly disagreed with some of the statements related to their understanding of EE:

Items	Strongly Agree	Agree	Disagree	Strongly Disagree
I understand the meaning of EE very well.	30.4	52.6	15.5	1.5
I understand EE concepts well enough to be effective in teaching EE.	26.8	51.0	21.1	1.1
EE provides learners with critical knowledge	35.6	57.2	6.2	1.0

Items	Strongly Agree	Agree	Disagree	Strongly Disagree
about the environment to resolve environmental issues and prevent the occurrence of new problems.				
EE provides learners with the skills and expertise to resolve environmental issues and prevent the occurrence of new problems.	32.5	58.2	8.2	1.0
I believe that the best educational level to teach EE is elementary.	43.8	41.2	12.4	2.6
Lack of EE is the reason why the majority of people do not lead an environmentally friendly lifestyle.	46.4	43.3	10.3	-
I think introducing kids to EE is vitally important in helping them become environmentally responsible citizens.	60.8	36.1	3.1	-
I have a good understanding of	25.8	54.6	18.0	1.5

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

Items	Strongly Agree	Agree	Disagree	Strongly Disagree
challenges facing the environment and how best they can be resolved.				
I have a professional responsibility to raise ecologically sensitive citizens that will play a frontline role in advocating for environmental conservation.	36.1	56.7	7.2	-
As a teacher, I am duty-bound to play an active role in activities aim to protect the environment.	45.4	47.4	7.2	-

Table 6: *Teachers' Beliefs about their Understanding of EE*

After indicating all of these percentages, it is also important to measure the mean (M) and the standard deviation (SD) of the different items proposed in a way to understand the mean of beliefs. Overall means for the first variable ranged between (M =1.42) and (M =1.96).

Based on the scale used in this study, the sixth item had the highest mean (M =1.42) since more than three out of four of the respondents agreed that lack of EE is a reason why the majority of people do not lead an environmentally friendly lifestyle followed closely by the idea that teachers have a professional responsibility

to raise ecologically sensitive citizens that will play a frontline role in advocating for environmental conservation (M=1.62). In this context, more than four out of five of the teachers surveyed in this study saw themselves as having an important role in raising awareness regarding the environment.

The item concerning the understanding of EE concepts to be effective in teaching EE generated the lowest mean (M =1.96) with a standard deviation (SD =0.72). This means that not all teachers agreed with the statement; approximately three out of four of them asserted that comprehending the different concepts of EE is vital while teaching EE.

Table (7) below clarified the high rate of consistency between all the questions raised. This reflects the high rate of agreement of all the teachers about the different issues raised in the questions proposed, as shown in the mean scores ranging between (M = 1.42) and (M= 1.96). Means and standard deviation obtained after dealing with the different items proposed are indicated in the table below:

Items	Mean	Standard Deviation
I understand the meaning of EE very well.	1.88	0.71
I understand EE concepts well enough to be effective in teaching EE.	1.96	0.72
EE provides learners with critical knowledge about the environment to resolve environmental issues and prevent the occurrence of new problems.	1.78	0.63

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

EE provides learners with the skills and expertise to resolve environmental issues and prevent the occurrence of new problems.	1.74	0.77
I believe that the best educational level to teach EE is elementary.	1.64	0.66
Lack of EE is the reason why the majority of people do not lead an environmentally friendly lifestyle.	1.42	0.55
I think introducing kids to EE is vitally important in helping them become environmentally responsible citizens.	1.95	0.71
I have a good understanding of challenges facing the environment and how best they can be resolved.	1.71	0.59
I have a professional responsibility to raise ecologically sensitive citizens that will play a frontline role in advocating for environmental conservation.	1.62	0.62
As a teacher, I am duty-bound to play an active role in activities that aim to protect the environment.	1.88	0.71

* Scale: 1=Strongly Agree, 2=Agree, 3=Disagree, 4=Strongly Disagree

Table 7: *Summary Statistics of Teachers' Beliefs about their Understanding of EE*

For further explanation, figure (8) below clarifies how much a deviation from the mean there was in term of each of the statements. In particular, the average mean equals to ($M=1.75$) and the average standard deviation equaled to ($SD=0.66$) when dealing with teachers' beliefs about their understanding of EE.

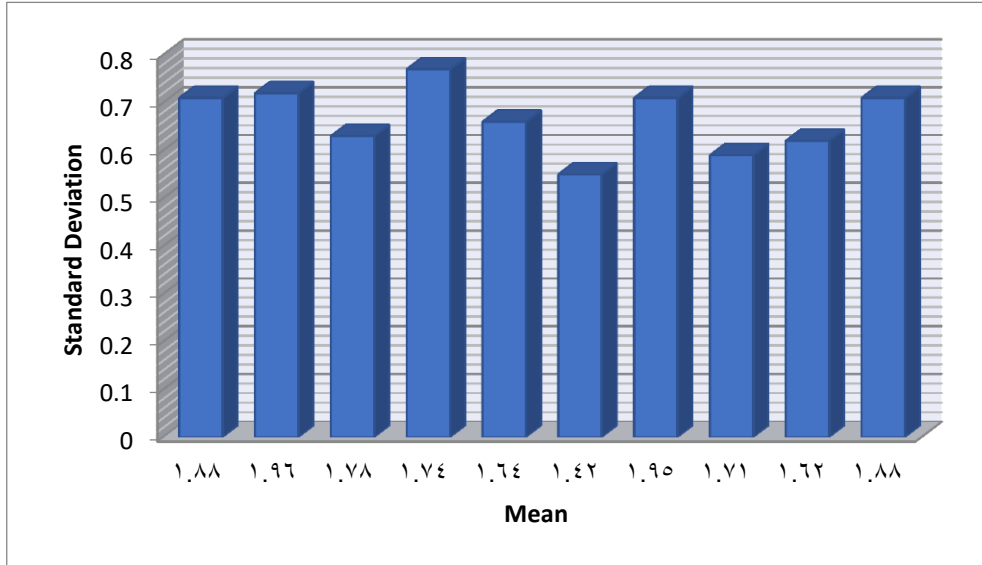


Figure 8: Teachers' Beliefs about their Understanding of EE (Mean Vs Standard Deviation)

