

# Green Teaching, Growing Confidence: Effects of Interdisciplinary Teaching Initiatives on HBCU Teacher Candidates' Self-Efficacy

*Cheron H. Davis*  
*Florida A&M University*

## Abstract

This study examined the impact of an environmental education (EE) initiative on the self-efficacy of preservice teachers from Historically Black Colleges and Universities (HBCUs), specifically within a reading methods course. Partnering with Project Learning Tree (PLT), university faculty provided these preservice teachers (PSTs) with EE training, involving them in literacy-based outdoor learning activities that promoted investigative inquiry. Employing a mixed-methods approach, the study assessed the effect of EE participation on PSTs' interdisciplinary teaching self-efficacy. Surveys conducted before and after the PLT training indicated significant improvements in teaching efficacy for both reading and environmental education. Participants' open-ended responses highlighted enhanced teacher identity and the effectiveness of integrating EE with literacy education, suggesting that such interdisciplinary training prepares PSTs to incorporate environmental themes effectively into their future classroom curricula, fostering a holistic educational experience and promoting environmental stewardship among diverse student populations.

**Keywords:** environmental education, preservice teachers, teacher education, self-efficacy, HBCU

## A Sense of Urgency

Global industrialization and urbanization have increased human dissociation or disconnection from nature, including anthropogenic influences (Bissinger & Bogner, 2018). Anthropogenic influences are mostly environmental pollution caused by human activity or human pollutants. This disconnection from nature also includes a generally uninformed or misinformed public regarding environmental issues (Ollerer, 2015). Thus, environmental education (EE) is becoming increasingly crucial for the future health of the natural world. As the importance of EE is being recognized, environmental education must be integrated into other educational disciplines to have its most significant impact (Ollerer, 2015).

## Environmental Education and Literacy Among Preservice Teachers

Well-established research highlights the advantages of incorporating the environment as a central theme for educational purposes (Bates, 2020; Kuo et al., 2019). For instance, studies by the National Environmental Education & Training Foundation (NEETF) showed overwhelming support from parents for EE in schools (Coyle, 2005). Environmental education promotes an environmentally literate citizenry that can identify and actively solve environmental issues. Although there is no universally accepted definition of EE, founding author Roth (1992) defines it as “the ability to perceive and interpret the relative health of environmental systems and to take the appropriate measures to maintain, restore, or improve the health of those systems” (p. 2). In essence, it is essential to nurture an informed populace to understand the operations of natural

systems and human–nature interaction and act on critical environmental issues (Roth, 1992). Ferguson et al. (2021) state, “Teachers, by virtue of the roles they perform, are critical change agents in schools and beyond” (p. 1355). Teachers are a great way to educate people and to ensure that students are adequately educated; teacher education programs are a great place to develop comprehensive EE programs.

However, despite this strong endorsement, the implementation of EE in teacher preparation programs varies significantly, with many programs lacking comprehensive environmental content, which limits preservice teachers’ ability to effectively teach these topics later (Crim et al., 2017; McKeown-Ice, 2000). Studies show that when preservice teachers are adequately exposed to EE, they are more likely to incorporate it into their future teaching, suggesting that exposure to teacher training is key to fostering environmental literacy and pedagogical confidence (Ferguson et al., 2021). Research has shown that preservice teachers generally lack sufficient exposure to EE, with many programs failing to offer foundational EE knowledge (McCrae & de Bettencourt, 2000; McKeown-Ice, 2000). This gap in preparation can leave future teachers ill-equipped to teach EE effectively despite their potential willingness to incorporate environmental topics into their teaching (Bozdogan, 2011; Cassell & Nelson, 2010; Groves & Pugh, 1999; Teksoz et al., 2010; Wagler, 2010). Stanišić and Maksić (2014) further discuss the difficulties in achieving the objectives of EE when teachers are expected to impart new information in innovative ways without appropriate training. In his study, Beach (2023) identifies several challenges in teacher preparation, including coping with varying state standards, providing valid knowledge, offering transdisciplinary curricula, addressing environmental justice, adopting systems thinking, using case-study methods, and notably fostering positive attitudes and self-efficacy. This disconnect underscores the need for teacher preparation programs to provide more comprehensive training in EE to equip future teachers with the necessary skills and knowledge to address environmental challenges effectively.

