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Professional Development Needs Assessment for Environmental Educators

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PROFESSIONAL DEVELOPMENT NEEDS ASSESSMENT FOR ENVIRONMENTAL EDUCATORS

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ABSTRACT

To assess the training needs of environmental educators, a survey was designed and distributed to members of environmental education organizations. This survey included a list of 28 professional competencies representing five overarching areas that was compiled with a team of professionals and practitioners and informed by the North American Association for Environmental Education's (NAAEE) Guidelines for Excellence (2019). Respondents to the survey were asked to rate each professional competency in terms of 1.) how important they think it is, and 2.) how well prepared they feel to perform it in their current position as an environmental educator. These two scores were used to create a Mean Weighted Discrepancy Score which measured the "gap" between importance and preparedness to perform. Competency items and areas with larger Mean Weighted Discrepancy Scores indicate a greater need for more high-quality training. Our results showed that environmental educators have the greatest need for increased and enhanced training in the areas of Diversity, Equity, and Inclusion (DEI) and communicating about complex and controversial issues. We also found that environmental educators have different training needs based on their age and their level of experience. This information can be used by environmental education organizations and providers to prioritize professional development that will benefit their employees the most.

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CHAPTER ONE

INTRODUCTION

Environmental education (EE) aims to provide the public with the knowledge and skills necessary to solve pressing environmental issues within their communities and around the globe (UNESCO, 1975; UNESCO, 1977; NAAEE, 2014). To build this toolset in a diverse public, environmental educators need to master a range of knowledge, skills, and abilities (KSAs), or professional competencies (Roth, 1992). These professional competencies are often taught through trainings, or professional development, that involve learning activities and exercises meant to improve environmental educators' ability to do their jobs effectively. Despite the existence of best practices for EE professional development (NAAEE, 2019), we know little about specific professional competencies in which educators have the greatest need. Therefore, this research is focused on identifying professional competencies that educators feel are important for providing high quality EE in the 21st Century, as well as their feelings of preparedness to perform them. Our results will also identify the KSAs with the largest gaps between importance and preparedness so that the field may develop targeted professional development to address these deficiencies.

Specifically, this study seeks to answer the following questions: 1.) What do environmental educators consider to be the most important professional competencies necessary for delivering high quality EE? 2.) How well-prepared do environmental educators feel they are in performing these professional competencies? 3.) Which professional competencies have the largest gaps between importance and preparedness?

And, 4.) What is the field's preferred way of receiving professional development? For our study, we distributed an online survey to members of the Association of Nature Center Administrators (ANCA), the North American Association for Environmental Education (NAAEE), the National Association for Interpretation (NAI), and state affiliate networks of EE providers. This information will be used to inform EE administrators about the KSAs to target in their professional development programs and how to provide their employees with the highest quality professional development. This will also help EE administrators to be more cost efficient with their professional development by avoiding investing in training for competencies that environmental educators already feel confident in performing, or ones that are not important.

CHAPTER TWO

LITERATURE REVIEW

Identifying the range of professional development opportunities available to environmental educators is difficult due to the wide variety of work settings and the lack of standardization in training (Harrison, Gross, & McGee, 2017). Professional development can focus on many different topics including interpersonal skills, pedagogical approaches, classroom management, program planning, student curriculum, etc. In the United States, there is not a required professional development standard for environmental educators across federal, state, local, or non-profit entities. Professional development can be delivered through many different methods from structured, formal activities to more casual, unstructured interactions (Ernst & Erickson, 2018; Darling-Hammond &McLaughlin, 2011; Evans, 2019). Informal methods of professional development include self-improvement through research or personal reflection, observing colleagues, being a part of a learning community, and mentorship (Evans, 2019; Eraut, 2007). These informal methods of professional development can take place during convenient times and they are often voluntary and on-going (Evans, 2019). Examples of formal methods of professional development include online or college-level courses, conferences, performance reviews, and certification. In some states that offer EE certification, like North Carolina, one must complete an intensive, highly structured curriculum including 200+ hours of experience (Harrison et al., 2017). Environmental educators that received a certification were found to be more confident in their teaching abilities than educators who were not certified (Harrison et al., 2017). These findings

suggest that receiving some type of highly structured and strenuous professional development can positively influence self-efficacy of environmental educators. Only 14 states in the U.S. offer EE certification, and only three of these state programs (Georgia, Colorado, and Kentucky) are NAAEE certified (NAAEE, 2020).

While there is no standardized form of professional development at this time, the goal of NAAEE's Guidelines for Excellence is to provide a set of consensus best practices that professional development can be based upon (NAAEE, 2019). These guidelines have been developed and reviewed with the input of thousands of EE professionals (NAAEE, 2020). Currently, the Guidelines for Excellence span the topics of K-12 Environmental Education, Community Engagement, Professional Development, Nonformal Programs, Early Childhood Environmental Education, and Materials for Environmental Education. Based on NAAEE's guidelines for excellence and additional literature on the need for training in Diversity, Equity, and Inclusion (e.g., Bonta, DeFalco, & Taylor-Smith, 2015), educator skills (e.g., Pianta, Hamre, & Allen, 2012), instructional methodologies (e.g., Ardoin & Bowers, 2020; NAAEE, 2019; Stern, Powell, & Hill, 2014), program planning and evaluation (e.g., Powell, Depper, & Wright, 2017), and creating online content (e.g., Pearson et. al, 2016; Ardoin, Clark, & Kelsey, 2013), the following broad training topic areas appear particularly relevant for environmental educators and are therefore covered in our study.

Diversity, Equity, and Inclusion

The field of EE in North America has been historically dominated by white, middle- and upper-class persons (Bonta, DeFalco, & Taylor-Smith, 2015). While issues of diversity, equity, and inclusion (DEI) have been discussed in the EE field for years, the 2020 Black Lives Matter movement and others have heightened the focus on creating relevant and inclusive programming. This, coupled with the fact that 57% of the United States' population will be comprised of people of color by 2060, has solidified issues of DEI in EE as a moral imperative (US Census Bureau, 2012). Despite the importance of these efforts, environmental educators have struggled with developing the skills necessary to create programs that are inclusive and attractive for diverse audiences (Schultz et al., 2019). Results from a recent training needs assessment of NPS employees found that educators felt unprepared to adequately engage diverse and underserved audiences despite the importance of these skills (Powell, Depper, & Wright 2017). Additionally, a recent Youth Outside case study found that the lack of culturally relevant environmental education programming is a top barrier to participation for underserved communities (Barreto & Rodriguez, 2017). This same study found that while NAAEE and other organizations have established best practices for DEI, it is difficult for small organizations with limited resources to master and use them consistently (Barreto & Rodriguez, 2017). Therefore, we identified a range of competencies pertaining to ways in which environmental educators can reach diverse audiences (Bonta, DeFalco, & Taylor-Smith, 2015; Hudson, 2001), create content that is culturally relevant (Simon, 2016;

Ladson-Billings, 1995), and promote an inclusive, welcoming, and equitable environment (Warren & Breunig, 2019).

Educator Skills

In this study, educator skills refer to specific ways in which environmental educators interact with their students and create a positive instructional environment and experience. The positive impacts of classroom management and responsive, emotionally supportive communication have been widely documented in formal K-12 education (Marzano, Marzano, & Pickering, 2003; Hamre & Pianta, 2005; Finn et al., 2009; Rudasill et al., 2012) and increasingly in EE (O'Hare, et al., 2020; Powell & Stern, 2013). Participant-centered teaching and the ability to talk about controversial issues are both particularly important in EE. Often, EE programs are not structured like a typical classroom lecture, and ideas like play and discovery are highly encouraged. Participant-centered teaching can facilitate experiences that build students' autonomy and follow individual interests (Estes, 2004; Lee & Hannafin, 2016). Additionally, environmental educators are often tasked with talking to students about complex issues that can sometimes be politically contentious (Brownlee, Powell, & Hallo 2013; Monroe et al., 2019). The ability to lead a program related to these issues (i.e., climate change) is at the heart of EE.

Instructional Methodologies

The instructional methodologies in this study refer to different methodologies and pedagogies that have been recommended in NAAEE's Professional Development of Environmental Educators: Guidelines for Excellence (2019) as well as research (e.g.,

Stern, Powell & Hill, 2014). Instructional methodologies determine how a program is structured and what types of activities may be included, such as investigation-focused, issue-based, experiential learning, or place-based educational approaches, which are all popular and commonly used in EE programs at parks and nature centers across the country (Woodhouse & Knapp, 2000; Jose, Patrick, & Moseley, 2017; Moseley et al., 2020; Dale, et al., 2020).

Planning and Evaluation

The NAAEE's Professional Development of Environmental Educators: Guidelines for Excellence (2019) stresses the importance of planning as a skill for EE instructors. In this study, we use the term "planning" to encompass the knowledge, skills, and abilities that are necessary to effectively develop EE programming. Organizations that provide EE programs for students must consider the applicable national, state, and/or local educational standards, which are a crucial part of the planning process (NAAEE, 2019). Another crucial aspect of planning is using evaluation to monitor performance and inform iterative programmatic improvement (Monroe, 2010). Despite the importance of evaluating EE programs, research suggests that environmental educators need additional training in the skills related to evaluation (Carleton-Hug & Hug, 2010; Powell, Depper, & Wright, 2017). These evaluation skills include informal processes such as reflection and peer-observation, as well as formal, systematic data collection and analysis skills (Powell, Depper, & Wright 2017).

Creating Online Programs and Resources

Traditionally, many EE programs consist of an in-person, nature immersion experience. However, this is not always feasible. Currently, due to the COVID-19 pandemic and social distancing restrictions, EE organizations are struggling to reach their audiences. According to a study and policy brief by the Lawrence Hall of Science (2020), many organizations are now revamping their programming to enhance accessibility by providing distance learning and online experiences. For organizations that have a specialized mission geared towards providing EE field trips for students, synchronous or asynchronous programming in the form of "virtual field trips" have replaced or complemented traditional in-person programming (e.g., Loxahatchee River Center, 2020; TN Dept. of Environment & Conservation, 2020; Young, 2020). Additionally, some organizations such as the U.S. National Park Service have also been successful at using social media platforms to reach large audiences (Garrison & Li, 2014). For this study, we focused on professional competencies that support developing high quality online EE programming.

CHAPTER THREE

METHODS

The purpose of this study is to answer the following questions: 1.) What do environmental educators consider to be the most important professional competencies necessary for delivering high quality EE? 2.) How prepared do environmental educators feel to perform these professional competencies? 3.) Which professional competencies have the largest gaps between importance and preparedness? And, 4.) What are the field's preferred ways of receiving professional development? For this training needs assessment, we adapted procedures used by Powell, Depper, and Wright (2018); Depper, Vigil, Powell, and Wright (2015-2016); Weddell, Fedorchak, and Wright (2009); and Machnik, Hammitt, Rogers, and Wright (2007). This included developing a list of professional competencies using the literature described above with iterative practitioner review and constructing an online survey that was distributed widely in the field. In addition to the professional competencies included in the survey, we also explored the range of potential methods for delivering professional development to gauge environmental educators' preferred format.