Second Section: Teachers' Beliefs about their Teaching Experiences with EE

Teachers' pre- and in-service experiences with a subject through different educational programs such as training and professional development are critical to helping teachers become effective at teaching their subject as teachers, since teachers enter the profession with varying degrees of expertise and competence. Over time, through training and by gaining teaching experience,

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

teachers become more proficient at teaching their subjects. Thus, it is vital to explore teachers' experiences with EE.

The study found that about three out of four (72.2%) of the respondents agreed that their pre-service exposure to EE prepared them to teach such content in the classroom. Only slightly more than half of the participants (50.8%) agreed that they had participated in EE experiences such as conference(s), field hours, student employment, student teaching, workshop(s), or training programs as a pre- and/or in-service teacher. The remaining half (49.2%) of the teachers participating in this study disagreed with the statement.

A considerable number of respondents (69.6%) agreed that they taught EE in their classroom. More than half (55%) of the respondents agreed that they separated EE lessons from the other subject(s) they taught, while the remaining (45%) agreed with the statement that they integrated EE into their curriculum.

Moreover, almost three out of four (84.3%) of the respondents agreed that they took learners outside the classroom to have firsthand experience with nature when teaching EE, while 25.7% did not. In addition, about nine out of ten (88.5%) of the respondents agreed that they could answer students' questions about the environment, while the remaining (11.5%) affirmed that they were unable to answer questions related to environment. In regard to the time management, more than half (61%) of the participants agreed that when the daily lessons included EE topic, they spent no more than 50% of the class time discussing that topic. However, (38.3%) of them indicated that they spent more than 50% of class time discussing an EE topic when the daily lesson included one of the EE issues.

Finally, about three out of four (69.6%) of the participants agreed that they understood all instructional strategies needed to effectively teach EE in their classrooms. In this context, almost half (49.7 %) of the respondents agreed that they employed action strategies such as role-playing to teach EE, while the remaining (16.3%) of the participants did not employ these strategies.

Figure (9) below illustrates participants' agreement and disagreement about the role of teaching experiences in achieving a successful EE program, as well as their experience in teaching EE in classrooms, whether or not they separate EE from the other educational subjects, if they teach EE outdoors, how comfortable they feel answering students EE questions, and whether they spend time to teach EE topics, understand different instructional strategies, and employ a range of strategies in their EE teaching.

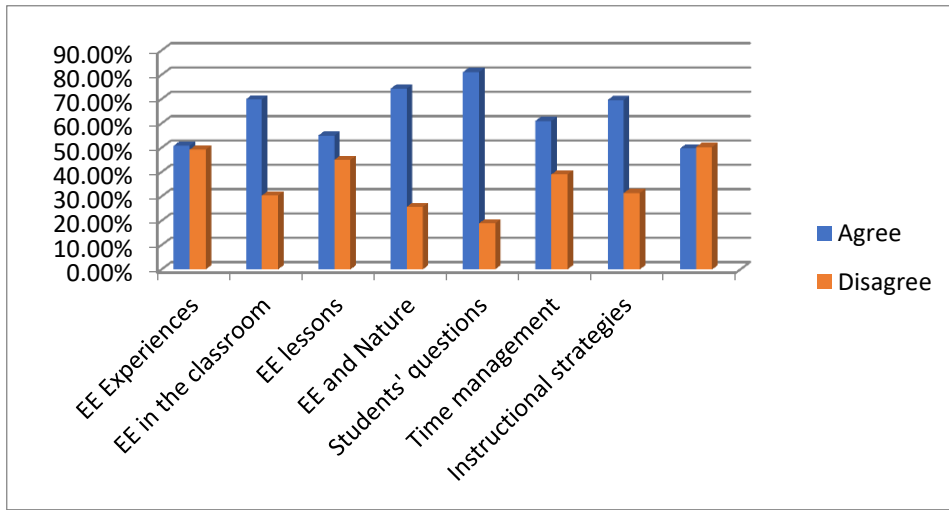


Figure 9: Teachers' Beliefs about their Teaching Experiences with EE

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

Table (8) below reports in detail the rates of teachers who strongly agreed, agreed, strongly disagreed or disagreed with the different statements in this section of the questionnaire.

Items	Strongly Agree	Agree	Disagree	Strongly Disagree
My pre-service exposure to EE prepared me to teach such content in the classroom.	26.7	45.5	23.6	4.2
I participated in EE experiences (e.g., conference(s), field hours, student employment, student teaching, workshop(s), or training programs) as a pre- and in-service teacher.	17.3	33.5	39.3	9.9
I teach EE in my classroom.	17.8	51.8	24.1	6.3
I separate EE lessons from the rest of my subject area.	17.3	37.7	37.7	7.3
I take learners outside the classroom to have firsthand experience with nature when	31.9	42.4	20.4	5.2

teaching EE.				
I can answer my students' questions about the environment.	31.4	57.1	9.4	2.1
When the daily lesson includes EE topic, I spend no more than 50% of the class time discussing that topic.	12.0	49.7	35.1	3.1
I think I understand all instructional strategies needed to effectively teach EE in my class.	16.2	53.4	26.2	4.2
I employ action strategies (e.g., role-playing) in teaching EE.	34.0	49.7	14.1	2.1

Table 8: Teachers' Beliefs about their Teaching Experiences with EE

As illustrated, more than half of the respondents agreed with the idea that experience is highly needed in teaching EE. The ability to answer students' questions about the environment had the highest mean score (M=1.82). This was followed by using action strategies, with a mean of (M=1.84). In contrast, the idea of participating in EE experiences such as conferences, workshops and training programs had the lowest mean (M=2.42). In this context, half of the teachers disagreed with the statement that they participate in professional development related to EE in order to enrich their EE teaching. The difference between the highest mean

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

(M=1.82) and the lowest mean (M = 2.42) is not very great, which reflects the strong agreement between teachers in terms of how they see the role of experience in teaching EE effectively.

