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Characterizing environmental education practices in Ethiopian primary schools

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ABSTRACT

Considering the profound roles of teachers in the formation of environmentally literate citizenry, the study analyzed how teachers view and convey environmental topics to young children. Guided by a phenomenological framework, data were collected using semi-structured interviews with 17 teachers in four primary schools of Ethiopia. The results suggest that the teachers were of the belief that the delivery of environmental content should be hands-on, place-based, and that students taking local actions. Despite the teachers favoring learner-centered and experience-based strategies, their self-reported teaching approach tended to be teacher-dominated and classroom-based. Large class size, training and capacity, and safety issues were identified as barriers to teaching environmental topics. Changes are needed if we genuinely wish to build civically engaged and capable youths who can confront the escalating environmental crises. Implications of the findings for teacher training, school practices, and further research are discussed.

1. Introduction

The enormity of environmental crises and the pressing survival challenges have made the development of environmentally sensitive and concerned citizenry imperative. Environmental education (EE) in the early years can lay a solid foundation for a love and care of nature, pro-environmental attitude and behavior, and ultimately create environmentally literate citizens (Ardoin and Bowers, 2020; Korfiatis and Petrou, 2021; North American Association for Enviornmental Education, NAAEE, 2019; Post and Meng, 2018). The future behavior of youths depends largely on their education about environmental issues (Ghanbari et al., 2023), and in this regard, primary schools play vital roles in nurturing desirable environmental values and attitudes in young children. This cannot be achieved without teachers who both know and are committed to putting in place relevant strategies in their teaching (Hungerford, 2010; Stanišić and Maksić, 2014). Teachers are considered mediators between environmental content in the school curricula and pupils (Zaradez et al., 2020), and they have an irreplaceable role in effective EE practices both within and outside classrooms (Timm and Barth, 2020). However, international literature shows that little attention is paid to teachers who are the principal implementers of EE in schools.

The integration of environmental content alone cannot lead students to act for the environment or to behave responsibly toward the environment. Such efforts are only small steps in a long and complex process (Stanisic, 2016), and Kostova and Atasoy (2008) argue that success in school EE depends largely on the way teachers communicate environmental issues to students. Lessons that are based on the transmission of knowledge and skills cannot generally be transformed into environmental behaviors and action competence (Jensen and Schnack, 2006; Krasny, 2020). Devising teaching strategies that can empower pupils and enable them to engage willingly in environmental actions is crucial (Jensen and Schnack, 2006).

In Ethiopia, the general education curriculum framework places strong emphasis on fostering environmental care and protection in primary schools and creating civically engaged students (Ministry of Education, 2009). The framework stipulates that cultivating environmentally active students will only be achieved if opportunities are provided for students to take active roles in their learning through exploring, observing, having first-hand experiences, and acting. The present study sets out to gain deeper insight into teachers' beliefs and actual teaching of environmental topics in primary schools. The following two research questions guided the inquiry:

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1. What are teachers' beliefs about proper teaching of environmental topics?
2. In what ways do teachers convey environmental topics to students?

2. The teaching and learning of environmental topics

2.1. Approaches and strategies

What approaches can teachers use to teach environmental topics at primary level and to prepare environmentally informed and active youths? It should be borne in mind that there is no universally agreed right or wrong approach to teaching environmental topics. However, at the forefront of EE instructions, some approaches have been found effective by authors in the field, including active class participation, experience-based learning, place-based outdoor learning, and engagement in real-world environmental issues (Ballantyne and Packer, 2009; James and Williams, 2017; Lloyd and Gray, 2014; Morrison, 2018; Stern et al., 2014). Some of the suggested teaching approaches are discussed in this section.

The nature of the environmental content entails the active involvement of students. Active learning engages students in activities and discussions in class, as opposed to passively listening to the verbal information of the teacher (Freeman et al., 2014). Participation enables students to develop their thinking and practical skills for solutions in real-world situations (Korfiatis and Petrou, 2021; NAAEE, 2019). Despite a compelling body of evidence suggesting active approaches, teachers often opt to apply "frontal teaching" to treat environmental topics (Stanisic, 2016). In such approaches, teachers within the four walls of a classroom provide detailed explanations of environmental issues while students passively listen.

Ballantyne and Packer (2009) encourage teachers to use experience-based learning for authentic student learning. Experience-based learning consists of two key aspects: hands-on activities and direct contact with nature. The authors posit that the "most engaging, effective, and enduring learning experiences occur through experience-based rather than teacher-directed strategies (p. 259)". Akin to Ballantyne and Packer's proposal, several authors suggest experiential outdoor learning as an effective strategy in the teaching of environmental issues (e.g., James and Williams, 2017; Stern et al., 2014; van Dijk-Wesselius et al., 2020), in which authentic experiences and learning by doing are the defining elements (Broda, 2007).

Furthermore, the place-based approach, which often is used interchangeably with outdoor learning, is instrumental in the teaching of environmental issues. Rather than being limited by the walls of the school, grounding learning in the local community enables children to become actively engaged in the learning process and to develop action competence (Meichtry and Smith, 2007; Miles, 2013; Powers, 2004; Winther et al., 2010). Hence, "the community becomes the classroom, and learning is grounded in experiences right outside the school door, involving the natural, built, and cultural environments" (Kozak and Elliott, 2014, p. 6). Similarly, Lloyd and Gray (2014) propose that place-based outdoor learning should be practiced in primary schools. The approach is found to be powerful to increase young people's engagement in their local environmental matters.

Authors have used different terms including experiential learning, outdoor learning, and place-based learning to denote the educational values of connecting and immersing students in the world beyond the boundaries of the classroom. These strategies share three central facets: 1) engaging students in direct experiences, 2) learning taking place in nature or in a constructed environment outside the classroom, and 3) exposing students to local phenomena. Despite significant educational benefits, engaging students outside the traditional classroom has been neglected in our school teaching (James and Williams, 2017).