Instrument and Competency Development

The professional competencies were developed based upon the NAAEE's Professional Development of Environmental Educators: Guidelines for Excellence (2019), a recent needs assessment conducted by the NPS (Powell, Depper, & Wright, 2017), reviews of literature on environmental education and interpretation (e.g., Stern, Powell, & Hill, 2014; Brownlee, Powell, & Hallo, 2012), as well as iterative

professional/practitioner review. We first reviewed the NAAEE's Professional Development of Environmental Educators: Guidelines for Excellence (2019) to guide the formation of the bulk of our competency items. These Guidelines include six main themes: 1.) Environmental Literacy, 2.) Foundations of Environmental Education, 3.) Professional Responsibilities of the Environmental Educator, 4.) Planning and Implementing Environmental Education, 5.) Fostering Learning and Promoting Inclusivity, and 6.) Assessment and Evaluation (NAAEE, 2019). Our competency development focused solely on the final four thematic areas because our study was intended for educators who are already working in the field of environmental education, as opposed to individuals just entering the field and those who are less familiar with the subject area. During our iterative review process, which included faculty from three universities and EE practitioners from a variety of backgrounds, we refined the list of professional competencies and developed additional ones as needed. While the issues of DEI and Creating Online Programs and Resources are covered briefly in the NAAEE (2019) Guidelines, we placed more emphasis on these issues due to the current climate surrounding the 2020 Black Lives Matter Movement and the COVID-19 Pandemic, respectively. When developing additional professional competencies outside the scope of the NAAEE (2019) Guidelines' themes, we relied on recent needs assessments and a review of EE literature. We then separated the competencies into groups or "competency areas" for organizational purposes.

We used the online survey platform Qualtrics to create our survey instrument. The final survey included 5 groups of competencies: DEI (5 items), Educator Skills (5 items),

Instructional Methodologies (10 items), Planning and Evaluation (4 items), and Creating Online Programs and Resources (4 items). Survey respondents were asked to rate each competency twice. First, they rated how important they perceived the item to be in their current EE position on a 1-5 Likert-type scale (Unimportant to Extremely Important). Then they rated how well prepared they felt to perform that competency on a 1-5 Likert-type scale (Unprepared to Extremely Well-Prepared). Respondents also indicated which methods of professional development delivery they have participated in within the last three years and what modes of delivery they would prefer for future professional development. Finally, the survey contained demographic questions recording respondents' organization type and size, number of years in the EE field, current job position, race, age, and gender identity.

Data Collection Procedures

We used a purposive sampling method to reach environmental educators. Invitations containing a description of the survey, voluntary consent information, and a link to the Qualtrics survey instrument were sent to members of NAAEE and ANCA in early October 2020 via e-newsletters. Combined, NAAEE and ANCA have over 20,700 members who are a part of the environmental education field in some capacity. We also contacted NAAEE State Affiliate Organizations and requested that they post the invitation online to their members. The twelve following state affiliates distributed the invitation via e-newsletters, Facebook posts, or email invitations to its members: Connecticut, Idaho, Illinois, Indiana, Kentucky, Minnesota, North Carolina, South Carolina, Oregon, Rhode Island, Virginia, and Wisconsin. In November 2020, the

National Association for Interpretation also distributed the invitation to its members. Reminder invitations were sent out one month following the initial invitation to maximize responses. When the survey closed after three months of data collection, we received 463 total responses. Surveys that were less than 50% complete were not included in the data analyses. Three hundred and seventy-nine respondents (n= 379; 82%) completed at least 50% of the survey and were included in our analyses.

Analyses

To answer the first and second research question as to what professional competencies respondents considered the most important and which they were most prepared to perform, we computed average scores based on the numerical responses to the Likert-scale for each individual competency. We then computed a Mean Weighted Discrepancy Score (MWDS) to answer our third question by measuring how much of a gap is present between the importance and preparedness scores on an item, taking into account the average importance score from all respondents (Bullard et al., 2013; Edwards & Briers, 1999; Robinson & Garton, 2008; Powell, Depper, & Wright, 2017). The MWDS formula is as follows: [(Preparedness – Importance) * (Importance Grand Mean)]. Items with a larger MWDS (a negative number with a larger absolute value) indicate a greater need for more professional development. A smaller MWDS (a negative number with a smaller absolute value, or a positive number) will indicate that environmental educators are receiving a nearly adequate, adequate, or excess of professional development regarding that particular competency area. Using our five-point Likert scales for importance and preparedness, the range of possible MWDS is from -20

to +4. We calculated a composite index MWDS for each of the five overall competency areas: DEI, Educator Skills, Instructional Methodologies, Planning and Evaluation, and Creating Online Programs and Resources.

We also explored whether educators with different experience levels, ages, and from different organization types have different training needs using one-way analysis of variance (ANOVA) tests with Bonferroni post hoc comparisons. For competencies that had significant post hoc ANOVA results, we computed a Cohen's d value to assess the effect size. Cohen's d indicates how meaningful the difference in mean scores is between groups (Cohen, 1992; Tabachnick & Fidell, 2007; Powell, Depper, & Wright, 2017). A Cohen's d value of 0.2 represents a small meaningful difference whereas a value of 0.8 or greater represents a large meaningful difference (; Powell, Depper, & Wright, 2017).

Another way to interpret which competencies educators have the highest need for training is an Importance Performance Analysis (IPA). An IPA is a quantitative method of analyzing data that was created in 1977 for use in the marketing field (Martilla & James). Since then, it has been used widely across many fields including tourism, leisure and recreation, and education (Oh, 2001). An IPA is useful for providing a clear picture of what areas of a program need improvement (Warner, Chaudhary, & Lamm 2016). Similar to a MWDS, an IPA assesses which areas have the lowest scores in performance/preparedness, while taking into account which areas are the most important for performing a job. Importance is on the y-axis and performance/preparedness is on the x-axis. The two axes meet at the average scores for importance and performance. Figure

1 (below) explains how each result quadrant has management implications that dictate how much attention should be focused KSAs that fall into one of the quadrants.

Finally, to answer our fourth research question regarding which methods of professional development delivery educators prefer, we used descriptive statistics to identify which methods received the highest scores.

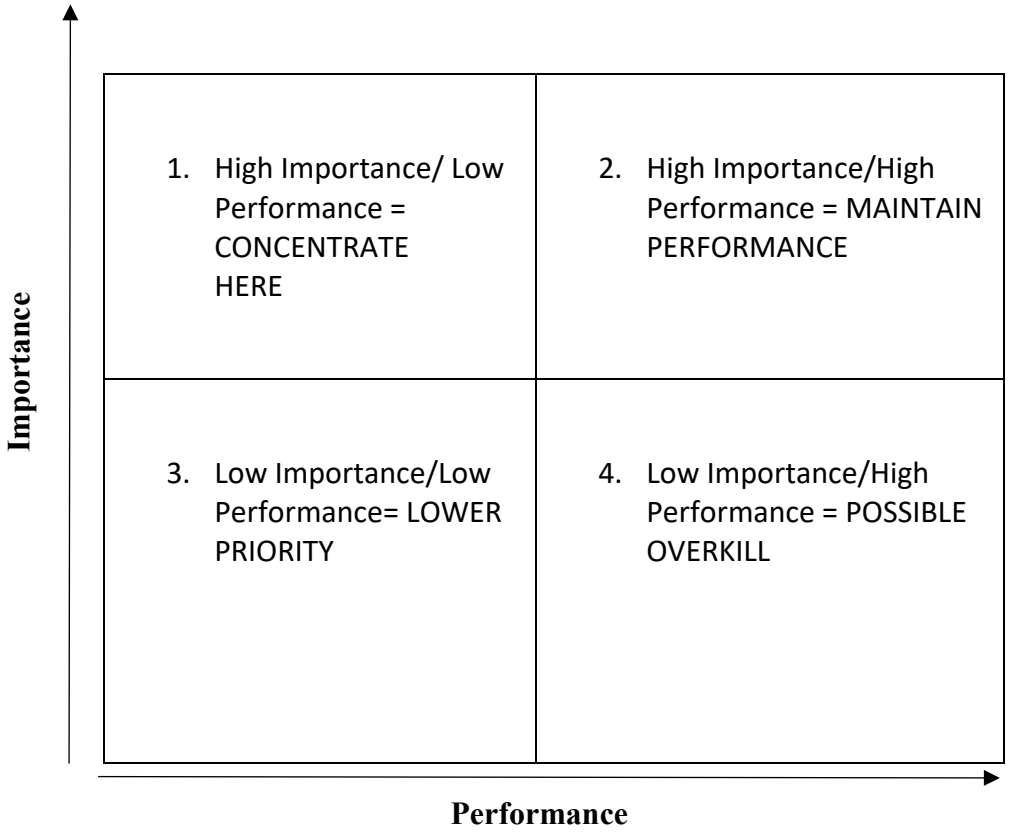

Figure 1. Possible Importance Performance Analysis Results (Martilla & James, 1977; Warner, Chaudhary, & Lamm 2016).

CHAPTER FOUR

RESULTS & DISCUSSION

Demographics of Survey Respondents

Most of our respondents indicated they teach EE programs (81%). Over half (66%) also indicated that they manage EE programs/EE employees. Many of the respondents (42.5%) were very experienced with 15 or more years in the EE field. The average age of respondents was 42 with the largest share of respondents (40.9%) in the "Millennial" Generation, ages 24-39. The overwhelming majority (95.5%) of our respondents were from the United States (Table 1). Our respondents largely self-identified as White/Caucasian (78.4%) and female (71%) (Tables 1 & 2). The next highest reported racial identity was "Mixed Race" at 3.2% (Table 2).

When given the option to "select all that apply" from a list of organization type descriptors, roughly one third of respondents indicated they worked at a non-profit organization or a nature center, respectively. The next most common responses for organization type were state park (18.2%), school (10.6%), and camp (10.3%). Some respondents (20.6%) indicated "Other" for their organization type (Table 3). Of these respondents, most indicated governmental entities such as "Fish and Wildlife Agency," "Natural Resource District", or "County Government." Most respondents (80.2%) indicated they work at a small or medium sized organization with 0-49 employees (Table 4). The majority of respondents worked at organizations that serve all age groups either "sometimes" or "often" (Table 5). Our results also indicate that most of our respondents

work at organizations that serve a diverse public including people of color, people for whom English is not their first language, and people of lower economic status (Table 6).