Differences in means and standard deviations are shown in table (9) below:

Items	Mean	Standard Deviation
My pre-service exposure to EE prepared me to teach such content in the classroom.	2.05	0.82
I participated in EE experiences (e.g., conference(s), field hours, student employment, student teaching, workshop(s), or training programs) as a pre- and in-service teacher.	2.42	0.89
I teach EE in my classroom.	2.19	0.80
I separate EE lessons from the rest of my subject area.	2.35	0.85
I take learners outside the classroom to have firsthand experience with nature when teaching EE.	1.99	0.86
I can answer my students' questions about the environment.	1.82	0.68
When the daily lesson includes EE topic, I spend no more than 50% of the class time discussing that topic.	2.29	0.72
I think I understand all instructional strategies	2.18	0.75

Items	Mean	Standard Deviation
needed to effectively teach EE in my class.		
I employ action strategies (e.g. role-playing) in teaching EE.	1.84	0.74

* Scale: 1=Strongly Agree, 2=Agree, 3=Disagree, 4=Strongly Disagree

Table 9: Summary Statistics of Teachers' Beliefs about their Teaching Experiences with EE

For further explanation, figure (10) below clarifies how much a deviation from the mean there is in each of the issues proposed. But in general, the average mean in relation to the second variable, teachers' beliefs about their teaching experiences with EE, was equal to (M= 2.14) and the average standard deviation was (SD = 0.79).

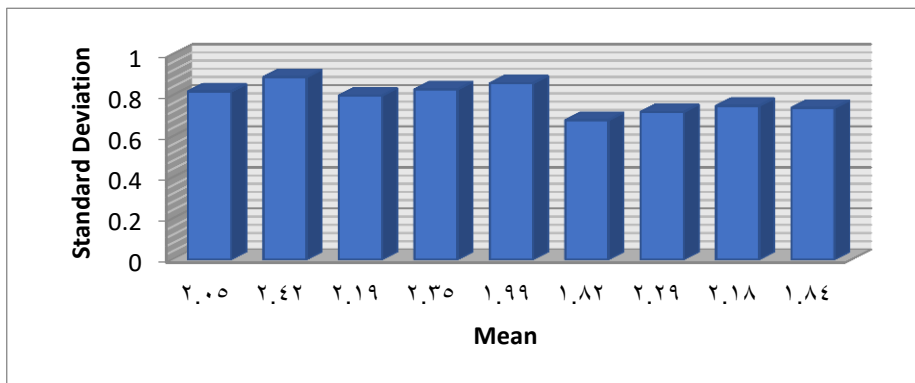


Figure 10: Teachers' Beliefs about their Teaching Experiences with EE (Mean vs Standard Deviation)

Thematic Analysis

The researcher conducted thematic analysis to explore the answers given to open-ended questions. These were analyzed independently, and categorized into two parts, each containing an analysis of one question.

Part 1

Question 15; *What do you think would help you improve your understanding of EE?*

This question sought to explore teachers' opinions about what they thought would help them improve their understanding of EE. The total number of responses for this question was greater than the number of respondents since the majority of the respondents gave more than one response and these responses could be coded in more than one category. The researcher identified four main codes; training, raising awareness, professional development, and other.

Theme 1: teachers' training

This theme was the most dominant of all, with the respondents indicating the need for a teachers' training program dedicated to teaching teachers about EE. However, it is important to note that the respondents used different wording to express the need for the training program, and they gave little to no explanation in regards to the design of such a program. Among the wordings used to express this theme: "*Training teachers about them (EE), Attending EE courses, Intensification of courses related to EE, Environmental education training courses*" (Respondent 6). The high number of respondents (109 teachers) advocating for such training speaks to the need for teachers training program to teach EE is an indicator of the critical role played by teacher training programs in

enhancing teachers' knowledge, skills, and expertise, and the desire on the part of teachers to receive such training.

Theme 2: raising awareness

A considerable number of the respondents (82 teachers) felt that raising awareness about EE would help them improve their understanding of EE. For instance, one respondent stated that understanding EE would be improved through undertaking *“intensive awareness work to urge attention to the environment and raise the efficiency of citizens to take care of the environment.”*(Respondent 23).

According to the respondents, raising awareness of EE would involve helping the populace understand pollution and its impacts, and also appreciate and take on their role of conserving the environment: *“Clarify the dangers of solid waste on living organisms on land and sea, as well as wasteful depletion of environmental products such as trees, minerals, soil, and rivers, as well as pollution in all its forms, the largest destroyer of the environment.”* (Respondent 78).

Another respondent stated that awareness should *“Urge attention to the environment and raise the efficiency of citizens to take care of the environment and make sure that taking care of the environment is the best way to prevent many diseases and the use of biodegradable materials and plastics”* (Respondent 103). While some did not expound on how an intensive awareness program would be organized, others felt that the media including multi-media and social media provide the most appropriate platform to raise awareness about EE: *“Making documentaries about the role of individuals in promoting the culture related to EE, benefiting from previous experiences that dealt with the concept of EE and*

developing it in line with the developments of life” (Respondent 13).