2.2. Spaces and the roles of teachers

In terms of space, schoolyards provide concrete experiences on selected environmental concepts. Learning in the schoolyard includes activities that take place right outside the traditional classroom (Broda, 2007). The advantage of using schoolyards is that there are no cost and transportation barriers and permission procedures (Broda, 2007; Kozak and Elliott, 2014). Teachers and students simply step out of the classroom. The use of the school grounds as a core part of instruction can certainly complement place-based and outdoor learning (Broda, 2007; Winther et al., 2010). Schoolyards appear to be vital alternatives in times when teachers are unable to organize out-of-school opportunities for their students.

Teachers have multiple tasks to help students gain relevant learning experiences. They need to identify appropriate topics and design lessons that are suitable to the approaches. Centering learning on the lived experiences of students is important, too. Teachers have the task of prompting and guiding students to explore their environment. Teachers are also expected to ask thought-provoking questions and to motivate students to act. It should be noted that teaching environmental content is not to the total exclusion of direct instructions (Kozak and Elliott, 2014), as there are appropriate times when a teacher should provide detailed explanations on certain environmental issues.

Kozak and Elliott (2014) suggest that opportunities should be created for students to identify and act on local environmental problems. Moreover, teachers should encourage divergent thinking in the classroom. Since environmental issues by nature can incite deep feelings and diverse views, teachers need to encourage differing perspectives (NAAEE, 2019). Exposing students to multiple sides of an issue and prompting them to analyze their perspectives and to make judgments is important (Kozak and Elliott, 2014). In a study of ecologically minded teachers, Morrison (2018) found that teachers encouraged students to provide viewpoints that were different from their own.

2.3. Dimensions of EE in primary classrooms

Lucas (1979) proposed a model for EE as being education *about*, *in*, and *for* the environment that has continued to influence EE practices and research worldwide. Education *about* the environment is concerned with developing knowledge and understanding about the environment (Palmer and Neal, 2003). It is associated with the transmission of environmental information to students, putting the environment as a topic or theme of study. Pupils primarily develop environmental understanding, although at times environmental concern may also result. Education *in/through* the environment refers to educational activities that take place outside the classroom in the biophysical and/or social context. This approach provides pupils with first-hand experiences in the environment (Thomas, 2005). The approach has a strong experiential orientation, developing environmental awareness and concern by encouraging personal growth through contact with nature. Education *for* the environment seeks to motivate pupils to resolve environmental problems and regards environmental improvement as an actual goal of education (Gough and Gough, 2010; Palmer and Neal, 2003).

Framing environmental lessons through these dimensions will help pupils not only to acquire knowledge about environmental issues but also to inculcate concern and encourage them to take possible actions, what authors call holistic development. The most common trend has been for teachers to begin by teaching *about* the environment (usually in a classroom setting), then progress to teaching both about and *in* the environment by going outdoors, and progress to teaching for the environment by working with students on local environmental action projects (Gough and Gough, 2010). Without addressing the three core threads, no environmental learning can be truly meaningful and worthwhile (Edwards, 2016; Palmer and Neal, 2003). The present study used these dimensions to characterize the practices of teaching environmental topics in Ethiopia.

2.4. Context: The status of EE in school curricula

Ethiopia officially introduced EE into the school curricula with the advent of the 1994 Education and Training Policy (Ministry of Education, 1994). With regard to EE, the policy specifically aspires to provide education that cultivates citizens who can protect the environment and natural resources. Accordingly, a new curriculum for the Ethiopian education system was developed. EE was integrated into the lower primary level (Grades 1–4) as a separate subject, named Environmental Science, and infused across different subjects in Grades 5–12 (Gugssa et al., 2021). After 15 years of implementation, the curriculum was revised at the national level, which pinpointed the drawbacks of the previous curriculum as teacher-centered and overloaded in terms of content (Ministry of Education, 2009). The currently in-use textbooks have been developed based on the directions of the 2009 curriculum framework. The major environmental topics included in Grades 1–6 textbooks are listed in Table 1.

3. The current study

A large body of research on the teaching practices of EE can be traced in scientific literature. However, most such studies have been conducted in developed countries such as the US, UK, Canada, and Australia, and studies in developing countries are lacking (Anderson and Jacobson, 2018). The context of Ethiopia echoed this global trend where EE practices have been understudied. A search of academic publications, conducted mainly in Scopus and Web of Science databases, revealed that studies of Ethiopian EE principally emphasized teaching practices in high schools (Degu, 2013), the perceptions of colleges students (Waktola, 2009), and the effects of in-service training on teachers and educators (Amado et al., 2017; Dalelo, 2009). Despite EE being taught in schools for over a decade, there is a paucity of research on the teaching practices of environmental topics in primary schools. Therefore, this study fills a void in the research by uncovering primary teachers' ideal teaching approaches versus actual teaching of environmental topics. For the purpose of this inquiry, "teaching practice" is used to refer to the teaching of environmental topics (contents) integrated into the textbooks.

4. Methodology

4.1. Research design: Phenomenology

The study seeks to elucidate the views and lived experiences of primary teachers in teaching environmental issues, hence Husserlian descriptive phenomenology was adopted as a suitable methodological framework. This method of inquiry allows the researcher to explore and describe individuals' life experiences in depth (Christensen et al., 2017; Shorey and Ng, 2022). Willis et al. (2016) state that descriptive phenomenology reveals the essence of a phenomenon as lived (the experience of teaching environmental topics) by a person who has had the experience (primary teachers). In unearthing teachers' experiences, the methodological underpinnings of phenomenology were followed during the data collection, analysis, and reporting process. Shorey and Ng (2022) stipulate that researchers must set aside their experiences and previous assumptions when collecting, analyzing, and understanding the data, which is what some authors call "bracketing" (Englander, 2016; Giorgi, 2009; Sundler et al., 2019b), and is known as the *epoché* stemming from the philosophy of Husserl. Bracketing means adopting a phenomenological attitude, meaning that habitual, taken-for-granted understandings are held in abeyance (Finlay, 2014; Giorgi, 2008). I held back my original beliefs, contentions, and understandings about EE theories and practices, and attempted to generate naturally occurring data and findings relating to teachers' lived experiences.