Table 1. Summary of Demographics (N = 379)						
Demographic	***Percentage***					
EE Position (non-exclusive)	**Teach EE**	**Manage EE**	**Volunteer in EE**	**Other**		
	81%	66%	16%	13.5%		
Experience in Years	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15+**
	7.4%	16.9%	12.1%	9.8%	9.5%	42.5%
Gender Identity	**Male**	**Female**	**Non-binary**			
	14.2%	71%	1.3%			
Country of Residence	**United States**	**Canada**	**Other**			
	95.5%	1.1%	2.1%			
Age*	**<24**	**24-39**	**40-55**	**56-74**	**>74**	
	1.1%	40.9%	27.7%	15.8%	0.8%	

** Mean age = 42.4, SD =13.1*

Table 2. Racial Identity of Respondents	
Racial/Ethnic Identity (Self-reported)	**Percentage**
White/Caucasian	78.4%
Mixed Racial/Ethnic Identity	3.2%
Black/African American	1.1%
Hispanic/Latinx	1.1%
Native American	0.5%
Asian	0.3%
Pacific Islander	0.3%
No answer	15.3%

Table 3. Which of the following describes your organization? (Select all that apply)	
Organization Type	**Percentage**
Non-profit Organization	35.6%
Nature Center	34.3%
Other	20.6%
State Park	18.2%
School	10.6%
Camp	10.3%
College	10.0%
Protected Area	8.4%
Residential Center	6.3%
Research Organization	6.3%
Cultural Site	6.1%
Museum	5.5%
Aquarium	5.3%
Garden	4.5%
Science Center	4.2%
Zoo	3.7%
Farm	3.4%
National Park	1.8%
Community Center	1.6%

Table 4. About how many people are employed by your organization?	
Number of Employees	**Percentage**
<10 employees	44.6%
10-49 employees	35.6%
50-249 employees	11.1%
>250 employees	7.0%

Table 5. How often do your EE programs serve the following age groups?				
	Never	**Rarely**	**Sometimes**	**Often**
Pre-K	9.0%	20.8%	22.4%	39.3%
Grades K-4	3.4%	6.1%	14.2%	67.8%
Grade 5	2.4%	5.5%	22.2%	61.5%
Grades 6-8	1.3%	12.4%	41.2%	36.9%
Grades 9-12	2.1%	29.8%	36.4%	23.5%
Adults	2.9%	11.9%	29.8%	47.5%

Table 6. How often do your EE programs serve people that fit the following descriptions?				
	Never	**Rarely**	**Sometimes**	**Often**
People of color	0.0%	18.7%	41.9%	35.4%
People for whom English is not their primary language	5.0%	37.7%	38.5%	12.7%
People of lower economic status	1.1%	11.3%	40.1%	40.6%

Importance of Competencies

Overall, the results indicate that EE practitioners thought all competency areas were important or very important with overall mean scores ranging from 4.08 to 4.67 out of 5 (Tables 7-11). The competency area with the highest mean importance from each item was the Diversity, Equity, and Inclusion (DEI). The means of each of the five individual DEI competencies range from 4.49 to 4.79. The competency area with the next highest mean importance score was Educator Skills (Table 8) with an average mean importance of 4.56. The means of each individual competency in this area ranged from 4.37 to 4.66. Out of the five competency areas, Planning and Evaluation (Table 10) had the middle-ranked average mean importance score (4.44). The means of the individual Planning and Evaluation competencies ranged from 4.28 to 4.63. The Instructional Methodologies competency area (Table 9) followed not far behind with an average mean importance score of 4.42 and individual competency scores ranging from 4.12 to 4.86. The Creating Online Programs and Resources competency area (Table 11) ranked last with an average mean importance of 4.08. The mean importance scores for the individual competencies in this area range from 3.98 to 4.21.

Level of Preparedness

The Educator Skills competency area (Table 8) had the highest average mean preparedness score at 3.94 out of our 5-point Likert scale, with individual competency mean preparedness scores ranging from 3.48 to 4.40. Next, Instructional Methodologies (Table 9) had a similarly high average mean preparedness score of 3.91. This area had individual competency mean preparedness scores from 3.46 up to 4.49. The Planning and Evaluation competency area (Table 10) had the middle-ranked average mean preparedness score (3.73). The DEI competency area (Table 7) had the second to lowest average mean preparedness score (3.20), with individual competency mean preparedness scores ranging from 3.00 up to 3.34. The mean preparation scores for the Creating Online Programs and Resources competency area (Table 11) had the lowest mean preparedness score of any competency area, with an average of 3.06. The mean preparation scores for the individual competencies range from 2.94 to 3.27.

Mean Weighted Discrepancy Scores for each Competency Area

The MWDS, which measures the "gap" between importance and preparation while taking into account the overall importance of that item (Powell, Depper, & Wright, 2017), was largest for the DEI competency area (-6.93) (Table 7), and smallest for the Instructional Methodologies competency area (-2.26) (Table 9).

Within the DEI competency area, the competencies with the two largest MWDS were related to attracting diverse audiences (-7.67) and engaging diverse audiences (-7.30) (Table 7). Each individual competency in the DEI area had a larger MWDS than any other individual competency from any area. For the Educator Skills area, the two

competencies with the largest MWDS pertained to talking about complex and controversial issues (-5.07) and providing emotional support to participants (-3.69) (Table 14). Within the Instructional Methodologies area, the competencies with the two largest MWDS were using community-based (-3.81) and the experiential learning cycle (-2.91) pedagogical approaches (Table 9). For the Planning and Evaluation competency area, formal (-4.51) and informal (-3.41) evaluation had the two largest MWDS (Table 10). Lastly, within the Creating Online Programs and Resources area, the competencies with the two largest MWDS were creating synchronous online programming (-4.51) and supplemental online materials (-4.27) (Table 11).

Table 7. Diversity, Equity, and Inclusion: Mean Importance, Preparation, and MWD Scores

Definition: Ways in which environmental educators can reach diverse audiences, create content that is meaningful to them, and promote an inclusive and equitable environment for them

Competencies	**Mean Importance**	**Mean Preparation**	**Mean Weighted Discrepancy Score**
Diversity, Equity, and Inclusion	4.67	3.20	-6.93
Attracting more diverse audiences to your programming	4.64	3.00	-7.67
Adapting programming to meaningfully engage diverse audience members and meet their needs	4.75	3.22	-7.30
Understanding the needs and desires of different audiences	4.79	3.33	-7.05
Using inclusive language that resonates with your audiences	4.66	3.34	-6.17
Collaborating with diverse groups to co-create programs they desire	4.49	3.10	-6.33

Table 8. Educator Skills: Mean Importance, Preparation, and MWD Scores			
Definition: Ways in which environmental educators interact with their students and create a positive instructional experience for them			
Competencies	**Mean Importance**	**Mean Preparation**	**Mean Weighted Discrepancy Score**
Educator Skills	4.56	3.94	-2.88
Classroom/Group management- encouraging participation, minimizing disruptions, and managing behaviors of the group to enable a high-quality experience	4.58	4.16	-1.96
Participant-centered teaching- enabling flexibility for participants to follow their own interests within the program and maximizing student autonomy	4.37	3.81	-2.51
Emotional support- creating an environment that enhances participants' feelings of safety, belonging, and comfort	4.60	3.81	-3.69
Public speaking- organizing program content, presenting confidently, and answering questions appropriately	4.66	4.40	-1.26
Communicating about complex and controversial issues- framing and facilitating conversation to reduce conflict and allow for effective discussion	4.57	3.48	-5.07

Table 9. Instructional Methodologies: Mean Importance, Preparation, and MWD Scores			
Definition: Different instructional methodologies and pedagogies recommended for teaching environmental education			
Competencies	**Mean Importance**	**Mean Preparation**	**Mean Weighted Discrepancy Score**
Instructional Methodologies	4.42	3.91	-2.26
Hands-on discovery- the educator facilitates direct interactions and experiences with the environment	4.86	4.49	-1.84
Inquiry- the educator uses participants' questions to guide the program	4.65	4.17	-2.25
Cooperative learning- the educator encourages participants to work together to learn or complete a task	4.40	4.09	-1.42
Problem-based education- the educator has participants seek or research solutions to a specific problem	4.22	3.70	-2.20
Investigation- the educator helps participants identify an issue, formulate research questions, collect data, analyze data, and draw valid conclusions	4.27	3.76	-2.19
Service learning- the educator facilitates a project in which participants provide a service for others/the environment	4.16	3.77	-1.62
Storytelling- the educator tells a holistic story that conveys deeper meanings to participants	4.12	3.46	-2.77
Place-based education- the educator makes the unique attributes of the place/resource a central focus of the program	4.61	4.21	-1.85
Experiential learning cycle- the educator provides a concrete experience, facilitates reflection and the use of this new knowledge in another context or experience	4.43	3.79	-2.91
Community-based education- the educator helps participants to engage in local environmental action	4.39	3.53	-3.81

Table 10. Planning and Evaluation: Mean Importance, Preparation, and MWD Scores			
Definition: The knowledge, skills, and abilities that environmental educators must put into preparing a program and assessing its effectiveness in meeting desired outcomes			
Competencies	**Mean Importance**	**Mean Preparation**	**Mean Weighted Discrepancy Score**
Planning and Evaluation	4.44	3.73	-3.10
Curriculum development- aligning content with educational standards and deciding which specific topics will be covered, and to what depth	4.38	3.89	-2.22
Program planning- deciding what activities and approaches will be used and what outcomes are to be achieved for each specific program	4.63	4.14	-2.33
Informal program evaluation- assessment about a program's effectives that uses periodic reflection, peer-observations, or other non-systematic methods and forms of data collection	4.43	3.67	-3.41
Formal program evaluation- the systematic collection and analysis of data to draw conclusions and make informed decisions about the effectiveness of your programs	4.28	3.23	-4.51

Table 11. Creating Online Programs and Resources: Mean Importance, Preparation, and MWD Scores			
Definition: Creating and maintaining educational content for your organization's online platforms			
Competencies	**Mean Importance**	**Mean Preparation**	**Mean Weighted Discrepancy Score**
Creating Online Programs and Resources	4.08	3.06	-4.17
Using social media to reach new audiences	4.21	3.27	-4.01
Creating high quality supplemental online materials for use before or after a live program	4.06	3.02	-4.27
Creating high quality synchronous (live) online programming	4.04	2.94	-4.51
Creating high quality asynchronous (pre-recorded) online programming	3.98	3.01	-3.90

Are there different training needs based upon the age of individuals (by generation)?

We grouped respondents into five different generation categories based on their reported age. Group 1, "Generation Z", included individuals who were 23 and younger (n=4; 1.1%). Group 2, the "Millennials" included individuals aged 24-39 (n=155; 40.9%). Group 3, "Generation X" included individuals aged 40-55 (n=105; 27.7%). Group 4, the "Baby Boomers", included individuals aged 56-74 (n=60; 15.8%). Finally, Group 5, the "Silent Generation" included individuals aged 75 and older (n=3; 0.8%). Because "Generation Z" and the "Silent Generation" had such small sample sizes, they were excluded from further analysis. We compared the MWDS of the "Millennials", "Generation X", and the "Baby Boomers" using an analysis of variance (ANOVA) with Bonferonni post hoc comparisons (Tables 12-17). "Millennials" had significantly larger mean MWDS than Generation X in the Educator Skills, Instructional Methodologies, and Planning and Evaluation overall competency areas. For the DEI competency area, "Millennials" had a significantly larger mean MWDS than "Baby Boomers." In the Creating Online Programs and Resources competency area, "Baby Boomers" had a significantly larger mean MWDS than both "Millennials" and "Generation X."