Theme 3: professional development

The respondents felt that organizing professional development programs to teach them about EE on the job would help improve their knowledge and understanding of EE: *“Develop the teacher professionally and provide him with important knowledge in the field of EE that is directly related to the subject he teaches.”* (Respondent 103).

Theme 4: others

It is important to note that some responses were ambiguous and challenging to be classified into the three main themes. For instance, a respondent stated that their understanding of EE would be improved through *“renewed viewing”* (Respondent 156), another asked for *“responsibility assessment”* (Respondent 17) and another wrote that we much *“Search and find out, solve the problem”* (Respondent 109). Therefore, the researcher classified these ambiguous and complicated responses in a category titled “other.”

Part 2

Question 25; *What teaching methods/ strategies/practices do you prefer to use when teaching environment-related content in your course?*

The responses for these questions were more than the number of respondents since the respondents gave more than one response and which could be categorized in two or more categories. The responses for these questions were categorized into

four themes; Active learning, flipped learning, technology/media mediated teaching, Interactive teaching, and other.

Theme 1: active/experiential learning

A considerable number of respondents stated that they used active learning strategies to teach EE. Among the wordings used to describe active learning they included “*outdoor trips - practical application in the school yard*” (Respondent 103), “*Role-playing,*” (Respondent 24), “*activities outside of class and trips*” (Respondent 6), “*field application and field trips*” (Respondent 88), and “*practical skills acquired by the student.*” (Respondent 36)

Theme 2: flipped learning

Various respondents attested that they used flipped learning to teach EE. “*Flipped class by sending a video of my students in their homes through communication groups and discussing them the next day in class.*” (Respondent 103)

Theme 3: technology/media mediated teaching

A number of respondents described using technological tools and platforms to provide instructions to their students. The most commonly described was the use of videos in EE: “*View a cartoon video explaining the seriousness of the attack on the environment.*” (Respondent 45) Other media platforms used to teach EE include smart boards whereby a respondent attested to using “*smart boards*” (Respondent 91) to teach EE to students.

Theme 4: interactive teaching

Responses revealed that some respondents used interactive methods to teach EE. For instance, a respondent stated that

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

“perhaps the most important way is to motivate students to research and present what each student has from the environmental outcome available to him.” (Respondent 16), while another stated that they use

The style of dialogue and discussion instead of lecture...using the method of inference from students, and reminding some of the means of resisting environmental damage through some means such as recycling waste and increasing reforestation, or the obligation to put waste in the designated places, etc. (Respondent 103)

other respondents stated that they used *“brainstorming strategies”* (Respondent 176) and *“opening the portal of dialogue between me [the teacher] and the students”* (Respondent 40).

Theme 5: other

There were some responses that could not be fit in the four categories above, and which did not recur enough to constitute a category. The researcher coded these responses in a category of “other”; some of these include *“critical thinking”* (Respondent 13), *“concept maps”* (Respondent 84), *“scientific investigation”* (Respondent 22).

Discussion of the Major Findings

This section is organized according to the two different variables mentioned in the two research questions (SRQ1, SRQ2).

SRQ1: What do KSA elementary school teachers believe they understand about EE and its importance?

The different items organized in the questionnaire considering the first variable highlighted the importance of having a clear understanding of EE since (83%) of the participants insisted that

they understood EE perfectly and about three in four (77.8%) of them affirmed that they understood EE concepts well enough to be effective in teaching EE. These percentages reflected the importance of teachers' beliefs about EE in enhancing not only their students' skills but also their own teaching strategies to provide students with the best EE curriculum using suitable teaching strategies and methods, which was similar to Stern et al. (2022) study finding, which found that teachers' belief have considerable impact on how a program is taught. In addition, teachers' understanding of EE would lead to their adoption of the suitable curriculum according to their beliefs. According to Cotton (2006), teachers' beliefs played a critical role in the success of the teaching program and the achievement of the main goals to conserve the environment.

The majority, about nine out of ten (90.8%), of the teachers agreed that the role of EE is to provide learners with the skills and expertise to resolve environmental issues and prevent the occurrence of new problems. In this context, the Tbilisi convention asserted in its second goal on the idea that EE provides learners with the opportunities to master appropriate skills and attitudes to protect the environment (Bengtson, 2010). This means that teachers' beliefs about EE and its concepts develop students' knowledge about the environment and the suitable techniques to enhance environmental conditions and to resist any danger that can threats environmental security after comprehending the complex nature of the environment (Tbilisi Convention, 1977 as reported by Bengtson, 2010). Developing students' knowledge in this way would be impossible if the teacher doesn't understand EE and the main concepts that are related to the environment in order to work together to protect the world and to account for what they can do

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

and what they cannot do in the course of raising citizens' awareness according to the different essential ethical values (GDRC, 2020).

Moreover, 85% of the respondents believed that the elementary level is the suitable level to start teaching EE, which was in line with the education policy in the KSA (Presidency of Meteorology and Environmental Protection, 2007). Also, the overwhelming majority of the teachers (96.9 %) agreed that EE should be introduced to children in a way to let them acquire the basic rules of protection and master the fundamental skills to become a responsible citizen in the future. The importance of this belief is supported by other studies (Nair, 2010; Kimaryo, 2011). Respondents agreed that introducing children to EE is a need in order to let them be able to act consciously either individually or with the group, the act that was called "Action Competence" (Jensen & Schnack ,1997). That would have a favorable impact on students' academic progress, as supported by Marques and Xavier (2020).