4.2. Setting and participant recruitment

The study took place at four public primary schools in Northwest Ethiopia in the academic year 2020/2021. While two of the schools were from the inner-city Bahir Dar, the other two schools were included from rural vicinities. At that time, the MoE[1] had structured primary education into two levels: lower primary (Grades 1–4) and upper primary (Grades 5–8). For the study, two grades from each level were included: Grades 3–4 from the lower level and Grades 5–6 from the upper level. Purposive sampling, considered the most appropriate sampling approach in phenomenology (Shorey and Ng, 2022; Willis et al., 2016), was used to recruit teachers. In total, 17 consenting teachers (6 male, 11 female) were included in the study (Table 2), considering that a range of 5–25 participants is sufficient size for a phenomenological study (Cypress, 2018). The inclusion criteria were:

a. Being assigned in grades 3–6
b. Teaching subjects that are officially recognized to integrate EE (Environmental Science, Integrated Science, and Social Studies). Teachers who have rich experiences related to the phenomenon (teaching environmental content) are targeted
c. Having five years and above teaching experience

4.3. Data collection

The data collection involved semi-structured interviews grounded in descriptive phenomenology (Giorgi, 2009). Interviews provide richer and diversified descriptions of participants' experiences (Bevan, 2014; Shorey and Ng, 2022). The interview for this study consists of broad and open-ended questions related to teachers' beliefs about the appropriate way of teaching environmental content, the approaches and methods of teaching they dominantly employ in their daily lessons, and outdoor learning opportunities for pupils. These questions were carefully designed to enable teachers to share their views and experiences in teaching environmental issues in and out of the classroom. Demographic information including gender, educational background, and teaching experience was also collected.

I contacted each teacher in person and explained the purpose of the interview, the types of questions to be addressed, the audiotaping, and the duration of the interviews. I also assured them that their identities and ideas would be kept hidden, and that they were free to withdraw at any stage of the study. Thereafter, all participants signed an informed consent form, and ethical approval was obtained from the Norwegian Centre for Research Data (Ref. nr. 584605). Following key ethical procedures, times and places convenient to teachers were identified. Questions were provided to the teachers one hour prior to each interview. Then, one-to-one interviews lasting 30–45 min were carried out in Amharic (official language). I strived to "bracket out" my prior understandings and beliefs, and to openly listen to the teachers, except when asking probing questions for elaboration and reflection on what they had already uttered. Audiotaped recordings, field notes, and transcripts were fully protected. The teachers' names were changed to pseudonyms, and school names were represented by alphabetical letters. Accordingly, schools A and B were urban schools, while C and D were rural schools.

4.4. Data analysis

The interviews were transcribed verbatim, and the researcher read and corroborated the transcribed data by listening to the tapes. The

[1] With the introduction of the new curriculum framework in 2020, MoE restructured general education into primary (grades 1–6), middle (grades 7–8), and secondary (grades 9–12). New textbooks have also been introduced in 2022.

Table 1
Primary textbooks and EE.

Grades	Subject	Major environmental themes	Key topics	Scope
1–4	Environmental Science	Human health	Personal and environmental hygiene, diseases associated with poor hygiene, food and food contamination, water sanitation, health problems and causes, prevention strategies	Local to national environmental issues
		The natural environment	Natural resources: water (its importance, water pollution and causes, prevention strategies), air (air pollution, causes and protection), soil (its types and uses, soil erosion causes and protection strategies), plants (types, uses, care and protection to plants), animals (domestic and wild animals, benefits to humans, wildlife extinctions and causes, prevention strategies), forests (uses of forests, depletion of forests and effects, protection strategies), living and non-living things	
		Physical features	Water bodies (rivers and lakes, benefits and threats), lowland and highlands	
5–6	Social Studies	Population issues	Distribution and settlement, rapid population growth (effects on food security, services, employment, resources)	East Africa and the Horn
		Biophysical features	Water bodies (lakes, rivers and sees, economic benefits, protecting water bodies), wildlife (their benefits, extinction of wild animals, establishing national parks to protect wildlife), plants and forest distribution	
		Environmental threats	Climate change, air pollution, depletion of forests, human impact on the natural environment, causes and consequences	
	Integrate Sciences	The natural environment	Air (composition and properties, air pollution, causes and consequences, prevention strategies), water (its importance, water wastage and solutions, water pollution, causes and consequences, purification), plants (importance, growing plants), forest (its benefits, causes of forest depletion and consequences, prevention strategies), soil (soil erosion, causes, and prevention strategies), humans (health, hygiene, food sanitation)	

Table 2
Teachers' profiles.

No.	Pseudonym	School	Sex	Exp. in years	Subject	Grade	School type
1	Etenesh	A	F	32	Env. Science	Fourth	Urban
2	Genet	A	F		Env. Science	Third	Urban
3	Hirut	A	F	20	Social Studies	Fifth	Urban
4	Emebet	A	F	40	Integrated Science	Sixth	Urban
5	Dereje	A	M	38	Social Studies	Sixth	Urban
6	Halima	B	F	21	Env. Science	Third	Urban
7	Abebaw	B	M	31	Env. Science	Fourth	Urban
8	Alemu	B	M	32	Integrated Science	Fifth	Urban
9	Zelalem	B	M	33	Social Studies	Sixth	Urban
10	Melkam	C	F	20	Social Studies	Fifth and sixth	Rural
11	Zewditu	C	F	16	Integrated Science	Fifth and sixth	Rural
12	Zemenu	C	M	19	Env. Science	Fourth	Rural
13	Hamelmal	C	F	15	Env. Science	Third	Rural
14	Degitu	D	F		Env. Science	Fourth	Rural
15	Muluwork	D	F	14	Env. Science	Third	Rural
16	Gubay	D	M	16	Social Studies	Fifth	Rural
17	Meseret	D	F	9	Integrated Science	Fifth and sixth	Rural

thematic analysis for descriptive phenomenology developed by Sundler et al. (2019a) was found to be more recent and suitable for analyzing teachers' transcripts. The objective of thematic analysis is to achieve an understanding of patterns of meanings from data on lived experiences (i.e., teachers' descriptions of experiences related to EE). The process involved three major stages: gaining familiarity with the data, searching for meanings and themes, and organizing themes into a meaningful wholeness.