The disparity between the recognized importance of EE and its actual incorporation into teacher education underscores the need for a more structured approach to embedding EE into the curricula. Studies suggest that increasing preservice teachers’ exposure to EE can significantly enhance their readiness and efficacy in teaching environmental topics, promoting a more environmentally literate future generation (Plevyak et al., 2001; Saribas, 2015). Incorporating EE into teacher education programs could increase environmental literacy among preservice teachers (Ogunyemi & Ifegbesan, 2011; Tuncer Teksoz et al., 2013). Preservice teachers (PSTs) who completed programs that included EE training demonstrated higher confidence and effectiveness when delivering EE teaching to their students than those who had not (Darling-Hammond et al., 2002). One way to evaluate PST ability is self-efficacy, an attitude measure that judges one’s perception that they can teach effectively. In this study, I utilize self-efficacy to provide insight into PSTs’ environmental literacy during a literacy-based outdoor education program.

## Rationale

To teach effectively about the environment, teachers should be knowledgeable and have experiential opportunities (Schmidt, 1996). Unfortunately, many teachers lack confidence in teaching EE because of a lack of training (Plevyak, 1997), while others lack experience teaching outdoors (Ainsworth, 1997; Ferry, 1995; Simmons, 1998). This lack of comfort and effectiveness is of great concern, particularly for elementary teachers tasked with teaching multiple content areas in self-contained classrooms (Stanišić & Maksić, 2014). Several programs, such as Project WILD and Project Learning Tree (PLT) workshops, have been implemented to mitigate the lack of preservice teacher training in EE. Furthermore, reading is a fundamental skill that students regularly use as they advance through their academic journey, typically taking shape during the early stages of elementary schooling (Cooper et al., 2014; Mancilla-Martinez, 2020). One factor

that provides this acquisition is undoubtedly preservice elementary teachers who later transition into professional classroom teachers. By taking reading methods coursework, PSTs gain competence and knowledge in the field of literacy acquisition. PSTs who think they will not be successful in teaching reading will make less effort to teach these skills (Delican & Adiyaman, 2021). Moreover, little to no literature exists to explore the affective and cognitive outcomes of this interdisciplinary training. Further, with the diverse demographic needs of classroom teachers, HBCU educator preparation programs' EE and literacy education preparation are of interest as they are also missing from the literature and are an area of great research significance.

## ***Environmental Education***

Environmental education has been referred to by various names since its inception: ecological education, conservation education, and sustainability education (Ollerer, 2015). While recognizing the distinctions among these aspects, this study will employ the term “environmental education” to encompass theoretical and practical knowledge and ethical, moral, and legal considerations pertaining to the environment. Roth (1992) considered four components of EE—knowledge, affect, skills, and environmental behavior. There is a doctrinal consensus that EE includes awareness and concern for the environment and its associated problems that require the knowledge, skills, and motivation to solve current and future environmental issues (NAAEE, 2010). UNESCO defines EE as education that builds “practical skills required in the devising and applying effective solutions to environmental problems” (UNESCO, 1978, p. 14).

Additionally, Berkowitz and colleagues (2005) include five components of environmental education:

- “Civics literacy: understanding key social, economic, cultural, and political systems using requisite critical thinking skills.
- Ecological literacy: understanding critical ecological systems using sound ecological thinking while also understanding the nature of ecological science and its interface with society.
- Values awareness: awareness of personal values with respect to the environment and ability to connect these values with knowledge and practical wisdom in order to make decisions and act.
- Self-efficacy: having the capacity to learn and act with respect to personal values and interests in the environment.
- Practical wisdom: possessing practical wisdom and skills for decision-making and acting with respect to the environment” (p. 230).