Moreover, Louv (2005) insisted that:

Within the space of a few decades, the way children understand and experience nature has changed radically. The polarity of the relationship has reversed. Today, kids are aware of global threats to the environment – but their physical contact, their intimacy with nature, is fading. (p. 1)

Children's awareness is due to teachers who play a great and active role in activities that aim to protect the environment as what the descriptive analysis has shown since (92.8%) of the respondents confirmed that idea.

The current research has confirmed the findings of all the studies that had been mentioned in the literature review part. So, the teachers who participated in this study believe that teachers play a vital role in producing consciously ecologically sensitive citizens who will play a frontline role in advocating for environmental conservation. In this regard, The KSA National Framework for Education (2019) affirmed that “[s]howing respect for and protecting the environment” are necessary “to ensure” “national development” (p. 19).

Additionally, teachers agreed that their role in raising students’ awareness about EE would necessarily help them develop their understanding of EE, and their beliefs are vital and critical for enhancing the teaching process (Stern et al., 2022). The thematic analysis of question 15 also revealed that many respondents see an important role of multi-media and social media in providing a suitable educational platform to raise awareness about EE. A number of participants indicated that professional development programs would be helpful in preparing them to better teach EE and understand it.

SRQ2: What are the KSA elementary school teachers’ beliefs about their teaching experiences with EE?

When examining the literature, only few studies have dealt with teachers’ beliefs about their teaching experiences with EE. Although having experience is fundamental in establishing one’s knowledge and skills, in the current study approximately half of the teachers questioned reported that they had not participated in EE experiences (e.g., conference(s), field hours, student employment, student teaching, workshop(s), or training programs) as a pre-and/or in-service teacher. This means that either they have not had a chance to participate in an EE experience, or that they do not

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

believe that it is important to increase one's knowledge about EE through these kinds of experiences.

In contrast, according to about half of the teachers (50.8%), these experiences increased teachers' knowledge about EE content which facilitates providing the suitable techniques to practice activities related to EE curriculum and to integrate different disciplines smoothly. This finding is similar to March and Willis's (2001). This difference suggests a dichotomy in what teachers believe about EE, and that there is a need to reconsider the teacher experience programs in related to EE.

Additionally, most (84.3%) of the participants asserted that taking learners outside the classroom is obligatory in order to have firsthand experience with nature when teaching EE. That would facilitate the learning process as it was stated in some studies conducted by Lee et al., (2018) and Volk and Cheak (2003). It helps learners detect the major problems that could threaten the environment (GDRC, 2020). The results of the present study suggest that children need study the local environment in order to understand the larger world and environment. This result connects to the idea of advocating for the importance of learning *through* the environment in enhancing students' knowledge and developing their environmental concern and awareness (Kimaryo, 2011; Hamrokulova, 2022).

Respondents ($M= 2.05$) asserted that exposure to the local environment facilitated EE comprehension according to the context being taught. This idea is advocated by Neal and Palmer (2003). In fact, similar to this result, it has been previously argued that interaction with the environment turned the teaching mode into a 'place-based EE' (Kimaryo, 2011).

In addition, the quantitative measures in the present study provide that 45% of the teachers did not agree on the idea of separating EE from the other subjects as separation leads to the narrowing of its scope. This finding is similar to those in studies conducted by Powers (2004), Rusinko (2010), and Pedretti and Nazir (2014). Other respondents (55%) agreed that it is necessary to teach EE in isolation as an independent subject. It means that half of the respondents agreed with the idea that EE should be taught in isolation. This is vital in order to be easily understood by learners who could grasp the main concepts that pertain only to EE (Husin et al., 2020). This result clarifies that EE could be taught according to either one of the modes, as Verma and Dhull (2017) affirmed.

When dealing with the open-ended question in this section, the majority of teachers who responded to the question reaffirmed the importance of active learning strategies to teach EE such as: outdoor trips and practical application in the school yard. This point matches what the aforementioned studies have called for (Esa, 2010; Volk & Cheak, 2003; Hamrokulova, 2022; Kimaryo, 2011). This relates to the assumption that teachers' attendance at environmental training and activities is operative (Stern et al., 2022) as they develop teachers' self-attitudes that are tied to their experiences with the environment (Osman & Meerah, 2010). Indeed, teachers need take students into the environment in order to gather relevant data about the environment, its problems, and the tools that might protect it from threats.

Since teachers play the role of EE facilitator, they need to master various issues related to the environment and to EE. That's why they need to be equipped with various means to be able to answer all students' questions about environment and to design an

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

effective syllabus. Therefore, it is important to note that about one in ten teachers saw themselves as unable to answer their students' questions about the environment. This seems problematic, because as Moroye (2009) has shown, when teachers lack mastery of the environmental content of their subjects, students learning EE in their classrooms learn less and have a less positive EE experience.

Enhancing positive attitude towards the environment is key to develop learners' cognition and environmental awareness. Thus, experiences provide teachers with different opportunities to raise their EE understanding and to find suitable measures to raise their students' critical thinking and environmental support as they were exposed to many experiences while they were teaching EE.

Moreover, textbooks and the different action strategies like role-playing and problem-based learning are necessary. These are considered parts from the professional academic trainings as what was said by respondent 6 "training teachers about them (EE), attending EE courses, intensification of courses related to EE, EE training courses."

Recommendations and Implications for Future Research

Although this research is limited in the number of participants and the location, the results obtained are useful in determining a broad range of teachers' beliefs about different issues related to EE. The results highlight the necessity of understanding teachers' beliefs about the importance of having pre- and in-service experiences to teach EE effectively and the suitable ways to teach it whether as an independent subject or integrated with other subjects.