Table 12. ANOVA Comparison of Mean MWDS for Competency Areas by Generations							
	24-39 (2)	**40-55 (3)**	**56-74 (4)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Diversity, Equity, and Inclusion	-7.44 (3.41)	-6.58 (3.72)	-5.96 (3.20)	4.41	(314)	.013	2<4* (.45)
Educator Skills	-3.21 (3.06)	-2.06 (2.94)	-2.53 (2.71)	4.72	(311)	.010	2<3** (.38)
Instructional Methodologies	-2.74 (2.90)	-1.42 (3.19)	-1.84 (3.00)	6.20	(310)	.002	2<3** (.43)
Planning and Evaluation	-3.61 (3.92)	-2.21 (4.15)	-3.17 (3.75)	3.87	(313)	.022	2<3* (.35)
Creating Online Programs and Resources	-3.42 (4.10)	-4.01 (4.02)	-6.09 (4.33)	9.06	(314)	<.001	4<2*** (.63) 4<3* (.50)

Table 13. ANOVA Comparison of Diversity, Equity, and Inclusion MWD scores by Generations							
	24-39 (2)	**40-55 (3)**	**56-74 (4)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Attracting more diverse audiences to your programming	-8.38 (4.58)	-7.75 (4.66)	-5.74 (4.82)	6.90	(316)	.001	2<4** (.56) 3<4* (.42)
Adapting programming to meaningfully engage diverse audience members and meet their needs	-8.15 (4.11)	-6.78 (4.59)	-5.96 (4.37)	6.60	(316)	.002	2<3* (.31) 2<4** (.52)
Understanding the needs and desires of different audiences	-7.52 (4.86)	-6.56 (4.84)	-6.28 (3.83)	2.13	(314)	.121	
Using inclusive language that resonates with your audiences	-6.10 (4.79)	-6.02 (4.73)	-6.40 (3.76)	0.13	(316)	.875	
Collaborating with diverse groups to co-create programs they desire	-6.95 (5.22)	-5.80 (5.36)	-5.33 (5.43)	2.62	(316)	.074	

Table 14. ANOVA Comparison of Educator Skills MWD scores by Generations							
	24-39 (2)	**40-55 (3)**	**56-74 (4)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Classroom/Group management	-2.07 (4.15)	-1.02 (4.25)	-2.29 (4.05)	2.51	(315)	.083	
Participant-centered teaching	-2.71 (4.29)	-1.79 (3.84)	-2.30 3.75	1.76	(316)	.173	
Emotional support	-4.15 (4.59)	-2.95 (4.01)	-3.59 (4.10)	2.39	(314)	.094	
Public speaking	-1.17 (4.56)	-0.72 (3.90)	-1.66 (3.32)	0.98	(316)	.376	
Communicating about complex and controversial issues	-6.00 (4.64)	-3.90 (4.50)	-3.18 (5.25)	10.34	(314)	<.001	2<3** (.46) 2<4*** (.57)

Table 15. ANOVA Comparison of Instructional Methodologies MWD scores by Generations							
	24-39 (2)	**40-55 (3)**	**56-74 (4)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Hands-on discovery	-2.10 (3.67)	-1.07 (3.58)	-1.57 (3.66)	2.50	(317)	.084	
Inquiry	-2.76 (3.46)	-1.65 (4.53)	-1.50 (3.71)	3.58	(317)	.029	
Cooperative learning	-1.71 (4.42)	-0.73 (4.23)	-1.19 (3.99)	1.66	(315)	.191	
Problem-based education	-2.61 (4.31)	-1.66 (4.18)	-1.29 (3.78)	2.85	(317)	.060	
Investigation	-2.51 (4.56)	-1.59 (4.37)	-1.62 (4.22)	1.64	(314)	.196	
Service learning	-1.77 (4.93)	-0.61 (4.51)	-1.36 (4.43)	1.87	(314)	.156	
Storytelling	-3.32 (4.67)	-2.00 (4.65)	-2.42 (4.50)	2.68	(315)	.070	
Place-based education	-2.41 (3.84)	-0.94 (4.10)	-1.64 (4.26)	4.21	(316)	.016	2<3* (.37)
Experiential learning cycle	-3.45 (4.51)	-1.94 (4.19)	-2.25 (3.98)	4.27	(315)	.015	2<3* (.35)

Community-based education	-4.59 (4.76)	-2.39 (5.06)	-3.27 (4.43)	6.71	(316)	.001	2<3** (.45)

Table 16. ANOVA Comparison of Planning and Evaluation MWD scores by Generations

	24-39 (2)	**40-55 (3)**	**56-74 (4)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Curriculum development	-2.65 (5.17)	-0.84 (4.81)	-2.82 (4.21)	5.06	(314)	.007	2<3* (.36) 4<3* (.44)
Program planning	-2.89 (4.43)	-1.51 (4.49)	-2.59 (4.57)	3.00	(316)	.051	
Informal program evaluation	-3.85 (5.30)	-2.77 (5.42)	-3.08 (5.28)	1.37	(315)	.256	
Formal program evaluation	-5.18 (5.37)	-3.70 (6.00)	-4.21 (4.80)	2.34	(315)	.098	

Table 17. ANOVA Comparison of Creating Online Programs and Resources MWD scores by Generations

	24-39 (2)	**40-55 (3)**	**56-74 (4)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Using social media to reach new audiences	-2.82 (5.12)	-4.29 (4.86)	-6.21 (5.15)	10.05	(315)	<.001	4<2*** (.66)
Creating high quality supplemental online materials for use before or after a live program	-3.72 (5.37)	-3.82 (4.88)	-6.06 (4.97)	4.79	(316)	.009	4<2* (.45)
Creating high quality synchronous (live) online programming	-3.70 (5.19)	-4.39 (4.88)	-6.64 (5.07)	7.22	(317)	.001	4<2** (.57) 4<3* (.45)
Creating high quality asynchronous (pre-recorded) online programming	-3.44 (5.19)	-3.60 (5.31)	-5.46 (5.32)	3.37	(317)	.036	4<2* (.38)

Are there different training needs based upon the level of experience of individuals?

In the survey, respondents were asked to indicate their level of experience in the EE field. Group 1 includes individuals with 0-2 years of experience (n=28; 7.4%). Group 2 includes individuals with 3-5 years of experience (n=64; 16.9%). Group 3 includes individuals with 6-8 years of experience (n=46; 12.1%). Group 4 includes individuals with 9-11 years of experience (n=37; 9.8%). Group 5 includes individuals with 12-14 years of experience (n=36; 9.5%). Lastly, Group 6 includes individuals with 15+ years of experience (n=161; 42.5%). We compared the MWDS of all six groups using an ANOVA with Bonferroni post hoc comparisons (Tables 22-25). For the overall competency areas, the general trend was that low-level experience groups (Groups 1 and 2) had significantly larger mean MWDS than high level experience groups (Groups 5 and 6) in Educator Skills, Instructional Methodologies, and Planning and Evaluation (Tables 18-21).

Table 18. ANOVA Comparison of Mean MWDS for Competency Areas by Years of Experience										
	0-2 (1)	**3-5 (2)**	**6-8 (3)**	**9-11 (4)**	**12-14 (5)**	**15+ (6)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Diversity, Equity, and Inclusion	-7.34 (4.26)	-7.04 (3.45)	-6.57 (4.37)	-7.72 (3.54)	-6.91 (3.18)	-6.73 (3.57)	.593	(361)	.706	
Educator Skills	-4.52 (4.06)	-4.01 (3.00)	-2.77 (3.12)	-3.23 (2.85)	-2.17 (2.66)	-2.26 (2.79)	5.35	(360)	.000	1<5* (.68) 1<6** (.65) 2<6** (.60)
Instructional Methodologies	-3.65 (4.08)	-3.65 (3.59)	-2.65 (2.58)	-2.78 (2.27)	-1.74 (2.43)	-1.33 (2.79)	7.39	(352)	.000	1<6** (.66) 2<5* (.62) 2<6*** (.72)
Planning and Evaluation	-5.69 (5.27)	-4.57 (4.71)	-3.65 (3.26)	-2.58 (3.70)	-2.46 (3.06)	-2.20 (3.70)	6.08	(350)	.000	1<4* (.68) 1<5* (.75) 1<6*** (.77) 2<6** (.60)
Creating Online Programs and Resources	-3.17 (4.35)	-5.25 (5.00)	-3.56 (3.41)	-4.33 (4.14)	-2.89 (4.16)	-4.33 (4.13)	1.89	(350)	.096	

Table 19. ANOVA Comparison of Educator Skills MWDS by Years of Experience										
	0-2 (1)	**3-5 (2)**	**6-8 (3)**	**9-11 (4)**	**12-14 (5)**	**15+ (6)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Classroom/ Group management	-3.44 (5.52)	-3.25 (4.50)	-1.99 (4.17)	-1.61 (4.21)	-2.42 (3.19)	-1.15 (4.18)	3.07	(364)	.010	2<6* (.48)
Participant-centered teaching	-4.06 (4.44)	-3.81 (4.30)	-2.57 (4.38)	-3.07 (5.03)	-1.82 (3.82)	-1.73 (3.66)	3.54	(365)	.004	2<6* (.52)
Emotional support	-3.61 (5.65)	-4.75 (4.08)	-3.76 (4.47)	-4.23 (4.11)	-2.56 (5.21)	-3.40 (4.07)	1.46	(363)	.203	
Public speaking	-3.99 (6.91)	-2.18 (4.97)	-0.61 (3.88)	-1.26 (3.04)	0.38 (4.51)	-0.98 (3.25)	4.57	(365)	<.001	1<3* (.60) 1<5** (.75) 1<6** (.56) 2<5* (.54)
Communicating about complex and controversial issues	-7.51 (5.16)	-6.52 (4.37)	-4.67 (5.05)	-5.71 (4.68)	-4.44 (4.30)	-4.19 (5.00)	3.89	(363)	.002	1<6* (.65) 2<6* (.50)