First, guided by the principle of openness, I closely read each participant's account three times to establish familiarity and obtain an overall sense of teachers' experiences. At this stage, the meanings embedded in the narratives were understood.

Then, I started a more concentrated reading over again, took notes, and carefully extracted meaningful statements and phrases that directly relate to the specific objectives: beliefs on pedagogical strategies, methods employed in teaching environmental topics, and outdoor opportunities. The statements were recorded on a separate sheet having page and line numbers referring to the original text. Following this, meanings pertaining to the objectives of the study were formulated. The differences and similarities between meanings were compared, and meanings related to each other were tentatively organized into patterns using different colors. Thereafter, themes emerged after thoroughly scrutinizing the patterns of meanings. The process was iterative, themes were re-examined against respective meanings and the original dataset and modified as necessary to ensure that each teacher's description was captured.

Lastly, the themes (findings) were explained through descriptive texts. Here, I was reminded by Finlay (2014, p. 136), who stated, "analysis is not simply to 'find' themes; the point is to explicate the phenomenon, the lived experience, holistically". Bracketing of pre-suppositions continued, and efforts were made to ensure the reporting of the themes is grounded in the described experiences of teachers.

4.5. Rigor

In an effort to ensure and maintain validity and rigor throughout the research, I paid close attention to criteria such as reflexivity, credibility, and transferability (Cypress, 2018; Sundler et al., 2019b). Concerning reflexivity, personal and transpersonal reflexivity were followed (Dörfler and Stierand, 2021; Finlay, 2014). I made a list of my own biases, understandings, and expectations about the teaching practices of EE and set this list aside to avoid them from influencing the data collection, analysis, and writing of the report (self-reflexivity). A preliminary discussion was conducted with a professor at the Norwegian University of Science and Technology (NTNU), during which critical

issues to be suspended were delineated. He closely followed the entire process to ensure that phenomenological principles are adhered to (transpersonal reflexivity).

Regarding credibility, important strategies such as critical friend, direct quotes, and member reflections were properly used. First, all transcripts were shared with a professor at NTNU to check the development of meanings and themes; regular discussions were held with him to gain critical insights. He acted as a "critical friend" in closely monitoring and offering crucial feedback at each stage of the data analysis and reporting process (Smith and McGannon, 2018b). Second, the process of analysis, from transcription and the formulation of meanings to the generation of themes and reporting of the findings was demonstrated clearly. Direct quotes from the participants were included to support claims. The report was also shared with six teachers to identify any gaps in the results and to generate additional data and insight, a procedure known as member reflection (Smith and McGannon, 2018a). Likewise, transferability was enhanced by involving strategically recruited teachers with rich experiences and by collecting sufficient data relevant to the study (Cypress, 2018).

5. Results

The analysis of interviews generated four categories of views about pedagogical strategies (action-based, modelling, observational, and hands-on experiences), and four categories of actual practices in schools (frontal, interactive, confirmatory, and indoors-based). In the ensuing section, each category is addressed in detail, and quotes are provided to illustrate claims. It should be born in mind that a single participant can be labeled into two categories.

5.1. Beliefs on pedagogical strategies

5.1.1. Action-based

Various teachers' statements highlighted the significance of engaging students in problem-solving activities. Tailoring lessons in a way that students can take action on the nearby environmental problems is considered the essence of teaching EE. The teachers criticized the commonly used way of teaching environmental topics as a futile exercise, as it merely prepares students for paper-pencil tests. For them, a typical environmental education was one that sensitized students to local environmental problems and encouraged them to take individual or collective actions. The following quotations illustrate the action-oriented view of the teachers:

> When we teach, it shouldn't be only for paper-pencil tests [.] We have to require students to show in action. If it is about plants, I should require students to plant trees in action [.]. We need to hand over responsibilities to students [.] It will not be that challenging to run over the content of the textbook for exams, but this doesn't bring any change […]. As teachers, we should facilitate action-oriented learning for students.(Zewditu).

> [I]t wouldn't be effective if we simply talk about the theory in class. It will be fruitful if students are encouraged to engage in action projects. We often talk in class. students also read, as the textbook [Social Studies, Grade 5] is prepared in Amharic [mother tongue]. It would be meaningful if students are given action-oriented lessons to help them take care of their environment. (Gubay).

For Hirut, the issue was reminiscent of earlier times, when she was a student and later as a teacher. She stressed that a typical EE lesson should comprise action components as done in the past:

> In the old days, when we were junior students there was a subject called farming. We prepared a special area for seedlings, we cultivated carrots, Swiss chard … we planted trees in the school, we prepared green parks. Lessons should be like that […].

5.1.2. Modelling

Some teachers appeared cognizant of the influence they could have on students through proper ways of behaving toward the environment. This theme is in alignment with the common saying "values are caught not taught." The teachers' statements highlighted the view that students learn desirable behaviors by watching teachers who practiced them, rather than by being told about them. This is particularly true in the Ethiopian context where teachers are regarded as the primary influencers of students' knowledge and behavior:

> Much is expected from teachers. So, first, we should keep our environment clean and thereby influence our students. Also, the responsibility to take good environmental practices for the community lies with teachers. (Halima).

> We should demonstrate in practice, especially in the school compound. Teachers should show students while they are accomplishing a specific environmental protection activity. (Abebaw).