Studies have produced findings that support a positive link between the inclusion of EE projects in teacher preparation courses and subjects' confidence in teaching in this area. For example, after James Cook University implemented a university-wide curriculum program to promote environmental sustainability in its programs, PSTs were given a stronger foundation to understand and teach environmental topics (Tomas & Mills, 2011). Kennelly and colleagues (2008) also found a link between teachers' feelings toward education for sustainability (EfS) and their future ability to teach these materials. These researchers found that this change in teachers' attitudes was due, in part, to their improved knowledge of the environment (Tomas et al., 2017).

While environmental education is often encouraged in school settings, there are structural and other barriers to EE implementation in higher education. Consequently, EE is not integrated into teacher preparation programs like other subjects. EfS is not common in teacher training in higher education (Tilbury, 2004) due to implementation barriers. Cheong (2005) found that

environmental education projects that engage PSTs are often limited despite teacher educators attempting to promote EE through personal content knowledge. Research has found that teacher education programs typically do not incorporate courses, practical experience, or other types of training related to ecological or environmental subjects or teaching methods (Green et al., 2016).

Research on preservice teachers' attitudes toward EE shows varying results. In one study, preservice teachers at a New South Wales university experienced a significant improvement in their environmental attitudes after participating in an EE unit (Taylor et al., 2006). Conversely, a study at the University of New England (Kennelly et al., 2008) found no significant change in attitudes. This could be attributed to participants' pre-existing positive attitudes toward the environment. Another study (Tomas & Mills, 2011) reported that many preservice teachers already held positive attitudes toward EE. It is important to note that attitudes are dynamic and may not always predict future behavior. While positive attitudes are valuable, they may not automatically translate into implementing EE in their future classrooms. However, there is a reciprocal relationship between attitudes and engagement. Positive attitudes can lead to increased engagement with EE, which, in turn, can further enhance positive attitudes and commitment to environmental education.

### ***Literacy Education***

At its most basic level, literacy is a skill set that includes decoding and arranging letters—the ability to read and write. Frankel and colleagues (2016, p.7) expand on this concept, stating that literacy is “the process of using reading, writing, and oral language to extract, construct, integrate, and critique meaning through interaction and involvement with multimodal texts in the context of socially situated practices.” They note that literacy is comprised of five tenets:

- Literacy is a constructive, integrative, and critical process situated in social practices.
- Fluent reading is shaped by language processes and contexts.
- Literacy is strategic and disciplinary.
- Literacy entails motivation and engagement.
- Literacy is a continuously developing set of practices (Frankel et al., 2016, pp. 8, 9, 11, 12)

Literacy is a tool for understanding the written word and the world around you (Freire, 2001). It is a skill recognized for aiding understanding beyond what is written and attaching one's meaning to readings. Effective practices in literacy education allow students to interpret and synthesize information to understand and impact the world around them.

While literacy education is predominantly associated with language arts teachers, it is a collective responsibility across all educators, given its fundamental role in teaching various school subjects. This holds particularly true in higher education, especially within elementary teacher preparation, where the ability to leverage literacy as a foundation for different subjects or interdisciplinary teaching is crucial. This study emphasizes literacy as a constructive process influenced by social practices as PSTs draw on their previous knowledge and experiences during the outdoor education series.

### ***Self-Efficacy and Attitudes***

Bandura (1977) defines self-efficacy as a social cognitive concept that relates to how individuals perceive their ability to achieve goals or produce results. Bandura's theory suggests that self-efficacy is influenced and shaped by factors such as critical thinking, self-management, and mastery experiences (Gal & Gan, 2020). Teaching self-efficacy pertains to teachers' individual

beliefs regarding their capacity to perform particular teaching responsibilities. Self-efficacy has the potential to impact personal motivation. When individuals can foresee a positive course of action, they tend to be more motivated to pursue challenging objectives. In contrast, those with lower levels of self-efficacy often shy away from the idea of tackling challenges and potential risks (Locke & Latham, 2006).