Table 20. ANOVA Comparison of Instructional Methodologies MWDS by Years of Experience										
	0-2 (1)	**3-5 (2)**	**6-8 (3)**	**9-11 (4)**	**12-14 (5)**	**15+ (6)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Hands-on discovery	-4.17 (5.07)	-3.61 (4.57)	-1.40 (2.67)	-2.36 (3.36)	-0.81 (2.96)	-0.97 (3.47)	7.68	(363)	<.001	1<3* (.68) 1<5** (.81) 1<6*** (.74) 2<3* (.59) 2<5** (.73) 2<6*** (.65)
Inquiry	-2.99 (5.55)	-3.60 (4.57)	-3.10 (3.43)	-2.76 (3.19)	-1.94 (2.81)	-1.28 (3.87)	4.11	(363)	.001	2<6** (.55)
Cooperative learning	-1.26 (5.20)	-3.12 (4.81)	-1.76 (3.56)	-1.47 (4.07)	-1.26 (3.47)	-0.71 (3.98)	3.09	(361)	.010	2<6** (.55)
Problem-based education	-2.97 (5.21)	-3.68 (4.74)	-3.47 (3.40)	-2.17 (3.67)	-0.94 (4.05)	-1.41 (3.86)	4.52	(361)	.001	2<5* (.62) 2<6** (.53) 3<6* (.57)
Investigation	-3.16 (5.37)	-3.37 (5.02)	-3.51 (4.20)	-1.50 (3.79)	-2.25 (4.51)	-1.31 (4.08)	3.39	(359)	.005	2<6* (.45)
Service learning	-3.54 (-2.68)	-2.68 (5.17)	-1.57 (4.96)	-2.36 (3.74)	-1.16 (4.83)	-0.79 (4.37)	2.74	(359)	.019	
Storytelling	-3.97 (5.88)	-3.32 (5.21)	-3.20 (4.88)	-3.34 (3.61)	-3.65 (3.28)	-1.86 (4.43)	2.22	(359)	.052	
Place-based education	-4.12 (5.93)	-3.12 (4.63)	-1.64 (3.70)	-3.11 (3.77)	-1.28 (3.59)	-0.81 (3.46)	6.10	(361)	<.001	1<6** (.68) 2<6** (.57) 4<6* (.64)
Experiential learning cycle	-4.75 (5.64)	-4.21 (4.88)	-3.54 (3.96)	-3.59 (4.53)	-1.01 (3.89)	-2.14 (3.81)	4.93	(358)	<.001	1<5** (.77) 1<6* (.54) 2<5** (.73)

										2<6* (.47)
Community-based education	-7.21 (4.96)	-5.03 (5.20)	-3.32 (5.31)	-5.22 (4.61)	-3.66 (4.87)	-2.53 (4.31)	6.69	(361)	<.001	1<3* (.76) 1<5* (.72) 1<6*** (1.01) 2<6** (.52) 4<6* (.60)

Table 21. ANOVA Comparison of Planning and Evaluation MWDS by Years of Experience										
	0-2 (1)	**3-5 (2)**	**6-8 (3)**	**9-11 (4)**	**12-14 (5)**	**15+ (6)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Curriculum development	-5.56 (6.62)	-4.01 (6.10)	-3.26 (4.49)	-0.61 (3.80)	-1.03 (3.90)	-1.31 (4.73)	6.45	(352)	<.001	1<4** (.92) 1<5** (.83) 1<6** (.74) 2<4* (.67) 2<6** (.55)
Program planning	-5.32 (5.25)	-3.77 (5.05)	-2.48 (4.09)	-2.57 (4.75)	-2.12 (3.04)	-1.20 (4.13)	5.93	(353)	<.001	1<6*** (.87) 2<6** (.56)
Informal program evaluation	-5.58 (6.09)	-4.81 (6.01)	-3.61 (4.35)	-3.20 (5.66)	-3.04 (3.99)	-2.58 (5.05)	2.63	(352)	.024	
Formal program evaluation	-6.18 (6.09)	-5.73 (6.34)	-5.28 (5.27)	-3.92 (5.55)	-3.91 (4.45)	-3.80 (5.28)	1.93	(352)	.090	

Are there different training needs based upon organization type or size?

We categorized the 19 organization types into four master groups. These groups were developed based on the similarity of organization type and the crossover between

respondents who chose more than one organization type (i.e, school and college, nature center and non-profit organization). Group 1 included the organization types: aquarium, garden, zoo, farm, and museum (n=27). Group 2 included camps, colleges, community centers, cultural sites, schools, and residential centers (n=64). Group 3 included national parks, state parks, protected areas, and "other" (n=116). Lastly, Group 4 included nature centers, non-profits, research organizations, and science centers (n=164). There were no significant differences in the MWDS between these groups. We also investigated if there was a significant difference in MWDSs between organization sizes. Group 1 represented small organizations with <10 employees (n= 169), Group 2 represented medium-sized organizations with 10-49 employees (n=135), Group 3 represented large organizations with 50-249 employees (n= 41), and Group 4 represented very large organizations with <250 employees (n=26). There were no significant differences in the MWDS between these groups.

Importance Performance Analysis

The results of our IPA showed that six competency items fell within the "Concentrate Here" quadrant. This included all five items from the DEI competency area, as well as *communicating about complex and controversial issues* from the Educator Skills area. All competency items from the Creating Online Programs and Resources area fell within the "Lower Priority" quadrant. The competency items *storytelling* and *community-based education* were also in the "lower priority" quadrant. The remaining Instructional Methodologies competencies were split between the "Maintain Performance" and "Possible Overkill" quadrants. Three of the five Educator Skills

competencies were in the "Maintain Performance" quadrant, with *participant-centered teaching* falling into the "Possible Overkill" quadrant. The Planning and Evaluation competency area items were spread out, with *curriculum development* and *informal program evaluation* in the "Possible Overkill" quadrant, *program planning* in the "Maintain Performance" quadrant, and *formal program evaluation* in the "Lower Priority" quadrant (Figure 2) (Table 22).

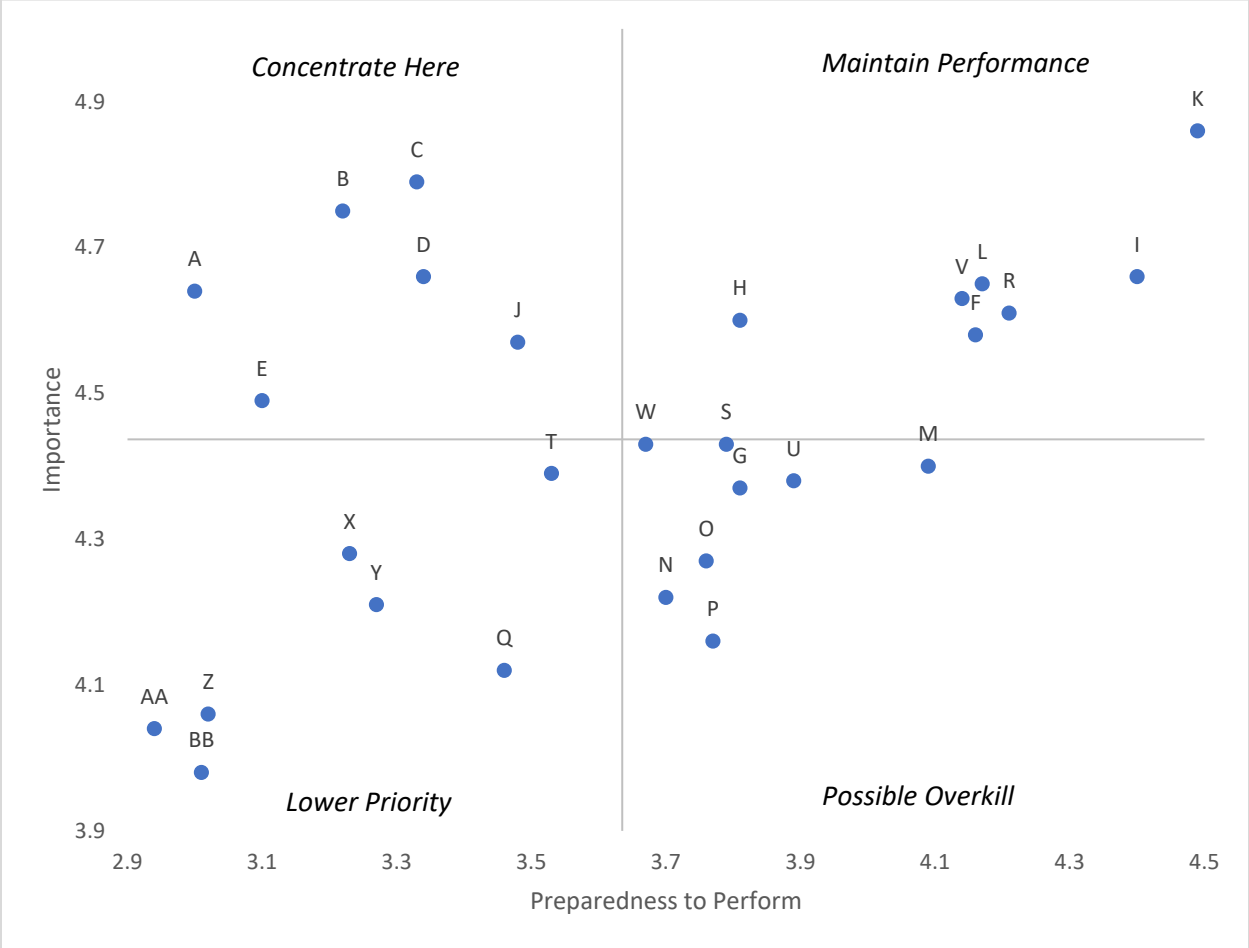

Figure 2. Importance Performance Analysis of Professional Competencies

Table 22. Professional Competency Item Key for IPA	
A	*Attracting more diverse audiences to your programming*
B	*Adapting programming to meaningfully engage diverse audience members and meet their needs*
C	*Understanding the needs and desires of different audiences*
D	*Using inclusive language that resonates with your audiences*
E	*Collaborating with diverse groups to co-create programs they desire*
F	*Classroom/Group management*
G	*Participant-centered teaching*
H	*Emotional support*
I	*Public speaking*
J	*Communicating about complex and controversial issues*
K	*Hands-on discovery*
L	*Inquiry*
M	*Cooperative learning*
N	*Problem-based education*
O	*Investigation*
P	*Service learning*
Q	*Storytelling*
R	*Place- based education*
S	*Experiential learning cycle*
T	*Community-based education*
U	*Curriculum development*
V	*Program planning*
W	*Informal program evaluation*
X	*Formal program evaluation*
Y	*Using social media to reach new audiences*
Z	*Creating high quality supplemental online materials for use before or after a live program*
AA	*Creating high quality synchronous (live) online programming*
BB	*Creating high quality asynchronous (pre-recorded) online programming*

What methods of delivery do educators prefer for future professional development?

When asked to indicate which forms of professional development respondents had participated in within the last three years, the most popular options were self-improvement (85%), conferences (83.4%), and personal reflection (72.6%) (Table 23). However, when given the option to select which methods of professional development they would prefer in the future, in-person training was the most popular (74.7%),

followed by online courses (72.6%), and participation in a professional learning community (58.8%). The least popular methods for future delivery were college level courses (18.7%) and performance reviews from a superior (13.2%) (Table 24).