In light of this, Dereje shared practical examples of the dark side of modelling in his school. He underlined the critical role of teachers in either cultivating students who are concerned and sensitive towards the environment or negligent students who pay little or no attention to their environment. Both outcomes were based on the behavior teachers displayed to their students. Dereje seemed to be disenchanted with teachers in his school due to their inappropriate practices of waste disposal:

> How can we blame students who observe their teachers dumping plastic bottles everywhere? In this city, the most widespread pollutants are plastic bags and plastic bottles […] We teach our students about this. but we failed to act properly. Teachers bring plastic bottles to the school … but they throw them away carelessly. So, it shall begin with us.

5.1.3. Through observation

Teaching about environmental topics can be enhanced when opportunities are created for students to observe the features physically. Teachers underscored the advantages of observation over indoors teacher-centered teaching. Two issues were raised. First, teachers suggested outing experiences during which students could observe things. This strategy was viewed as meaningful and results permanence in students' learning:

> Students learn better when they observe the entity physically. Their learning is more enhanced when they see and touch things. (Etenesh).

> We should take students outside and show different features and provide them relevant explanations about that. It will be instilled in their mind (Halima).

Second, at times when taking students outdoors is impractical, the teachers suggested that learning could be supported through videos and bringing actual objects to the classroom. Even though showing videos could not be a substitute for observations in the real setting, they were considered useful strategies. While Alemu suggested the use of videos on environmental features or phenomena in the classroom, Muluwork was of the opinion that bringing real objects was equally important.

5.1.4. Hands-on experiences

Apart from observing natural and human-made features, meaningful learning occurs through engaging students in hands-on activities. Unlike

the "action-based" category which stimulates students to take local actions, hands-on experiences are primarily used to develop students' understanding about environmental issues through hands-on activities. Students learn best through physically observing and touching the things indicated in textbooks. Muluwork cited an example of different types of soil. Instead of classroom explanations, students could be supported to experiment and identify soil types physically in a real setting. Providing direct experience or learning by doing was suggested as a typical teaching strategy by some teachers:

> It should be by letting students practice and experiment […] For instance, there are three types of soil, sandy soil, clay soil, and loamy soil […] Students can physically touch and identify each type of soil. Teachers can encourage students to practically learn that. (Muluwork).

> Activities that encourage students to practically engage are the most powerful. Instead of sitting and passively listening to our explanations, students prefer and learn better when exposed to real-life and practical situations. (Etenesh).

5.2. The teaching of environmental topics in the schools: Actual practices

5.2.1. Frontal

There were extensive mentions of lecturing and detail explanations in the teachers' responses. Almost all teachers cited lecture method as the principal method of teaching environmental contents. They assumed that explaining in detail, repetition, and supplementing what was taught with local examples would increase their students' environmental awareness. The phrase "I explain in detail" appeared extensively in the transcripts. Much of the topics about environment seemed to be covered predominantly through teachers' presentations. The teachers occasionally advised students to keep their personal and environmental hygiene:

> I mostly use lecture method. I use my long experience to teach issues out of the textbook. I strive to broaden what is in the textbook. I provide details and examples to make my points clear to students. (Melkam).

> [T]o make students understanding solid, I repeatedly explain the idea, and dictate them in detail by supplementing with examples. (Etenesh).

> I advise them to keep their hygiene. Details should be provided to students based on what they observe and experience. (Alemu).

Most teachers appear to be informed about making their lessons participatory. They stressed the need to involve students in classroom discussions and debates. Despite this conviction, they often use teacher-dominated approaches. Barriers related to large class size, resources, notably textbooks, training and time constraints were mentioned.

> [T]he large number of students poses a critical challenge. In a single class, you will find over eighty students. It is extremely difficult to conduct participatory lessons. (Gubay).

> Students do not have textbooks to bring to the classroom. In a single class of over sixty students, we have only nine textbooks […] there is a serious shortage of science textbooks. I write everything on the board, and then I explain it. (Etenesh).

> I really lack the capacity to teach environmental issues, especially to children. I was not trained in how to plan and implement environmental activities for primary school students. I often teach based on my assumption and general understanding. (Genet).

5.2.2. Interactive

Interactive methods involve opportunities for students to participate actively in their learning process. In contrast to frontal teaching, these methods encourage students to debate, practice, reflect, and observe phenomena. Fewer responses were made compared to frontal instructions. Group discussion was found to be the most prevalent participatory method used in the classrooms, followed by questions and answers. The teachers forward a range of questions about environmental topics for students to discuss in groups:

> I raise an environmental issue and students discuss that. Then, representatives explain to me using local examples [.]. After the presentations of each group, I briefly encapsulate the key ideas addressed in the discussion. (Etenesh).

> I [put] forward questions for group discussion. For example, what are the causes of desertification? I instruct them, "discuss this in group!" There is a one to five group arrangement. I use the already set group. (Zewditu).

Some other teachers reported the use of student-centered method to treat environmental topics. However, they appear to confuse student-centered with group discussion. These teachers tend to equate group discussion with student-centered methods. Hamelmal, Ababaw, and Muluwork hold similar perceptions. The following dialogue is illustrative:

> Mulugeta: What methods of teaching do you often use to treat environmental topics in your class?

> Muluwork: I use student-centered. and question and answer.

> Mulugeta: What do you mean by student-centered?

> Muluwork: It is group discussion. you forward a certain topic for students to discuss in group. They then reflect… finally, you elaborate on their responses.

Another interactive teaching method is question and answer. The procedure goes like this: teachers raise questions either from their own experience or the textbooks, and students rightly respond to that. Some teachers spoke of integrating local contexts and examples for clarification and encouraging students to answer the questions:

> I often use question and answer based on their surroundings. For example, I ask questions like. how do you keep personal hygiene? How do you protect soil? What measures should be taken to protect soil? (Degitu).