In the context of teacher education and the broader theme of environmental education (EE), preservice teacher self-efficacy plays a pivotal role. Numerous studies have examined self-efficacy levels among PSTs as they progress through their teacher education programs, particularly during professional experience placements. While PSTs often start with relatively high levels of self-efficacy, their confidence in various aspects of teaching can fluctuate during these placements. This fluctuation might result from PSTs' increasing responsibilities as they transition from observers to active educators (Yüksel, 2014). Interestingly, some PSTs maintain their high self-efficacy levels throughout their placements (Knobloch, 2006), while others experience significant shifts in their self-efficacy (Thomson et al., 2019). Additionally, studies have investigated self-efficacy within specific domains of teaching, such as classroom management, student engagement, and instructional strategies. These subdomains often exhibit distinct patterns of change among PSTs (Pfitzner-Eden, 2016; Sciuchetti & Yssel, 2019). It is essential to grasp the intricate shifts in PSTs' self-efficacy to create more effective teacher education programs. This study delves into these nuanced alterations, particularly within specific subdomains, such as integrating literacy and environmental education. Furthermore, it addresses a distinctive group—PSTs enrolled in Historically Black Colleges and Universities (HBCUs) educator preparation programs. Through this research, I aim to contribute to the field, shedding light on this population's unique experiences and needs.

### ***HBCU Preservice Teachers***

Research emphasizes the necessity for enhanced training approaches in preparing PSTs for effective environmental and stewardship education. This entails developing their awareness of environmental issues and encouraging a deeper engagement and enthusiasm for environmentalism. As Scott and Sulsberger (2019) suggest, educational institutions and programs play a pivotal role by providing PSTs with real-life experiences that promote active participation in environmental matters. However, little to no research exists that explores the unique experiences of HBCU PSTs in their environmental education training. In recent years, institutional initiatives have been made to address the recruitment of PSTs at HBCUs, but efforts focused on the retention and graduation of PSTs are limited (Young, 2018).

Data indicate that the teaching workforce in the United States predominantly consists of white female educators, highlighting a diversity gap (Young, 2018). When properly trained and supported, Black teachers have a profound impact on the educational outcomes of Black students. Studies, such as those by Dee (2004), show that Black teachers can facilitate higher academic achievement in Black students compared to their counterparts from other groups. It is paramount for school-age children to have educators who are not only culturally relatable but also skilled in culturally conscious teaching. However, professional education programs are facing a decline in enrollment, as many students at HBCUs are choosing STEM fields with aspirations for careers outside the realm of academia. This shift poses significant challenges in recruitment, development, mentorship, and retention at the graduate level in these programs (Davis, 2017). Additionally, the specific nature of environmental education curricula, which varies depending on the community it serves, highlights the need for diverse educators. These educators can bring unique perspectives to the curriculum, making it more relevant and effective for the diverse populations they serve. This situation underscores the critical need to engage preservice teachers

from HBCUs in meaningful and authentic ways, preparing them to meet the diverse educational needs of a new generation of students.

## **Purpose**

The study aimed to evaluate the effect of outdoor literacy-based environmental education training in a teacher education preparation program on HBCU preservice teachers' self-efficacy and outcome expectancy for EE and literacy teaching in their future classrooms. I describe the methodology, treatment, participants, and instrument used, as well as the data analyses and results of the study.

## **Methods**

### ***Treatment***

Project Learning Tree (PLT) is a robust national environmental education program sponsored by the Sustainable Forestry Initiative, a nonprofit international organization. This program equips educators across all 50 states with comprehensive curriculum resources and professional development specifically designed for teaching students from early childhood through high school. PLT ensures its materials maintain rigorous educational standards by adhering to the North American Association for Environmental Education Guidelines for Excellence in Environmental Education (NAAEE, 2010).