Table 23. Form of Professional Development Participated in Within the Last Three Years

Method of Delivery	**Percentage**
Self-improvement (for example, reading articles, watching YouTube videos)	85.0%
Conferences	83.4%
Personal reflection on my own performance	72.6%
Online courses	69.9%
Workshops for curriculum certification (for example, Project Learning Tree, Project WILD, Project WET)	59.6%
Performance reviews from boss (or other superior)	58.0%
Observing colleagues	50.7%
Participation in a professional learning community	49.6%
Mentoring	27.4%
College-level courses	26.1%
Receiving peer review from colleagues	23.5%

Table 24. Preferred Methods for Delivery of Future Professional Development

Method of Delivery	**Percentage**
In-person training exercises/workshops	74.7%
Online courses	72.6%
Participation in a professional learning community	58.8%
Conferences	55.4%
Workshops for curriculum certification (for example, Project Learning Tree, Project WILD, Project WET)	43.0%
Self-improvement (for example, reading articles, watching YouTube videos)	39.1%
Mentoring	29.8%
Observing colleagues	29.8%
State certification	28.8%
Receiving peer review from colleagues	22.4%
Personal reflection on my own performance	20.8%
College-level courses	18.7%
Performance reviews from boss (or other superior)	13.2%

Table 25. Competencies with the Ten Highest MWD Scores	
Competencies	**Mean Weighted Discrepancy Score**
Attracting more diverse audiences to your programming	-7.67
Adapting programming to meaningfully engage diverse audience members and meet their needs	-7.30
Understanding the needs and desires of different audiences	-7.05
Collaborating with diverse groups to co-create programs they desire	-6.33
Using inclusive language that resonates with your audiences	-6.17
Communicating about complex and controversial issues	-5.07
Formal program evaluation	-4.51
Creating high quality synchronous (live) online programming	-4.51
Creating high quality supplemental online materials for use before or after a live program	-4.27
Using social media to reach new audiences	-4.01

Discussion

Our results identify the knowledge, skills, and abilities, (professional competencies) about which EE professionals need and desire additional professional development. Our analyses identified not only broad areas in which environmental educators need further training, but also specific skills that require attention. Furthermore, our results indicate that professional development needs are different depending upon age and experience-level. The most pressing needs for additional professional development are related to Diversity, Equity, and Inclusion (DEI) and discussing controversial issues (Figure 2). Additionally, items with some of the lowest preparedness scores, and highest

MWDS were related to Creating Online Programs and Resources and formally evaluating program efficacy (Table 25).

Irrespective of age, experience level, or organizational type, training in competencies pertaining to DEI appeared most pressing. These results echo a recent case study which found that using inclusive, culturally responsive best practices was challenging for the field, especially smaller organizations with limited resources, despite extensive efforts by NAAEE and other organizations to establish best practices for diversity and inclusion (Barreto & Rodriguez, 2017). Similarly, Roberts and Spears (2020) argue that the need for using practices that support DEI cannot be divorced from advocacy for better budgets that will enable organizations to provide their employees with the much-needed training in that area. Prioritizing and securing funding for DEI professional development appears paramount to assuring environmental educators feel well-prepared to make meaningful connections with diverse audiences. In terms of what types of DEI professional development educators desire, Barreto and Rodriguez (2017) found that educators are most interested in tailored workshops and ongoing coaching from objective experts. This mirrors our finding that workshops are the most preferred method for future professional development.

With the advent of the Covid-19 pandemic and the elimination of many face-to-face programs, it is not surprising that competencies related to Creating Online Programs and Resources had relatively high MWDS. However, what was more unexpected is that despite many organizations having to switch their programming to online formats, the competencies related to creating synchronous and asynchronous programs were rated

significantly lower in importance than other competencies in this area. It is possible the reason for this is how deeply the field of environmental education is rooted in immersive in-person experiences. While there is plenty of evidence to support the positive benefits associated with in-person and outdoor field experiences for students and others (e.g., Jose, Patrick, & Moseley, 2017; Eick, 2012; Dillon et al., 2006), adaptations must be made when these experiences are no longer an option. Environmental educators may view creating online programs as only a temporary requirement until the pandemic is over (Quay et al., 2020). However, the extended duration of the current COVID-19 pandemic, the possibility of future pandemics (Simpson, Kaufmann, Glozman, & Chakrabarti, 2020), and the issue of accessibility for students who may not be able to attend in-person programs all contribute to the importance of environmental educators' ability to create high quality online programming. Other results of note include that the use of social media had the highest importance score of any of the other competencies in this area. Additionally, "Baby Boomers" had higher training needs in this area than "Millennials," which again is not surprising because many "Millennials" (ages 24-39) have used social media since they were a very young age (Lenhart et al., 2010; Russell, 2014).

Two additional specific competencies were identified as having training needs. First, while our results showed that *communicating about complex and controversial issues* had a high MWDS and fell within the "Concentrate Here" quadrant of our IPA, younger generations and those with less experience had significantly larger MWDS than older generations and persons with more experience. A recent study by Nation and

Feldman (2021) found that educators often feel uncomfortable discussing complex and controversial issues like climate change because of their political nature. Because of this, educators may try to limit how often they discuss these issues, even if they consider them to be important (Nation & Feldman, 2021). It is possible that with more training and practice, educators may become more confident, or well-prepared, to tackle these tough issues. Further research could illuminate the reasoning for the discrepancy in MWDS of this competency between different age groups and experience levels. Lastly, the level of preparedness for *formal program evaluation* is consistently low, irrespective of age and experience level. While this competency item did not fall into the "Concentrate Here" quadrant of our IPA, it did have one of the largest MWDS out of all competencies. Because formal program evaluation is a complex skill that involves systematic data collection, analysis, and often the use of specialized software, this competency is not one that can be easily mastered by someone who does not have extensive education in this area (Keene & Blumstein, 2010).

The most evident limitation to our study was the lack of diversity among respondents. Our respondents were overwhelmingly white (78.4%) and female (71%). Additionally, very few respondents were a part of Generation Z, although many people in this generation have already entered the workforce. This lack of diversity could be attributed to the fact that our survey was distributed by professional organizations that require a membership fee. By only targeting these professional organizations, we may have created a response bias towards more experienced and less diverse educators. For future studies, this issue could be addressed by distributing the surveys through EE

providers and community organizations to enhance diversity. An additional limitation to using a survey is that our data on preparedness is self-reported and subjective. If we were able to observe these educators in the field and survey their students to see how well they achieved their desired program outcomes, we may draw different conclusions about how well-prepared educators are to perform specific competencies. Finally, our study was not able to include every professional competency that is important for environmental educators to do their jobs. Because EE takes place in a wide variety of settings, many educators need specialized skills such as handling live animals or safety protocols for adventure activities. This study attempted to focus on professional competencies that are universally important for the majority of environmental educators.

Conclusion

For our professional development needs assessment, we created a list of the knowledge, skills, and abilities, or professional competencies, that environmental educators need to master to provide high quality EE programming in the 21st century. These professional competencies spanned five broad subject areas: 1.) Diversity, Equity, and Inclusion, 2.) Educator Skills, 3.) Instructional Methodologies, 4.) Planning and Evaluation, and 5.) Creating Online Programs and Resources. We used this list of professional competencies to create an online survey instrument that we distributed to environmental education organizations and their members to gauge how important they found these competencies to be and how well-prepared they feel to perform them in their positions as environmental educators.

The results of this needs assessment will aid environmental education providers and organizations such as NAAEE, ANCA, NAI, the NPS, and others, by providing the specific professional competency areas environmental educators need professional development in the most, as well as options for how to deliver it. This needs assessment is particularly salient in 2021's political and social landscape, as it emphasized issues related to creating online environmental education content and promoting diversity, equity, and inclusion. Our results are part of an effort to continuously revise and update best practices for professional development in the environmental education field so that educators may be well-equipped to promote environmental literacy for current and future generations.

CHAPTER FIVE

MANAGEMENT RECCOMENDATIONS

While our analyses show areas in which environmental educators may need more training, it is important for managers to consider these results within the context of their own organizations. Some organizations may have a workforce that is more skilled than the general population of environmental educators in certain competency areas because they have more experience, or because they have already been receiving high quality professional development in that area. Alternatively, some organizations may struggle with a competency area that was not reflected by these results. Therefore, it is important for managers or supervisors to be in tune with the needs of their employees.

Regarding the competencies that were identified in our study as having a large gap between importance and preparedness, managers should use their best judgment to choose methods of professional development that are well-suited for each competency or competency area. As noted in the discussion, another study found that educators would prefer in-person exercises like coaching for DEI competencies (Barreto & Rodriguez, 2017), which all fell within the "Concentrate Here" quadrant of our IPA. This is a logical pairing of method(s) of professional development delivery with a competency, as DEI competencies require interpersonal communication and emotional intelligence skills. These skills can be nurtured through practice and honest feedback from others, especially experts.

For competencies related to creating online programs and using social media, in-person exercises or peer mentoring may be the most appropriate method of professional

development delivery. Since educators who are not well-prepared in this area may not feel comfortable using online resources, direct in-person coaching on how to use these applications or technology appears to be the best method of delivery rather than through an online course. Because younger generations felt more well-prepared in some of these competencies, managers could consider having their younger educators lead training exercises and direct coaching. This type of peer mentoring is an excellent way to utilize the talents of staff, while also allowing educators to gain valuable leadership experience. Similarly, since older educators and those with more experience feel more prepared to discuss complex and controversial issues, peer mentoring or observation could be an opportunity for newer educators to improve their skills.

Areas of professional development that are particularly appropriate for delivery through online courses are ones that are complex and may take a long time to master, like formal program evaluation. The KSA's necessary to perform formal program evaluation are often taught in college level courses. However, it is not practical for educators to enroll in a college program for one competency. Specialized professional development for environmental educators that is delivered through an online course can provide a similar, intensive learning experience and were rated as highly popular amongst our respondents.

The most important take-away from this study is to use these results as a guide, or a starting point for a discussion about what works best for your employees. While our findings can help shape future professional development opportunities for your team,

they can also help begin an open, honest, and continuous conversation about what staff need to grow as environmental educators.