Zelalem showed a strong interest to incorporate varieties of methods in his instruction. However, the large class size seriously hampered the use of other participatory methods. Consequently, he employs question and answer for the most part of the lessons:

> I often prefer question and answer. I use it most of the time. I am not comfortable to use other methods as the class size is large. I can't conduct group discussions and other interactive approaches. I put effort to make it participatory through question and answer.

5.2.3. Confirmatory

The theme "confirmatory" comprised a set of mechanisms that teachers used to determine the extent to which students could reproduce what was delivered in a specific lesson. The teachers sought to gain a uniform reaction from the students. Gubay predominantly used lecture method, whereby environmental topics were repeatedly explained to students. He strived to see students holding a similar understanding

about environmental issues: "I put efforts to develop similar understandings among students."

Likewise, key environmental issues were brought to the classroom and students were instructed to discuss them in groups. Then, the teachers made judgments at the end of the presentations. Ranks were assigned to each group based on the closeness of responses to teachers' expectations; the students' ideas were judged to be poor, good, or best. Evidently, group reflections that deviated somewhat from the teachers' preconceived answers were rated poor. Groups were expected to reproduce predetermined knowledge:

> I instruct them to discuss in groups, for example, how to keep personal hygiene. There are group representatives who reflect the group's view. We then set a rank of the groups to select the one that presented best. I tell them group X presented best, and their idea is better [.] I finally supplement my reflection on the issue. (Genet).

> I require students to form groups and discuss. I often prepare answers first. I feel satisfied if students mention similar answers. I assign ranks to the groups based on their responses… Students struggle to rank first. (Halima).

5.2.4. Indoors-based

The teachers almost unanimously reported that they had not organized any outdoor activities for the past three years. Environmental topics that would have invited students to do fieldwork had been skipped and much of the section was addressed orally in the classroom. The teachers most often provided detailed explanations for students to grasp environmental issues conceptually. Even though the textbooks stipulated some outdoor opportunities for students, the teachers appeared to limit instructions to the classrooms:

> The textbook sporadically suggests a sort of field visit. For example, it classifies plants into three and instructs students to undertake a visit to observe variations. There is also a topic about higher and lower altitudes, and it [the textbook] instructs children to visit such places. But I skip the task and cover it through classroom presentations. (Etenesh).

> When the topic is about plants, rivers, lakes, I only explain them in the classroom. I have never taken them outside. (Melkam).

Five of the teachers cited instances of outdoor experiences in their former rural school and old curriculum. When they were in rural schools, conditions were favorable to practice outing activities. Teachers were able to link contents in the textbooks with physical features found within a few miles of distance. Risks and administrative procedures were reduced as the settings were accessible without travelling a far distance. However, teachers couldn't trace any field-based learning activities since they were assigned to urban schools. .

Alemu spoke of keen interest in learning experiences outside the classrooms and link the contents with visible environmental issues out of the school. Asked about his experience, Alemu recalled his practices in the former rural school, named Gordema. He used to take students on field trips and excursions in immediate and distant places. As the school is located near the great Abay River, particularly topics related to water pollution were treated outdoors. Hamelmal shared similar experiences in her former school four years ago. She organized several fieldwork activities with students until she joined the current school.

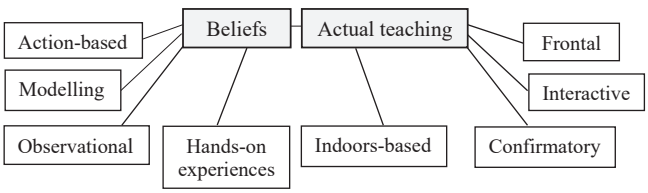

Fig. 1. Summary of themes emerged from the analysis of interviews.

> I took students to the river where a Tannery factory was established nearby. The wastewater and hazardous chemicals are released into the river. I showed them how the chemical used to soften the skin, the fur removed, and the wastewater pollutes the water. However, I didn't take students anywhere after I joined this school. (Alemu).

> I used to conduct field visits when I was in a rural school. I used to take students to forests, farmlands, and gullies. Here, I didn't plan and carry out field visits. (Hamelmal).

Some teachers also reported their experiences in the old curriculum where some subjects like Agriculture and Home Economics require students to demonstrate through practical actions. They indicated that the currently in-use textbooks placed less emphasis and space for outdoor practical activities. Except for some previous instances, these teachers have never considered outing experiences for their students.

> In the past, we took students not only to visit but also to tackle problems. We planted trees in degraded areas and picked litter. We practically observed how over-grazing degrades the land surface. This has never happened in our current teaching practices. (Zelalem).

The teachers identified the challenges they had encountered in considering outdoors. Constraints related to budget and transportation, fear of risks, and uncertainties about managing large group were discussed:

> Students' number is very large and most of the time they misbehave. It is tough to take all students and turn them back safely. It is difficult these days to handle them here [in school] let alone taking them outside. They lack good manners. (Halima).

> If I take them to the field, and something goes wrong with students, I will be responsible… I don't want to take risks. (Emebet).

Opportunities on the school premises: Teachers from school A and B (urban schools) indicated that providing lessons outside the classrooms had never been part of their teaching. They considered that it was not that necessary to take students outside, and they thought that students knew everything outside. Instead, those teachers often provided detail explanations with examples in the classrooms, sometimes citing the names and types of plants, trees and soils located in the school compound. In rare cases, students would stand up and observe things outside without leaving the classroom:

> I don't take them out. I complete everything in the classroom because students know everything outside. They also observe things standing in the classroom. (Halima).

> I feel the things in the school compound are not that helpful to students' learning. I just provide examples while I teach [.] it is not necessary to take them out, because they always see them. I point to the trees outside and give examples in the classroom. (Alemu).