In this study, the teacher education program at the HBCU incorporated PLT training to offer PSTs a blend of online and face-to-face professional development opportunities. This training prepared them to design, plan, and implement literacy-embedded EE lessons creatively. These lessons, which utilize literature in outdoor settings, allowed PSTs to apply their theoretical knowledge in practical, hands-on teaching scenarios. This training was a critical component of their coursework within a reading methods course, requiring them to deliver these innovative lessons in real classroom settings at a university-affiliated developmental research school's Pre-K and elementary programs. The primary goal of incorporating PLT into the teacher education curriculum was to equip these PSTs with essential skills and experiences. The goal was to equip them to effectively integrate EE into their future literacy teaching practices, enhancing their instructional strategies and ultimately enriching their students' learning outcomes.

### ***Participants***

The study focused on PSTs enrolled in a foundational reading methods course during the fall of 2022 and spring of 2023. Data collection occurred at the start and end of each semester, following the completion of PLT training and the implementation of literacy-based environmental education lessons by the PSTs. The decision to involve PSTs from Historically Black Colleges and Universities (HBCUs) was driven by several objectives: to better understand their knowledge of environmental education, assess their willingness to incorporate literacy and science into their teaching, and contribute to diversifying the existing body of literature on Black teachers' self-efficacy in teaching STEM-related topics using literature as a basis. PSTs were invited to participate in online surveys conducted at the beginning and end of each semester. A total of 11 participants completed both the pre-and post-training surveys in the fall, and 14 completed both in the spring.

### ***Instrument***

The survey utilized in this research was a questionnaire developed by the researchers. This instrument encompassed various questions covering participant demographics and self-efficacy in

environmental education (EE) teaching. Specifically, the questions were aligned with the *Guidelines for Excellence in Environmental Education*, which emphasize the significance of Environmental Literacy (EL) in enabling EE professionals to fulfill their roles effectively (NAAEE, 2009). Beyond assessing their EL knowledge, the survey instrument was modified to evaluate participants' familiarity with text-based literacy instruction, including vocabulary, fluency, and comprehension, often referred to as the *science of reading* (Goodwin & Jiménez, 2020). Participants utilized a Likert scale to assess their self-efficacy in delivering lessons integrating environmental concepts while teaching reading using children's picture books. Moreover, the survey incorporated open-ended questions to mitigate the likelihood of random responses and delve into participants' environmental and literacy knowledge from a qualitative standpoint.

## **Data Analyses**

This study utilized a mixed-methods research design based on the principles outlined by Creswell and Plano (2011). This approach allowed me to delve deeper, capturing quantitative data and the richness of personal experiences and perspectives (Creswell & Plano, 2011). The data from the pre- and post-training survey Likert-style questions were analyzed using SPSS. Inferential statistics in the form of *t*-tests were run to compare mean scores before and after the training. This method allowed me to measure the degree of change in participants' responses, or self-efficacy, through a series of nine targeted questions encompassing various facets of EE and literacy teaching methods, from comfort in implementation to the likelihood of incorporating said instructional methods in future classrooms. The questions used to guide the quantitative analyses are as follows:

1. How comfortable do you feel using environmental education activities from PLT with youth?
2. How comfortable do you feel implementing reading lessons with K-5 students?
3. How comfortable do you feel blending environmental education activities with reading lessons?
4. How successful do you think you will be teaching reading skills to elementary students through environmental education lessons in the future?
5. How easily can environmental education be built into a reading lesson?
6. How competent do you feel in using environmental education activities with students?
7. How comfortable do you feel taking K-5 students outdoors to learn?
8. How motivated do you think youth are to learn about nature?
9. How likely will you use PLT (environmental education) in your future classroom?