Since the majority of teachers included in this study agree with the importance of EE in the KSA educational system, it seems

important that we advocate for including EE at different educational levels, targeting not only elementary students but also learners at middle and secondary levels. In addition, the Ministry of Education in KSA should provide appropriate EE professional training programs for teachers at all levels. Such training sessions are beneficial for students because they give teachers deeper knowledge about the environment and environmental problems, and also provide them with tools and techniques they can use in the classroom. Similar, colleges of education in Saudi universities should include EE courses as a main component of their programs. Teachers cannot be required to teach environment-related content without prior preparation.

Enhancing students' critical thinking skills by developing an ideal educational program that focuses on the mastery of environmental understanding and basic concepts has to match KSA views of 2030 to establish a well-organized environment. Then, teachers should stress on their learners' needs in order to let them conduct environmental research to reinforce their knowledge and develop their positive attitudes toward the environment in general.

Outdoor education has to be developed also in the sense that students need to discover nature, explore the different environmental problems, and look for the suitable solutions. There is a need to organize tours and visits to environmental settings as to raise students' responsibility of the importance of saving nature. Moreover, it is not only the role of schools to develop students' awareness of the environment but also parents play a fundamental role in shaping students' conscious as they master the basic prerequisites of environment from their families.

In addition to the recommendations that have to be set for an EE to be ideal in KSA, further research needed to discover a

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

number of the issues that connect to EE. One of the issues that need further investigation would be assessing a large number of participants in order to get more results. It could be very interesting to investigate a group of teachers in different locations to have ideas about the kinds of teaching methods and strategies that could be used by many teachers because the investigation of EE would be of great interest to not only teachers and learners but also all citizens as they live together in nature. So, it is necessary for further research to be conducted to identify and then develop systematic techniques used for measuring students' awareness about different environmental problems. Research facilitates identifying which strategies needed to understand nature and identify its challenges in order to provide suitable ways to solve the problems.

It is critical to outline the role of students and their beliefs about an ideal EE curriculum that must be offered in KSA. As the research relies on a cross-sectional study that was mainly based on statistical analysis, it is needed to observe teachers and the way they implement the curriculum outline inside the classroom walls and to observe the strategies used by teachers in enhancing students understanding and developing their awareness. It means, it seems important to conduct longitudinal research in order to identify whether the procedures and the measures taken by the ministry first and by the teachers second fit students' needs or not. A study could also be conducted to evaluate the governmental role in achieving the important goals that provide teachers and students with better EE understanding and develop the efficient strategies to protect environment from the external threats.

Moreover, the present study could be replicated in other regions in Riyadh or other districts in KSA. Additionally, it would

be better to investigate how teachers of elementary, middle, and secondary schools look at EE as a subject outlined in the whole educational program. The aim is to get an overall image and a thorough understanding of how all teachers of all schools believe about the different issues stated in the items proposed.

This study leads to the establishment of other studies and diagnosis which could provide possible opportunities for other related variables and research questions. As this research is based on one angle-method based on quantitative data collection and analysis, it could be possible to study the problems raised in this research qualitatively based on an in-depth descriptive analysis. Rather than using calculation as the main tool used to get percentages, it could be feasible also to let teachers expand talk clarifying their choices.

One of the methods that helps in evaluating the status of EE in the KSA is the study of students' beliefs. This study should bridge the gap between what teachers believe about EE and what students also believe about EE. Therefore, one of the recommendations that can be referred to here is that a survey research study similar to this current research study be conducted focusing on secondary school students to investigate their beliefs about the state of EE in the KSA. Such a study would establish general frameworks about the educational needs of students towards enhancing their environmental awareness.

Based on the implications of this current study, researchers can also develop an EE philosophy that builds on Islamic principles as a major contribution to the field of EE in the KSA. This philosophy must develop a general framework for formulating an EE curriculum that is consistent with the local values and cultural

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

principles in the KSA, which are mainly derived from the Islamic religion.

Finally, teachers' reasons behind ticking on one of the two options stated in the surveys could be integrated in other research papers as it is vital to justify the answers selected.

References

- Aalto, E., Tarnanen, M., & Heikkinen, H. L. (2019). Constructing a pedagogical practice across disciplines in pre-service teacher education. *Teaching and Teacher Education*, 85, 69-80.
- Abdullah, S. I. S. S., Halim, L., & Shahali, E. H. M. (2011). Integration of environmental knowledge across biology, physics and chemistry subject at secondary school level in Malaysia. *Procedia-Social and Behavioral Sciences*, 15, 1024-1028.
- Adedayo, A., & Olawepo, J. A. (1997). Integration of environmental education in social science curricula at the secondary school level in Nigeria: Problems and prospects. *Environmental Education Research*, 3 (1), 83 – 93
- AFED (2019). Environmental Education for Sustainable Development in Arab Countries. Annual Report of Arab Forum for Environment and Development, 2019; Saab, N., et al. (Ed.).
- Alam, M. (2023). Activists' heterodox beliefs in fostering urban environmental education in Indonesia. *Local Development & Society*, 4(1), 128-145.
- Al-Asmari, H. (2012). *Degree of inclusion of the environmental concepts in social science textbooks in secondary schools in light of the global environmental education concepts* [Unpublished master's thesis]. Umm Al-Qura University, College of Education, Department of Curriculum and Instruction.
- Al-Dossary, R. (2016). The reality of environmental education in public education in the Kingdom of Saudi Arabia. *Education Journal*, 167(2), 391-420.