Some teachers from schools A and C reported that they rarely utilize outdoor opportunities, once or twice a year. They feel that the trend of in-school outdoor learning is insignificant. In a few instances when teachers conduct outdoors, students simply gather in one spot and observe plants and soils, and distant topographies. The most prevalent activity teachers perform is demonstrating the uses of plants and trees in preserving soil. They occasionally take students to sites covered by plants and show students how the roots of plants and grass protect the

soil from wearing away. Outdoors are limited to observing physical aspects instead of hands-on experiences and actions. This is evident in the following quotations:

> Very rarely, students gather in the schoolyard, and observe the hills located at distance. Also, when I teach about soil erosion, I take them outside. In a site where there is plant coverage, there is little erosion. Whereas in bare areas, the soil is taken by stormwater. I raise a question, why? (Zemenu).

> They simply observe physical features at the school compound. they observe the degree of accumulation of rubbishes in the school… I show them the soil and stone, but such activities occur once in a year. (Genet).

By contrast, all teachers from school D (rural) reported the integration of outdoor activities in their teaching. The school had established a schoolyard garden, where students were encouraged to practice the environmental activities indicated in the textbooks. The school was supported by Frances G. Cosco Foundation (FGCF), which provided seedlings, water tanks, and experts for the greening of the school. Teachers indicated that they often organized environmental protection activities such as litter picking and watering plants. They also encouraged students to plant trees and provide proper care throughout the school year:

There is a topic on preparing seedbeds, how to plant trees. I let students [go] out and encourage them to show in practice. They practically show by digging, preparing seedbeds, and watering plants […] There are also newly planted trees and plants. Students water them regularly. (Degitu).

6. Discussion

This phenomenological study documented teachers' ideas and practices of EE in primary schools. The interviewed teachers believed that the delivery of environmental topics should be supported by hands-on outdoor experiences and by students taking local actions. The teachers opined that the traditional teaching approach of "talk and chalk", which is teacher-dominated, is incompatible with the nature of environmental education. Teachers seem to assume "confining learning exclusively to the four walls of a classroom just doesn't make sense" (Broda, 2007, p. 2). The teachers' views in this study are in concert with the strategies proposed by Ballantyne and Packer (2009) and by Stern et al. (2014), who have underlined that the most engaging and enduring learning experiences occur through active and experiential engagement in real-world environmental issues rather than teacher-led lessons.

Despite the teachers favoring learner-centered and experience-based strategies, considering students as actors in curbing local environmental problems, their self-reported teaching approach tended to be frontal and relied on textbooks. Edwards (2016) terms this a rhetoric-reality gap, in describing the difference between teachers' beliefs and understandings and their classroom practices. The teachers cited the lecture method as the principal method of teaching about environmental issues. Few teachers occasionally integrate interactive approaches, mostly group discussions. The experience of Costa Rica echoed the present finding where classroom teaching is dominated by the transmission of environmental facts and students' memorization (Blum, 2008). In an observational study conducted in Serbia, it was found that the monologue and textbook-based instruction was dominant (Stanisic, 2016). This form of teaching primarily targets conveying and imparting environmental knowledge to the students. Contrarily, teachers in Morrison' (2018) study use active learning strategies, and none of them reported the extensive use of lecturing or transmitting information to students.

None of the teachers in my study had planned and organized outdoor opportunities for their students. With the exception of one school, schoolyards were not used as a teaching resource, despite being widely recognized as enhancing students' learning on environmental issues (Broda, 2007). While students in New Zeeland and Canada elementary schools have increased access to outdoor experiences (Dring et al., 2020; Eames et al., 2008), only a handful of urban private schools create such opportunities in Ethiopia (Waktola, 2009).

The interviewed teachers reported large class size, lack of training and capacity, and safety issues as barriers to teaching environmental topics. These findings support those of previous empirical studies and reviews (Anderson and Jacobson, 2018; Dillon and Dickie, 2012). Similarly, the lack of educational resources and inadequate or absence of teachers training on the principles and practices of EE are among the major barriers that Greek teachers face over three decades (Ntona et al., 2023). The shortage of textbooks is identified in this study though none of the reviewed studies reported it as a barrier.

There appeared to be less room for students' divergent views about environmental issues. Some of the teachers expected students to reproduce similar information and come to a definitive conclusion. They wanted to hear about students' ideas that fitted with their own preconceived understandings. This is not surprising given the dominant teaching style that the teachers employed in the classroom, namely frontal instruction based on textbooks. This finding supports a finding from a study in primary schools in Belgrade, in Serbia, where teachers paid less attention to developing divergent thinking among students (Stanisic, 2016).

Seen through the lens of education *about*, *in*, and *for* the environment (Lucas, 1979; Palmer and Neal, 2003), the findings from this study point to the fact that teachers almost exclusively apply the education *about* dimension. While the interviewed teachers seemed to suggest that environmental lessons should encompass *for* and *in* the environment, their practice was found to be education *about* the environment, confined to the classrooms. In an evaluative study of schools in New Zealand, Eames et al. (2008) found that the purpose of teachers' of teaching EE tended to be education *about*, with the belief that students could then take direct actions *for* the environment.

Considering the current practices, it can be claimed that the teachers emphasize conveying and imparting "awareness" and "knowledge" about the environment, consistent with objectives 1 and 2 of UNESCO (1978). A study by Ko and Lee (2003) echoed the present finding wherein teachers put most emphasis on teaching environmental knowledge, less on attitudes, and least on skills. The experience of Costa Rica is no exception where classroom teaching is dominated by the transmission of environmental facts and students' memorization (Blum, 2008). More recently, practitioners of nonformal EE programs in Finland and Madagascar emphasized cognitive domains in their responses to the purposes of EE (Brias-Guinart et al., 2023), and it is claimed to relate to their instructional approaches. This was based on the widely held belief that instructions about the environment would lead to knowledge acquisition, which would be translated into actions (Eames et al., 2008; Gugssa and Aasetre, 2022). However, the link between knowledge, awareness, and pro-environmental behavior is much more complex than this, and teaching students about something may not necessarily lead to desired behavior (Kollmuss and Agyeman, 2002; Krasny, 2020).