I analyzed qualitative data, consisting of written lesson reflections and responses from open-ended surveys, using a general inductive approach outlined by Bryman and Burgess (1994). This method facilitated the extraction of meaningful insights from the data, particularly focusing on how the training received by PSTs over the semester influenced their interdisciplinary self-efficacy. The analysis of survey responses involved concept mapping, which was based on how PSTs described their training experiences, teaching expectations, and outcomes within the reading methods course and PLT training. This approach also followed Creswell and Plano's (2011) guidelines, which describe a procedure for identifying dominant themes directly from raw data, allowing research findings to emerge naturally.

## Quantitative Results

### **Fall 2022**

In Fall 2022, participants markedly increased their mean scores from the pre-test to the post-test across questions 1–8 (see Table 1). These questions explored various aspects of comfort and competence in using EE and literature in elementary classrooms with students. Notably, the most significant improvement was seen in Q7, which pertained to comfort in taking students outdoors for learning. However, Q9, which assessed the likelihood of using PLT in future teaching, showed no significant change, maintaining a neutral position.

The statistical analysis revealed that all  $p$ -values for questions 1 to 8 were less than 0.001, indicating a significant difference in pre- and post-training scores. This suggests that the PLT training had a substantial positive effect on the participant's perception of comfort and competence in utilizing and teaching EE and literacy in their classrooms.

### **Spring 2023**

In Spring 2023, a similar trend was observed. The post-training responses showed an increase in mean scores across the same set of questions (Q1–Q8), indicating a continued improvement in comfort and competence in aspects of environmental education (see Table 2). Like the fall cohort, the most notable increase was in Q7, while Q9 remained neutral post-training.

Again, the  $p$ -values for Q1 to Q8 were less than 0.001, demonstrating a statistically significant difference between pre- and post-test scores and affirming the positive perceived impact of the PLT training.

Despite significant improvements in comfort and competence across most parameters measured in the pre- and post-training evaluations (Q1–Q8), it is noteworthy that Q9, assessing the likelihood of incorporating PLT and EE in future teaching, showed no change in mean differences in both the fall 2022 and spring 2023 cohorts. This consistent neutrality suggests that while the training positively impacts specific teaching competencies, it does not necessarily influence the PSTs' intentions to use these methods in their future classrooms.

The lack of change in Q9 could be attributed to several factors. One possibility is the PSTs' relative inexperience and uncertainty about their future teaching environments. They might perceive that whether or not they will use PLT or include EE in their curriculum depends more on future school policies or curricular requirements than on their personal preference or training. Additionally, the PSTs may not fully recognize the potential for integrating PLT into their future teaching practices, considering that this reading course is only the initial course in a sequence of four. They also lack substantial field clinical experience, which could further hinder their ability to see the practical application of PLT in classroom settings.

This surprising result warrants further investigation to understand the underlying reasons and explore how the training program might be adjusted to enhance its influence on future teaching behavior.



**Table 1. Paired Samples Test—Fall 2022**

	Paired Differences						Significance		
	<i>M</i>	<i>SD</i>	<i>SEM</i>	95% CI		<i>t</i>	<i>df</i>	One-	Two-
				<i>LL</i>	<i>UL</i>			Sided <i>p</i>	Sided <i>p</i>
Pair 1 time tested - Q51_1	2.125	.957	.239	-2.635	-1.615	-8.878	15	<.001	<.001
Pair 2 time tested - Q51_2	2.187	1.167	.292	-2.809	-1.566	-7.496	15	<.001	<.001
Pair 3 time tested - Q51_3	2.125	1.088	.272	-2.705	-1.545	-7.814	15	<.001	<.001
Pair 4 time tested - Q51_4	2.312	1.195	.299	-2.950	-1.675	-7.737	15	<.001	<.001
Pair 5 time tested - Q51_5	2.062	1.124	.281	-2.661	-1.464	-7.342	15	<.001	<.001
Pair 6 time tested - Q51_6	2.187	1.109	.277	-2.778	-1.597	-7.892	15	<.001	<.001
Pair 7 time tested - Q51_7	2.812	1.167	.292	-3.434	-2.191	-9.638	15	<.001	<.001
Pair 8 time tested - Q51_8	2.375	1.310	.328	-3.073	-1.677	-7.251	15	<.001	<.001
Pair 9 time tested - Q53	.000	1.211	.303	-.645	.645	.000	15	.500	1.000