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APPENDICES

Appendix A

Additional Tables

Table 26. Methods of Professional Development Delivery (NAAEE PD Themes 6.3 and 3.3) (NAAEE, 2019)
Workshops for curriculum certification (for example, Project Learning Tree, Project WILD, Project WET)
Online courses
Conferences
In-person training exercises/workshops
College-level courses
Mentoring
Observing colleagues
Receiving peer review from colleagues
Performance reviews from boss (or other superior)
Personal reflection on my own performance
Self-improvement (for example, reading articles, watching YouTube videos)
Participations in a professional learning community

Table 27. Diversity, Equity, and Inclusion Professional Competencies (NAAEE, 2019)	
Competency	**NAAEE PD Theme**
Attracting more diverse audiences to your programming	5.2
Adapting programming to meaningfully engage diverse audience members and meet their needs	5.2
Understanding the needs and desires of different audiences	5.2
Using inclusive language that resonates with your audiences	5.2
Collaborating with diverse groups to co-create programs they desire	5.2

Table 28. Educator Skills Professional Competencies and their Definitions (NAAEE, 2019)	
Competency	**NAAEE PD Theme**
Classroom/Group management- encouraging participation, minimizing disruptions, and managing behaviors of the group to enable a high-quality experience	5.1
Participant-centered teaching- enabling flexibility for participants to follow their own interests within the program and maximizing student autonomy	5.1, 5.3
Emotional support- creating an environment that enhances participants' feelings of safety, belonging, and comfort	5.1, 5.2
Public speaking- organizing program content, presenting confidently, and answering questions appropriately	3.1
Communicating about complex and controversial issues- framing and facilitating conversation to reduce conflict and allow for effective discussion	3.1, 3.2

Table 29. Planning and Evaluation Professional Competencies and their Definitions (NAAEE, 2019)	
Competency	**NAAEE PD Theme**
Curriculum development- aligning content with educational standards and deciding which specific topics will be covered, and to what depth	4.7
Program planning- deciding what activities and approaches will be used and what outcomes are to be achieved for each specific program	4.7
Informal program evaluation- assessment about a program's effectives that uses periodic reflection, peer-observations, or other non-systematic methods and forms of data collection	6.4
Formal program evaluation- the systematic collection and analysis of data to draw conclusions and make informed decisions about the effectiveness of your programs	6.4

Table 30. Instructional Methodologies Professional Competencies and their Definitions (NAAEE, 2019)	
Competency	**NAAEE PD Theme**
Hands-on discovery- the educator facilitates direct interactions and experiences with the environment	4.2
Inquiry- the educator uses participants' questions to guide the program	4.2
Cooperative learning- the educator encourages participants to work together to learn or complete a task	4.2
Problem-based education- the educator has participants seek or research solutions to a specific problem	4.2
Investigation- the educator helps participants identify an issues, formulate research questions, collect data, analyze data, and draw valid conclusions	4.2
Service learning- the educator facilitates a project in which participants provide a service for others/the environment	4.2
Storytelling- the educator tells a holistic story that conveys deeper meanings to participants	4.2
Place-based education- the educator makes the unique attributes of the place/resource a central focus of the program	4.2
Experiential learning cycle- the educator provides a concrete experience, facilitates reflection and the use of this new knowledge in another context or experience	4.2
Community-based education- the educator helps participants to engage in local environmental action	4.2

Table 31. Creating Online Programs and Resources Professional Competencies (NAAEE, 2019)	
Competency	**NAAEE PD Theme**
Using social media to reach new audiences	4.5
Creating high quality supplemental online materials for use before or after a live program	4.5
Creating high quality synchronous (live) online programming	4.5
Creating high quality asynchronous (pre-recorded) online programming	4.5

Table 32. ANOVA Comparison of Diversity, Equity, and Inclusion MWDS by Years of Experience										
	0-2 (1)	**3-5 (2)**	**6-8 (3)**	**9-11 (4)**	**12-14 (5)**	**15+ (6)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Attracting more diverse audiences to your programming	-8.12 (5.74)	-7.63 (4.61)	-7.57 (5.21)	-8.40 (4.35)	-7.16 (5.20)	-7.57 (4.85)	0.31	(364)	.909	
Adapting programming to meaningfully engage diverse audience members and meet their needs	-9.33 (5.85)	-7.81 (3.86)	-6.92 (5.46)	-7.83 (4.22)	-7.19 (3.71)	-6.75 (4.41)	1.94	(364)	.087	
Understanding the needs and desires of different audiences	-7.70 (5.43)	-6.64 (4.70)	-6.66 (4.89)	-7.71 (5.16)	-7.39 (4.70)	-6.97 (4.72)	0.43	(362)	.830	
Using inclusive language that resonates with your audiences	-4.66 (4.39)	-6.31 (5.00)	-5.17 (4.93)	-6.93 (4.87)	-6.26 (4.07)	-6.47 (4.68)	1.33	(364)	.253	
Collaborating with diverse groups to co-create programs they desire	-6.90 (5.39)	-6.81 (6.02)	-6.54 (6.33)	-7.40 (4.64)-	-6.54 (5.59)	-5.67 (5.20)	0.91	(363)	.477	

*p<.05 **p<.01 ***p<.001

Table 33. ANOVA Comparison of Creating Online Programs and Resources MWDS by Years of Experience										
	0-2 (1)	**3-5 (2)**	**6-8 (3)**	**9-11 (4)**	**12-14 (5)**	**15+ (6)**	**ANOVA**			**Post Hoc (cohen's d)**
Competencies	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**F**	**(df)**	**p**	
Using social media to reach new audiences	-3.43 (4.96)	-4.14 (6.37)	-3.44 (5.00)	-4.44 (3.89)	-2.42 (5.37)	-4.46 (5.18)	1.04	(351)	.393	
Creating high quality supplemental online materials for use before or after a live program	-4.06 (5.52)	-5.44 (6.15)	-3.97 (4.67)	-4.51 (5.38)	-2.99 (4.61)	-4.17 (4.93)	1.08	(353)	.371	
Creating high quality synchronous (live) online programming	-2.99 (6.20)	-5.82 (5.42)	-3.76 (4.03)	-4.71 (5.75)	-3.21 (4.75)	-4.72 (5.10)	1.90	(353)	.093	
Creating high quality asynchronous (pre-recorded) online programming	-2.21 (5.21)	-5.60 (5.49)	-3.08 (4.85)	-3.65 (6.41)	-2.93 (4.73)	-4.06 (5.22)	2.24	(353)	.050	

*p<.05 **p<.01 ***p<.001

Appendix B
Online Survey Instrument

Professional Development Needs Assessment

Start of Block: Block 10

Q1 Welcome and thank you for your interest in professional development. This study focuses on the availability and quality of professional development and training in environmental education (EE) and we are looking for a broad range of perspectives. Please fill out this survey even if you have limited professional development experience.

This study is being conducted by researchers at Clemson University and Virginia Tech in partnership with the North American Association for Environmental Education (NAAEE), the Association of Nature Center Administrators (ANCA), and the National Association for Interpretation (NAI) and is funded by the National Science Foundation (NSF). Our goal is to better understand what types of professional development environmental educators are receiving, how effective it is, and areas of greatest need so that the field may develop more effective professional development opportunities. We will also be producing a research publication to share the results. Your input is essential to this work!

The survey is intended broadly for people who teach or manage environmental education programs. This survey is not intended for funders or for professional evaluators outside of organizations that provide EE. If you are recently out of work due to COVID-19, please answer from the perspective of your most recent role and organization.

We expect the survey to take approximately 12 minutes to complete.

For the best experience, we recommend that you not take this survey on a mobile device.

Although participation is voluntary and you may quit at any time, we value your thoughts and input on this important topic and hope that you will take the time to complete this survey. Your responses will be kept confidential and there are no anticipated risks from participating.

If you have questions about this survey, or how the results will be used, you may contact Ms. Laura Banister (lbanist@clemson.edu) or Dr. Robert Powell (rbp@clemson.edu).

If you have any questions about your rights as a research participant, please contact the Clemson University Office of Research Compliance by email at irb@clemson.edu or toll-free at 866-297-3071.

End of Block: Block 10

Start of Block: Default Question Block

Q2 In what country does your organization provide EE programming?

- ○ United States (1)
- ○ Canada (2)
- ○ Mexico (3)
- ○ Other (write in) (4) _____

Display This Question:

If In what country does your organization provide EE programming? = United States

Q3 In what state (or territory) does your organization provide EE programming?

▼ AL (1) ... Other (56)

Q4
Which of the following best describes your organization?
Select all that apply.

- [ ] Aquarium (1)
- [ ] Botanical garden (2)
- [ ] Camp (3)
- [ ] College or university (4)
- [ ] Community center (5)
- [ ] Cultural or historic site (6)
- [ ] Farm (7)
- [ ] K-12 school (8)
- [ ] Museum (9)
- [ ] National park (10)
- [ ] State or local park (11)
- [ ] Other protected area (12)
- [ ] Nature center (13)
- [ ] Non-profit organization (14)

- [ ] Research organization (15)
- [ ] Residential environmental education center (16)
- [ ] Science center (17)
- [ ] Zoo (18)
- [ ] Other (write in) (19) _____

Q5 How many years have you worked in the Environmental Education profession?

- ○ 0-2 years (1)
- ○ 3-5 years (2)
- ○ 6-8 years (3)
- ○ 9-11 years (4)
- ○ 12-14 years (5)
- ○ 15+ years (6)

Q6 What are your roles within your organization?

Check all that apply

- ☐ I teach EE programs (1)
- ☐ I manage EE programming/other EE employees (2)
- ☐ I volunteer and help conduct EE programming (3)
- ☐ Other (write in) (5) _____

Q7 About how many people are employed by your organization?

If you are a part of a larger state, regional, national, or international organization, please answer questions for your local site, center, or administrative unit only.

- ○ Fewer than 10 employees (1)
- ○ 10-49 employees (2)
- ○ 50-249 employees (3)
- ○ 250 or more employees (4)

End of Block: Default Question Block

Start of Block: Block 6

Q8 ***Section 1: Types of Professional Development*** *Professional development refers to learning activities and exercises that contribute to an educator's knowledge, skills, and abilities to do their job effectively. Each item listed below is a method of delivering professional development.*

Q9 Please indicate which of the following forms of professional development (training) you have participated in within the last three years. Select all that apply.

- ☐ Workshops for curriculum certification (for example, Project Learning Tree, Project WILD, Project WET) (1)
- ☐ Online courses (2)
- ☐ Conferences (3)
- ☐ In-person training exercises/workshops (4)
- ☐ College-level courses (5)
- ☐ Mentoring (6)
- ☐ Observing colleagues (7)
- ☐ Receiving peer review from colleagues (8)
- ☐ Performance reviews from boss (or other superior) (9)
- ☐ Personal reflection on my own performance (10)
- ☐ Self-improvement (for example, reading articles, watching YouTube videos) (11)
- ☐ Participation in a professional learning community (15)
- ☒ None (12)
- ☐ Other (write in) (13) _____

☐ Other (write in) (14)

_____

End of Block: Block 6

Start of Block: Block 7

Display This Question:

If If Please indicate which of the following forms of professional development (training) you have part... q://QID29/SelectedChoicesCount Is Equal to 1

Carry Forward Selected Choices from "Please indicate which of the following forms of professional development (training) you have participated in within the last three years. Select all that apply."

Q10 Please indicate how effective each type of professional development was for you personally.

	Not effective at all (24)	Slightly effective (25)	Moderately effective (26)	Very effective (27)	Extremely effective (28)
Workshops for curriculum certification (for example, Project Learning Tree, Project WILD, Project WET) (x1)	○	○	○	○	○
Online courses (x2)	○	○	○	○	○
Conferences (x3)	○	○	○	○	○
In-person training exercises/workshops (x4)	○	○	○	○	○
College-level courses (x5)	○	○	○	○	○
Mentoring (x6)	○	○	○	○	○
Observing colleagues (x7)	○	○	○	○	○
Receiving peer review from colleagues (x8)	○	○	○	○	○
Performance reviews from boss (or other superior) (x9)	○	○	○	○	○
Personal reflection on my own performance (x10)	○	○	○	○	○

Self-improvement (for example, reading articles, watching YouTube videos) (x11)	○	○	○	○	○
Participation in a professional learning community (x15)	○	○	○	○	○
⊗ None (x12)	○	○	○	○	○
Other (write in) (x13)	○	○	○	○	○
Other (write in) (x14)	○	○	○	○	○

End of Block: Block 7

Start of Block: Block 9

Q11 For the following sections, you will be asked about different Environmental Education professional competencies. "Professional competencies" refer to the different knowledge, skills, and abilities necessary to do your job. For each item, please rate how **important** you perceive the competency to be in your current position and how well prepared you are to **perform** the competency.