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

- Alharbi, W. (2020). *Achieving environmental pedagogy in middle schools: The role of principals* [Unpublished master's thesis]. Um-Alqura University, College of Education, Department of Curriculum and Instruction.
- Al-Otaibi, K. (2014). *The role of school in developing environmental awareness for secondary school students in Riyadh from the teachers' point of view* [Unpublished master's thesis]. King Saud University, College of Education, Department of Educational Policies.
- Alsubaie, M. A. (2016). Curriculum development: Teacher involvement in curriculum development. *Journal of Education and Practice*, 7(9), 106-107.
- Anderson, S. E. (2002). *Improving schools through teacher development: Case studies of the Aga Khan Foundation Projects in East Africa*. Routledge.
- Ardoin, N. M., & Bowers, A. W. (2020). Early childhood environmental education: A systematic review of the research literature. *Educational Research Review*, 31, 1-16.
- Aznar-Díaz, I., Hinojo-Lucena, J., Cáceres-Reche, P., Trujillo-Torres, M., & Romero-Rodríguez, J. (2019). Environmental attitudes in trainee teachers in primary education. The future of biodiversity preservation and environmental pollution. *International Journal of Environmental Research and Public Health*, 16(3), 1–11
- Bengtson, K. J. M. (2010). *Elementary teachers' perceptions of environmental education*. (Doctoral dissertation, University of Minnesota)
- Blanchet-Cohen, N., & Reilly, R. C. (2013). Teachers' perspectives on environmental education in multicultural contexts:

- Towards culturally-responsive environmental education. *Teaching and Teacher Education*, 36, 12-22.
- Bolstad, R., Cowie, B., Eames, C., Baker, M., Keown, P., Edwards, R., & Rogers, N. (2004). *Environmental education in New Zealand schools: Research into current practice and future possibilities: Summary of the research findings*. Ministry of Education.
- Boyle, B., & Charles, M. (2016). *Curriculum development: A guide for educators*. Sage.
- Chen, C. H. (2006). *Investigating the influences of teacher belief and contextual factors on the technology integration of Taiwanese high school teachers*. The University of Texas at Austin.
- Chronin-Jones, L. L. (1991). Science teacher beliefs and their influence on curriculum implementation: Two case studies. *Journal of Research in Science Teaching*, 28(3), 235-250.
- Cotton, D. R. (2006). Implementing curriculum guidance on environmental education: The importance of teachers' beliefs. *Journal of Curriculum Studies*, 38(1), 67-83.
- Creswell, J. (2009). Editorial: Mapping the field of mixed methods research. *Journal of Mixed Methods Research*, 3(2), 95–108.
- Creswell, J. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

- Eames, C. & Birdsall, S. (2019). Teachers' perceptions of a co-constructed tool to enhance their pedagogical content knowledge in environmental education. *Environmental Education Research*, 25(10), 1438-1453.
- Eisenhart, M. A., Cuthbert, A. M., Shrum, J. L., & Harding, J. R. (1988). Teacher beliefs about their work activities: Policy implications. *Theory Into Practice*, 27 (2), 137-143.
- Esa, N. (2010). Environmental knowledge, attitude and practices of student teachers. *International Research in Geographical and Environmental Education*, 19(1), 39–50.
- Glatthorn, A. A., Boschee, F., & Whitehead, B. M. (2005). *Curriculum leadership: Development and implementation*. SAGE Publications.
- Goodenough, W. H. (1971). *Culture, language and society*. Addison-Wesley.
- Grace, M., & Sharp, J. (2000). Exploring the actual and potential rhetoric-reality gaps in environmental education and their implications for pre-service teacher training. *Environmental Education Research*, 6 (4), 331– 345.
- Hamrokulova, S. (2022). Pedagogical-program implementation of the development of environmental education in higher class pupils of secondary schools. *Central Asian Journal of Education and Computer Sciences (CAJECS)*, 1(4), 52-56.
- Handler, B. (2010). Teacher as curriculum leader: A consideration of the appropriateness of that role assignment to classroom-based practitioners. *International Journal of Teacher Leadership*, 3(3), 32-42.

- Hassan, A. & Ismail, M. (2011). The infusion of environmental education (EE) in chemistry teaching and student's awareness and attitudes towards environment in Malaysia. *Procedia- Social and Behavioral sciences*, 15, 3404 - 3409.
- Husin, A., Maharani, S. D., Yosef, & Sumarni, S. (2020). Teachers' perceptions of environmental care education in elementary schools. *Creative Education*, 11, 1802-1811.
- Jadhav, M. S., & Patankar, P. S. (2013). Role of teachers in curriculum development for teacher education. *National Conference on Challenges in Teacher Education, Physical Education and Sports*. [accessed in November 3, 2018].
- Jensen, B. & Schnack, K. (1997). The action competence approach in environmental education. *Environmental Education Research*, 3 (2), 163 – 178.
- Kimaryo, L. A. (2011). *Integrating environmental education in primary school education in Tanzania: Teachers' perceptions and teaching practices*. Abo Akademi University Press.
- Ko, A. C., & Lee, J. C. (2003). Teachers' perceptions of teaching environmental issues within the science curriculum: A Hong Kong perspective. *Journal of Science Education and Technology*, 12(3), 187-203.
- Kraemer, H. C. (1991). Without increasing sample size. *Psychopharmacology bulletin*, 27(3-4), 217.
- Lee, Y. J., Chu, H. E., & Martin, S. N. (2018). Examining factors that influence on elementary teachers' perceptions in a graduate level interdisciplinary environmental education program: Using ePCK as a framework. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(10), 1-23.