**Table 2. Paired Samples Test—Spring 2023**

	Paired Differences						Significance			
	<i>M</i>	<i>SD</i>	<i>SEM</i>	95% <i>CI</i>		<i>t</i>	<i>df</i>	One-Sided	Two-Sided	
				<i>LL</i>	<i>UL</i>			<i>p</i>	<i>p</i>	
Pair 1	time tested - Q51_1	2.500	.860	.169	-2.847	-2.153	-14.819	25	<.001	<.001
Pair 2	time tested - Q51_2	2.769	.652	.128	-3.032	-2.506	-21.669	25	<.001	<.001
Pair 3	time tested - Q51_3	2.462	.905	.177	-2.827	-2.096	-13.874	25	<.001	<.001
Pair 4	time tested - Q51_4	2.577	.857	.168	-2.923	-2.231	-15.339	25	<.001	<.001
Pair 5	time tested - Q51_5	2.154	.967	.190	-2.544	-1.763	-11.355	25	<.001	<.001
Pair 6	time tested - Q51_6	2.308	.838	.164	-2.646	-1.969	-14.049	25	<.001	<.001
Pair 7	time tested - Q51_7	2.923	.744	.146	-3.224	-2.622	-20.028	25	<.001	<.001
Pair 8	time tested - Q51_8	2.692	1.087	.213	-3.131	-2.253	-12.630	25	<.001	<.001
Pair 9	time tested - Q53	.000	.894	.175	-.361	.361	.000	25	.500	1.000

## Qualitative Results

Interesting patterns emerged when analyzing the qualitative responses provided by PSTs both before and after undergoing EE training in the reading methods course.

### ***Theme 1: Desire to Integrate Environmental Education***

**Pre-Training:** Participants initially expressed a strong desire to incorporate EE into their teaching practices. One participant noted, “I hope to learn more about the science of reading so I can help my students who are dyslexic. I want to use reading methods to teach environmental education effectively.” This statement highlights the participants’ aspirations to blend reading skills with environmental awareness to enhance the educational experience for students with specific learning needs.

**Post-Training:** Participants reflected on their enhanced ability to integrate EE into their curriculum after the training. The hands-on experience provided by PLT was particularly transformative. One preservice teacher described, “I loved that it was hands-on, and we got to see, feel, and experience how it would work for our students. Making learning meaningful and fun is one of my goals as a future educator, and PLT definitely contributes to that.”

### ***Theme 2: Development of Practical Pedagogical Skills***

**Pre-Training:** Before the training, there was a clear focus on acquiring practical pedagogical literacy knowledge. Participants were keen on developing effective lesson plans that could integrate environmental concepts. “I hope that we will learn techniques and gain knowledge about EE. Also, we need materials and lesson plans to implement the activities,” shared a participant, highlighting the need for tangible resources and strategies.

**Post-Training:** The post-training responses illustrated a significant growth in participants’ perception of their pedagogical skills and resource acquisition. They expressed gratitude for the practical tools and resources they had acquired, which they found immediately applicable in their teaching contexts. “The training provided me with the tools to teach science and reading in a fun way so that kids are always eager to learn,” remarked one participant, reflecting the sentiment of many others about the value of the resources and training they received.

### ***Theme 3: Enhancement of Student Engagement***

**Pre-Training:** Initially, participants shared a goal to better engage students, especially those who struggle with reading. This was seen as a pivotal component of their professional development. Participants stated that they hoped to learn “how to teach my students to read” and “how to keep students’ interest and attention.” PSTs displayed a keen goal of ensuring their instruction was engaging and impactful.