End of Block: Block 9

Start of Block: Block 1

Q12 ***Section 2: Diversity, Equity, and Inclusion***
The items in this section pertain to reaching and serving audiences from a variety of social and cultural backgrounds

Q13 In the first column please indicate **how important** you feel the following professional competencies are in your current position on a 1-5 scale with 1 being Unimportant and 5 being Extremely Important. In the second column please indicate **how well prepared** you feel that you are to perform that same professional competency on a scale of 1-5 with 1 being Unprepared and 5 being Extremely Well Prepared.

	Unimportant (1) --> Extremely Important (5)					Unprepared (1) --> Extrememly Well Prepared (5)				
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)

Attracting more diverse audiences to your programming (1)	○	○	○	○	○	○	○	○	○	○
Adapting programming to meaningfully engage diverse audience members and meet their needs (2)	○	○	○	○	○	○	○	○	○	○
Understanding the needs and desires of different audiences (3)	○	○	○	○	○	○	○	○	○	○
Using inclusive language that resonates with your audiences (4)	○	○	○	○	○	○	○	○	○	○
Collaborating with diverse groups to co-create programs they desire (7)	○	○	○	○	○	○	○	○	○	○
Additional topic pertaining to Diversity, Equity, and/or Inclusion (write in) (5)	○	○	○	○	○	○	○	○	○	○

End of Block: Block 1

Start of Block: Block 12

Q14 ***Section 3: Instructional Skills***
The items in this section pertain to skills used by educators to foster positive educational outcomes.

Q15 In the first column please indicate **how important** you feel the following instructional skills are in your current position on a 1-5 scale with 1 being Unimportant and 5 being Extremely Important. In the second column please indicate **how well prepared** you feel that you are to perform that same instructional skill on a scale of 1-5 with 1 being Unprepared and 5 being Extremely Well Prepared.

	Unimportant (1) --> Extremely Important (5)					Unprepared (1) --> Extrememly Well Prepared (5)				
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)

Classroom/Group management *Encouraging participation, minimizing disruptions, and managaing behaviors of the group to enable a high quality experience* (1)	○	○	○	○	○	○	○	○	○	○
Participant-centered teaching *Enabling flexibility for participants to follow their own interests within the program and maximizing student autonomy* (2)	○	○	○	○	○	○	○	○	○	○
Emotional support *Creating an environment that enhances participants' feelings of safety, belonging, and comfort* (3)	○	○	○	○	○	○	○	○	○	○
Public speaking *Organizing program content, presenting confidently, and answering questions appropriately* (4)	○	○	○	○	○	○	○	○	○	○

Communicating about complex and controversial issues *Framing and facilitating conversation to reduce conflict and allow for effective discussion* (7)	○	○	○	○	○	○	○	○	○	○
Additional topic pertaining to Instructional Skills (write in) (5)	○	○	○	○	○	○	○	○	○	○

End of Block: Block 12

Start of Block: Block 2

Q16 ***Section 4: Programmatic Approaches***
The items in this section refer to instructional strategies used in EE programming. While there may be many ways to define these approaches, please base you answer only on the complete definition provided here.

Q17 In the first column please indicate **how important** you feel the following programmatic approaches are in your current position on a 1-5 scale with 1 being Unimportant and 5 being Extremely Important. In the second column please indicate **how well prepared** you feel that you are to perform that same programmatic approach on a scale of 1-5 with 1 being Unprepared and 5 being Extremely Well Prepared.

	Unimportant (1) --> Extremely Important (5)					Unprepared (1) --> Extremely Well Prepared (5)				
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)

Hands-on discovery *The educator facilitates direct interactions and experiences with the environment* (1)	○	○	○	○	○	○	○	○	○	○
Inquiry *The educator uses participants' questions to guide the program* (2)	○	○	○	○	○	○	○	○	○	○
Cooperative learning *The educator encourages participants to work together to learn or complete a task* (3)	○	○	○	○	○	○	○	○	○	○
Problem-based education *The educator has participants seek or research solutions to a specific problem* (4)	○	○	○	○	○	○	○	○	○	○

Investigation *The educator helps participants identify an issue, formulate research questions, collect data, analyze data, and draw valid conclusions* (5)	○	○	○	○	○	○	○	○	○	○
Service learning *The educator facilitates a project in which participants provide a service for others/the environment* (6)	○	○	○	○	○	○	○	○	○	○
Storytelling *The educator tells a holistic story that conveys deeper meanings to participants* (9)	○	○	○	○	○	○	○	○	○	○

Place-based education *The educator makes the unique attributes of the place/resource a central focus of the program* (10)	○	○	○	○	○	○	○	○	○	○
Experiential learning cycle *The educator provides a concrete experience, facilitates reflection and the use of this new knowledge in another context or experience* (11)	○	○	○	○	○	○	○	○	○	○
Community-based education *The educator helps participants to engage in local environmental action* (13)	○	○	○	○	○	○	○	○	○	○
Additional topic pertaining to Programmatic Approaches (write in) (12)	○	○	○	○	○	○	○	○	○	○

End of Block: Block 2

Start of Block: Block 3

Q18 ***Section 5: Planning and Evaluation*** *The items in this section pertain to curriculum development, program planning, and evaluating the success of programming to meet desired outcomes.*

Q19 In the first column please indicate **how important** you feel the following professional competencies are in your current position on a 1-5 scale with 1 being Unimportant and 5 being Extremely Important. In the second column please indicate **how well prepared** you feel that you are to perform that same professional competency on a scale of 1-5 with 1 being Unprepared and 5 being Extremely Well Prepared.

	Unimportant (1) --> Extremely Important (5)					Unprepared (1) --> Extremely Well Prepared (5)				
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)

Curriculum development *Aligning content with educational standards and deciding which specific topics will be covered, and to what depth* (1)	○	○	○	○	○	○	○	○	○	○
Program planning *Deciding what activities and approaches will be used and what outcomes are to be achieved for each specific program* (2)	○	○	○	○	○	○	○	○	○	○

Informal program evaluation *Assessment about a program's effectiveness that uses periodic reflection, peer-observations, or other non-systematic methods and forms of data collection* (3)	○	○	○	○	○	○	○	○	○	○
Formal program evaluation *The systematic collection and analysis of data to draw conclusions and make informed decisions about the effectiveness of your programs* (4)	○	○	○	○	○	○	○	○	○	○
Additional topic pertaining to Planning and Evaluation (write in) (5)	○	○	○	○	○	○	○	○	○	○

End of Block: Block 3

Start of Block: Block 4

Q20 ***Section 6: Creating Online Programs and Resources***
The items in this section pertain to creating and maintaining *educational content for your organization's online platforms.*

Q21 In the first column please indicate **how important** you feel the following professional competencies are in your current position on a 1-5 scale with 1 being Unimportant and 5 being Extremely Important. In the second column please indicate **how well prepared** you feel that you are to perform that same professional competency on a scale of 1-5 with 1 being Unprepared and 5 being Extremely Well Prepared.

	Unimportant (1) --> Extremely Important (5)					Unprepared (1) --> Extremely Well Prepared (5)				
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)

Using social media to reach new audiences (1)	○	○	○	○	○	○	○	○	○	○
Creating high quality supplemental online materials for use before or after a live program (2)	○	○	○	○	○	○	○	○	○	○
Creating high quality synchronous (live) online programming (3)	○	○	○	○	○	○	○	○	○	○
Creating high quality asynchronous (pre-recorded) online programming (4)	○	○	○	○	○	○	○	○	○	○
Additional topic pertaining to Creating Online Programs and Resources (write in) (5)	○	○	○	○	○	○	○	○	○	○

End of Block: Block 4

Start of Block: Block 5

Q22 ***Section 7: Gaps in Professional Development and Desires for the Future***

Q23 What topics/areas do you desire professional development in the most? (write in)

_____

_____

_____

_____

_____

Q24 For future professional development, what method(s) of delivery would you prefer?

- [ ] Workshops for curriculum certification (for example, Project Learning Tree, Project WILD, Project WET) (1)
- [ ] Online courses (2)
- [ ] State certification (3)
- [ ] Conferences (4)
- [ ] In-person training exercises/workshops (5)
- [ ] College-level courses (6)
- [ ] Mentoring (7)
- [ ] Observing colleagues (8)
- [ ] Peer review from colleagues (9)
- [ ] Performance reviews from boss (or other superior) (10)
- [ ] Personal reflection on my own performance (11)
- [ ] Self-improvement (for example, reading articles, watching YouTube videos) (12)
- [ ] Participation in a professional learning community (14)
- [ ] Other (write in) (13) _____

End of Block: Block 5

Start of Block: Block 11

Q41 To complete the survey, please answer the following questions about your organization to the best of your ability. *If you are a part of a larger state, regional, national, or international organization, please answer questions for your local site, center, or administrative unit only.*

Q25 Approximately how many people do your organization's EE programs serve annually?

- ○ <100 (4)
- ○ 100-999 (5)
- ○ 1000-4,999 (6)
- ○ 5,000-9,999 (7)
- ○ 10,000-14,999 (8)
- ○ 15,000-19,999 (9)
- ○ 20,000-99,999 (10)
- ○ 100,000+ (11)

Q26 How often do your EE programs serve the following age groups?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)
PreK (younger than 5 years old) (prek)	○	○	○	○
Grades K-4 (ages 5-10) (gradek4)	○	○	○	○
Grade 5 (ages 10-11) (grade5)	○	○	○	○
Grades 6-8 (ages 11-14) (grade68)	○	○	○	○
Grades 9-12 (ages 14-18) (grade912)	○	○	○	○
Adults (18+) (adult)	○	○	○	○

Q27 How often do your EE programs serve people that fit the following descriptions?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)
People of color (poc)	○	○	○	○
People for whom English is not their primary language (non_english)	○	○	○	○
People of lower socioeconomic status (low_ses)	○	○	○	○
Additional specific identity (write in) (add_ident)	○	○	○	○

Q42 What is your age? (write in)

_____

Q43 What is your gender identity? (write in)

_____

Q44 What is your racial identity? (write in)

_____

End of Block: Block 11

Start of Block: Block 8

Q28
Thank you for your participation in this valuable research project!

If you have questions or comments contact Laura Banister at lbanist@g.clemson.edu or Bob Powell at rbp@clemson.edu. You may also contact the Clemson
University Office of Research Compliance by email at irb@clemson.edu or toll-free at 866-297-3071 if you have questions regarding your rights as a research participant.

End of Block: Block 8

[1]

[1] The online Qualtrics survey used the terms “Instructional Skills” and “Programmatic Approaches” for the competency areas. For the report, these terms were changed to “Educator Skills” and Instructional Methodologies”, respectively, for clarity.