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

- Marques, R., & Xavier, C. R. (2020). The Challenges and Difficulties of Teachers in the Insertion and Practice of Environmental Education in the School Curriculum. *International Journal on Social and Education Sciences*, 2(1), 49-56.
- Marsh, C. J., & Willis, G. (2003). *Curriculum: Alternative approaches, ongoing issues*. Merrill/Prentice Hall.
- Mathers, C., & Oliva, M. (2008). *Improving instruction through effective teacher evaluation: Options for states and districts*. TQ Research & Policy Brief. National comprehensive center for teacher quality.
- McClaren, M., & Hammond, B. (2005). Integrating education and action. *Environmental education and advocacy: Changing perspectives of ecology and education*, 267-291.
- Ministry of Education. (2004). *Education policy in the Kingdom of Saudi Arabia*, Ministry of Education Press.
- Ministry of Education. (2018). *Directory of public schools in the Kingdom of Saudi Arabia*. General Administration for Education Development Project (Tatweer).
- Ministry of Education. (2019). *Professional development and training courses guide for teachers*. MOE Press.
- Moroye, C. (2009). Complementary curriculum: The work of ecologically minded teachers. *Journal of Curriculum Studies*, 41(6), 789–811.
- Nair, G. G. (2010). Environmental education and curriculum at primary level. *Nature, Environment and Pollution Technology*, 9(2), 409-426.

- Nation, M. T., & Feldman, A. (2021). Environmental education in the secondary science classroom: How teachers' beliefs influence their instruction of climate change. *Journal of Science Teacher Education*, 32(5), 481-499.
- Neal, P., & Palmer, J. (2003). *The handbook of environmental education*. Routledge
- O'Donoghue, R., & Russo, V. (2004). Emerging patterns of abstraction in Environmental Education: A review of materials methods and professional development perspectives. *Environmental Education Research*, 10 (3), 331– 351.
- OECD (2005). Glossary of statistical terms. Accessed on 6th Feb. 2022 from <https://stats.oecd.org/glossary/detail.asp?ID=813>
- Osman, K., & Meerah, T. S. M. (2010). The effectiveness of classroom and non-classroom activities on developing Saudi Arabian secondary students' environmental values. *Procedia-Social and Behavioral Sciences*, 9, 408-413.
- Ozden, M. (2008). Environmental awareness and attitudes of student teachers: empirical research. *International Research in Geographical and Environmental Education*, 17 (1), 40-55.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Palmer, J. A. (2009). *Environmental education in the 21st century: Theory, practice, progress and promise*. Routledge.

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

- Pedretti, E., & Nazir, J. (2014). Tensions and opportunities: A baseline study of teachers' views of environmental education. *International Journal of Environmental & Science Education*, 9, 265-283.
- Pinsonneault, A., & Kraemer, K. (1993). Survey research methodology in management information systems: an assessment. *Journal of Management Information Systems*, 10(2), 75-105.
- Powers, A. (2004). Teacher preparation for environmental education: faculty perspectives on the infusion of environmental education into pre-service methods courses. *The Journal of Environmental Education*, 35(3), 3 – 11
- Presidency of Meteorology and Environmental Protection. (2007). *Annual report*, Governmental Presses.
- Riyadh General Administration of Education. (2021). *Directory of government schools in the General Administration of Education in Riyadh*. (4th ed). Department of Information.
- Rusinko, C. A. (2010). Integrating sustainability in higher education: A generic matrix. *International Journal of Sustainability in Higher Education*, 11(3), 250 – 259
- Salkind, N. J. (2010). *Encyclopedia of research design*. Calif: SAGE.
- Saudi Vision 2030*. (n.d.). Retrieved October 23, 2021, from <https://vision2030.gov.sa/en/node/10>
- Seow, T., & Ho, L-C. (2016). Singapore teachers' beliefs about the purpose of climate change education and student readiness to handle controversy. *International Research in Geographical and Environmental Education*, 25(4), 358-371.

- Siddqui & Khan (2015). Environmental education: An Indian perspective. *Research Journal of Chemical Sciences*, 5(1), 1-6
- Sterling, S. (2004). Higher Education sustainability and the role of systematic learning. In B. P. Corcoran & A. E. J.n Wals (Eds.). *Higher education and the challenge of sustainability: problems: Promise and practice* (pp. 49 70). Dordrecht: Kluwer Academic Publishers.
- Stern, M. J., Powell, R. B., & Frensley, B. T. (2022). Environmental education, age, race, and socioeconomic class: An exploration of differential impacts of field trips on adolescent youth in the United States. *Environmental Education Research*, 28(2), 197-215.
- Teksoz, G., Sahin, E., & Ertepinar, H. (2010). A new vision for chemistry education students: Environmental education. *International Journal of Environmental and Science Education*, 5(2), 131-149.
- Tomas, L., Girgenti, S., & Jackson, C. (2015). Pre-service teachers' attitudes toward education for sustainability and its relevance to their learning: Implications for pedagogical practice. *Environmental Education Research*, 23(3), 324-347.
- UNESCO (1972). *Environmental education and training: Suggestions developed by the Secretary General of the United Nations Conference on the Human Environment (Stockholm Sweden, 1972)*. UNESCO.
- UNESCO (2015). *The right to education and the teaching profession: overview of the measures supporting the rights,*

Environmental Education in Saudi Arabia: Probing Teachers' Beliefs About Their Understanding and Experiences
Dr. Mohammed Saad Alqarni

status and working conditions of the teaching profession reported on by member states.

- Valderrama-Hernández, R., Alcántara, L., & Limón, D. (2017). The complexity of environmental education: Teaching ideas and strategies from teachers. *Procedia-Social and Behavioral Sciences*, 237, 968-974.
- Verma, G., & Dhull, P. (2017). Environmental education as a subject in schools. *International Journal of Advanced Research*, 5(8), 1547-1552.
- Volk, T. L., & Cheak, M. J. (2003). The effects of an environmental education program on students, parents, and community. *The Journal of Environmental Education*, 34(4), 12-25.
- Zahrani, S. Ibrahim, S. (2012). Enrichment activities for a teacher to promote some environmental education concepts in the first-grade family education curriculum in the Kingdom of Saudi Arabia. *Arabian Studies in Education and Psychology*, 27(1), 139-164.