**Post-Training:** Following the training, participants reported a noticeable improvement in the perception of their abilities to engage students. The experiential learning components of the training were particularly impactful. “Seeing that lightbulb was amazing. A lot of the times, we were connecting things they vaguely knew about to more specific and direct instruction, and they enjoyed it,” explained a participant. Said another,

I believe having access to the resources is all we need. Being able to have the books and lesson plans at my fingertips empowered and encouraged me to USE them. Additionally, having an environment where other preservice teachers around me are doing the same thing. I think PLT being pushed from the top down and showing the teachers and the school that this [PLT/literacy education]

MATTERS is what will help us be able to continue using these activities in our future classrooms.

This reflects a broader understanding of how environmental education can be made engaging and meaningful through direct, experiential learning.

## Discussion

This study possesses several notable strengths. It contributes to a well-established body of research on environmental education and self-efficacy that suggests that most teachers do not experience self-efficacy when it comes to teaching EE (Moroye, 2009; Tilbury, 1994, 1997) while offering valuable insights that are relevant to HBCU teacher education programs across various contexts and disciplines. Moreover, the findings are generalizable, thanks to the availability of PLT resources for broader application.

However, it is crucial to acknowledge the study's limitations. The relatively small sample size, comprising participants from a single HBCU, may limit the generalizability of the findings to a broader population. The study's results warrant replication to ensure validity and reliability. Additionally, the survey-based nature of the study may introduce response bias, as participants might provide socially desirable answers. Moreover, the use of surveys over interviews to obtain rich qualitative data can pose limitations in capturing the depth of participants' experiences and emotions. Surveys often restrict responses, which might not fully encompass the range of individual perspectives, whereas interviews allow for more detailed, nuanced exchanges. Additionally, surveys lack the interactive element of interviews, which can prompt respondents to reflect deeper and clarify their thoughts, leading to more comprehensive insights. The absence of a control group also restricts the ability to definitively attribute changes in perceptions to the PLT training.

Despite these limitations, the qualitative reflections shared by the participants resonate deeply with the transformative potential of the EE training program. They illuminate how this program significantly alters PSTs' perspectives, enriches their knowledge base, and refines their instructional approaches. These themes highlight the program's success in meeting its goals, especially among HBCU preservice teachers involved in environmental education and literacy advocacy. They also emphasize the importance of further professional development initiatives to enhance educators' preparedness and perspectives, offering promising EE and literacy instruction possibilities.

## Conclusion

In conclusion, this study leverages well-established research emphasizing the importance of incorporating EE as a central theme in educational strategies, as it fosters an environmentally literate citizenry equipped to address critical ecological challenges (Bates, 2020; Kuo et al., 2019; Roth, 1992). This research highlights literacy's essential role across all content areas by integrating EE within literacy education rather than isolating it within the sciences or mathematics. Literacy transcends mere reading and writing; it is a critical tool for interpreting and engaging with the world, making it an ideal medium through which complex environmental concepts can be communicated and understood. This approach enhances PSTs' efficacy in teaching reading skills. It prepares them to integrate environmental themes across the curricula they will teach, thus promoting a holistic educational experience that mirrors the interconnected nature of our world.

The interdisciplinary focus of this project addresses a significant gap in current teacher education programs, which often compartmentalize EE away from core content areas like literacy. Ultimately, this study aims to enrich PSTs' instructional competencies and empower them to

cultivate an informed, proactive citizenry capable of thoughtful environmental stewardship. By embedding EE within literacy education, the project not only educates future teachers about the environment but also equips them with the pedagogical skills necessary to integrate these critical issues across all areas of learning, thereby maximizing the impact on student awareness and action. In doing so, it contributes significantly to the broader field of education, underlining the critical role of teachers in shaping a sustainable future.

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Corresponding Author: Cheron H. Davis

Author Contact Information: [cheron.davis@famuedu](mailto:cheron.davis@famuedu)

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