7. Implications for teacher training and school practices

Based on the 2018 national roadmap study recommendation for Ethiopia, the Ministry of Education introduced a new curriculum framework for the period 2020–2030 (Ministry of Education, 2020). Over the past two years, regions have been tasked with designing textbooks using the centrally developed flowcharts and syllabuses. I have been actively involved in the process, particularly in developing an environmental science textbook and a teachers' guide for Grade 6. I have also reviewed the draft environmental science textbooks for Grades 1–6. In short, local, national, and contemporary global environmental issues were included, participatory approaches including inquiry-based and problem-based activities were incorporated, and lessons that encourage

outdoor experiences and tasks that promote individual and collective actions were integrated into the textbooks. At the time of writing this paper, the textbooks were ready for publication.

However, as revealed in the present study and from experiences in Australia (Evans et al., 2012), teachers may opt to skip action components and instead continue with their usual classroom-based and teacher-directed instructions. The mere inclusion of participatory and action-based activities in the curriculum does not guarantee that teachers can or will implement them. In order to help students to become action competent and to live and act sustainably towards the environment, teachers themselves need first and foremost to be action competent (Eames et al., 2008; Tolppanen and Kärkkäinen, 2022). If teachers do not receive adequate training and develop favorable environmental attitudes and concerns, it is unlikely that they can effectively translate and implement EE in schools (Tuncer et al., 2009). Thus, continuous training, closer follow-up and support of teachers is necessary, given the new curriculum for the period 2020–2030 is to be in place.

Training opportunities should emphasize effective pedagogical practices for teaching environmental issues to schoolchildren. The teachers in this study were not cognizant of the potential of resources on the school premises and in the nearby community, and they limited their teaching entirely to in the classrooms. Training could be organized to help teachers to recognize, identify, and use spaces and resources at their disposal. The interviewed teachers did at least have some idea about how to approach EE. This alone does not mean that teachers can implement the strategies in their teaching of subjects. Professional development efforts might capitalize on their current beliefs and empower teachers to practice them in their school contexts. School principals and district education officials should provide continuous support for teachers. Reports reveal that in schools with strong and proactive support from principals, teachers could implement effective sustainability education activities in their schools (Evans et al., 2012). Moreover, a national EE guideline should be developed and made available to teachers. Such a document would guide teachers on appropriate strategies and provide examples of how to teach environmental issues to children.

Teachers should encourage and appreciate diverse ideas without taking a particular position. Reaching consensus is not always necessary, and students should be supported to make value judgments and to come up with different responses (Hedefalk et al., 2014; Kozak and Elliott, 2014). Rudsberg and Öhman (2010) criticize the indoctrination of environmental and sustainability issues, and they suggest pluralistic teaching practices in classrooms. In such practices, teachers should encourage students to examine, evaluate, and reach their conclusions, and to generate multiple solutions for a single environmental problem.

The cultivation of citizens who are equipped with the 21st century skills and the demands of the UN's SDGs for 2030 (Ministry of Education, 2020) cannot be realized by confining teaching to traditional classrooms, and to teachers conveying predefined knowledge to students. The teachers in this study tended to put greater emphasis on teaching *about* the environment, which ultimately developed students' awareness and knowledge. Such methods of teaching will not lead to environmental improvement or quality (Krasny, 2020). Students should be encouraged to be participants and active agents, experiential and outdoor opportunities should be designed, and students should be supported to investigate and act on local environmental issues. Students can work in groups to identify the causes of unsustainable practices in their homes and in the community, to develop plans, and to take action with the support of teachers. The schoolyard, the green area, the school refuse site, and the community can create avenues for effective EE. For this to happen, teachers may not require budget, transportation, and permissions since the teacher and students are expected to simply step outside (Broda, 2007). The proposed ideas seem to be daunting and over-ambitious, but that is how today's youths are cultivated.

8. Future research

This paper provided a glimpse of EE practices in primary schools in Northwest Ethiopia and forwarded measures to be taken. Admittedly, the study had some limitations. First, the findings relied on the teachers' self-reported experiences. Data from classroom observations could have substantiated the findings from the interviews. Second, the findings are valid only for primary schools, due to the limited number of participants and school type. Future studies might therefore engage more teachers and include larger geographic settings to gain a more comprehensive picture. Moreover, researchers can design observational studies to understand more fully the actual practices of teachers and continue to carry out participatory action research to jointly overcome barriers and improve practices. Recent experiences in South Africa (Matsekoleng and Awshar, 2020) and the Netherlands (van Dijk-Wesselius et al., 2019) were commendable. Apart from analyzing teachers' practices, progressive action research was followed, and teachers were empowered to mitigate some barriers and enhance their practices. It is also suggested that future research considers the professional development of teachers and analyzing the improvements in practices and students' environmental attitudes and behaviors.

9. Conclusion and final thoughts

The ultimate objective of EE is creating environmentally literate citizens who are informed, willing and able to act to preserve and protect the environment. Can we claim the existing school practices nurture and instill such values and attitudes? The study revealed that the EE being conveyed to primary classrooms in Northwest Ethiopia is inadequate to develop future citizens who can make informed decisions and take responsible actions. The knowledge-centered instruction is incompatible with the goals and underpinning principles of EE (Krasny, 2020). Hence, a shift away from teacher-led and classroom-based instructions to participatory and experience-based approaches is necessary. Primary schools and their teachers should drive this shift and contribute to the development of active agents. The MoE should reorient teachers' preparation and development processes, and closely monitor and support school practices.

Major strides are being made to transform the country's education system. The need to re-orient the teaching approaches is well stipulated in the new curriculum framework (Ministry of Education, 2020, p. 66). Further, the national roadmap study (Ministry of Education, 2018, p. 47) highlighted the integration of EE/education for sustainability across the curricula for teacher education institutions. Such considerable efforts hold a strong potential for effective EE practices in schools.

CRediT authorship contribution statement

I confirm sole responsibility for the study conception and design, data collection, analysis and interpretation of results, and manuscript preparation. I wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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